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Occupational status benefits of studying abroad and the role of occupational specificity – A propensity score matching approach

Stine Waibel[a,*], Knut Petzold[b], Heiko Rüger[a]

[a] Federal Institute for Population Research (BiB), Friedrich-Ebert-Allee 4, 65185 Wiesbaden, Germany
[b] Ruhr-Universität Bochum, Faculty of Social Science, Universitätsstraße 150, 44801 Bochum, Germany

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ABSTRACT

Occupational status benefits of student mobility remain uncertain, despite increasing interest in the implications of international student mobility for the reproduction of societal inequality. Since mobile young people are a selective group in terms of socio-economic and achievement-oriented factors, we apply propensity score techniques to test whether German higher education graduates who did or did not study abroad differ in occupational status (based on the Socio-Economic Index of Occupational Status) three years after graduation. Analyses are based on multi-cohort representative data of the German population (Working and Learning in a Changing World). Results confirm a positively biased effect of mobility on early career occupational status driven by compositional differences. Subgroup analyses show that even when accounting for this bias, occupational status returns to mobility are positive for those graduating in occupationally unspecific fields of study. There are no returns for those graduating in occupationally specific fields of study. Findings also suggest that the effect of studying abroad is not homogeneous across the study population. Individuals less likely to study abroad are at the same time more likely to reap the occupational benefits from this experience.

1. Introduction and research question

As international exchange schemes and fellowships have gained popularity and as the international education market rapidly grew into a 'multi-billion dollar industry' (Waters, 2006, 180) different disciplines developed a sustained interest into the characteristics, determinants, and consequences of studying abroad during higher education. Up to now, most research has been driven by the question *who* studies abroad (or who doesn't) closely related to discussions about growing horizontal education-based stratification (Lörz et al., 2016; Triventi, 2013). The group of students studying abroad is highly socially selective in terms of the economic, cultural, and social capital of the students' families (Brooks and Waters, 2010; Netz and Finger, 2016; Gerhards and Hans, 2013).

Given that the share of the population reaching secondary and postsecondary levels of education has increased substantially across the educationally expanding Western world, competitions for privileged positions in society have intensified. It is likely that horizontal characteristics of education such as international mobility become more important erecting new dimensions of social stratification and new types of social inequality (Gerber and Cheung, 2008; Reimer and Pollak, 2010, 427). In fact, the benefits of international mobility are often taken for granted. Being mobile possibly strengthens graduates' skills, resources, and competitive advantage on the job market and for this reason may be valued by individuals as well as potential employers (e.g., Opper, 1991).

Based on these observations and assumptions, it is essential to figure out whether studying abroad actually yields returns in terms

* Corresponding author.
E-mail address: stine.waibel@bib.bund.de (S. Waibel).

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of earnings and occupational status and, thereby, might increase socioeconomic inequality given its social selectivity. To this end, the past decade has seen major advances in estimating the socioeconomic consequences of studying abroad, mainly in terms of income achieved a few years after graduation (e.g., Di Pietro, 2015; Kratz and Netz, 2016; Messer and Wolter, 2007; Oosterbeek and Webbink, 2006; Sorrenti, 2017; Wiers-Jenssen, 2011). However, analyzing the returns to studying abroad has confronted researchers with several methodological challenges. Chief among them is the necessity to control for systematic selection into study abroad programs on the basis of pre-study-abroad individual and family determinants that are themselves related to future career outcomes (endogeneity bias). Therefore, statistical methods estimating the effect of mobility must account for compositional differences between mobile and immobile persons in order to tackle this paper's central question: *is there a general causal relationship between studying abroad and early career occupational success*?

Although most studies fall short of methodological rigor needed to address the stated challenge, efforts have recently been made to minimize the endogeneity bias via experiments (Petzold, 2017a,b), instrumental variable estimation (Di Pietro, 2015; Messer and Wolter, 2007; Sorrenti, 2017), propensity score matching (Euler et al., 2013), regression discontinuity designs (Oosterbeek and Webbink, 2006; Rodrigues, 2013), and effect decomposition (Kratz and Netz, 2016) (for a review see Waibel et al., 2017).

Results of existing studies are ambiguous and deeply context-dependent so that the question whether studying abroad exerts some causal effect on employment outcomes is far from settled. Some studies find that income returns to studying abroad are significantly reduced (Kratz and Netz 2016 (Germany)) or even diminish (Messer and Wolter 2007 (Switzerland); Oosterbeek and Webbink 2006 (Netherlands)) once accounting for possible confounders or self-selection. Other studies identify a substantial and significant causal effect of studying abroad on the likelihood to be in employment a few years after graduation (Di Pietro 2015 (Italy)) and on starting salaries (Sorrenti 2017 (Italy)). Again others highlight that study abroad increases the probability of invitation to a job-interview, but only in international work contexts (Petzold 2017a (Germany)). Hence, discussions about if and under which conditions studying abroad brings about occupational returns are ongoing.

We propose that a more coherent idea of the professional impact of studying abroad could be established if the institutional stratification of the educational and vocational systems is taken into account. Needless to say, advancing on the job market and achieving a high occupational status is not only based on individual-level resources, but reflects the institutional relationship between the educational system and the labor market (e.g., Allmendinger, 1989; Kerckhoff, 1995; Roksa and Levey, 2010; van de Werfhorst, 2004). In this regard, fields of study in higher education differ considerably in their vocational embedding. We assume that this field-specific relation to the labor market will affect the links between studying abroad and occupational outcomes.

Solid evidence on differential returns to studying abroad contingent on the vocational embedding of the field of study is lacking so far. There is some indicative support for our claim to be outlined below that economic returns to study abroad are highest in more occupationally unspecific fields of study (Janson et al., 2009; Kratz and Netz, 2016; Opper et al., 1990). However, none of these investigations has applied methods that both control for selection and perform subgroup analysis.

Using data that is representative of the population living in Germany, the fundamental aim of this study is to provide evidence on the occupational returns of studying abroad a few years after graduating from higher education. We focus on the occupational status at the *early career* stage for two reasons. First, tertiary level graduates face a situation of heightened competition when transitioning from education to work. At this career development stage the relative value of one's accumulated educational credentials is particularly relevant for getting access to attractive labor market positions (cf., Gangl, 2002). Respondents may still be in their first job three years after graduation yet search, adaptation, and promotion processes may have already taken place during the first three years of employment. Second, we face data limitations with respect to investigating the effect of studying abroad on longer-term career outcomes. Given that we use multi-cohort data (see section 4.1.), complete employment histories are only available for a small number of respondents.

We make several contributions to the existing literature. First, we use a multi-cohort representative sample including individual-level information on residential, educational, and employment biographies that has so far not been exploited for investigating the returns to studying abroad. Second, while most research has focused on income returns to studying abroad, we examine the value of studying abroad in terms of the occupational status it brings that is of particular interest to sociological analysis. Using status as our central outcome we follow a long tradition in social mobility research characterizing the status of jobs by a socioeconomic index, representing not only economic capital but also the symbolically legitimated social organization of modern societies (Featherman et al., 1975). Third, we apply a propensity score matching approach in order to account for compositional differences between mobile and immobile graduates and to identify the causal effect of studying abroad. The matching estimates depend on the assumption that unmeasured confounders are “ignorable” once measured confounders are controlled for. Although we cannot rule out unobserved heterogeneity, we are still able to adjust effect estimates for a rich set of covariates. Moreover, we will discuss unobserved heterogeneity with respect to the question of who benefits most from studying abroad. Fourth, we perform subgroup analyses to test our hypothesis that the connection between studying abroad and occupational allocation is embedded in institutional processes specific to the field of study.

2. Theoretical considerations

2.1. Cause or selection?

In general, connections between educational attributes and labor market allocations are understood in the context of two-sided matching processes between applicants' skills and the requirements of employers’ jobs. Employers evaluate potential employees and employees evaluate potential employers in order to achieve the most optimal match to maximize both returns from educational

investments for the applicant and job performance for the employer (Kalleberg and Sørensen, 1979; Müller, 2005). Human capital and signaling approaches are the two most prominent theories that address how education in general is causally related to job assignment (cf., Bills, 2003; Kjelland, 2008).

First, economists typically model mobility and education as an investment in one's stock of human capital, which refers to the total of one's skills, knowledge, and abilities (cf. Becker, 1964; Mincer, 1958; Schultz, 1961). From a rational choice point of view, investments in human capital are the results of a cost-benefit analysis and made if they promise to yield economic returns over the long period. In these premises, students' primary consideration for becoming internationally mobile may be the acquisition of human capital (King and Findlay, 2015, 262). Study-related international mobility is an investment in foreign language proficiency, personal development, and social, intercultural, and mobility skills. Taken together, this human capital is valued on globalized labor markets that demand a high degree of global awareness, self-initiative, and personal responsibility (e.g., Gerhards and Hans, 2013; King and Findlay, 2015; Potts, 2015; Salisbury et al., 2009).

Second, according to proponents of the signaling approach educational degrees and grades do not necessarily lead to an accumulation of human capital. They mainly serve as signal or credential that conveys information about one's inherent ability and, thus, labor market productivity (cf. Spence, 1973; Stiglitz, 1975). Weiss (1995) understands the signaling approach in extension, and not in opposition, to human capital theory. In his view it is an advantage of signaling models that they conceptualize formal educational credentials not merely as representation of observable trained skills but also of unobserved individual attributes.

With respect to studying abroad it is argued that employers positively screen job applicants for taking part in study-related mobility because the former assume this to be related to unobserved characteristics such as motivation, initiative, or flexibility that also make them more productive in the workplace (e.g., Hilmer, 2002; Petzold, 2017a; Wiers-Jenssen, 2008). But regardless of whether a human capital or signaling perspective is taken – from the individual perspective it matters little what mechanisms work in practice (Kjelland, 2008, 70) – the fundamental idea is that studying abroad benefits professional career trajectories. Therefore, the juxtaposition of human capital and signaling approaches has struck observers as being overly divisive, since both can be integrated into a common argument about the labor market value of education (Rospigliosi et al., 2014).

It is well-known that educational choices interact with ability, resources, and socially generated attitudes such as risk aversion and time preferences, explaining why education and mobility strategies are more often pursued by high-achieving individuals from upper and middle class backgrounds (e.g., Boudon, 1974; Breen and Goldthorpe, 1997; Schultz, 1961). It seems that international educational mobility, too, is the result of preceding social selection processes (Lörz and Krawietz, 2011, 202; see also Di Pietro and Page, 2008; Powell and Finger, 2013; Souto-Otero, 2008), although differences across countries exist (van Mol and Timmerman, 2014). Specifically in Germany, students that have parents with an academic degree and sufficient financial resources are statistically much more likely to study abroad (Lörz et al., 2016). Hence, one cannot disregard the possibility that the expected positive occupational effect reduces to self-selection of more capable individuals into study abroad programs.

Taken together, our first hypothesis is that there is a positive association between studying abroad and occupational status that can be attributed in part to (observed) self-selection or the compositional overrepresentation of high-achievement groups and in part to causality as predicted by human capital and signaling theories. This distinction is key, yet, not the whole story. An important drawback of previous research has been the incomplete theoretical specifications about the applicability of human capital or signaling processes to different educational contexts, which may further explain inconsistencies in empirical findings.

2.2. Differential effects

Research on the transition from school to work acknowledges that national specificities and the extent to which educational programs and sectors provide occupation specific training have a substantial impact on occupational returns (e.g., Kerckhoff, 1995; Klein, 2016; Leuze, 2007; Scherer, 2005; Roksa and Levey, 2010). In Germany, tertiary education induces close links between training obtained and the occupationally segmented structure of jobs, as well, with universities providing ‘standardized educational products’ (Müller et al., 1995, 6). The state-regulated higher education system offers various occupation-specific courses – such as medicine, law, and education – that guarantee standardized access to professional and managerial positions within a few years or even months after graduation (Leuze, 2007), i.e., independent of any additional skills gained via international mobility (Kratz and Netz, 2016, 12; 18). Although additional skills such as studying abroad may not be irrelevant for practicing the profession, it is likely that these will not have a substantial effect on vertical occupational allocation.

