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International student mobility and labour market outcomes: an investigation of the role of level of study, type of mobility, and international prestige hierarchies

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Abstract
Over the last decades, there has been increasing interest in the topic of international student mobility (ISM). However, there is surprisingly little analysis of the ways in which different characteristics and types of short-term ISM or the importance of host education systems and labour markets may affect early career outcomes of formerly mobile graduates. Therefore, in this study we explore, first, the relationship between participation in ISM at the Bachelor and Master level and graduates' wages and the duration of education-to-work transitions. Second, we investigate variations in ISM labour market outcomes according to the type of mobility: study, internships, or combinations of both. Third, we examine the relationship between labour market outcomes of formerly mobile students and the country of destination's position in higher education international prestige hierarchies and labour market competitiveness. We use the Dutch National Alumni Survey 2015, a representative survey of higher education graduates in the Netherlands, conducted 1.5 years after graduation. Before controlling for selection into ISM, the results suggest the existence of labour market returns to ISM and that the heterogeneity of ISM experiences matters as labour market outcomes vary according to the level of study, the type of mobility, and the positioning of the country of destination in international prestige hierarchies. However, after controlling for selection into ISM through propensity score matching, the differences in early career outcomes between formerly mobile and non-mobile graduates disappear, suggesting that they cannot be causally attributed to their ISM experience. We explain these results with reference to the characteristics of the Dutch education system and labour market, where restricted possibilities for upward vertical mobility limit returns to ISM in the local labour market.

Keywords International student mobility · Labour market returns · Location-specific capital · The Netherlands

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Introduction

In recent decades, higher education institutions have significantly increased their investment in the preparation of students for the labour market. In line with this development, empirical evidence on the employment outcomes of international student mobility (ISM) has increased over the last decade (see e.g. Cammelli et al. 2008; Di Pietro 2015; Kratz and Netz 2018; Messer and Wolter 2007; Sorrenti 2017; Waibel et al. 2018). However, the heterogeneity in labour market returns of different kinds of ISM experiences has so far been largely neglected in the literature. In this paper, we aim to contribute to closing this gap using data on early career outcomes from a representative sample of Dutch higher education graduates.

We contribute to the literature in three ways. First, studies on labour market returns to ISM that compared formerly mobile and non-mobile graduates (e.g. Kratz and Netz 2018; Wiers-Jenssen 2011) do not generally make a distinction between study levels (Bachelor/Master). Even international statistics on ISM rarely make a distinction between mobility at Bachelor's and Master's level (Kelo et al. 2006). This is unfortunate as it cannot be assumed that the returns to ISM are constant across educational levels.

Second, we distinguish between different types of ISM: study abroad, internships abroad, or combinations of both. Most of the literature on the employment outcomes of ISM focuses on a single type of mobility: internships abroad (e.g. Deakin 2014) or study abroad (e.g. Wiers-Jenssen 2011). In other words, scholars have paid insufficient attention to differences between mobility experiences of a different type. Nevertheless, given the value employers generally attribute to work placements and other previous working experiences during recruitment (Brooks and Youngson 2016; Brown et al. 2004; Bullock et al. 2009), international internships might have a different 'market value' compared with international study experiences (Toncar and Cudmore 2003; Trooboff and Berg 2008).

Third, we investigate whether there are differences in labour market outcomes to ISM depending on the characteristics of the country of destination. It has been argued that the place where one studies is not neutral and can have an effect on later careers (Raghuram 2013). Recent studies have begun to explore the influence higher education rankings or 'world-class' status of higher education institutions on students' study mobility decisions (see e.g. Findlay et al. 2012; Souto-Otero and Enders 2017) and employers' recruitment practices (Souto-Otero and Enders 2017). Similarly, countries also occupy differential positions within a global hierarchy of labour market competitiveness, and the value of international internships in the labour market could be expected to vary depending on the host country's position in that hierarchy, an issue that previous literature has seldom considered. We explore whether these global 'structures of prestige' of higher education systems and of labour markets may be consequential it terms of early career outcomes. After all, employers may not always be able to assess the value of individual foreign higher education institutions or companies where graduates did their internship when recruiting (Wiers-Jenssen 2011). Instead they may resort to more broad-brush considerations about systems. Previous studies have suggested that ISM from less to more economically developed countries and from countries with less strong to countries with stronger higher education systems may yield higher returns (Teichler 2012). Considering that the Netherlands has both a strongly performing higher education system and labour market, examining graduates from Dutch higher education institutions provides a critical test to the widespread view that ISM yields benefits in the labour market. In fact, previous research has singled out the Netherlands as an interesting case, in which negative earnings returns to short international student mobility has been reported (Rodrigues 2013).

Throughout the paper, we distinguish between graduates who did not go abroad and graduates who participated in international student mobility as part of their degree. As such, in this paper, by ISM we refer to international student mobility whereby the ECTS credits earned abroad contributed to students' study programme at a Dutch higher education institution.

Literature review and hypotheses

Labour market returns to international student mobility

If ISM is to be considered an investment in skills that gives students a competitive advantage on the labour market after graduation (Van Mol 2014; Waibel et al. 2018), we should expect ISM to lead to specific labour market returns (Sorrenti 2017). In line with this argument, most of the existing empirical studies undertaken in Europe on the labour market outcomes of ISM indicate that formerly mobile graduates receive higher wages in their country of origin compared with those who did not go abroad during their studies (e.g. Favero and Fucci 2017; Kratz and Netz 2018; Messer and Wolter 2007; Wiers-Jenssen 2011; Wiers-Jenssen and Try 2005) and that they also experience steeper wage growth in their early careers (Cammelli et al. 2008; Kratz and Netz 2018). However, most authors are reluctant to make causal interpretations as self-selection into mobility experiences is likely at play (Wiers-Jenssen et al. 2020). As such, unobserved heterogeneity between formerly mobile and non-mobile graduates explains a large part of the observed wage differences in these studies (e.g. Messer and Wolter 2007).

One of the most advanced analyses in this respect has been developed by Kratz and Netz (2018), who focused on wage differences between graduates from German universities who moved abroad during their studies and those who did not. Their results show that selection effects account for an important share of such wage differences, as well as possible causal mechanisms such as more frequent employer changes and better access to both large companies and multinational companies. Favero and Fucci (2017), making use of longitudinal data from a single Italian university (thus controlling for institutional quality differences between mobility and non-mobile students), report a wage premium to Erasmus mobility of around 7–9%, after employing various techniques to address endogeneity issues in the decision to participate in the programme.

Such positive effects, however, are not documented regarding the transition into employment. A recent systematic review from Waibel et al. (2017), for example, suggests that while students report that ISM improves their career planning skills, it does not necessarily substantially shorten their education-to-work transition. A study of Rodrigues (2013) including 16 European countries even indicated that formerly mobile graduates might experience longer education-to-work transitions compared with non-mobile persons: the longer one goes abroad, the more significant the difference between both groups in the duration of their respective education-to-work transitions becomes. Waibel et al. (2017: 92) relate these findings not only to potential problems in human capital transferability but 'also to job seekers' commitment to finding a *suitable* employment matching his or her aspirations'.

Given this previous empirical literature, we expect that graduates from Dutch universities who participated in ISM during their studies gain higher wages (*hypothesis 1)* but take more time in the transition to their first job than non-mobile graduates (*hypothesis 2*).

Differentiating factors

In a context characterized by congested labour markets and an increase in the number of higher education graduates who participated in ISM, we could expect the heterogeneity of an ISM experience to become more important for early career outcomes. With regard to job matching, the 'heterogeneous skills within qualification levels' hypothesis (Mason et al. 2009) suggests that employers try to grasp the heterogeneity that exists *within* educational qualification categories during the recruitment process (Allen and van der Velden 2001; Mason et al. 2009) in the context of 'education inflation' (Côté and Allahar 1996), whereby the relative value of educational degrees diminishes because of an increasing number of individuals obtaining similar degrees. In a similar vein, it can be expected that, with the increasing popularity of ISM, employers do not merely screen applications for foreign experience but also take differentiating factors with regard to that experience into account.

