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IZA DP No. 14374

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ABSTRACT

Do International Study Programmes Pay off for Local Students?*

International study programmes are increasing in number worldwide, but little is known about the impact on local students' job prospects, especially in a non-English speaking countries. Using rich administrative data from Statistics Netherlands, we analyse labour market outcomes of native graduates in master programmes of Dutch universities between 2006 to 2014 within 5 years after graduation. A coarsened exact matching analysis within cohort-university-detailed field of study group addresses the self-selection issue by generating a matched sample of students with similar characteristics. We find that graduates from international programmmes obtain a wage premium of 2.3% starting from the 1st year after graduation, ceteris paribus. The wage premium keeps increasing by about 1% every year. We investigate the mechanisms through which the wage premium operates. The wage premia can neither be explained by wage increase via cross-firm mobility, nor by faster upward mobility within a firm. Instead, evidence point towards the differential characteristics of the first job upon graduation. Graduates from international programmes are much more likely to choose large firms that have a higher share of foreign-born employees and have business of trade for the first job. They get a head start in wage level and the initial wage advantages persist in the long-run.

JEL Classification: international programme, native students, wage premium, coarsened exact matching

Keywords: I23, J24, F22

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* We are grateful to Klaus Zimmerman, Olena Nizalova, Nick Drydakis, Almas Heshmati, Anurag Shar and Kompal Sinha for the in-depth discussion in GLO Virtual Young Scholar community. Any remaining mistakes are our own.

1. Introduction

Ever since the Bologna Process started back in 1999, Europe witnessed an uprising trend of comparable, compatible and coherent systems of higher education. This process is mainly driven by removing language barriers through the massive introduction of international study programmes at continental European Universities. In 2017, the number of international programmes has amounted to 29,400, experiencing a fifty-fold growth over the past 8 years.[1] Public concerns on the perceived threat of cultural identity in non-English-speaking countries have initiated fierce debate in political forums, especially in countries providing large share of international study programmes.[2] On the contrary, arguments in favour of international study programmes are that they bring tuitions fees as revenues and Europe's attractiveness as a place to work for foreigners is also greatly increased.

Despite much of the discussion on the benefit and cost at the societal level, there is a lack of empirical evidence about the actual impact of international study programmes on native students at the individual level. In fact, there is no methodologically sound empirical research trying to assess the actual return to natives' attendance of an international study programme. We consider attending an internationalized program of study an asset for the development of the human capital of those who attend. Such an asset may affect the human capital in different ways, from increasing the way students master their knowledge of the English language to widening their views about a number of important aspects such as study methods, skills and cultural attitudes towards the world of work, which may well draw from the experience of students of other countries. In fact, a number of work-related outcomes may be affected: job search strategies and effort; international informal links with friends and colleagues for future economic activities both as wage employees and as self-employed and entrepreneurs; and so on.

This paper aims to fill in this gap in the extant literature by assessing native graduates' actual returns on the labour market to attending an international study programme instead of a domestic study

[1] Data Source: StudyPortal Database. The sample consists of the 1617 institutions within the European Higher Education Area countries.

[2] DutchNews.nl, January 26th, 2018, Dutch student hopefuls are being disadvantaged by 'English madness'. https://www.dutchnews.nl/news/2018/01/dutch-student-hopefuls-are-being-disadvantaged-by-english-madness/

programme. We focus on one hypothesis in particular, namely that studying in an international programme endows native graduates wage premia after graduation.

The lack of studies measuring the returns to internationalized programs of higher education is essentially due to the lack of large-scale microdata. The Netherlands stands out as an interesting context to study this topic, not only because it is a non-English-speaking country, but also because it is one of the leading countries in Europe to provide international programmes. Over half of the master programmes are taught in English. More importantly, we are able to extract a unique longitudinal dataset from Statistics Netherlands, which tracks all students' in their post-graduation periods. The data provide a wealth of information on the location of the individual and the type of program of studies attended, the personal characteristics and the characteristics of the jobs held in those crucial years of the first stages of their school-to-work transition.

The most challenging issue in identifying the effect is that attending international programmes is a strategic decision possibly made by better students in the cohort, thus introducing a risk of self-selection and omitted-variable bias. A simple comparison of wages of native graduates who attended international programmes and those who attended domestic programmes will therefore give an upward bias in the estimate of the wage premium. In this paper, we restrict the comparison of wage difference within cohort-university-detailed field of study cell. Ensuring a relatively similar set of skills learned in university both for treated and control students enables us to attribute the difference in wage to the type of programmes attended. We further apply coarsened exact matching, which is a more effective matching method than the traditional propensity score matching to assess the impact of the study program at an individual level. The matching procedure matches on several important characteristics that affect students' chances in entering international programmes. Thus, we can minimize the difference in individual aptitude within cohort-university-detailed field of study cell, and compare wages of matched students.