In contrast, if study fields lack such occupation-specific orientation employers will anticipate greater training costs and will therefore screen applicants more carefully, especially given educational expansion and intensifying competition among graduates at tertiary educational level (Reimer et al., 2008; Reimer and Pollak, 2010). Career success and occupational status may depend more on means that expand and refine one's skills, and increase qualitative differences between graduates. Supporting this logic, it has been shown for the German context that completing an internship while attending university provides positive labor market returns mainly for graduates from occupationally unspecific fields of study (Saniter and Siedler, 2014).

This speaks to a growing literature seeing study abroad as ‘positional good’. A positional good can be defined as ‘a good, valuable to some people only on condition that others do not have it’ (Hollis, 1982, 236). Therefore, studying abroad may have increased in (relative) value for individuals who are increasingly alike in terms of educational attainment (Waters and Brooks, 2010, 218), particularly in unspecific fields. Our second hypothesis is that the occupational returns to studying abroad depend on the occupational specificity of the respective field of study.

3. Methodology

3.1. Causal inference

In this paper we want to identify the causal effect of studying abroad during higher education on occupational status. Causal inference is prominently conceptualized within the potential outcomes approach (Morgan and Winship, 2015). Pursuant to the vocabulary of scientific experimentation, two states – the treatment state and the control state – can be distinguished that units of observation are assigned to. In our analysis, graduates are assigned either to the study abroad group (treatment) or the non-study abroad group (control). Both states bear potential outcomes for each unit of observation and the difference between these potential outcomes for each unit *i* is the individual-level causal effect of the treatment condition on the outcome of interest. Since any unit of observation can only be subject to one of the potential states, we observe only the outcome Y_i^* that is realized under the respective treatment condition D_i. In our case, we can only observe the outcome (occupational status) either for graduates in the treatment state (study abroad) or in the control state (non-study abroad).

The individual-level causal effect, however, can be approximated. For this purpose, counterfactual values for potential outcomes are constructed using information of comparable units in the alternative state. The average treatment effect on the treated (ATT) is the mean difference between the expected outcome of the observed values of units that were subjected to the treatment condition ($D = 1$) and the expected outcome of the *counterfactual* values, which are estimated (Morgan and Winship, 2015, 55):

$$ATT = E[Y^1|D = 1] - E[Y^0|D = 1]$$

Here, the ATT is the expected what-if difference in occupational status if we could expose a randomly selected person from the study abroad group to both the study abroad and the non-study abroad condition.

In contrast to the ATT, the average treatment effect on the untreated or controls (ATC) estimates the average effect for units that did not receive treatment ($D = 0$). In other words, the ATC is the expected difference between the observed outcomes among individuals who did not study abroad and the estimated counterfactual outcomes:

$$ATC = E[Y^1|D = 0] - E[Y^0|D = 0]$$

Finally, the average of the ATT and the ATC, weighted by comparison group sizes, is the average treatment effect for the whole sample (ATE).

The comparability of average outcome values builds on the decisive assumption that units of observation being compared have to show an equal distribution of observed and unobserved characteristics (e.g., gender, age, education) except for the treatment to make sure that results are not biased by confounding variables (Morgan and Winship, 2015). As the treatment must be independent from confounding covariates X, this is referred to as the conditional independence assumption (CIA)[1]

$$Y^1; Y^0 \perp D|X$$

3.2. Propensity score matching

While in experimental studies units are randomly assigned to treatment or control conditions meeting the CIA by design, extending causal inference into observational studies is problematic since researchers cannot control the assignment of observational units to treatment and control condition (Rosenbaum, 2010, 153ff). Instead, self-selection of units into treatment and control condition takes place and a simple comparison of units in the treatment and control condition would be biased because covariates are not at balance and associated with the treatment.

A prominent procedure for balancing covariates related to the observational units in the treatment and control conditions is propensity score matching (PSM) (e.g., Morgan and Harding, 2006), which is used with increasing frequency in the literature assessing the effects of education and educational contexts (e.g., Brand and Halaby, 2006) or residential mobility (e.g., Haelermans and Witte, 2015). In this method, the first step is to reduce the multi-dimensional differences in covariates between units of treatment and control condition to one dimension, the propensity score. In the second step, the propensity score serves as distance metric for the identification of fitting counterfactual outcomes and matching them to the observed outcomes. Observed and counterfactual outcomes are compared in the third step in order to estimate causal effects. In line with the potential outcomes framework outlined above, the ATT is estimated as the average difference between observed outcomes Y_i in the treatment sample ($D=1$) and the appropriately matched observed outcomes Y_j in the control sample ($D=0$).

The propensity score is usually estimated by parametric models, such as logistic regression, and expresses the probability of experiencing the treatment given a set of observed pre-treatment covariates that determine self-selection into treatment. For the assignment of counterfactual outcomes to observed outcomes, different matching algorithms can be used that calculate weights for each comparison unit as a function of the (estimated) propensity scores reflecting the observational similarity of observations regarding the covariate space (for an overview, see for example Gangl, 2015). The more comprehensively algorithms include (weighted) sample observations to estimate the treatment effect, the more efficient matching estimators become (i.e., smaller

[1] Instead of CIA, others refer to unconfoundedness and selection on observables. An additional assumption is that the treatment effect for an individual does not depend on who else also receives the treatment, referred to as stable unit treatment value assumption (or SUTVA).

variance). For example, kernel matching estimators use all observations in the comparison group inside the common support region in constructing the estimated counterfactual outcomes. However, this efficiency comes potentially at some loss of covariate balance. We will compare estimates using different matching algorithms in order to be sensitive to the robustness of the results.[2]

PSM has major advantages over regression analyses. First, in contrast to the standard regression solution, where the goal is to simultaneously estimate the effects of the treatment and a set of covariates, X, on the outcome, Y, a matching estimate non-parametrically balances the variables in X across D (i.e., the treatment groups) in order to obtain the best possible estimate of the *causal* effect of the treatment on Y. Matching on the propensity score, thus, forces researchers to examine the distribution of covariates across units exposed to treatment and control condition and to identify sample cases that are comparable taking into account processes of self-selection that are based on previous empirical knowledge and theory (cf., Morgan and Harding, 2006). Second, matching is only justified when performed over the so called region of common support in the sample data, that is, the estimated propensity score (or the covariate data) has to overlap across the comparison groups of the analysis. If not, observations are not comparable and excluded from the analyses to avoid fundamental mismatches. If there are many non-matching cases, this will be reflected in a relatively high variance of the treatment effect estimators. Finally, in using non-parametric matching estimators, propensity score matching makes less stringent parametric assumptions and may surpass linear regression modeling when the true functional form of a relationship is nonlinear. For the same reason, propensity score matching can be applied even if outcome variables are not distributed normally.

A limitation of PSM is that since it rests on the conditional independence assumption it can only deal with confounding based on observed covariates.[3]

4. Data, sample, and variables

4.1. Data and analytic sample

Analyses are based on the forerunner study of the German National Educational Panel Study (NEPS), called Working and Learning in a Changing World (German acronym, ALWA). ALWA is a nationally representative sample of 10,177 adult German residents (regardless of their nationality) interviewed in 2007 and 2008 when they were 18–53 years old. ALWA provides comprehensive retrospective information on participants' complete educational and employment trajectories and respondent characteristics such as parental background and places of living (see Kleinert et al., 2011).

Our analytical sample is restricted to individuals who obtained a higher education degree and who were in regular gainful full or part time employment three years after graduation.[4] Graduation is defined as the point of leaving the higher education system after the latest degree has been obtained. Traineeships and practical training periods connected to educational degrees are counted as part of the training system and not as employment. We intended to keep the sample homogeneous in terms of educational trajectories and considered only educational episodes that started when a person was 30 years old or younger. As exception to this rule we considered late episodes if they corresponded to the first tertiary degree the person pursued.

Like other countries, Germany has a stratified higher education system (Leuze, 2011). However, compared to Anglo-Saxon countries, there are no pronounced differences within individual university types in terms of reputation and prestige (Müller et al., 1995, 6; Reimer and Pollak, 2010, 417). Three basic types of higher education exist: traditional universities (*Universitäten*), universities of applied sciences (*Fachhochschulen*) and universities of cooperative, administrative and economic education (*Berufsakademien*), which combine elements of firm-based training with academic education. Traditional universities cover the full range of academic disciplines and promise access to the most favorable class positions (Müller et al., 2002). Universities of applied sciences and universities of cooperative education offer a more limited, applied, business and engineering oriented set of disciplines. We chose to include individuals with degrees from all three university types because all school leavers and prospective students perceive pursuing a degree in one of these institutions as attractive educational alternatives (Trautwein et al., 2006).[5]

Our final analytic sample includes 1708 higher education graduates of which 44 percent were female and 56 percent were male. Individuals spent on average five years in higher education and graduated at mean age of 27. About 40 percent of individuals in the sample graduated between 1975 and 1990, while the remaining 60 percent graduated between 1991 and 2005.

[2] Irrespective of the specific matching algorithm, all matching estimators of the ATT can be expressed as (Gangl, 2015, 257) $ATT_M = \frac{1}{n_{D_1}} \sum_{i \in D=1} \left[y_i^1 - \sum_{j \in D=0} w_{ij} y_j^0 \right]$, where $i \in D = 1$ and $j \in D = 0$ denote individuals in the treatment and control group, respectively, n_{D_1} is the number of individuals in the treatment group (consider that the ATT is an average), and w_{ij} are the weights derived from the matching algorithms and the propensity scores. The weights express the algorithm-scaled distance between each control case and the target treatment case based on the covariate information (i.e., the similarity between observations) so that more weight is given to control group members equivalent to those in the treatment group (Morgan and Winship, 2015, 155). w_{ij} does not alter the treated cases ($w_{ij} = 1$), but only adjusts the control cases to match the treatment cases (Davidson and Sanyal, 2017, 1705). The weights for the ATC work in the opposite direction. They do not alter the control cases, but attempt to turn the treatment group into a comparison sample for the control cases with respect to the distribution of covariates (Morgan and Todd, 2008, 244).

[3] To account for unmeasured confounders, studies often use instrumental variables methods. In this approach, "instruments" have to be found that are associated with treatment choice but not with the outcome. The variation in the treatment choice affected by the instruments is then used to generate unbiased causal effect estimates. Identifying good instruments is not straightforward and was therefore not a viable strategy in our study.

[4] In the full respondent sample, 93 percent of men and 85 percent of women were in regular employment and only four percent were unemployed three years after graduation.

[5] In our analyses we excluded first-generation immigrants, as their foreign education predominantly takes place in immigrants' countries of origin and can hardly be transferred to the host-country's labor market (Chiswick and Miller, 2009; Friedberg, 2000).

4.2. Outcome: occupational status

Within the ALWA survey information on respondents' occupation is coded using the International Standard Classification of Occupations 1988 (ISCO88). We calculated the International Socio-Economic Index (ISEI; see Ganzeboom and Treiman, 1996) as our measure of occupational status using the conversion table provided by the German Microdata Lab.[6] The ISEI range is 16–85.

We chose three years after graduation as point in time for measuring occupational status assuming that we capture the labor market outcomes of graduates in their early careers, still unaffected by mobility processes occurring after labor market entry (cf. Gebel, 2009, 671). Most empirical studies in the German context show that individuals leaving the higher education system successfully enter the labor market even after initial periods of unemployment, have a low risks of involuntary job loss, and have relatively stable labor market careers (e.g., Biemann et al., 2011; Giesecke and Heisig, 2011; Lindberg, 2009; Scherer, 2005). Moreover, by choosing our time of measurement we intended to build on previous studies that use graduate tracer surveys to analyze the economic returns to study abroad sometime between labor market entry and five years after graduation (cf., Di Pietro, 2015; Kratz and Netz, 2016; Messer and Wolter, 2007; Wiers-Jenssen, 2011).