Recent work on ISM has already started to explore heterogeneous effects of ISM. Waibel et al. (2018), for example, indicate that occupational returns to international study experiences are heterogeneous in the German context. More specifically, they revealed a positive return for those who graduate in occupationally unspecific fields of study (e.g. Life Sciences, Social Sciences) but not for graduates from occupationally specific fields of study (e.g. Law, Medicine). Furthermore, their study indicated heterogeneous effects depending on students' social background: those who are less likely to study abroad due to their background characteristics are more likely to be rewarded in the labour market for their study abroad experiences. Subject matter and student profile are, thus, relevant characteristics shaping the career outcomes of international mobility in the German context. In this paper, using data from the Netherlands, we expand the analysis to focus on three other factors that may be expected to affect the early career outcomes of ISM: the study level when the experience took place, the type of international experience, and the country where students spent their period abroad. In the following sections, we elaborate on these three factors.

Study level

The ISM-literature does not generally distinguish between the degree levels wherein the experience took place. Nevertheless, this might be a relevant factor as going abroad in different phases of a student's study career might have a different impact on her/his career. Employers screen job applications looking for indicators that the candidate has acquired certain desired skills and make inferences about the applicants' skills, personality (Cole et al. 2009), and ability (Chen et al. 2011). Through these inferences, employers make predicitions about the applicants' skills, suitability, potential performance, and fit within the broader context of the organization (Cole et al. 2007; Tsai et al. 2011). If ISM is a differentiating factor that can help a candidate 'stand out from the crowd' by signalling his/her achievement of life experiences, cultural awareness, and non-cognitive skills (such as entrepreneurship and organization skills), Bachelor's mobility can be expected to have greater returns than later mobility (hypothesis 3), as a signal of 'early achievement' of those skills. In addition, international enrolment increases substantially at the Master level: the proportion of incoming students at least doubles between bachelor's and master's levels in nearly two thirds of OECD countries (OECD 2019). As the labour market returns to ISM are larger in contexts where the share of graduates with international experience is lower (Jacob et al. 2019, figure 6), we expect that increasing participation in

ISM during the master phase potentially makes ISM during this study phase less of a differentiating factor.

Type of international study experience

Participating in an international study exchange might have a different impact compared with doing an international internship (Neumeyer and Pietrzyk 2016). Relevant work experience has been shown to have a substantial impact, for example, on graduates' chances of getting invited to a job interview (Humburg and van der Velden 2015), although the literature on internships is less clear about its labour market outcomes, with a range of studies reporting low or no positive effects (Saniter and Siedler 2014; Klein and Weiss 2011). An international internship, however, can be considered to provide students with relevant transnational work experience (Neumeyer and Pietrzyk 2016) valued by employers. The scarce literature that has investigated whether international study experiences and internships lead to different labour market outcomes so far suggests a larger return for internships (Kratz and Netz 2018; Toncar and Cudmore 2003; Trooboff and Berg 2008). A study of Deakin (2012), who conducted 40 semi-structured interviews with British students who completed an Erasmus work placement in industry indicated, for example, that these students considered their international internship experience to be of high value for their employability after graduation. The study of Van Mol (2017) on employers' perceptions on the value of study abroad in 31 European countries seems to confirm these findings as it indicated that international internships are more highly valued by employers than international study experiences when recruiting new employees. Following this literature, we expect international internships to yield higher rewards in the labour market than international study (*hypothesis 4*).

Location-specific capital and systemic hierarchies: the importance of 'place'

To our knowledge, no study to date has analysed whether the gains from study abroad differ depending on the location where the graduate spent his/her ISM experience, despite the theoretical and empirical relevance of this aspect. Teichler distinguished between 'horizontal' and 'vertical' student mobility (Rivza and Teichler 2007; Teichler 2004). Vertical mobility can be understood as a move to countries with a superior (positive vertical mobility) or inferior (negative vertical mobility) academic or economic system. Horizontal mobility, by contrast, refers to mobility to countries or institutions with a roughly equal level of academic quality or economic development as those at home.

The above differentiation refers to the existence of education (and economic) 'systems' and an independent effect of these systems, beyond the effects of individual host institutions on the outcomes of mobility. By explicitly zooming in on differences in labour market outcomes depending on the country where students went, our study follows a recent line of inquiry in the international student mobility literature, which emphasizes the importance of 'place' in the study of ISM dynamics (Prazeres et al. 2017). Biao and Shen (2009, cited in Prazeres et al. 2017: 116) pointed out 'that countries and cities are differentially ordered within an academic reputability hierarchy, with countries such as the US and the UK positioned at the top tier while other countries descend lower in the ranks'. Raghuram (2013) argues that destinations stand in a hierarchical order in terms of desirability and distinctiveness. As Prazeres et al. (2017) argue, the symbolic currency and capacity of place to negotiate distinction might potentially exist *above* educational prestige of individual educational institutions.

When considering the returns to ISM in relation to 'place', two hypotheses can be formulated. First, positive vertical ISM (to a country with a higher reputation than the home country of study in terms of the higher education system) might be more beneficial in career terms than horizontal ISM, whereas negative vertical ISM (to a country with a lower reputation) will be the least beneficial (*hypothesis 5)*. Second, as students generally do their internships in companies, not in higher education institutions, we expect that international internships will be judged under different criteria to study periods. As such, we hypothesize that doing an internship in countries that are characterized by a higher ranking in terms of labour market performance than the home country of study (positive vertical labour market mobility) might be more valuable than horizontal or negative vertical labour market mobility (*hypothesis 6)*.

The Dutch context

The Netherlands is a high performer in both international labour market and higher education rankings. For example, in 2015—the year of the survey on which this study is based—the Netherlands was ranked 5th on the Global Innovation Index (Cornell University et al. 2015), the Innovation Union Scoreboard (European Commission 2015), and the Global Competitiveness Index (World Economic Forum 2015). When consulting international higher education rankings, a similar pattern can be observed. For example, the Netherlands is ranked 7th in the U21 Ranking of National Higher Education Systems 2015, which covered 25 national higher education systems in the world (Williams et al. 2015), as well as in the QS Higher Education System Strength Rankings 2016, covering 75 systems. Altogether, this indicates Dutch students have limited options in terms of positive vertical mobility to more highly regarded higher education systems and/or more competitive labour markets.

The internationalization of Dutch higher education has been actively promoted for about 25 years through policies of the Dutch government and the European Commission (Nuffic 2019). In 2015–2016, 25% of higher education graduates had participated in an international exchange at some point during their studies, about half of them through the European exchange programme Erasmus or its successor Erasmus+ higher education (Nuffic 2019: 96). Compared with other European countries, Dutch higher education students are very mobile: the share of higher education students that participate in programme-based international mobility on the graduate population is only higher in Finland, France, Norway, Slovenia, and Sweden (Nuffic 2019: 97). When considering the employment situation of Dutch higher education graduates, it can be observed that 94% of them have a job 1–3 years after graduation (Eurostat 2018). Out of 35 European countries, only Iceland and Malta have higher employment rates for recent higher education graduates, indicating that Dutch graduates incorporate relatively smoothly into the labour market compared with other European countries. Overall, existing research on the Netherlands indicates that former exchange students do not have a better labour market position compared with those who did not move (Nuffic 2019). The main difference between those with an international mobility experience and those who do not have it seems to be a more international orientation in the early career path of the formerly mobile students (Nuffic 2019). These results are in line with results reported by Van Mol (2017), which indicated that only 9.6% of Dutch employers took international study experience into account when recruiting graduates over the previous 12 months.

However, the same study also indicated that international internship experiences seem to be somewhat more valued: 17.4% of the surveyed Dutch employers reported to take this into account when recruiting graduates.