4.3. Treatment: study abroad

Our conceptualization of study abroad includes any stay abroad during educational spells, not limited to participation in a particular mobility or exchange program. Importantly, individuals pursuing an entire graduate or postgraduate degree abroad were excluded. Theoretically, we expected that these graduates, sometimes called 'degree mobiles', may face readjustment and recognition issues when entering the labor market of their origin countries similar to immigrants with foreign schooling (cf., Wiers-Jenssen, 2013). Moreover, degree-mobile students are a quite heterogeneous group so that assumptions about the eventual impact of studying abroad are difficult to make (Teichler, 2012, 44).

Given the multidimensional life-course data that is contained in ALWA it was possible to match residential and educational histories and to identify overlaps in educational and residential episodes abroad. In addition, survey participants indicated whether they spent at least one month in a foreign country during a given educational spell. In these cases, we had no information on the length of the stay abroad or the host country, but observations could none the less be integrated into our binary treatment indicator (1 = study abroad, 0 = no study abroad). Overall, we identified N = 219 individual biographies (13 percent of the analytic sample) that included at least one period abroad during higher education. For those persons in the sample for who we had information, the most common destinations of the stay abroad were Northern Europe (Great Britain and Scandinavia), North America, and France.

4.4. Covariate choice and common causes

The effect of studying abroad corresponds to the difference in mean levels of occupational status across units that differ in study abroad experience yet share a similar propensity to participate in such mobility based on a set of observed covariates. These covariates include pre-study-abroad individual characteristics that determine selection into the treatment, and are also related to the outcome. These common causes introduce bias in the effect estimates, confounding the causal effect of the treatment on the outcome.

We condition on a rich set of covariates provided by ALWA, to be presented below. These covariates figure prominently in sociological research on student mobility (e.g., Di Pietro and Page, 2008; Finger, 2011; Gerhards and Hans, 2013; Lörz et al., 2016; Schindler and Lörz, 2012; van Mol and Timmerman, 2014). An overview of operationalizations of covariates is given in Table A1 in the Appendix.

4.4.1. Parental educational background

Student mobility has repeatedly been characterized by its social selectivity. In particular, parents' education has been a stable and good predictor of variation in student mobility (cf., Lörz et al., 2016; Souto-Otero, 2008). It reflects a child's learning environment as well as the cultural and social capital of the family and has influence on educational decision making especially in stratified educational systems (Buis, 2013; Erola et al., 2016).

Accordingly, we differentiated between graduates whose parents both have education below tertiary level (ISCED 1 to 4) and graduates with at least one parent (mostly, the father) holding a tertiary educational degree (ISCED 5A and 6). We did not differentiate parental education further, as there were few cases in the sample where parents have lower secondary education (ISCED1-2). Ultimately, in our sample, differences in mobility patterns by social background emerged mainly between first-generation university students and students with at least one parent having a university degree (similarly, see Kratz and Netz, 2016; Lörz et al., 2016; Kratz and Netz, 2016; Salisbury et al., 2009).

4.4.2. Educational trajectory: Abitur, university type, student jobs and internships, vocational and public-sector training, previous international experience

Rather than having itself an effect on labor market achievement, studying abroad may simply be more likely within educational trajectories that lead to higher status jobs (Lörz et al., 2016), such as academic aspirations, extra-curricular engagement, vocational orientation of mobile students. We include several covariates capturing this process.

[6] http://www.gesis.org/missy/materials/MZ/tools/isei.

In Germany, the direct transfer from school to university is traditionally regulated by the *Abitur*, designed to certify young adults 'general academic ability' (*Studierfähigkeit*). Though educational expansion has lead more and more persons to reach this upper secondary level of education (Lörz and Schindler, 2009, 101), the *Abitur* is not a necessary requirement for non-traditional university types and a greater openness of traditional universities towards so called non-traditional students without Abitur has been formalized more recently (Brändle and Lengfeld, 2016). In general, the *Abitur* can still be seen as academic credential and indicator of higher educational aspirations associated with studying abroad.

Moreover, internationalization and Europeanization have made stronger inroads into the academically oriented traditional university system than the technical and applied system (DAAD and DZHW, 2017). Consequently, graduates from traditional university have more opportunities to study abroad than graduates from non-traditional universities. The occupational position of mobile graduates may, thus, reflect the higher returns to degrees obtained from traditional universities that are often the sole providers of the more prestigious study courses (e.g., medicine).

Students who study abroad may also be more engaged in other out-of-class experiences conforming to a 'culture of engagement' associated with intellectual and personal development helping them to aspire prestigious occupations in society (Brint et al., 2008). For example, the same persons who study abroad may also work on-campus as student assistants and collect internship experiences during their educational trajectories.

In addition, people who complete vocational training prior to tertiary education are more bound to a certain company, usually in Germany, and tend to be less mobile (Parey and Waldinger, 2011, 213). Similarly, a career in the public sector is associated with less student mobility. Public service careers are rather internally orientated with strong institution-specific labor markets and on-the-job training (Leuze, 2010, 56ff). By nature of their educational trajectory, individuals from public and vocational career tracks tend be in technical, administrative, and associate level positions corresponding to lower occupational statuses (cf., Anger et al., 2010).

Finally, the propensity to study abroad at university is also determined by previous international experiences (Brooks and Waters, 2010; Carlson, 2013; Finger, 2011; Lörz et al., 2016; Petzold and Peter, 2015), as it creates confidence in internationalized social environments, develops one's capacity to be mobile, and confirms international dispositions through interaction with similar others. That way, pre-university international experiences in primary and secondary education, as part of a family stay abroad, student exchange or voluntary service, may already endow individuals with competences that set the stage for successful careers.

4.4.3. Field of study and occupational specificity

Studying abroad is more common in some fields of studies than in others and the chosen field of study may affect the propensity to study abroad (e.g., Stroud, 2010; Salisbury et al., 2009) as well as the occupational rewards (Kratz and Netz, 2016). Higher rates of student mobility in Germany have been observed in humanities, economics, and medicine, lower rates in law, natural sciences, engineering, as well as technical fields that are more often studied at applied universities (Gerhards and Németh, 2015; DAAD and DZHW, 2017). Therefore, on the one hand, studying abroad may not by itself produce occupational gains, but may be driven by higher rates of student mobility in fields of study, like medicine, that lead directly into the most prestigious jobs. On the other hand, the effect of studying abroad on occupational status may vary by field of study.

To examine this moderation effect, we conceptualize occupational specificity of the field of study as the degree to which the field has occupational counterparts in the labor market (Roksa and Levey, 2010). Graduates from fields with high occupational specificity are predominantly employed in one occupational category related to the field of study. In contrast, graduates from occupationally unspecific fields are distributed across different occupations and not concentrated in a specific occupation that relates to their studies. Operationalization is based on the data (see Table A2 in the Appendix). We identified law, medicine, teaching (primary and secondary level), engineering, architecture, computer science, physics and related natural sciences as well as public administration as occupationally specific fields of study, whereas other educational sciences, social sciences, psychology, life science, math and statistics as well as technical and commercial subjects were identified to be occupationally unspecific fields (similarly, see Leuze, 2010, 140; Saniter and Siedler, 2014, 44).

4.4.4. Region and year of birth

Research shows that employment trajectories in the Eastern part of Germany tend to be more instable than in the West even in the higher educated segment of the population (Falk et al., 2000; Kurz and Steinhage, 2001). Significant differences between students raised in the East of Germany and students raised in the West in terms of international experience and willingness to become mobile have been demonstrated (Spieß and Brüch, 2002). Therefore, the propensity to study abroad may be related to the region of birth which may in turn be positively related to higher occupational achievements after graduation.

Finally, given the multi-cohort design of the sample, individuals experienced their education and early careers at different points in time reflecting changing labor market returns to higher qualifications. At the same time, there has been a stark increase study abroad up until the more recent years. Therefore, year of birth may be a confounder in the association between study abroad and occupational status.

4.4.5. Language skills

Although language skills (number of spoken languages and English language proficiency) may be positively related to studying abroad and occupational status, we cannot examine if they are clearly prior to studying abroad, since the information is only available in cross-sectional data records. Foreign language proficiency is likely to be influenced by studying abroad itself (cf. Kinginger, 2008). In this case, foreign language skills would correspond to human capital acquired *after* studying abroad and would mediate the association between studying abroad and occupational achievement (cf., Sorrenti, 2017). They are, thus, not eligible as

Table 1
Sample composition (full sample and by occupational specificity of study field).

	Full Sample				Graduates from specific fields				Graduates from unspecific fields			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
ISEI 3 years after graduation	63.87	12.79	20.00	85.00	67.32	12.08	25.00	85.00	58.35	11.92	20.00	85.00
Study Abroad	.13	.33	.00	1.00	.11	.32	.00	1.00	.15	.36	.00	1.00
Higher Educated Parent	.34	.48	.00	1.00	.35	.48	.00	1.00	.33	.47	.00	1.00
Abitur	.80	.40	.00	1.00	.79	.41	.00	1.00	.81	.39	.00	1.00
Master Traditional University	.57	.50	.00	1.00	.55	.50	.00	1.00	.60	.49	.00	1.00
Applied Uni/Bachelor Trad. Uni.	.36	.48	.00	1.00	.42	.49	.00	1.00	.28	.45	.00	1.00
Uni. Coorp. Education	.07	.25	.00	1.00	.04	.18	.00	1.00	.12	.33	.00	1.00
Student Assistant	.11	.31	.00	1.00	.12	.32	.00	1.00	.09	.29	.00	1.00
Vocational Training	.37	.48	.00	1.00	.35	.48	.00	1.00	.42	.49	.00	1.00
Career in Public Sector	.05	.22	.00	1.00	.07	.26	.00	1.00	.02	.14	.00	1.00
Previous Mobility Experiences	.06	.23	.00	1.00	.05	.21	.00	1.00	.08	.27	.00	1.00
Field of Study												
Agrig./admin./techn./oth.	.14	.34	.00	1.00	.17	.37	.00	1.00	.09	.29	.00	1.00
Science, Eng., Math	.34	.48	.00	1.00	.54	.50	.00	1.00	.03	.17	.00	1.00
Medicine & Life Science	.10	.30	.00	1.00	.09	.29	.00	1.00	.11	.31	.00	1.00
Teaching	.11	.32	.00	1.00	.13	.34	.00	1.00	.09	.28	.00	1.00
Soc. Sci., Psych., Social Work	.26	.44	.00	1.00	.	.	.	.	.69	.46	.00	1.00
Law	.04	.20	.00	1.00	.07	.26	.00	1.00	.	.	.	.
Sex (Male = 1)	.56	.50	.00	1.00	.60	.49	.00	1.00	.48	.50	.00	1.00
Region of birth (West = 1)	.80	.40	.00	1.00	.82	.39	.00	1.00	.78	.41	.00	1.00
Year of birth	1965	5.96	1956	1982	1965	6.02	1956	1982	1965	5.84	1956	1981
Number of languages learned	2.42	1.03	.00	10.00	2.35	.92	.00	7.00	2.53	1.19	.00	10.00
English speaking competence	3.32	1.03	.00	5.00	3.32	.99	.00	5.00	3.32	1.08	.00	5.00
	N = 1708				*N = 1050*				*N = 658*			

pre-intervention confounder determining the propensity to study abroad. Accordingly, language skills are only included in the sensitivity analyses below.[7]

4.5. Sample composition

Descriptive statistics for the outcome variable (ISEI), the treatment variable (study abroad), and all mentioned covariates are presented in Table 1 for the full sample, the sample of graduates of unspecific fields of study, and the sample of graduates of specific fields. In addition, all zero-order correlations between studying abroad, the occupational status three years after graduation, and all covariates are shown in Table A3 in the Appendix.

The sample description confirms relatively established knowledge that graduates who did or did not study abroad differ in several respects. Mobile graduates more often come from families with high educational capital, more often complete full secondary education with the *Abitur*, and more often obtain a degree from a traditional university. They tend to show higher extra-curricular engagement with respect to working as student assistants or completing an internship. Study abroad graduates tend to have gained international experiences already before starting higher education. They less often pursue vocational training next to higher education, less often have a career in the public sector, and more often study in fields like medicine that lead directly into most prestigious jobs.

Moreover, Table A.3 shows that studying abroad is positively related to graduates' occupational status three years after finishing higher education ($r = 0.07$, $p \leq .01$). However, this bivariate association applies more strongly to graduates of occupationally unspecific fields ($r = 0.12$, $p \leq .001$) than graduates of occupationally specific fields ($r = 0.08$, $p \leq .05$) aligning with our theoretical expectations. Yet, it is still impossible to say whether studying abroad provides distinct benefits in terms of occupational status or whether systematic selection of individuals with good career prospects into study abroad programs explains this correlation. Disentangling these two processes is the main task of propensity score matching.

5. Estimation results

5.1. Main analysis

First, we estimate the propensity to study abroad including all covariates using logistic models (Table A4a-c in the Appendix). We

[7] It has also been shown that school performance determines selection into study abroad (Di Pietro and Page, 2008; Lörz et al., 2016; Kratz and Netz, 2016), which, in turn, can improve occupational success. Unfortunately, ALWA does not provide objective performance measures, but only self-reported evaluations by the respondents regarding their achievement in German and Math. We neglected these measures as they are inadequate and also uncorrelated with study abroad (see Table A3 in the Appendix). Implications will be discussed below.

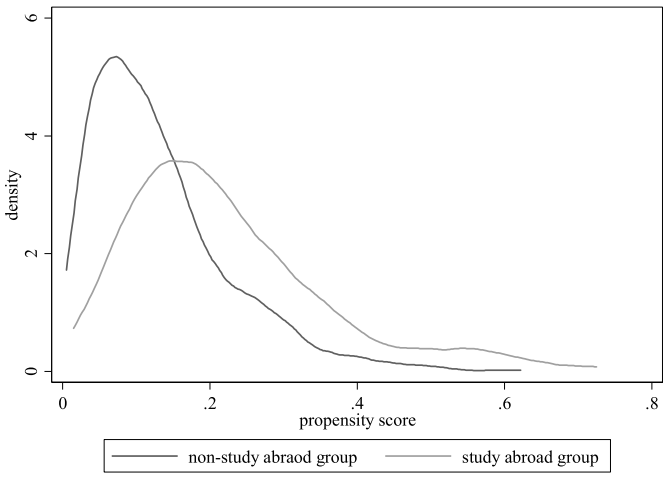

Fig. 1. Kernel density estimates of the estimated propensity score, calculated separately for study abroad (grey) and non-study abroad group (black).

then match observationally similar individuals in the study abroad group and non-study abroad group using the kernel algorithm, as it yielded best matches with respect to bias reduction. The plots of the group-specific propensity scores show considerable overlap in propensity scores between graduates who studied abroad and those that did not (Figs. 1 and 2), allowing the straightforward estimation of treatment effect with comprehensive common support.

Table 2 demonstrates that matching has worked in balancing all the variables affecting selection into studying abroad, for the full sample as well as the two subsamples indicating occupational specificity of the fields of study. The covariate distribution across treatment and control group *before matching* confirms systematic group differences, while there are no substantial *post-matching* differences in mean covariate values across the treatment and control cases, reducing the potential for selection bias. Standardized mean bias is calculated for each covariate and is defined as the difference of sample means in the treated and control subsamples divided by the square root of the average sample variances in both groups. For example, the standardized mean bias in the share of graduates from traditional universities was 43 percent before matching, reduced to four percent after matching. Overall mean bias is reduced below three percent, which is considered sufficient to balance control and treatment groups (Caliendo and Kopeinig, 2008, 48).

Table 3 presents estimates of the average effect of studying abroad for both the unmatched and matched sample. Again, we run separate analyses on the full sample and the two subsamples. Looking first at the unmatched effect and corresponding to results from pairwise correlation analysis, we find positive mean differences in occupational status between graduates who studied abroad and graduates who didn't in all samples. With 4 points (standard error = 1.30) on the ISEI scale, the difference is highest for graduates of occupationally unspecific subjects.

For the full sample, as assumed in our first hypothesis, the matching estimates for the average treatment effect on the treated (ATT) show that graduates who studied abroad seem to benefit only slightly from studying abroad after accounting for compositional

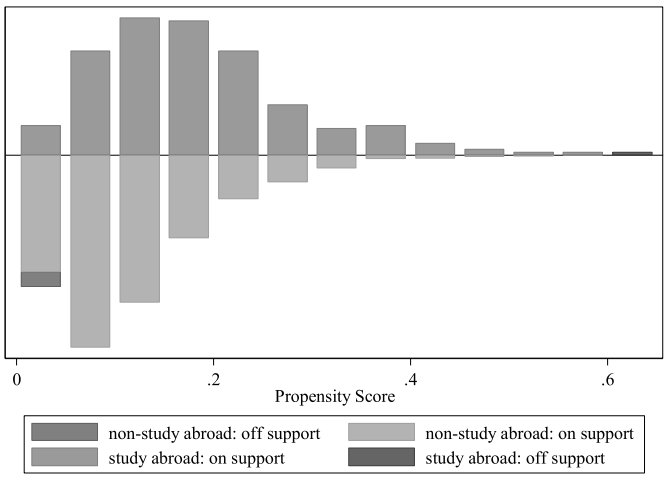

Fig. 2. Propensity score histogram by treatment status.

Table 2
Covariate balance before and after matching.

	Full sample					Occupationally specific fields					Occupationally unspecific fields				
		Unmatched control sample		Matched control sample			Unmatched control sample		Matched control sample			Unmatched control sample		Matched control sample	
	SA	*NSA*	*%bias*	*NSA*	*%bias*	*SA*	*NSA*	*%bias*	*NSA*	*%bias*	*SA*	*NSA*	*%bias*	*NSA*	*%bias*
Socio-economic background															
Parent with HE degree	.45	.33	25.70	.44	3.60	.47	.34	27.80	.48	−.30	.43	.31	24.10	.43	−1.10
Educational trajectory															
Abitur	.90	.78	32.90	.89	2.60	.89	.78	30.10	.88	1.50	.92	.79	35.80	.91	2.80
University type															
Master Trad. Uni.	.75	.54	43.10	.73	3.70	.71	.53	38.30	.70	2.60	.79	.57	47.80	.78	1.70
Degree from Uni. Corp. Ed.	.03	.08	−21.80	.03	−1.40	.01	.04	−20.00	.01	−1.70	.05	.14	−29.90	.06	−1.70
Student assistant	.18	.10	24.20	.17	1.40	.23	.10	34.20	.22	2.20	.12	.09	11.40	.11	4.20
Vocational training	.27	.39	−25.90	.28	−1.80	.26	.36	−20.50	.27	−.60	.28	.44	−35.30	.27	1.40
Public sector career	.01	.06	−27.10	.01	−1.00	.01	.08	−34.80	.01	.50	.01	.02	−10.10	.01	−2.70
Previous mobility	.12	.05	24.40	.10	3.70	.09	.04	21.50	.08	3.60	.14	.06	25.90	.12	4.70
Field of study															
Science, Eng., Math	.27	.35	−17.40	.28	−1.20	.47	.55	−14.70	.48	−1.10	.03	.03	.10	.03	2.20
Life Science & medicine	.14	.09	14.80	.13	2.70	.19	.08	34.30	.19	.60	.07	.11	−14.80	.07	2.10
Teaching	.14	.11	10.10	.15	−1.10	.20	.12	22.00	.19	3.00	.07	.09	−6.60	.07	−.80
Soc. Sci., related	.36	.25	24.30	.35	2.00	.	.	.	.	.	.80	.67	29.50	.80	−.60
Law	.04	.04	−4.00	.04	−.70	.07	.07	−1.60	.07	−.30	.	.	.	.	.
Socio-demography															
Born in West Germany	.85	.80	14.50	.85	.10	.08	3.60	.08	.87	1.40	.83	.77	13.70	.83	−2.00
Year of birth	1966	1964	34.60	1966	2.30	1966	1964	33.90	1966	6.30	1966	1964	37.00	1966	5.30
Mean bias before matching	25.00					24.90					23.00				
Mean bias after matching	1.80					1.40					2.40				

Note: *SA = Graduates with study abroad experience; NSA = graduates without study abroad experience; HE = higher education.*

Table 3
Kernel matching estimates of effect of study abroad on ISEI 3 years after graduation.

	Unmatched			Kernel matching		
	TE (s.e.)	*n1*	*n0*	TE (s.e.)	*n1*	*n0*
Full Sample						
	2.71 (.93)	*1492*	*216*			
ATT				1.59 (.90)	*1458*	*215*
ATC				2.25 (.90)		
ATE				2.16 (.78)		
Unspecific Fields						
	4.00 (1.30)	*560*	*98*			
ATT				2.91 (1.25)	539	*98*
ATC				4.58 (1.25)		
ATE				4.29 (1.22)		
Specific Fields						
	2.97 (1.78)	*932*	*118*			
ATT				−.48 (1.01)	*879*	*118*
ATC				.82 (1.27)		
ATE				.66 (1.05)		

Note: TE = treatment effect; n1 and n0 = number of treated (1) and control (0) cases within region of common support; epanechnikov kernel and a fixed bandwidth of 0.10 are used; s.e. = bootstrapped standard errors each with 100 repetitions.

differences. Their occupational status deviates by 1.59 scale points from the counterfactual average.[8] Yet, the effect estimates differ substantially across subsamples. While the ATT for graduates of unspecific fields clearly takes on a higher value of 2.91 scale points, the ATT of graduates of specific fields is −0.48 scale points and, thus, is close to zero. This effect heterogeneity across occupational specificity of study fields supports our second hypothesis.

Moreover, and unlike standard OLS regression[9] that assumes a constant coefficient for the effect of the treatment on the outcome, PSM differentiates between three average effects, the ATC, ATT, and ATE, which has been outlined above. As Table 3 shows, both ATE and the ATC consistently exceed the ATT.[10] Regarding graduates of unspecific fields of study, we find differences between the ATC and ATT of almost 2 points. If the average effect of studying abroad is larger for those who did not study abroad if they had done so (ATC) than for those who actually did study abroad (ATT), this means that individuals with a lower probability of treatment (for a distribution of propensity scores across control and treatment groups see Fig. 1) benefit more from the treatment (cf., Brand and Xie, 2010). We will discuss possible explanations for why this should be the case in the concluding section.

5.2. Sensitivity analysis

To assess the robustness of our findings regarding the effect of studying abroad on occupational status, we conducted further analyses (1) comparing alternative matching algorithms, (2) using alternative operationalizations of the outcome, (3) adding (current) language skills to the covariate space, and (4) getting separate matching estimates by gender.[11]

First, we compare kernel matching with nearest neighbor matching (with replacement) using one neighbor, nearest neighbor matching using five neighbors, and local linear matching (Table 4). Instead of weighing observations by a kernel function of the propensity score within a set bandwidth to get the counterfactual outcomes, nearest neighbor matching calculates counterfactuals for each treatment (control) case using a specified number (here, 1 and 5) of control (treatment) cases closest to it in terms of the propensity score. Local linear matching is based on the kernel estimator but it includes a linear term in the weighting function. Local linear matching is better able to deal with bias due to unequally spaced propensity scores, especially at the ends of the scale (Deaton, 1997, 197-99). As seen in Table 5, all matching algorithms estimate gaps in occupational status between study abroad and non-study abroad graduates similar to the kernel algorithm, proving the stability of our findings.

Second, as shown in Table 5, the matching estimates for graduates of occupationally specific fields across different specifications

[8] Related standard errors are commonly calculated using bootstrapping that includes the first steps of the estimation, because estimation of the variance of the treatment effect includes variance due to the estimation of the propensity score (Caliendo and Kopeinig, 2008, 53).

[9] Mathematically, kernel matching can also be seen as weighted regression of the counterfactual outcome on an intercept with weights given by the kernel weights (Caliendo and Kopeinig, 2008, 43).