Methodology

Data

Our analysis is based on the Dutch National Alumni (NAE) 2015 survey, which is a nationally representative survey of all recent graduates from Dutch universities. It records the educational and labour market trajectories of graduates approximately one and a half years after their graduation. The surveys were conducted in the autumn of 2015. Graduates could complete either an online or a paper-pencil questionnaire. Graduates from all Dutch Bachelor and Master programmes who completed their degree were approached between October 1, 2013, and September 30, 2014, for participation in the NAE 2015 survey. The response rate to the 2015 NAE was 21.4%, generating 8140 responses.

Respondents in the NAE 2015 survey were between 22 and 72 years old. We restricted the sample to individuals aged 22 to 35 at the time of the survey. After all, respondents who were over 35 years old at the time of survey ($n = 516$) are likely to already have substantial professional experience and thus different labour market trajectories compared with those aged 35 and younger. We further restricted our sample to graduates who were working at the time of the survey, to enable an examination of current wage differentials. This means that graduates who were unemployed at the time of survey—including those who never had previous paid employment—were excluded ($n = 906$). We also excluded respondents who were working abroad at the time of survey ($n = 1942$) as absolute wage levels and education-to-work transitions are not easily comparable across countries due to differences in costs of living and the structure of labour markets, among other factors (see e.g. Donnelly and Pop-Eleches 2018; Jacob et al. 2019).[1] Finally, we also excluded respondents that indicated to have an education-to-work-transition lasting 25 months or more as respondents were surveyed 24 months after their graduation ($n = 4$). Our final sample for analysis comprised 5366 respondents.

Variables

Dependent variables

Our analysis focuses on two labour market outcomes. First, the classical labour market outcome of wage returns, measured as the log of individual's monthly wage, controlling for hours worked. Second, the duration of education-to-work transition, which is measured by a

[1] We estimated models with and without those working abroad, as well as a model with only those working abroad. These models yielded different results: on average, graduates who work abroad have longer education-to-work transitions and lower salaries. Furthermore, they more often have international experience during the Bachelor and Master phase, and only 20% of these graduates have the Dutch nationality (compared to 93% of graduates who work in the Netherlands). As the background characteristics of graduates working abroad are different from those working in the Netherlands, and including them would add analytical challenges to account for the heterogeneity of countries of work (for example in terms of wages for graduate work), we excluded them from the analyses in this paper.

continuous variable indicating the number of months a respondent needed to find his/her first paid job, considering that he or she was actively searching for a job.[2]

Key independent variables

Our key independent variables refer to the experience and characteristics (level of study, type of mobility and host country characteristics) of ISM during higher education studies.

First, the NAE 2015 survey allows us to precisely identify the timing and type of ISM. We considered, first, whether a respondent went abroad during the Bachelor or during the Master phase. Second, in line with our hypothesis on differential early career outcomes by mobility type, we created four categories of international experience: 0 = no foreign experience (reference category), 1 = study abroad, 2 = internship abroad, 3 = both study abroad and internship abroad.

Third, we considered two host country characteristics: economic context (two indicators), which we used for the analysis of international internships, and the national higher education system context (two indicators), which we used for the analysis of international study mobility. Regarding the economic context, we used GDP per capita (log transformed) of the country of destination to indicate economic performance. Second, we used an indicator on the capacity of the destination countries to attract talented people from abroad. This variable is taken from the Global Competitiveness Index 2017–2018 and ranges from 1 (not at all) to 7 (to a great extent). With regard to higher education systems, we used two different indicators from the 2016 QS Higher Education System Strength Rankings: system strength and flagship institution. The system strength variable assigns each country a score based on the number of its institutions that are ranked in the QS World University Rankings, divided by the average position of those institutions. This provides an overall indication of each country's relative standing in the global ranking tables. Flagship institution indicates the performance of each country's leading institution within the global rankings, which could generate a halo effect.

Control variables

In our models, we control for several background, work, and study characteristics of graduates that might affect labour market outcomes. First, background characteristics include gender (measured as a dichotomous variable), a continuous variable indicating the age of the respondents (in years) and a variable that captures respondents' nationality (0 = Dutch, 1 = non-Dutch). We do so because having an immigrant background can have a negative effect on labour market outcomes (see e.g. Zschirnt and Ruedin 2016) and can also play a role in selectivity into mobility (see e.g. Middendorff et al. 2013: 174 for an example on the German context).

Second, we include two variables related to work experience. First, as occupational experience is associated with higher wages (Kambourov and Manovskii 2009), we include a variable indicating whether respondents gained work experience that is relevant for their current field of work, during or in between their higher education studies (0 = no, 1 = yes). Second, we included a control variable measuring whether respondents did any internships in the Netherlands during their studies (0 = no, 1 = yes).

[2] Unfortunately, the data do not allow to set more specific criteria to respondents' first job such as the duration of the first job or the number of hours worked, as the question asked 'How many months did it take, and where you were actively looking for a job, between your graduation and your first paid job?'. Although the data contain information about respondents' current job, this information does not necessarily corresponds to the first paid job.

Finally, we control for four study characteristics. First, whether graduates from Dutch universities studied for another degree after graduation (0 = no, 1 = yes, completed, 2 = yes, still studying, 3 = yes, but quit) as continued education likely affects the labour market outcomes of interest in this study. Second, a variable indicating the 'performance' of graduates during their degree, namely students' final graduation grade, a continuous variable ranging from 1 (a mark of 6) to 9 (a mark of 10). We do so as graduates' average academic performance could be expected to contribute to their employability (Ng et al. 2010), which might also influence their wages positively. We also control for graduates' secondary school track, as a measure of scholastic performance (1 = HAVO, 2 = VWO, 3 = HBO, 4 = combination of HAVO/VWO/HBO, 5 = other). Recent studies in the Dutch context (Di Stasio and van de Werfhorst 2016) have suggested that due to institutional characteristics associated with the country's education system and labour market institutions, employers in the Netherlands may attach less importance to marks obtained than in other countries. Instead, they seem to place greater emphasis on field of study and occupation-specific degrees. As such, labour market outcomes can vary substantially by field of study (Reimer et al. 2008; Van de Werfhorst 2004). Recent research also indicated differences in labour market outcomes related to ISM can be partly explained by the occupational specificity of study fields (Waibel et al. 2018). Given this, we include a fourth study characteristic indicating the study field in which the degree was obtained. Based on the available NAE 2015 categories we distinguish between Health (which we take as reference category in our analysis), Agriculture, Natural Sciences, Engineering, Economy, Law, Social Sciences, Language and Culture, and Education.

A descriptive overview of early career outcomes according to students' ISM experiences is presented in Table 1. Descriptive statistics of all dependent, independent, and control variables, as well as destination country characteristics, can be found in Annex Tables 7 and 8.

Analytical strategy

First, descriptive statistics provide preliminary insights into the differences between graduates with and without ISM. Second, standard OLS regressions were used to investigate the relationship between ISM and early career outcomes (education-to-work transitions and monthly salary). High tolerance values (range 0.41–0.99) and low VIF values (range 1.01–2.45) indicate no multicollinearity between the variables.

Third, we applied Propensity Score Matching (PSM) to further reduce observable selection bias using Stata's user-written software programme 'psmatch2' (Leuven and Sianesi 2003).

Table 1 Descriptive statistics on early career outcomes by ISM experience

		Monthly wage (log)			Duration education-to-work transition (months)		
		Mean	S.E.	*t*	Mean	S.E.	*t*
ISM experience during degree	No	2.72	0.01		1.96	0.05	
	Yes	2.75**	0.01	−2.592	1.70**	0.06	3.053
ISM experience BA phase	No	2.73	0.01		1.89	0.04	
	Yes	2.73	0.01	−0.263	1.75	0.09	1.372
ISM experience MA phase	No	2.72	0.01		1.91	0.05	
	Yes	2.76***	0.01	−3.162	1.70*	0.08	2.038

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

PSM is a technique to match graduates with ISM experiences to similar graduates without such experience and subsequently estimates an 'average treatment effect for the treated' (ATT). The ATT shows the average difference between the outcomes of graduates with international experience and matched control graduates without such experience. Using PSM allows us to control for observable characteristics that might occur when internationally mobile students have characteristics that make them more likely to succeed in the labour market and have better early career outcomes. PSM is thus based on observable differences between mobile and non-mobile students, meaning that we cannot control for bias arising from unobservable characteristics that differ between these two groups.