[10] Remember that the ATE is the weighted average of the ATT and the ATC. Thus, it falls between the ATT and ATC. For the same reason, the ATE is always close to the ATC since almost 90 percent of the sample did not study abroad.

[11] In addition, business cycles may influence study abroad behavior as well as labor market outcomes and would possibly bias our results. As sensitivity check (not reported) and to exclude such confounding we linked the year of graduation with the economic indicator "change of GDP compared to the previous year, seasonal and calendar adjusted" (varies between −1.0 and 5.5 percent for the observation years 1975–2008) and tested whether this economic indicator is related to our treatment (study abroad) or outcome (occupational status). In both cases the correlation is virtually zero (less than .03) and not significant. There is therefore no reason to assume that our results will be distorted by the effects of the business cycle. In addition, we already control for the year of birth that is highly correlated with the year of graduation. That means we check at least for the confounding effects of trends in the economic situation that might be related to trends in study abroad participation.

Table 4
Sensitivity analysis: Alternative matching estimates of effect of study abroad on ISEI 3 years after graduation.

	Unmatched			Nearest neighbor matching (1)			Nearest neighbor matching (5)			Local Linear matching		
	TE (s.e.)	*n1*	*n0*	TE (s.e.)	*n1*	*n0*	TE (s.e.)	*n1*	*n0*	TE (s.e.)	*n1*	*n0*
Full Sample												
	2.71 (.93)	*1492*	*216*									
ATT				.53 (1.22)	*1458*	*215*	1.13 (.97)	*1458*	*215*	1.84 (.88)	*1492*	*216*
ATC				2.77 (1.24)			2.33 (.92)			2.13 (1.11)		
ATE				2.51 (1.08)			2.18 (.92)			2.09 (.87)		
Unspecific Fields												
	4.00 (1.30)	*560*	*98*									
ATT				3.33 (1.78)			2.82 (1.24)	539	*98*	2.93 (1.05)	*560*	*98*
ATC				4.87 (1.63)	*539*	*98*	5.08 (1.40)			4.94 (1.26)		
ATE				4.63 (1.39)			4.74 (1.42)			4.64 (1.16)		
Specific Fields												
	2.97 (1.78)	*932*	*118*									
ATT				−2.08 (1.48)	*879*	*118*	−1.22 (1.18)	879	*118*	−.38 (.82)	*932*	*118*
ATC				.52 (1.62)			.48 (1.27)			1.76 (1.36)		
ATE				.21 (1.31)			.29 (1.12)			1.52 (1.35)		

Note: TE = treatment effect; n1 and n0 = number of treated (1) and control (0) cases within region of common support; s.e. = bootstrapped standard errors each with 100 repetitions.

Table 5
Sensitivity analysis: Kernel matching estimates of ATT, ATC, and ATE with different model specifications.

	Full sample			Unspecific fields			Specific fields		
	ATT	ATC	ATE	ATT	ATC	ATE	ATT	ATC	ATE
(1) Different specifications of the outcome									
ISEI 3 years after graduation or ISEI of previous employment spell that lasted at least 6 months									
	1.36	1.99	1.91	2.82	3.62	3.50	−.54	.68	.53
	(.86)	(.85)	(.92)	(1.18)	(1.43)	(1.39)	(1.07)	(.91)	(1.06)
ISEI 1 year after graduation									
	2.05	3.10	2.95	2.91	3.91	3.75	.14	1.86	1.64
	(.88)	(.79)	(.86)	(1.28)	(1.38)	(1.35)	(1.04)	(1.15)	(1.01)
ISEI 5 years after graduation									
	1.32	1.92	1.84	2.31	2.85	2.76	.07	.50	.44
	(.75)	(.86)	(.90)	(1.31)	(1.40)	(1.25)	(.79)	(1.35)	(1.03)
(2) Restrictive specification of covariate structure									
Including language skills in covariate structure: number of learned foreign languages and English competences									
	.84	1.76	1.64	1.68	3.66	3.34	−.98	.28	.13
	(.88)	(1.19)	(.95)	(1.33)	(1.55)	(1.55)	(1.05)	(1.33)	(1.22)
(3) Gender-separate analyses									
Males									
	1.17	2.06	1.94	2.64	3.14	3.09	−.23	.79	.65
	(1.02)	(1.48)	(1.19)	(1.42)	(1.36)	(1.37)	(1.04)	(1.67)	(1.72)
Females									
	1.52	1.91	1.84	2.65	4.18	3.94	- .70	- .33	- .39
	(1.29)	(1.37)	(1.21)	(1.82)	(1.82)	(1.68)	(1.88)	(1.78)	(1.80)

Note: Epanechnikov kernel and a fixed bandwidth of 0.10 are used (a number of different bandwidths were tried, but estimates remained insensitive to bandwidth choice); bootstrapped standard errors with 100 repetitions in parentheses.

lend support to our finding that the effect is virtually indistinguishable from zero.[12] At the same time, matching estimates and standard errors for graduates of occupationally unspecific fields (middle columns) confirm the advantage in occupational status of those who studied abroad by around three points on the ISEI scale. The effect estimates for different outcomes specifications are close the estimates of the main analyses, however, differences between ATT and ATC are less pronounced.

Third, adding language skills as potential confounders to the set of covariates used in estimating the propensity score reduces effect sizes of the matching estimates, especially the ATT. It seems that part of the effect of studying abroad on occupational status is due to the correlation between studying abroad and language skills. Yet, with the available data we cannot be sure if graduates had good foreign language proficiency before studying abroad or if language skills were acquired after studying abroad, thus, meditating

[12] For reasons of simplicity and comprehensibility we only show effect estimates based on the kernel algorithm.

the association between studying abroad and occupational status.

Finally, we report the results of separate analyses by gender, as commonly done in labor market research. Gender-separate analyses document hardly any differences in effect estimates between men and women.

6. Discussion

Our analysis reveals that graduates who did or did not study abroad differ in several respects. Those who studied abroad combine characteristics such as high academic family background and high educational achievement that should increase their chances of reaching a higher occupational status after graduation irrespectively of studying abroad. Compositional differences, however, are not the only factors that account for the observed status returns to studying abroad. Resting upon the counterfactual inference model and the conditional independence assumption, propensity score estimates suggest slight occupational status differences between graduates who studied abroad and those who did not, even after controlling for selection of high-achievement groups into study abroad.

In addition to that, our analyses empirically validate our theoretical expectation that differentiating by level of standardization of the transition from higher education to work is crucial to quantifying the occupational benefits derived from studying abroad. We found no evidence that studying abroad increases the occupational status of graduates trained for specific occupations. Their educational degree directly translates into acknowledged specialized expertise and is almost synonymous with their economic opportunities in the labor market. Under such tight educational-professional coupling, studying abroad has limited additional value in finding a high status job and in controlling occupational access.

On the other hand, we find net occupational status benefits of about three points on the ISEI-scale for mobile graduates of unspecific fields, who have less access to professional 'labor market shelters' (Freidson, 1999). If we consider for example that the mean difference in ISEI between graduates from academic and non-academic backgrounds is around the same size in our sample, this difference does seem to be substantial. It supports our hypothesis that if educational degrees are more risky signals of practically applicable skills and competent performance, and given the incomplete information in job markets, gaining a privileged competitive position in the labor market is facilitated by the acquisition of positional goods. Of these, studying abroad is a particular example. This ties in with research that tries to show more generally how, in the course of educational expansion, tertiary education degrees that do not prepare for a specific occupation have become less reliable signals of productivity and human capital for potential employers (Klein, 2016; Reimer et al., 2008).

We are well aware that the interpretation of our findings rests on the conditional independence assumption (CIA). That is, while we were successful in matching the study abroad and the comparison groups in terms of theoretically relevant confounders we observed, we cannot rule out selection bias due to the dependence of average effects on *unobserved* differences between those who studied abroad and those who did not. Unfortunately, the data we use leaves aspects such as motivation, confidence, and general ability unmeasured. This unresolved self-selection is a drawback that our data shares with many other datasets, but nevertheless has to be kept in mind when interpreting findings, particularly if policy implications are to be drawn.

We also find systematic differences between causal effect estimates, that is, the average treatment effect on the treatment group (ATT) and the average treatment effect on the control group (ATC). Formally, the ATT differs from the ATC whenever one or more observed or unobserved variables correlate with selection into the treatment as well as the size of the individual-level treatment effect (Morgan and Todd, 2008). In our sample, the ATC exceeds the ATT indicating that status returns to studying abroad for those who have a higher propensity to study abroad based on various observed background factors (parental education, own educational achievement) are smaller in comparison to the returns achieved by low-propensity graduates (for similar findings on causal effect heterogeneity with respect to education, see Brand and Halaby, 2006; Brand and Xie, 2010; Morgan and Todd, 2008).

Whereas the true variables that generate heterogeneity in ATC and ATT are unobserved, we can nevertheless identify at least two possible explanations for why the effect of studying abroad may not be homogeneous across the study population. First, those with higher propensity to study abroad, e.g. high status individuals with more financial and social resources, will study abroad independent of expected career benefits from studying abroad, maybe following an emergent norm to study abroad (Petzold and Peter, 2015). In contrast, those with lower propensity to study abroad, e.g. low-status individuals for whom studying abroad may imply financial or emotional sacrifices, will only study abroad if they are convinced of the professional value of the experience. In other words, there would be self-selection into studying abroad based on the unobserved expected utility of studying abroad that is more meaningful for low-propensity students. Economists call this "sorting gain selection", and in this case the ATU would be biased since individuals that did not study abroad would not be comparable to those that did (cf., Tsai, 2015). Second, as argued for example by Di Pietro (2015, 2012), studying abroad may provide those with lesser propensity to study abroad with an opportunity to develop social, intercultural, and language skills that high-propensity graduates already possess. For graduates with lower propensity to study abroad, studying abroad may also play a stronger market signaling role in setting themselves apart from their peers. In this case, the ATU is unbiased and low-propensity students who currently do not study abroad would profit from the expansion of study abroad opportunities.

In any case, attending to unobserved heterogeneity *and* effect heterogeneity in future work will make an essential contribution to scientific and policy debates about the role of study abroad expansion in stratification processes. If those who are least likely to study abroad, in other words, those with the least economic, social, and cultural resources, are the ones who are most likely to benefit from studying abroad, student mobility could even reduce instead of reproduce social inequality despite the high social selectivity into studying abroad.

From a policy perspective, outreach programs drawing in more low-propensity students into study abroad as well as financial aid programs may appear as straightforward social measures. However, as long as we do not know which variables generate the

heterogeneity in returns to studying abroad the effectivity of such programs remains uncertain. Importantly, if it is true that low-propensity (as opposed to high-propensity) students are positively selected into student mobility programs based on their expected gains, low-propensity students who currently choose not to study abroad would also benefit less in a counterfactual scenario.

7. Conclusion

Studying temporarily in another country during higher education is now 'a normal option within easy reach' (Teichler, 2012, 46) and perhaps more frequently than ever before conforms to what is perceived to be a 'social norm to study abroad' (Petzold and Peter, 2015). While international education is an enriching experience in itself, there is also a common belief in its positive effect on labor market opportunities. Many speculate that studying abroad being more accessible to the affluent has turned into a factor that reproduces social inequality in society. Yet, while there is ample evidence for the social selectivity of studying abroad, its socio-economic impact in terms of income and occupational achievement is far more contested.

Our research reports new findings on this issue in the German national context. We applied propensity score techniques to investigate the causal effect of studying abroad on early career success of German higher education graduates and address concerns about selection bias. The data we used is representative of the population living in Germany and includes information on residential, education, and employment biographies.

Results confirm a positive effect of student mobility on early career occupational status. Yet, this effect is partly driven by compositional differences, i.e. graduates with better occupational prospects self-select into study abroad programs. The results also show that occupational status returns to mobility are confined to graduates from occupationally unspecific fields of study. We hypothesize that for these graduates, transition from education to work is less smooth than for graduates from specific fields and labor market allocation will depend on the relative value of their accumulated educational capital including capital acquired through studying abroad.

Furthermore, we propose that the effect of studying abroad is not homogeneous across the study population. Rather, individuals with the lowest propensity to study abroad (those with the least economic, social, and cultural resources) are the most likely to benefit from studying abroad in occupational terms. In light of our findings, it is therefore unlikely that studying abroad is substantially related to social inequality in society. Yet, the processes behind the higher returns to studying abroad experienced by low-propensity graduates remain to be explored.

To conclude, our research provides an enriched theoretical understanding of the links between studying abroad and occupational achievement and hopefully serves as avenue for future research. Our findings should be transferable to other national contexts with similar educational systems and with similar experiences of educational expansion. Future research would benefit from a closer analysis of national differences in the signaling and human capital potential of studying abroad. Another area for future research could be the investigation of how country- and period-specific conditions of national economies (e.g., business cycles) influence the labor market impact of studying abroad over the long-term. Moreover, distributional shifts in studying abroad may encourage research on whether the rapid expansion of studying abroad affects the signaling value of international mobility experiences on the labor market.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.ssresearch.2018.05.006.

References

Allmendinger, Jutta, 1989. Educational systems and labor market outcomes. Eur. Socio Rev. 5 (3), 231–250. http://dx.doi.org/10.1093/oxfordjournals.esr.a036524.
Anger, Christina, Plünnecke, Axel, Schmidt, Jörg, 2010. Bildungsrenditen in Deutschland - Einflussfaktoren, politische Optionen und volkswirtschaftliche Effekte [Returns to education in Germany - political options and economic effects]. Cologne Institute for Economic Research.
Becker, Gary S., 1964. Human Capital: a Theoretical and Empirical Analysis, with Special Reference to Education. Chicago University Press, Chicago.
Biemann, Torsten, Fasang, Anette E., Grunow, Daniela, 2011. Do economic globalization and industry growth destabilize Careers? An analysis of career complexity and career patterns over time. Organ. Stud. 32 (12), 1639–1663. http://dx.doi.org/10.1177/0170840611421246.
Bills, David B., 2003. Credentials, signals, and screens: explaining the relationship between schooling and job assignment. Rev. Educ. Res. 73 (4), 441–449. http://dx.doi.org/10.3102/00346543073004441.
Boudon, Raymond, 1974. Educational growth and economic equality. Qual. Quantity 8 (1), 1–10. http://dx.doi.org/10.1007/BF00205861.
Brand, Jennie E., Halaby, Charles N., 2006. Regression and matching estimates of the effects of elite college attendance on educational and career achievement. Soc. Sci. Res. 35 (3), 749–770. http://dx.doi.org/10.1016/j.ssresearch.2005.06.006.
Brand, Jennie E., Xie, Yu, 2010. Who benefits most from college? Evidence for negative selection in heterogeneous economic returns to higher education. Am. Socio. Rev. 75 (2), 273–302.
Brändle, Tobias, Lengfeld, Holger, 2016. Erzielen Studierende ohne Abitur geringeren Studienerfolg? Befunde einer quantitativen Fallstudie [Do Students without a General Qualification for University Entrance Show Lower Academic Performance? Findings from a Quantitative Case Study]. Z. Soziol. 44 (6), 447–467. http://dx.doi.org/10.1515/zfsoz-2015-0605.
Breen, Richard, Goldthorpe, John H., 1997. Explaining educational differentials. Ration. Soc. 9 (3), 275–305. http://dx.doi.org/10.1177/104346397009003002.
Brint, Steven, Cantwell, Allison M., Hanneman, Robert A., 2008. The two cultures of undergraduate academic engagement. Res. High. Educ. 49 (5), 383–402. http://dx.doi.org/10.1007/s11162-008-9090-y.
Brooks, Rachel, Waters, Johanna, 2010. Social networks and educational mobility: the experiences of UK students. Glob. Soc. Educ. 8 (1), 143–157. http://dx.doi.org/10.1080/14767720903574132.
Buis, Maarten L., 2013. The composition of family background: the influence of the economic and cultural resources of both parents on the Offspring's educational attainment in The Netherlands between 1939 and 1991. Eur. Socio Rev. 29 (3), 593–602. http://dx.doi.org/10.1093/esr/jcs009.
Caliendo, Marco, Kopeinig, Sabine, 2008. Some practical guidance for the implementation of propensity score matching. J. Econ. Surv. 22 (1), 31–72. http://dx.doi.

org/10.1111/j.1467-6419.2007.00527.x.
Carlson, Sören, 2013. Becoming a mobile student – a processual perspective on German degree student mobility. Popul. Space Place 19 (2), 168–180. http://dx.doi.org/10.1002/psp.1749.
Chiswick, Barry R., Miller, Paul W., 2009. The international transferability of immigrants' human capital. Econ. Educ. Rev. 28 (2), 162–169. http://dx.doi.org/10.1016/j.econedurev.2008.07.002.
Davidson, Thomas, Sanyal, Paromita, 2017. Associational participation and network expansion: microcredit self-help groups and poor women's social ties in rural India. Soc. Forces 95 (4), 1695–1724. https://doi.org/10.1093/sf/sox021.
Deaton, Angus, 1997. The Analysis of Household Surveys: a Microeconometric Approach to Development Policy. World Bank Publications, Washington, D.C.
Deutscher Akademischer Austauschdienst (DAAD), and Deutsches Zentrum für Hochschul- und Wissenschaftsforschung (DZHW), 2017. Wissenschaft Weltoffen: Daten und Fakten zur Internationalität von Studium und Forschung in Deutschland [Facts and Figures on the International Nature of Studies and Research in Germany]. http://www.wissenschaftweltoffen.de/publikation/wiwe_2017_verlinkt.pdf.
Di Pietro, Giorgio, 2012. Does studying abroad cause international labor mobility? Evidence from Italy. Econ. Lett. 117 (3), 632–635. http://dx.doi.org/10.1016/j.econlet.2012.08.007.
Di Pietro, Giorgio, 2015. Do study abroad programs enhance the employability of graduates? Educ. Finance Pol. 10 (2), 223–243. http://dx.doi.org/10.1162/EDFP_a_00159.
Di Pietro, Giorgio, Page, Lionel, 2008. Who studies Abroad? Evidence from France and Italy. Eur. J. Educ. 43 (3), 389–398. http://dx.doi.org/10.1111/j.1465-3435.2008.00355.x.
Erola, Jani, Jalonen, Sanni, Lehti, Hannu, 2016. Parental education, class and income over early life course and children's achievement. Res. Soc. Stratif. Mobil. 44, 33–43. http://dx.doi.org/10.1016/j.rssm.2016.01.003.
Euler, Hanns P., Rami, Ursula, Glaser, Evelyne, Reber, Gerhard, Bacher, Johann, 2013. Lohnt sich ein Auslandsaufenthalt während des Studiums? Ergebnisse der Evaluierung eines Förderprogrammes. [Is it worth staying abroad during studies? Evaluation of a funding program]. DBW Die Betriebswirtschaft 73 (5), 425–446.
Falk, Susanne, Sackmann, Reinhold, Struck, Olaf, Weymann, Ansgar, Windzio, Michael, Wingens, Matthias, 2000. Gemeinsame Startbedingungen in Ost und West? Risiken beim Berufseinstieg und deren Folgen im weiteren Erwerbsverlauf [Common starting conditions in East and West? Risks at labor market entry and consequences for career development]. Sfb 186 -Arbeitspapier Nr. 65.
Featherman, David L., Jones, F. Lancaster, Hauser, Robert M., 1975. Assumptions of social mobility research in the U.S. The case of occupational status. Soc. Sci Res. 4 (4), 329–360. https://doi.org/10.1016/0049-089X(75)90002-2.
Finger, Claudia, 2011. The Social Selectivity of Internal Mobility Among German University Student - a Multi-level Analysis of the Impact of the Bologna Process. WZB Discussion Paper SP I 2011-503. Unpublished manuscript, last modified July 03, 2012. http://bibliothek.wzb.eu/pdf/2011/i11-503.pdf.
Freidson, Eliot, 1999. Theory of professionalism: method and substance. Int. Rev. Sociol. 9 (1), 117–129. http://dx.doi.org/10.1080/03906701.1999.9971301.
Friedberg, Rachel M., 2000. You Can't take it with You? Immigrant assimilation and the portability of human capital. J. Labor Econ. 18 (2), 221–251. http://dx.doi.org/10.1086/209957.
Gangl, Markus, 2002. Changing labour markets and early career outcomes: labour market entry in Europe over the past decade. Work. Employ. Soc. 16 (1), 67–90. http://dx.doi.org/10.1177/09500170222119254.
Gangl, Markus, 2015. Matching estimators for treatment effects. In: Best, Henning, Wolf, Christof (Eds.), The Sage Handbook of Regression Analysis and Causal Inference. SAGE Publications, Los Angeles, pp. 251–274.
Ganzeboom, Harry B., Treiman, Donald J., 1996. Internationally comparable measures of occupational status for the 1988 international standard classification of occupations. Soc. Sci. Res. 25 (3), 201–239. http://dx.doi.org/10.1006/ssre.1996.0010.
Gebel, Michael, 2009. Fixed-term contracts at labour market entry in west Germany: implications for job search and first job quality. Eur. Socio Rev. 25 (6), 661. http://dx.doi.org/10.1093/esr/jcp005.
Gerber, Theodore P., Cheung, Sin Yi, 2008. Horizontal stratification in postsecondary education: forms, explanations, and implications. Annu. Rev. Sociol. 34 (1), 299–318. https://doi.org/10.1146/annurev.soc.34.040507.134604.
Gerhards, Jürgen, Hans, Silke, 2013. Transnational human capital, education, and social inequality. Analyses of international student exchange. Z. Soziol. 42 (2), 99–117. http://dx.doi.org/10.1515/zfsoz-2013-0203.
Gerhards, Jürgen, Németh, Boróka, 2015. Ökonomisches Kapital der Eltern und Medizinstudium im Ausland. Wie Europäisierungs- und Globalisierungsprozesse die Reproduktion sozialer Ungleichheiten verändern. [Parental economic capital and medical studies abroad. How Europeanization and globalization change reproduction of social inequalities]. Berliner J. Soziol. 25 (3), 283–301. http://dx.doi.org/10.1007/s11609-015-0290-y.
Giesecke, Johannes, Heisig, Jan P., 2011. Destabilization and destandardization: for Whom? The development of west German job mobility since 1984. Schmollers Jahrb. 131 (2), 301–314. http://dx.doi.org/10.3790/schm.131.2.301.
Haelermans, Carla, de Witte, Kristof, 2015 July July. Does residential mobility improve educational outcomes? Evidence from the Netherlands. Soc. Sci. Research 52, 351–369. https://doi.org:10.1016/j.ssresearch.2015.02.008.
Hilmer, Michael J., 2002. Student migration and institution control as screening devices. Econ. Lett. 76 (1), 19–25. http://dx.doi.org/10.1016/S0165-1765(02)00021-6.
Hollis, Martin, 1982. Education as a positional good. J. Philos. Educ. 16 (2), 235–244. http://dx.doi.org/10.1111/j.1467-9752.1982.tb00615.x.
Janson, Kerstin, Schomburg, Harald, Teichler, Ulrich, 2009. The professional value of ERASMUS mobility: the impact of international experience on former students' and on teachers' careers. In: Cairns, David (Ed.), ACA Papers on International Cooperation in Education. Lemmens, Bonn.
Kalleberg, Arne L., Sørensen, Aage B., 1979. The sociology of labor markets. Annu. Rev. Sociol. 5 (1), 351–379. http://dx.doi.org/10.1146/annurev.so.05.080179.002031.
Kerckhoff, Alan C., 1995. Institutional arrangements and stratification processes in industrial societies. Annu. Rev. Sociol. 21 (1), 323–347. http://dx.doi.org/10.1146/annurev.so.21.080195.001543.
King, Russell, Findlay, Allan, 2015. 11 student migration. In: Martiniello, Marco, Rath, Jan (Eds.), An Introduction to International Migration Studies: European Perspectives. Amsterdam University Press, Amsterdam, pp. 259–280.
Kinginger, Celeste, 2008. Modern Language Journal Monograph Series. Language Learning in Study Abroad: Case Histories of Americans in France, vol. 1 Blackwell, Oxford.
Kjelland, Jim, 2008. Economic returns to higher education: signaling v. Human capital theory: an analysis of competing theories. The Park Place Economist 16 (1), 70–77.
Klein, Markus, 2016. The association between graduates' field of study and occupational attainment in West Germany, 1980–2008. J. Lab. Mark. Res. 49 (1), 43–58. http://dx.doi.org/10.1007/s12651-016-0201-5.
Kleinert, Corinna, Matthes, Britta, Antoni, Manfred, Drasch, Katrin, Ruland, Michael, Trahms, Annette, 2011. ALWA – new life course data for Germany. Schmollers Jahrb. 04, 525–634. http://dx.doi.org/10.3790/schm.131.4.625.
Kratz, Fabian, Netz, Nicolai, 2016. Which mechanisms explain monetary returns to international student mobility? Stud. High Educ. 1–26. http://dx.doi.org/10.1080/03075079.2016.1172307.
Kurz, Karin, Steinhage, Nikolei, 2001. Globaler Wettbewerb und Unsicherheiten beim Einstieg in den Arbeitsmarkt [Global competition and uncertainties at labor market entry]. Berliner J. Soziol. 11 (4), 513–531. http://dx.doi.org/10.1007/BF03204035.
Leuze, Kathrin, 2007. What makes for a good Start? Consequences of occupation-specific higher education for career mobility: Germany and great Britain compared. Int. J. Sociol. 37 (2), 29–53. http://dx.doi.org/10.2753/IJS0020-7659370202.
Leuze, Kathrin, 2010. Smooth Path or Long and Winding Road? How Institutions Shape the Transition from Higher Education to Work. Farmington Hills/Mich. Budrich UniPress, Opladen.
Leuze, Kathrin, 2011. Higher education and graduate employment: the importance of occupational specificity in Germany and Britain. In: Clasen, Jochen (Ed.), Converging Worlds of Welfare? British and German Social Policy in the 21st Century. Oxford University Press, Oxford/New York, NY, pp. 245–265. http://dx.doi.