To study the relationship between ISM and early career outcomes with PSM, we compare respondents with ISM experience to those who did not have such experience but who share a similar propensity to have been internationally mobile. We use several matching variables related to selection into the 'treatment' (ISM) and to the outcome (early career outcomes). These variables are selected based on previous research, which has shown that they influence the likelihood of participation in ISM in the European context, and include gender, age, and nationality (e.g. Böttcher et al. 2016; Middendorff et al. 2013; Netz et al. 2020; Van Mol 2014). These variables are all exogenous to students' international experience. In addition, we control for a range of variables that are possibly not exogenous but that do capture important known features of mobile students, such as field of study (e.g. Waibel et al. 2018), and academic performance and a proactive attitude (measured by average graduation grade, having done a Dutch internship, having had relevant work experience during their studies, and secondary school track)[3]—for a similar approach see Rodrigues (2013).

In order to obtain robust results, we used three different matching estimators to calculate the ATT: Nearest Neighbour (5), Kernel (Gaussian), and Radius matching (calliper 0.01) (Caliendo and Kopeinig 2005). To check whether systematic differences between the two groups disappeared, balancing tests were carried out by comparing mean absolute standardized biases between the treatment and the control group.

Finally, we carried out OLS regression analyses on a sub-sample of graduates who went abroad during their Master's degree ($n = 1150$)—as the results of analyses with Bachelor students are very similar—to study the relationship between the characteristics of the country of destination and early career outcomes. In the analyses, listwise deletion was used for missing values. Given the low percentage of missing values (5.6% missings in the final models), no separate analyses were conducted on the missing data.

Findings

Descriptive findings

Table 1 presents descriptive statistics of early career outcomes according to whether graduates had been internationally mobile and during what phases of their higher education studies (first undertaking an aggregate analysis and then disaggregated into BA or MA). The results show a statistically significant difference in monthly salaries between non-mobile graduates and

[3] Since the meaning of grades might differ by field of study, we also ran an assignment model (not included, available upon request) whereby we interacted the grades and field of study, as this might improve the matching. As the results do not change significantly, we used the assignment model without interactions.

graduates that were mobile at some point during their degree. However, when data are analysed by study level, this relationship holds for MA level mobility, in line with expectations, but not for BA level mobility, which is against our expectations.

The difference in education-to-work transition is slightly more pronounced, with graduates who participated in ISM experiencing shorter education-to-work transitions, which is again against our expectations. Similarly to the finding on monthly salaries, the difference is statistically significant for the whole sample and graduates who participated in ISM during their Master degree but not for graduates that participated in ISM during their Bachelor degree. On the whole, and given this initial analysis, it would appear that the labour market returns to international student mobility in a country where positive vertical mobility can only be limited, like the Netherlands, still exist—particularly at the Master's level—even though they are rather small.

Multivariate analysis

ISM experiences at different study levels, wages, and education-to-work transitions

In Table 2, we present the multivariate results on the relationship between ISM experience, wages, and the length of education-to-work.

Table 2 shows that after controlling for a wide range of factors, the preliminary results reported in Table 1 change: there is a significant relationship between ISM during the Bachelor degree and wages as well as with the duration of the education-to-work transition. Importantly, the type of experience during the Bachelor degree seems to matter: study mobility is the only type of the three mobility types included in our analysis that has a positive association with wages, and international internships are associated with shorter education-to-work transitions. Hypothesis 1 on higher wages for those who participated in study mobility during their degree is hence only partially supported, and hypothesis 2 on longer education-to-work transitions for graduates with a mobility experience is rejected. In fact, the opposite (shorter education-to-work transitions) happens for graduates who participated in international internships during their Bachelor degree.

The coefficients for mobility during the Master phase, on the other hand, become non-significant for wages and for the duration of education-to-work transition. Hypotheses 3 and 4 are thus partly supported: we find some empirical evidence of more beneficial outcomes for those who participate in ISM during their Bachelor degree, but these outcomes are dependent upon the mobility type. Study abroad during the Bachelor correlates with slightly higher wages, and participation in an international internship during graduates' Bachelor degree correlates with shorter education-to-work transitions.

Controlling for selectivity into ISM experiences

In order to take selectivity into ISM into account, we conducted a logistic regression to estimate the propensity scores for students' ISM experience (both for study and internship experiences) during the Bachelor and Master phase, respectively (see Table 3). The results show, first, that female students are more mobile than male students during the BA phase—although this does not hold for mobility during the Master phase. Second, having a non-Dutch nationality is positively associated with ISM during the Bachelor phase but again not during the Master phase. Third, mobile students are more likely to have better academic results and

Table 2 OLS regression on the relationship between ISM experiences and early labour market outcomes, by level of study and type of mobility

	Monthly wage		Duration education-to-work transition (months)	
	Coef.	SE	Coef.	SE
ISM				
Bachelor phase (ref: no)				
Study abroad	0.043**	(0.018)	−0.116	(0.145)
Internship abroad	−0.018	(0.023)	−0.360*	(0.145)
Both	−0.040	(0.090)	−0.313	(0.285)
Master phase (ref: no)				
Study abroad	0.008	(0.021)	0.112	(0.191)
Internship abroad	0.017	(0.013)	0.023	(0.122)
Both	0.032	(0.040)	0.253	(0.236)
Control variables				
Gender (ref: male)	−0.051***	(0.013)	0.244*	(0.091)
Age (years)	0.029***	(0.003)	−0.080***	(0.020)
Nationality (ref: Dutch)	0.013	(0.041)	0.681***	(0.166)
Relevant work experience during study (ref: no)	0.028**	(0.011)	−0.335***	(0.081)
Continued education (ref: no)				
Yes, with degree	0.027	(0.019)	−0.510***	(0.148)
Yes, still studying	−0.053***	(0.013)	−0.793***	(0.099)
Yes, but quit	−0.024	(0.052)	0.145	(0.385)
Dutch internship (ref: no)	0.049***	(0.015)	−0.190*	(0.093)
Average graduation grade	0.030***	(0.009)	−0.430***	(0.075)
Study field (ref: Health)				
Agriculture	−0.200***	(0.022)	0.790**	(0.252)
Natural Sciences	−0.130***	(0.018)	0.178	(0.175)
Engineering	−0.087***	(0.021)	0.047	(0.157)
Economy	−0.094***	(0.024)	−0.185	(0.145)
Law	−0.102***	(0.018)	0.281	(0.187)
Social sciences	−0.162***	(0.017)	0.688***	(0.153)
Language & Culture	−0.265***	(0.021)	0.474*	(0.189)
Education	−0.122***	(0.028)	−0.077	(0.316)
Constant	1.810***	(0.108)	7.357***	(0.874)
Observations	5095		5095	
R^2	0.07		0.05	

Standard errors in parentheses

*$p < .05$, **$p < .01$, ***$p < .001$

engage in relevant work during their Bachelor phase. Mobile students are less likely to have done an internship in the Netherlands during their Master phase. On the whole, the differences of mobile students with their non-mobile peers at BA level seem somewhat more pronounced compared with those of Master students.