org/10.1093/acprof:oso/9780199584499.003.0012.
Lindberg, Matti E., 2009. Student and early career mobility patterns among highly educated people in Germany, Finland, Italy, and the United Kingdom. High Educ. 58 (3), 339–358. http://dx.doi.org/10.1007/s10734-009-9198-9.
Lörz, Markus, Krawietz, Marian, 2011. Internationale Mobiltät und soziale Selektivität: ausmaß, Mechanismen und Entwicklung herkunftsspezifischer Unterschiede zwischen 1990 und 2005 [International mobility and social selectivity: extent, mechanisms, and development of origin-specific differences between 1990 and 2005]. Kölner Z. Soziol. Sozialpsychol. 63, 185–205. http://dx.doi.org/10.1007/s11577-011-0134-5.
Lörz, Markus, Netz, Nicolai, Quast, Heiko, 2016. Why do students from underprivileged families less often intend to study abroad? High Educ. 72 (2), 153–174. http://dx.doi.org/10.1007/s10734-015-9943-1.
Lörz, Markus, Schindler, Steffen, 2009. Educational expansion and effects on the transition to higher education: has the effect of social background characteristics declined or just moved to the next stage? In: Hadjar, Andreas, Becker, Rolf (Eds.), Exected and Unexpected Consequences of the Educational Expansion in Europe and the US: Theoretical Approaches and Empirical Findings in Comparative Perspective. Haupt Verlag, Berlin, Stuttgart, Vienna, pp. 97–110.
Messer, Dolores, Wolter, Stefan C., 2007. Are student exchange programs worth it? High Educ. 54 (5), 647–663. http://dx.doi.org/10.1007/s10734-006-9016-6.
Mincer, Jacob, 1958. Investment in human capital and personal income distribution. J. Polit. Econ. 66 (4), 282–302. http://dx.doi.org/10.1086/258055.
Morgan, Stephen L., Harding, David J., 2006. Matching estimators of causal effects. Socio. Meth. Res. 35 (1), 3–60. http://dx.doi.org/10.1177/0049124106289164.
Morgan, Stephen L., Todd, Jennifer J., 2008. A diagnostic routine for the detection of consequential heterogeneity of causal effects. Socio. Meth. 38 (1), 231–281. http://dx.doi.org/10.1111/j.1467-9531.2008.00204.x.
Morgan, Stephen L., Winship, Christopher, 2015. Counterfactuals and Causal Inference: Methods and Principles for Social Research. Cambridge University Press, New York, NY.
Müller, Walter, 2005. Education and youth integration into european labour markets. Int. J. Comp. Sociol. 46 (5–6), 461–485. http://dx.doi.org/10.1177/0020715205060048.
Müller, Walter, Brauns, Hildegard, Steinmann, Susanne, 2002. Expansion und Erträge tertiärer Bildung in Deutschland, Frankreich und im Vereinigten Königreich. [Expansion of tertiary education and economic returns in Germany, France and the United Kingdom]. Berliner J. Soziol. 12 (1), 37–62. http://dx.doi.org/10.1007/BF03204042.
Müller, Walter, Steinmann, Susanne, Ell, Renate, 1995. Education and Labour-market Entry in Germany. Working Papers AB I/Nr. 10.
Netz, Nicolai, Finger, Claudia, 2016. New horizontal inequalities in German higher Education? Social selectivity of studying abroad between 1991 and 2012. Sociol. Educ. http://dx.doi.org/10.1177/0038040715627196.
Oosterbeek, Hessel, Webbink, Dinand, 2006. Asessing the returns to studying abroad. CPB discussion paper 64.
Opper, Susan, Teichler, Ulrich, Carlson, Jerry, 1990. Impacts of study abroad programmes on students and graduates. In: In: Burn, Barbara B., a, u (Eds.), Higher Education Policy Series, vol. 11. Kingsley, London, pp. 2.
Opper, Susan, 1991. Study abroad: a competitive edge for women? Oxf. Rev. Educ. 17 (1), 45–64. http://dx.doi.org/10.1080/0305498910170104.
Parey, Matthias, Waldinger, Fabian, 2011. Studying abroad and the effect on international labour market mobility: evidence from the introduction of ERASMUS. Econ. J. 121 (551), 194–222. http://dx.doi.org/10.1111/j.1468-0297.2010.02369.x.
Petzold, Knut, 2017a. Studying abroad as a sorting criterion in the recruitment process. A field experiment among German employers. J. Stud. Int. Educ. 21 (5), 412–430. http://dx.doi.org/10.1177/1028315317697543.
Petzold, Knut, 2017b. The role of international student mobility in hiring decisions. A vignette experiment among German employers. J. Educ. Work 30 (8), 893–911. https://doi.org/10.1080/13639080.2017.1386775.
Petzold, Knut, Peter, Tamara, 2015. The social norm to study abroad: determinants and effects. High Educ. 69 (6), 885–900. http://dx.doi.org/10.1007/s10734-014-9811-4.
Potts, Davina, 2015. Understanding the early career benefits of learning abroad programs. J. Stud. Int. Educ. 19 (5), 441–459. http://dx.doi.org/10.1177/1028315315579241.
Powell, Justin J.W., Finger, Claudia, 2013. The Bologna Process's model of mobility in Europe: the relationship of its spatial and social dimensions. Eur. Educ. Res. J. 12 (2), 270–285. http://dx.doi.org/10.2304/eerj.2013.12.2.270.
Reimer, David, Noelke, Clemens, Kucel, Aleksander, 2008. Labor market effects of field of study in comparative perspective. Int. J. Comp. Sociol. 49 (4–5), 233–256. http://dx.doi.org/10.1177/0020715208093076.
Reimer, David, Pollak, Reinhard, 2010. Educational expansion and its consequences for vertical and horizontal inequalities in access to higher education in west Germany. Eur. Socio Rev. 26 (4), 415–430. http://dx.doi.org/10.1093/esr/jcp029.
Rodrigues, Margarida, 2013. Does Student Mobility during Higher Education Pay? Evidence from 16 European Countries. Publications Office of the European Union, Luxembourg.
Roksa, Josipa, Levey, Tania, 2010. What can you do with that Degree? College major and occupational status of college graduates over time. Soc. Forces 89 (2), 389–415. http://dx.doi.org/10.1353/sof.2010.0085.
Rosenbaum, Paul R., 2010. Design of Observational Studies. Springer New York, New York, NY.
Rospigliosi, Asher P., Greener, Sue, Bourner, Tom, Sheehan, Maura, 2014. Human capital or signalling, unpacking the graduate premium. Int. J. Soc. Econ. 41 (5), 420–432. http://dx.doi.org/10.1108/IJSE-03-2013-0056.
Salisbury, Mark H., Umbach, Paul D., Paulsen, Michael B., Pascarella, Ernest T., 2009. Going global: understanding the choice process of the intend to study abroad. Res. High. Educ. 50, 119–143. http://dx.doi.org/10.1007/s11162-008-9111-x.
Saniter, Nils, Siedler, Thomas, 2014. Door Opener or Waste of Time? the Effects of Student Internships on Labor Market Outcomes. IZA Discussion Papers 8141.
Scherer, Stefani, 2005. Patterns of labour market entry – long wait or career Instability? An empirical comparison of Italy, great Britain and west Germany. Eur. Socio Rev. 21 (5), 427–440. http://dx.doi.org/10.1093/esr/jci029.
Schindler, Steffen, Lörz, Markus, 2012. Mechanisms of social inequality development: primary and secondary effects in the transition to tertiary education between 1976 and 2005. Eur. Socio Rev. 28 (5), 647–660. http://dx.doi.org/10.1093/esr/jcr032.
Schultz, Theodore W., 1961. Investment in human capital. Am. Econ. Rev. 51 (1), 1–17.
Sorrenti, Giuseppe, 2017 (October). The Spanish or the German Apartment? Study abroad and the acquisition of permanent skills. Econ. Educ. Rev. 60, 142–158. http://dx.doi.org/10.1016/j.econedurev.2017.07.001.
Souto-Otero, Manuel, 2008. The socio-economic background of erasmus students: a trend towards wider inclusion? Int. Rev. Educ. 54 (2), 135–154. http://dx.doi.org/10.1007/s11159-007-9081-9.
Spence, Michael, 1973. Job market signaling. Q. J. Econ. 87 (3), 355–374. http://dx.doi.org/10.2307/1882010.
Spieß, Erika, Brüch, Andreas, 2002. Auswirkungen von interkulturellen Erfahrungen für die Motivation beruflicher Auslandsaufenthalte ost-und westdeutscher Studierender [The impact of intercultural experiences on the motivation of East and West German students for job related stays abroad]. Z. für Sozialpsychol. 33 (4), 219–228. http://dx.doi.org/10.1024//0044-3514.33.4.219.
Stiglitz, Joseph E., 1975. The theory of 'screening', education, and the distribution of income. Am. Econ. Rev. 65 (3), 283–300.
Stroud, April H., 2010. Who plans (not) to study abroad? An examination of U.S. student intent. J. Stud. Int. Educ. 14 (5), 491–507. http://dx.doi.org/10.1177/1028315309357942.
Teichler, Ulrich, 2012. International student mobility and the Bologna process. Res. Comp. Int. Educ. 7 (1), 34–49. http://dx.doi.org/10.2304/rcie.2012.7.1.34.
Trautwein, Ulrich, Maaz, Kai, Lüdtke, Oliver, Nagy, Gabriel, Husemann, Nicole, Watermann, Rainer, Köller, Olaf, 2006. Studieren an der Berufsakademie oder an der Universität, Fachhochschule oder Pädagogischen Hochschule? [Studying at the Berufsakademie or at the University, Fachhochschule or Pädagogische Hochschule?]. Z. für Erziehungswiss. (ZfE) 9 (3), 393–412. http://dx.doi.org/10.1007/s11618-006-0057-5.
Triventi, Moris, 2013. Stratification in higher education and its relationship with social inequality: a comparative study of 11 european countries. Eur. Socio Rev. 29 (3), 489–502. http://dx.doi.org/10.1093/esr/jcr092.
Tsai, Shu-Ling, 2015. Revisiting selection in heterogeneous returns to college education. 人文及社會科學集刊 27 (2), 323–360.