In a next step, we checked whether the balancing was successful, looking at *t* tests for equality of means in the treated and untreated groups, both before and after matching. Table 9 (for ISM during the BA phase) and Table 10 (for ISM during the MA phase) in the Annex demonstrate a successful matching procedure, regardless of the matching estimator. There were systematic differences regarding the considered covariates before matching, but no significant differences remain after matching. The balancing tests further show that PSM using the Radius estimator (with Calliper 0.01) resulted in removing the most bias between the

Table 3 Logistic regressions estimating the probability of having international experience during Bachelor and Master phase

	International experience: Bachelor phase		International experience: Master phase	
	b-Coeff.	S.E.	Coef.	S.E.
Gender (ref: male)	0.307***	0.085	0.156	0.084
Age (years)	− 0.010	0.020	0.040*	0.021
Nationality (ref: Dutch)	0.921***	0.144	− 0.035	0.179
Relevant work experience during study period (ref: no)	0.254***	0.077	− 0.049	0.077
Internship in the Netherlands (ref: no)	0.030	0.088	− 0.622***	0.089
Average graduation grade	0.253***	0.069	0.403***	0.069
Secondary school track (ref. HAVO)				
VWO	− 0.358	0.298	0.366	0.360
HBO	− 0.339	0.312	− 0.571	0.389
Combination	0.043	0.309	− 0.183	0.377
Other	− 0.323	0.315	− 0.322	0.381
Study field (ref. Health)				
Agriculture	0.775***	0.205	− 0.109	0.173
Natural sciences	− 0.200	0.192	− 0.834***	0.138
Engineering	0.127	0.168	− 0.460***	0.126
Economy	0.985***	0.145	− 2.186***	0.153
Law	− 0.144	0.196	− 1.777***	0.180
Social sciences	0.159	0.141	− 2.028***	0.132
Language & Culture	0.600***	0.162	− 1.717***	0.161
Education	0.572*	0.282	− 1.899***	0.361
Constant	− 3.626***	0.870	− 4.155***	0.907
Observations	5091		5091	
Pseudo *R*-squared	0.05		0.14	

*$p < .05$, **$p < .01$, ***$p < .001$

treated and untreated groups. We therefore present the ATT with Radius (cal. 0.01) matching for our two outcome variables in Table 4. The results of the other matching estimators are presented in Table 11 in the Annex and are relatively similar to the Radius estimator.

In Table 4, we see the estimated effect of ISM on the early career outcomes. The differences between groups are small. Thus, for Dutch graduates, ISM does not seem to be associated with differences in the early career outcomes we explored in the Dutch labour market, namely monthly wage and duration of work-to-education transition, after controlling for selection mechanisms. As such, hypothesis 1 and hypothesis 2 are rejected.

Table 4 Radius matching (cal. 0.01) estimates of ISM during the BA and MA phase on early career outcomes

	Mean treated	Mean untreated	Difference (ATT)
ISM during BA			
Monthly wage (log)	2.73	2.72	0.02
Duration of work-to-education transition (months)	1.75	1.88	− 0.13
ISM during MA			
Monthly wage (log)	2.77	2.75	0.02
Duration of work-to-education transition (months)	1.72	1.72	0.00

Location-specific capital and systemic hierarchies

Finally, we examined how early career outcomes vary for internationally mobile graduates depending on the host country of their stay abroad. We distinguish between economic characteristics of the host country on the one hand (models I and II, Tables 5 and 6), which we hypothesized would be particularly relevant for explaining early career outcomes related to international internships, and higher education system factors on the other hand (models III and IV, Tables 5 and 6), which we expected to be particularly important in relation to the early career outcomes of ISM. We only present the results of ISM during the Master phase as the results for ISM during the Bachelor phase were very similar (available upon request to the corresponding author). As can be observed, our findings do not support our hypotheses on the beneficial effect of positive vertical mobility in terms of education (hypothesis 5) or labour market context (hypothesis 6) in the case of the Netherlands, an already high-performing country in both respects. No differences can be found regarding wages (Table 5) and when considering the duration of education-to-work transitions (Table 6), it can be noted that graduates who went to countries that rank higher in terms of system strength and the number of flagship institutions on average even experience a slightly longer education-to-work transition, although effects are small they are statistically significant.

Discussion and conclusion

In this paper, we aimed to advance our current understanding of the relation between ISM and early career outcomes, looking at international student mobility of graduates from Dutch higher education institutions who earned ECTS credits abroad that contributed to their Dutch higher education qualification. We particularly focused on heterogeneities within the ISM experience. More specifically, we investigated whether it matters if ISM took place during graduates' Bachelor or Master's degree, the type of mobility (study, internship, or both), and the characteristics of the country where the ISM experience took place.

Our initial results suggested, at first sight, positive early labour market outcomes from ISM even in a context such as the Netherlands, where the possibilities for upward vertical mobility in ISM are rather limited. Moreover, the form of ISM was identified as crucial in the initial

Table 5 OLS regression on the relationship between system hierarchies and wages

	Model I Coef (SE)	Model II Coef (SE)	Model III Coef (SE)	Model IV Coef (SE)
GDP pc	0.000 (0.000)			
Capacity to attract talent (GCI)		0.002 (0.007)		
System strength			− 0.000 (0.000)	
Flagship institution				− 0.000 (0.000)
Constant	2.291*** (0.256)	2.303*** (0.252)	2.300*** (0.253)	2.302*** (0.254)
Observations	768	783	783	783
R^2	0.16	0.16	0.16	0.16

All models control for gender, age, nationality, relevant work experience during study period, duration of the education-to-work transition, continued education, internships, average graduation grade, and study field. Full models can be obtained upon request to the corresponding author. Standard errors in parentheses

*$p < .05$, **$p < .01$, ***$p < .001$

Table 6 OLS regression on the relationship between system hierarchies and the duration of education-to-work transitions

	Model I Coef (SE)	Model II Coef (SE)	Model III Coef (SE)	Model IV Coef (SE)
GDP pc	0.000 (0.000)			
Capacity to attract talent (GCI)		0.084 (0.057)		
System strength			0.006 ** (0.002)	
Flagship institution				0.005 * (0.002)
Constant	6.407 *** (2.176)	6.688 *** (2.143)	6.669 *** (2.131)	6.607 ** (2.140)
Observations	774	789	789	789
R^2	0.08	0.08	0.08	0.08

All models control for gender, age, nationality, relevant work experience during study period, continued education, internships, average graduation grade, and study field. Full models can be obtained upon request to the corresponding author. Standard errors in parentheses

*$p < .05$, **$p < .01$, ***$p < .001$

analysis: ISM during the Bachelor was associated with greater labour market rewards than ISM during the Master phase, and the form of ISM at Bachelor level also appeared to play a role: study mobility during the Bachelor phase was associated with slightly higher wages, whereas participation in international internships was associated to shorter education-to-work transitions—with a stronger effect than internships carried out in the Netherlands, although without their benefits in terms of wage increases.

However, when we account for selection effects through PSM, the differences in early career outcomes in the Dutch labour market between mobile and non-mobile students disappear for both the Bachelor and Master phase. As such, our main result suggests that the reported differences in early career outcomes between Dutch graduates who went abroad and those who did not cannot be causally attributed to their ISM experience. It can be hypothesized that the differences found before controlling for selection effects are connected to pre-existing differences between mobile and non-mobile students. Students' characteristics might thus matter when explaining the positive results of ISM initially found in our data—which is in line with other studies that controlled for selectivity into ISM among Dutch graduates (see Jacob et al. 2019).

Third, we also followed a recent line of inquiry in the ISM-literature on the importance of 'place' (e.g. Prazeres et al. 2017; Raghuram 2013), investigating the relation between global 'structures of prestige' of higher education systems and labour markets and early career outcomes. Our analysis did not support the idea that vertical mobility, whereby students move to countries that are higher or lower ranked in terms of labour markets and higher education systems, is associated with different career outcomes, at least in the case of already strongly performing national graduate labour markets and higher education systems, as is the case in the Netherlands. The results even suggest that when students move to stronger higher education systems, education-to-work transitions might become lengthier, which is in line with our initial expectations of longer education-to-work transitions for those participating in ISM. Although this finding deserves further investigation, it might be explained from a human capital perspective: if students went to a stronger system they might develop higher career-related aspirations and be more selective in their job search after graduation. These students may be willing to wait additional time for a suitable job that offers a good match to the skills acquired abroad or other labour market rewards (Waibel et al. 2017).