van de Werfhorst, Herman G., 2004. Systems of Educational Specialization and Labor Market Outcomes in Norway, Australia, and The Netherlands. Int. J. Comp. Sociol. 45 (5), 315–335. https://doi.org/10.1177/0020715204054154.
van Mol, Christof, Timmerman, Christian, 2014. Should I stay or should I Go? An analysis of the determinants of intra-european student mobility. Popul. Space Place 20 (5), 465–479. http://dx.doi.org/10.1002/psp.1833.
Waibel, Stine, Rüger, Heiko, Ette, Andreas, Sauer, Lenore, 2017. Career consequences of transnational educational mobility: a systematic literature review. Educ. Res. Rev. 20, 81–98. http://dx.doi.org/10.1016/j.edurev.2016.12.001.
Waters, Johanna, Brooks, Rachel, 2010. Accidental Achievers? International higher education, class reproductionand privilege in the experiences of UK students overseas. Brit. J. Sociol. Educ. 31 (2), 217–228. http://dx.doi.org/10.1080/01425690903539164.
Waters, Johanna L., 2006. Geographies of cultural capital: education, international migration and family strategies between Hong Kong and Canada. Trans. Inst. Br. Geogr. 31 (2), 179–192. http://dx.doi.org/10.1111/j.1475-5661.2006.00202.x.
Weiss, Andrew, 1995. Human capital vs. Signalling explanations of wages. J. Econ. Perspect. 9 (4), 133–154. http://dx.doi.org/10.1257/jep.9.4.133.
Wiers-Jenssen, Jannecke, 2008. Does higher education attained abroad lead to international jobs? J. Stud. Int. Educ. 12 (2), 101–130. http://dx.doi.org/10.1177/1028315307307656.
Wiers-Jenssen, Jannecke, 2011. Background and employability of mobile vs. Non-Mobile students. Tert. Educ. Manag. 17 (2), 79–100. http://dx.doi.org/10.1080/13583883.2011.562524.
Wiers-Jenssen, Jannecke, 2013. Degree mobility from the nordic countries: background and employability. J. Stud. Int. Educ. 17 (4), 471–491. http://dx.doi.org/10.1177/1028315312463824.

Appendix

Table A.1: Operationalization of Covariates

Variable name	Operationalization
Socio-economic background	
Parental education	Coded 0/1; 1= Father or mother completed higher education degree (ISCED 5A or 6)
Educational trajectory	
Abitur	Coded 0/1; 1= full secondary education completed with Abitur
University type	Categorical variable; (1) Master from traditional university/higher public service career; (2) Bachelor from traditional university, degree from applied university, higher intermediate public service career; (3) Degree from university of cooperative education
Student assistant	Coded 0/1; 1=worked as student assistant during studies or completed an internship
Vocational training	Coded 0/1; 1=completed vocational training prior to or after higher education
Public sector career	Coded 0/1; 1=pursued a career in the public service (higher or higher intermediate level)
Previous mobility experiences	Coded 0/1; 1=previous international experience during primary or secondary school or during voluntary service
Field of Study	Categorical variable; (1) Agrig./Admin./Techn./Oth.; (2) Science, Engineering, Math; (3) Life Science & medicine; (4) Teaching; (5) Social Science & related, Psychology, Social Work; (6) Law *[in case of multiple degrees, the study field with established higher occupational returns was coded]*
Socio-demography	
Region of Birth	Coded 0/1; 1=Born in West Germany
Year of birth	Continuous variable; range is 1965 to 1982
Language skills	
Self-report of number of foreign languages learned (current situation)	Numbers range from 0 to 10
Self-report of competence in English language (current situation)	Answers range from 0 to 5 (0=no competence, 1=very bad; 5= very good)

Table A.2: Fields of study and degree of occupational specificity

Field of Study	Occupational specificity	Primary Occupational Category (three years after degree completion)
Law	High	Lawyers (63%)
Medicine	High	Medical doctors (94%)
Teaching (primary level)	High	Teachers (86%)
Teaching (secondary level)	High	Teachers (65%)
Engineering, architecture	High	Engineers, architects (71%)
Computer science	High	IT professional (75%)
Physics, Chemistry, & related	High	Physicist, chemists, & related scientists (68%)
(Public) Administration incl. Police	High	Public administration professionals and police commissioners (76%)
Other educational studies	Moderate	Teachers (39%), government associate professionals (16%)
Social science & related, Psychology, Social work	Moderate	Social scientist & information professionals (18%), associate professionals (14%)
Life Science	Moderate	Life science professionals (33%), medical assistants (11%)
Math, Statistics	Moderate	Mathematicians, statisticians (45%); teachers (15%)
Technical and Commercial Professionalization	Moderate	Technical professionals (14%), clerks (11%)

Note: based on ALWA data; calculations based on procedure by Roksa & Levey (2010); see also Leuze (2010, 140) and Saniter & Siedler (2014, 44)

Table A.3: Bivariate Correlations (r) between outcome, treatment, and covariates by specificity of field of study

	Full sample		**Graduates from specific fields**		**Graduates from unspecific fields**	
	ISEI 3 YAG	StudyAbroad	ISEI 3 YAG	StudyAbroad	ISEI 3 YAG	StudyAbroad
ISEI 3 years after graduation	1.00		1.00		1.00	
Study Abroad	.07**	1.00	.08*	1.00	.12***	1.00
Higher Educated Parent	.10***	.09***	.13***	.09**	.03	.09*
Abitur	.16***	.10***	.18***	.09**	.17***	.11**
Master Traditional University	.25***	.14***	.34***	.12***	.21***	.16***
Applied Uni./Bachelor Trad. Uni.	-.16***	-.10***	-.28***	-.10**	-.12**	-.10**
Uni. Coorp. Education	-.19***	-.06**	-.15***	-.05^{+}	-.15***	-.09*
Student Assistant	.09***	.09***	.07*	.12***	.12**	.04
Vocational Training	-.19***	-.08***	-.16***	-.06*	-.19***	-.12**
Career in Public Sector	-.06**	-.07**	-.15***	-.09	.01	-.03
Previous mobility experiences	.03	.10***	.05	.08**	.07^{+}	.11**
Field of Study						
Agrig./admin./techn./oth.	-.26***	-.10**	-.44***	-.10***	-.06	-.09*
Science, Eng., Math	.25***	-.06*	.08**	-.05	.14***	.00
Medicine & Life Science	.26***	0.05*	.43***	.13***	.07^{+}	-.05
Teaching	-.05*	.04	-.13***	.08*	.00	-.02
Soc. sci., Psych., Social Work	-.28***	.08***	.	.	-.07^{+}	.10*
Law	.18***	-.01	.16***	-.01	.	.
Sex (Male=1)	.10***	-.02	.07*	-.01	.04	-.01
Region of birth (West=1)	.06*	.05^{+}	.06	.05	.03	.05
Year of birth	.04^{+}	.12***	.05	.11***	.00	.13***
Number of languages learned	.08***	.22***	.14***	.17***	.09*	.27***
English speaking competence	.14***	.25***	.15***	.20***	.15***	.30***
	N=1,708		*N=1,050*		*N=658*	

*Note: $^{+}$p<=.1, *p<=.05, **p<=.01, ***p<=0.001; YAG = years after graduation*

Table A.4a: Logistic regression predicting participation in study abroad (full sample)

	Coef.	Std. Err.	[95% Conf. Interval]	
Socio-economic background				
Parent with HE degree	.33*	.16	.02	.64
Educational trajectory				
Abitur	.20	.28	-.35	.74
Degree type				
Reference BA Trad. Uni. or Applied Uni.				
MA Trad. Uni.	0.36^{+}	.213	-.055	.778
Corp. Uni.	-1.05*	.461	-1.950	-.142
Vocational training	-.15	.19	-.50	.24
Student assistant	0.47*	.21	.06	.88
Public sector career	-1.18	.74	-2.63	.28
Previous mobility experiences	.53*	.26	.01	1.05
Field of Study				
Reference Agrig./Admin./Techn./Oth.				
Science, Eng., Math	.44	.37	-.29	1.17
Life Science & Medicine	.83*	.42	.01	1.65
Teaching	.75^{+}	.42	-.07	1.62
Soc. Sci., Psych., Social Work	1.15**	.37	.42	1.88
Law	.22	.52	-.80	1.25
Socio-demography				
Born in West Germany	.44	.37	-.29	1.17
Year of birth	.83*	.42	.01	1.65

N	1,708
LR chi2(15)	111.34
Prob > chi2	.000
Pseudo R2	.0859

*Note: $^{+}$p<=.1, *p<=.05, **p<=.01, ***p<=0.001; HE = higher education*

Table A.4b: Logistic regression predicting participation in study abroad (only graduates from occupationally unspecific fields)

	Coef.	Std. Err.	[95% Conf.	Interval]
Socio-economic background				
Parent with HE degree	.34	.24	-.13	.81
Educational trajectory				
Abitur	.20	.44	-.66	1.07
Degree type				
Reference BA Trad. Uni. or Applied Uni.				
MA Trad. Uni.	1.49**	.53	.46	2.53
Corp. Uni.	.78	.55	-.30	1.86
Student assistant	-.01	.37	-.74	.72
Vocational training	-.38	.27	-.91	.16
Public sector career	-.01	1.08	-2.13	2.12
Previous mobility experiences	.55	.37	-.18	1.28
Field of Study				
Reference Agrig./Admin./Techn./Oth.				
Science, Eng., Math	.38	.90	-1.39	2.16
Life Science & Medicine	.01	.75	-1.45	1.47
Teaching	.28	.75	-1.19	1.75
Soc. Sci., Psych., Social Work	.98	.63	-.25	2.21
Law	.	.	.	.
Socio-demography				
Born in West Germany	.22	.31	-.39	.83
Year of birth	.07***	.02	.03	.11

N	658
LR chi2(15)	53.20
Prob > chi2	.000
Pseudo R2	.0961

*Note: $^{+}p<=.1$, *p<=.05, **p<=.01, ***p<=0.001; HE = higher education*

Table A.4c: Logistic regression predicting participation in study abroad (only graduates from specific fields)

	Coef.	Std. Err.	[95% Conf. Interval]	
Socio-economic background				
Parent with HE degree	.28	.22	-.15	.71
Educational trajectory				
Abitur	.31	.37	-.42	1.05
Degree type				
Reference BA Trad. Uni or Applied Uni.				
MA Trad. Uni.	-.01	.29	-.58	.56
Corp. Uni.	-1.23	1.05	-3.28	.83
Student assistant	.79***	.26	.28	1.30
Vocational training	.15	.27	-.38	.68
Public sector career	-1.68	1.04	-3.71	.35
Previous mobility experiences	.58	.38	-.17	1.33
Field of Study				
Reference Agrig./Admin./Techn./Oth.				
Science, Eng., Math	.59	.45	-.29	1.47
Life Science & Medicine	1.49**	.53	.45	2.54
Teaching	1.15*	.52	.13	2.17
Soc. Sci., Psych., Social Work	.	.	.	.
Law	.53	.59	-.61	1.68
Socio-demography				
Born in West Germany	.60*	.31	.00	1.21
Year of birth	.05**	.02	.02	.09
N	1,050			
LR chi2(15)	68.36			
Prob > chi2	.000			
Pseudo R2	.0926			

Note: $^{+}$p<=.1, *p<=.05, **p<=.01, ***p<=0.001*; HE = higher education*