In this respect, our results are in line with other studies that indicated the importance of selectivity into ISM in relation to labour market outcomes (e.g. Jacob et al. 2019; Kratz and Netz 2018; Messer and Wolter 2007). Further comparative research is required to investigate whether the presented findings also hold for other national contexts. We focused on the Netherlands, a very particular context to identify returns to international student mobility. As mentioned, the Dutch labour market and higher education system perform highly in international hierarchies, and as a result ISM may be less advantageous in terms of career outcomes for graduates from Dutch institutions. They mainly move horizontally or vertically down to other educational systems, and the positive 'vertical gains' can only be limited. In countries that are ranked lower there are more possibilities for marked upward vertical mobility, which may translate into more pronounced early returns in the labour market. Moreover, the Netherlands registers one of the highest rates of international student mobility in Europe, which may also reduce the differentiating value of international mobility in the national labour market. A recent study of Jacob et al. (2019: 500) supports this idea, as their analysis of early career outcomes in 13 European countries—including the Netherlands—indicates returns in terms of wages and class position to be larger in countries with 'poorer university quality, lower international trade volume, higher graduate unemployment, and with relatively few students going abroad'.

Finally, some limitations of our study should be acknowledged. First, the response rate of 21.4% indicates that the NAE-Survey suffers from non-response bias, a common shortcoming of many graduate surveys. The use of multivariate statistics in our paper helps to partly overcome this shortcoming (see e.g. Rindfuss et al. 2015), but future research that can rely on graduate surveys with higher response rates would be highly valuable. Second, the NAE-Survey does not include any information on socio-economic background, a variable that has been found to be correlated with the decision to study abroad (e.g. Di Pietro and Page 2008; Kratz 2012; Lörz et al. 2016; Orr et al. 2011; Wiers-Jenssen 2011) as well as with educational choices and subsequent labour market outcomes (e.g. Croll 2008; Dustmann 2004). In addition, the survey focuses on early returns to ISM, 1.5 years after graduation, whereas returns to mobility may accrue over a longer term. Third, our sample is limited to graduates from Dutch higher education institutions. Research in other national contexts, both in countries ranking in similar positions as the Netherlands in international rankings and countries that are ranked lower, would—as mentioned—complement our study. Finally, our data did not allow us to investigate differences in terms of the specific higher education institutions or companies students went to. Such fine-grained analysis, however, would be relevant to advance our understanding on the role that specific locations play on labour market outcomes.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethics This paper relies on secondary data analysis of the Dutch National Alumni Survey 2015. The data was provided by the The Association of Universities (VSNU) in the Netherlands, and was conducted by Desan Research Solutions under supervision of the VSNU. The VSNU and Desan Research Solutions informed us that the data collection was not subjected to ethical review. However, all higher education institutions involved in the data collection signed a processor agreement whereby it is explicitly stated that respondents have the opportunity to withdraw from the survey at any point if he or she wishes to do so. Furthermore, the dataset that was made available for our paper is anonymized in order to ensure the privacy and protection of respondents' personal data.

Appendix

Table 7 Descriptive statistics (individual level)

	Mean	S.D.	Min	Max
Dependent variables				
Duration of work-to-education transition (months)	1.87	2.96	0	24
Monthly wage (log)	2.73	0.41	− 5.16	5.85
Independent variables: International experience				
International experience: Bachelor phase				
No international experience	0.82		0	1
Study abroad	0.09		0	1
Internship abroad	0.07		0	1
Both	0.02		0	1
International experience: Master phase				
No international experience	0.80		0	1
Study abroad	0.05		0	1
Internship abroad	0.14		0	1
Both	0.02		0	1
Control variables				
Gender				
Male	0.43		0	1
Female	0.57		0	1
Age (years)	27.45	2.10	22	35
Nationality				
Dutch	0.93		0	1
Non-Dutch	0.07		0	1
Relevant work experience during study period				
No	0.53		0	1
Yes	0.47		0	1
Continued education after degree				
No	0.71		0	1
Yes, with degree	0.08		0	1
Yes, still studying	0.20		0	1
Yes, but quit	0.01		0	1
Dutch internship				
No	0.27		0	1
Yes	0.73		0	1
Average graduation grade	7.47	0.56	6	9.5
Study field				
Agriculture	0.04		0	1
Natural sciences	0.09		0	1
Engineering	0.12		0	1
Health	0.14		0	1
Economy	0.18		0	1
Law	0.08		0	1
Social sciences	0.23		0	1
Language & Culture	0.09		0	1
Education	0.02		0	1
	$N = 5065$			

Table 8 Descriptive statistics (country level)

Country	*N*	Capacity to attract talent (GCI)	System strength (QS)	Flagship (QS)	GDP per capita
Netherlands		5.1	89.3	92.9	49,527.67
United Kingdom	121	6.0	98.6	99.8	41,579.86
United States	115	5.8	100	100	56,469.01
Germany	78	5.0	93.9	92.2	47,810.84
Australia	67	4.7	89	97.8	46,095.17
Belgium	44	4.2	67.3	88.8	45,430.91
Italy	38	2.6	67.1	68.7	36,629.70
South Africa	38	3.3	35.3	72.2	13,164.48
France	35	3.4	86.6	97.3	40,468.51
Suriname	34				15,724.64
Denmark	30	4.0	50.9	90.8	48,674.84
India	30	4.7	57.8	77.1	6127.30
Sweden	28	4.3	71	90.7	47,891.28
Switzerland	26	6.2	81.7	99	63,648.29
Spain	25	3.2	70.1	73.2	34,818.12
China	25	4.5	87.9	97	14,450.10
Canada	24	5.2	85.9	97.2	44,452.25
Indonesia	24	4.5	12.1	26.3	11,040.19
Norway	22	4.6	35.4	79.5	61,722.24
Tanzania	21	3.4			2652.53
Japan	17	3.3	83	95.3	40,607.06
New-Zealand	17	5.2	56	88.8	37,426.28
Dutch Antilles	15				15,342.87
Brazil	13	2.8	52.2	77.9	15,617.32
Aruba	12				
Singapore	11	5.9	95.6	98.7	86,139.08
Turkey	11	2.6	31.2	18.1	24,844.90
Hungary	10	2.5			26,147.54
Austria	9	3.9	33.2	75.9	49,938.11
Portugal	9	3.4	25	38.9	29,532.38
Greece	9	1.9	19.6	22.1	26,697.25
Ghana	9	4			4184.58
Kenia	9	4.0			3019.58
Peru	8	3.6			12,530.82
Malawi	8	3.1			1159.32
Unknown	8				
South Korea	8		77.9	95.6	
Ireland	7	5.0	48.1	89.4	69,394.42
Zambia	7	3.5			3862.48
Uganda	7	3.1			1774.01
Argentina	6	2.9	47.8	81.6	20,340.29
Thailand	6	3.8	21.5	53	16,225.03
Malaysia	5	4.9	39.8	77.3	26,623.33
Poland	5	2.5	11.2	29.8	26,594.76
Ecuador	5	3			11,446.37
Nepal	5	2.4			2464.39
Taiwan	5	3.4	66.7	90.7	
Hongkong	4	5.2	68.8	96.7	57,071.67
Finland	4	3.6	57	86.5	42,066.57
Israel	4	4.0	38.2	76.9	35,888.88
Vietnam	4	3.4			5915.17
Mozambique	4	3.3			1190.75
United Arab Emirates	3	6.1	20.5	12.9	70,254.83
Iceland	3	4			47,055.16
Malta	3	4.6			35,873.82

Table 8 (continued)

Country	*N*	Capacity to attract talent (GCI)	System strength (QS)	Flagship (QS)	GDP per capita
Czech Republic	3	3.3	16.5	46.4	33,468.73
Russia	3	3.2	63.5	84.4	24,691.83
Serbia and Montenegro	3	2.0			13,896.12
Albania	3	2.3			11,282.79
Philippines	3	3.3	6.1	16.7	7320.50
Bangladesh	3	2.7			3335.76
Rwanda	3	5			1827.19
Ethiopia	3	3.5			1632.55
Netherlands	3				
Romania	2	2.0			21,566.07
Mexico	2	3.5	32.8	74.5	16,983.46
Costa Rica	2	3.9			15,881.61
Dominican Republic	2	3.2			14,238.86
Colombia	2	3.2	26.9	45.4	13,827.67
Jordan	2	3.2			9041.82
Nigeria	2	3.6			6038.46
Nicaragua	2	2.9			5282.70
Cambodia	2	3.8			3504.42
Cameroon	2	2.5			3502.41
Iran	2	2.6			5219.10
Ukraine	2	2.6			2185.70
Sri Lanka	2	3.0			3835.40
Syria	2				
Luxembourg	1	5.6			102,517.14
Kuwait	1	3			72,918.00
Lithuania	1	2.4			28,709.76
Estonia	1	2.3			28,688.97
Seychelles	1	4.3			27,180.62
Chile	1	4.3	31.6	72.4	22,647.46
Bahama's	1				22,448.53
Bulgaria	1	2.3			18,115.24
Iraq	1				15,897.24
Algeria	1	2			14,614.97
FYROM	1				13,766.32
Tunesia	1	2.3			11,447.14
Egypt	1	2.4	6.5	29.5	10,750.46
Fiji	1				9027.54
Jamaica	1	3.3			8620.36
Morocco	1	3.3			7770.25
French Guyana	1				7533.07
Angola	1				6635.24
Cape Verde	1	3			6302.49
Uzbekistan	1				6069.98
Myanmar	1				5384.87
Lesotho	1	3.1			2883.81
East-Timor	1				2044.70
Zimbabwe	1	2.2			2036.32
Sudan	1				1925.45
Guinee-Bissau	1	2.8			1540.29
Madagascar	1	3.1			1466.50
Sierra Leone	1	3.1			1401.33
Congo	1	2.8			799.18
Burundi	1	2.3			796.96
Gabon	1				

Table 8 (continued)

Country	*N*	Capacity to attract talent (GCI)	System strength (QS)	Flagship (QS)	GDP per capita
Libia	1				
American-Samoa	1				11,834.70
Armenia	1	2.9			3614.70
Cyprus	1	3.3			23,541.50
Guatemala	1	3.1			4146.70
Kosovo	1				9041.82
Lao PDR	1	3.5			2338.70
Lebanon	1	2.6			8257.30
Mauritius	1	4.0			9630.90
Moldova	1	1.8			1900.20
Namibia	1	3.7			4415.00
Pakistan	1	3.3			1443.60
Panama	1	4.8			13,680.20

Table 9 Balancing tests for propensity score matching for ISM during the BA phase

	Sample	%bias	%bias reduction	*t* test (prob.)
Nearest Neighbour (5)				
Gender (ref: male)	Unmatched	8.9		2.41*
	Matched	−3.1	64.9	−0.67
Age (years)	Unmatched	−2.2		−0.58
	Matched	6.0	−170.9	1.3
Nationality (ref: Dutch)	Unmatched	28.3		8.96***
	Matched	8.5	69.8	1.6
Relevant work experience during study period (ref: no)	Unmatched	15.0		4.08***
	Matched	2.4	83.9	0.51
Dutch internship (ref: no)	Unmatched	−6.3		−1.72
	Matched	−2.5	59.4	−0.53
Average graduation grade	Unmatched	13.4		3.61***
	Matched	−2.1	84.5	−0.44
Secondary school track (ref. HAVO)				
VWO	Unmatched	−18.8		−5.21***
	Matched	−11.7	38	−2.44*
HBO	Unmatched	7.0		1.97*
	Matched	1.7	76.5	0.34
Combination	Unmatched	12.3		3.5***
	Matched	4.5	63.8	0.91
Other	Unmatched	5.8		1.61
	Matched	11.3	−96.3	2.49**
Study field (ref. Health)				
Agriculture	Unmatched	9.7		2.84***
	Matched	2.7	72.1	0.53
Natural sciences	Unmatched	−15.0		−3.79***
	Matched	2.4	84.2	0.59
Engineering	Unmatched	−6.3		−1.67
	Matched	5.1	18.6	1.17
Economy	Unmatched	31.0		9.07***
	Matched	−7.5	75.9	−1.42
Law	Unmatched	−12.7		−3.24***
	Matched	2.5	80.3	0.62
Social sciences	Unmatched	−9.0		−2.41**
	Matched	−1.1	87.4	−0.25
Language & Culture	Unmatched	9.7		2.76***

Table 9 (continued)

	Sample	%bias	%bias reduction	*t* test (prob.)
	Matched	0.4	96.2	0.07
Education	Unmatched	1.3		0.36
	Matched	2.5	−94.1	0.55
Kernel (Gaussian)				
Gender (ref: male)	Unmatched	8.9		2.41**
	Matched	0.9	90	0.19
Age (years)	Unmatched	−2.2		−0.58
	Matched	0.1	97.1	0.01
Nationality (ref: Dutch)	Unmatched	28.3		8.96***
	Matched	5.8	79.5	1.07
Relevant work experience during study period (ref: no)	Unmatched	15.0		4.08***
	Matched	1.0	93.3	0.21
Dutch internship (ref: no)	Unmatched	−6.3		−1.72
	Matched	−1.0	84.3	−0.2
Average graduation grade	Unmatched	13.4		3.61***
	Matched	−0.4	97.1	−0.08
Secondary school track (ref. HAVO)				
VWO	Unmatched	−18.8		−5.21***
	Matched	−2.4	87.1	−0.5
HBO	Unmatched	7.0		1.97*
	Matched	1.5	78.7	0.31
Combination	Unmatched	12.3		3.50***
	Matched	0.7	94	0.15
Other	Unmatched	5.8		1.61
	Matched	0.9	84.5	0.18
Study field (ref. Health)				
Agriculture	Unmatched	9.7		2.84**
	Matched	1.0	89.2	0.2
Natural sciences	Unmatched	−15.0		−3.79***
	Matched	0.1	99.5	0.02
Engineering	Unmatched	−6.3		−1.67
	Matched	0.1	97.6	0.03
Economy	Unmatched	31.0		9.07***
	Matched	2.6	91.6	0.51
Law	Unmatched	−12.7		−3.24***
	Matched	−0.6	95.4	−0.14
Social sciences	Unmatched	−9.0		−2.41**
	Matched	−1.4	84.2	−0.31
Language & Culture	Unmatched	9.7		2.76***
	Matched	−0.5	94.5	−0.11
Education	Unmatched	1.3		0.36
	Matched	−0.1	94.5	−0.01
Radius (Calliper 0.01)				
Gender (ref: male)	Unmatched	8.9		2.41**
	Matched	0.7	91.9	0.15
Age (years)	Unmatched	−2.2		−0.58
	Matched	0.8	65.4	0.16
Nationality (ref: Dutch)	Unmatched	28.3		8.96***
	Matched	3.7	86.8	0.68
Relevant work experience during study period (ref: no)	Unmatched	15.0		4.08***
	Matched	0.3	97.9	0.07
Dutch internship (ref: no)	Unmatched	−6.3		−1.72
	Matched	−0.2	97.1	−0.04
Average graduation grade	Unmatched	13.4		3.61***
	Matched	−1.3	90.5	−0.26
Secondary school track (ref. HAVO)				
VWO	Unmatched	−18.8		−5.21***

Table 9 (continued)

	Sample	%bias	%bias reduction	*t* test (prob.)
	Matched	−0.3	98.5	−0.06
HBO	Unmatched	7.0		1.97*
	Matched	0.3	95.1	0.07
Combination	Unmatched	12.3		3.5***
	Matched	−0.7	94.1	−0.15
Other	Unmatched	5.8		1.61
	Matched	0.3	94.7	0.06
Study field (ref. Health)				
Agriculture	Unmatched	9.7		2.84**
	Matched	0.2	97.5	0.05
Natural sciences	Unmatched	−15.0		−3.79***
	Matched	0.1	99.2	0.03
Engineering	Unmatched	−6.3		−1.67
	Matched	1.2	80.7	0.27
Economy	Unmatched	31.0		9.07***
	Matched	−1.1	96.4	−0.21
Law	Unmatched	−12.7		−3.24***
	Matched	0.4	97.2	0.09
Social sciences	Unmatched	−9.0		−2.41**
	Matched	0.2	97.9	0.04
Language & Culture	Unmatched	9.7		2.76**
	Matched	−1.9	80.2	−0.38
Education	Unmatched	1.3		0.36
	Matched	−0.6	52.1	−0.13

*$p < .05$, **$p < .01$, ***$p < .001$

Table 10 Balancing tests for propensity score matching: ISM during the MA phase

	Sample	%bias	%bias reduction	*t* test (prob.)
Nearest Neighbour (5)				
Gender (ref: male)	Unmatched	1.3		0.37
	Matched	−1.8	−35.9	−0.4
Age (years)	Unmatched	6		1.59
	Matched	3.9	33.8	0.99
Nationality (ref: Dutch)	Unmatched	−4.8		−1.36
	Matched	2.2	53.7	0.55
Relevant work experience during study period (ref: no)	Unmatched	−6.9		−1.97*
	Matched	−0.2	97.2	−0.04
Dutch internship (ref: no)	Unmatched	−11.3		−3.3***
	Matched	−5.5	51.6	−1.23
Average graduation grade	Unmatched	30.4		8.71***
	Matched	−2.1	93.2	−0.47
Secondary school track (ref. HAVO)				
VWO	Unmatched	38.3		10.44***
	Matched	−4.1	89.3	−1.06
HBO	Unmatched	−26.6		−6.85***
	Matched	−2.1	91.9	−0.62
Combination	Unmatched	−20.2		−5.41***
	Matched	3.3	83.8	0.89
Other	Unmatched	−11.1		−3.05**
	Matched	4.8	56.4	1.28
Study field (ref. Health)				
Agriculture	Unmatched	21.6		7.21***
	Matched	12.7	41.1	2.66

Table 10 (continued)

	Sample	%bias	%bias reduction	*t* test (prob.)
Natural sciences	Unmatched	12		3.63***
	Matched	3.7	69.3	0.8
Engineering	Unmatched	30.1		9.5***
	Matched	6.9	77.2	1.41
Economy	Unmatched	−39.4		−10.16***
	Matched	−4.8	87.9	−1.35
Law	Unmatched	−17.4		−4.6***
	Matched	−2.6	85.1	−0.69
Social sciences	Unmatched	−43.5		−11.33***
	Matched	2.8	93.7	0.81
Language & Culture	Unmatched	−14.3		−3.86***
	Matched	0.8	94.1	0.22
Education	Unmatched	−11.1		−2.85**
	Matched	0	100	0
Kernel (Gaussian)				
Gender (ref: male)	Unmatched	1.3		0.37
	Matched	−1.3	1	−0.29
Age (years)	Unmatched	6		1.59
	Matched	−0.4	92.8	−0.1
Nationality (ref: Dutch)	Unmatched	−4.8		−1.36
	Matched	−0.8	84	−0.18
Relevant work experience during study period (ref: no)	Unmatched	−6.9		−1.97*
	Matched	−2	70.7	−0.46
Dutch internship (ref: no)	Unmatched	−11.3		−3.3***
	Matched	−2.6	77	−0.58
Average graduation grade	Unmatched	30.4		8.71***
	Matched	−2.4	92	−0.54
Secondary school track (ref. HAVO)				
VWO	Unmatched	38.3		10.44***
	Matched	1.7	95.6	0.43
HBO	Unmatched	−26.6		−6.85***
	Matched	−1.7	93.7	−0.49
Combination	Unmatched	−20.2		−5.41***
	Matched	−1	94.9	−0.27
Other	Unmatched	−11.1		−3.05**
	Matched	0.1	99.5	0.01
Study field (ref. Health)				
Agriculture	Unmatched	21.6		7.21***
	Matched	4.1	81.2	0.79
Natural sciences	Unmatched	12		3.63***
	Matched	1	91.7	0.21
Engineering	Unmatched	30.1		9.5***
	Matched	4.5	84.9	0.93
Economy	Unmatched	−39.4		−10.16***
	Matched	−2	94.9	−0.59
Law	Unmatched	−17.4		−4.6***
	Matched	−0.5	96.9	−0.15
Social sciences	Unmatched	−43.5		−11.33***
	Matched	−1.9	95.7	−0.53
Language & Culture	Unmatched	−14.3		−3.86***
	Matched	0.4	97.4	0.1
Education	Unmatched	−11.1		−2.85**
	Matched	−0.7	94.1	−0.19
Radius (Calliper 0.01)				
Gender (ref: male)	Unmatched	1.3		0.37
	Matched	−0.8	39.4	−0.18
Age (years)	Unmatched	6		1.59

Table 10 (continued)

	Sample	%bias	%bias reduction	*t* test (prob.)
	Matched	0.2	96.8	0.04
Nationality (ref: Dutch)	Unmatched	−4.8		−1.36
	Matched	−2.2	55.4	−0.5
Relevant work experience during study period (ref: no)	Unmatched	−6.9		−1.97*
	Matched	−1.4	79.8	−0.32
Dutch internship (ref: no)	Unmatched	−11.3		−3.3***
	Matched	0.1	98.8	0.03
Average graduation grade	Unmatched	30.4		8.71***
	Matched	−4.8	84.2	−1.07
Secondary school track (ref. HAVO)				
VWO	Unmatched	38.3		10.44***
	Matched	0.8	98	0.19
HBO	Unmatched	−26.6		−6.85***
	Matched	−2.1	92.2	−0.6
Combination	Unmatched	−20.2		−5.41***
	Matched	0	100	0
Other	Unmatched	−11.1		−3.05**
	Matched	0.8	92.8	0.2
Study field (ref. Health)				
Agriculture	Unmatched	21.6		7.21***
	Matched	3.2	85.4	0.62
Natural sciences	Unmatched	12		3.63***
	Matched	−0.2	98.6	−0.03
Engineering	Unmatched	30.1		9.5***
	Matched	5.1	83.1	1.03
Economy	Unmatched	−39.4		−10.16***
	Matched	−1.5	96.2	−0.43
Law	Unmatched	−17.4		−4.6***
	Matched	−0.4	97.9	−0.1
Social sciences	Unmatched	−43.5		−11.33***
	Matched	−0.1	99.9	−0.01
Language & Culture	Unmatched	−14.3		−3.86***
	Matched	−0.8	94.7	−0.19
Education	Unmatched	−11.1		−2.85**
	Matched	−0.2	98	−0.07

*$p < .05$, **$p < .01$, ***$p < .001$

Table 11 NN and Kernel matching estimates of ISM during the BA and MA phase on early career outcomes

	Mean treated	Mean untreated	Difference (ATT)
ISM during BA			
Monthly wage (log)			
NN (5)	2.73	2.72	0.01
Kernel (Gaussian)	2.73	2.72	0.01
Duration of work-to-education transition (months)			
NN (5)	1.75	1.85	−0.10
Kernel (Gaussian)	1.75	1.88	−0.13
ISM during MA			
Monthly wage (log)			
NN (5)	2.77	2.77	0.00
Kernel (Gaussian)	2.76	2.75	0.01
Duration of work-to-education transition (months)			
NN (5)	1.72	1.69	0.03
Kernel (Gaussian)	1.72	1.72	0.00

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