Our main findings are that students from international programmess obtain a wage premium of 2.3 % starting from the 1st year after graduation, ceteris paribus. The wage premium keeps increasing by about 1% every year. Further investigation into mechanisms implies that the wage premium is largely

driven by differential choices in the first firm upon graduation, rather than cross-firm mobility or faster upward mobility within firm. Upon graduation, Graduates from international programmes are much more likely to choose large firms that have a higher share of international employees and have business of trade for their first jobs. The get a head start in wage level and the initial wage advantages persist in the long-run.

To the best of our knowledge, this is the first study examining the spillovers in globalization of education and investigate mechanisms in detail. An important feature is that the wealthy information in government administrative data allows us to trace graduates as long as 10 years, which is rarely observed in similar data based on sample surveys. The richness of information also enables the comparison within cohort-university-detailed field of study cell and generates reliable matched groups of graduates based on observed characteristics in multiple dimensions. These steps minimise the selection bias to a large extent.

The paper is structured as follows. Section 2 presents a survey of the literatures to which our paper aims to contribute. Section 3 presents the specific features of our data set, highlighting the main advantages and shortcoming of the data. Section 4 discusses the methodology adopted, while section 5 presents the main results of the empirical analysis. Some concluding remarks follow.

2. State of the Art

We contribute to an emerging literature studying the impacts of globalization of higher education.[3] Some studies look at how the enrolment of international students limits the enrolment chances for native students, i.e. crowd out effect (Borjas 2004; Machin and Murphy 2017; Shen 2016; Shih 2017). Under different assumptions on the enrolment capacity of the university, these studies have not been able to reach consistent results regarding possible crowd out. These studies are conducted in the US and the UK, which are English-speaking countries. Some other studies look into the impact of international

[3] Here we only discuss papers that look into full-time international programmes that students are expected to obtain a tertiary degree. Some papers (Liwiński 2019; Oosterbeek and Webbink 2011; Parey and Waldinger 2011) on exchange programmes abroad for academic credits are also part of the globalization of higher education.

graduates' supply on native graduates' labour market performances (Borjas 2005; Levin et al. 2004; Su 2013). International students trained in the US are found to displace native students in the same field of study and depress their earnings. Nevertheless it is hard to generalize their findings any further because the analysed population is a narrow group of doctoral students trained in limited fields of study.

These studies mentioned above focus on the competition between international and native students and yet they omit the positive spillover effects of international students. International study programmes in universities are key facilitators of the skilled migration flow, because international students studying in the host country are likely to remain in the local labour market after they obtain a tertiary degree. This relates our paper to a broader literature of labour market consequences of high-skilled immigrants. Previous studies have acknowledged positive labour market consequences of high-skilled immigrants on innovation, employment and wages (Bosetti, Cattaneo, and Verdolini 2015; Kerr, Kerr, and Lincoln 2015; Peri, Shih, and Sparber 2015). Bosetti, Cattaneo, and Verdolini (2015) show that a higher share of migrants in the skilled professions contributes to a higher level of knowledge creation. Kerr, Kerr, and Lincoln (2015) analyse firms' hiring strategies with matched employer-employee data. They find that increased skilled immigrant employment leads to an employment expansion also in skilled native workers. Peri, Shih, and Sparber (2015) find that increases in STEM workers are associated with wage gains both for college-educated and non-college-educated natives. The benefit comes from the tacit knowledge transferred: in fact, face-to-face interactions between high-skilled workers spur ideas, learning and local productivity at work. International students are often regarded as an integral part of high-skilled immigrants, but their impact on native students' job prospects takes place via non-work channels during study. Therefore, our paper contributes to this strand of literature by extending it to the spillover effects of globalisation in higher education.

The social interaction between international students and native students could improve international competences (linguistic and non-linguistic) of native students and thus boost native students' future job prospects. On one hand, attending international study programmes endow native students with better linguistic proficiency in English, which is an important component of human capital on the labour market for native workers (Chiswick and Miller 2018; V. A. Ginsburgh and Prieto-

Rodriguez 2011; Saiz and Zoido 2005; Wang, De Graaff, and Nijkamp 2017). These studies point to significant earnings increase of the use of a foreign language at work. On the other hand, international study programmes enrich learning through study together with a culturally and ethnically diversified composition of students and thus foster the intercultural understanding of native students. On top of some seminal studies showing that ethnic diversity has a long-term impact on economic growth (Ager and Brückner 2013; Alesina, Harnoss, and Rapoport 2016; Ottaviano and Peri 2006), our paper complements these studies by testing micro-level channels in the campus environment through which cultural diversity might affect growth. Internationalization of study programs might generate an asset which may be an important building block in the formation of the human capital of attendants. We test this hypothesis trying to assess whether there is any return and which type of return to this asset and component of the human capital of the individuals who are exposed to international study programs.

3. Data

Our data come from Statistics Netherlands which keeps individual administrative records of all Dutch citizens.[4] The data of Statistics Netherlands include information from education registry agent, municipalities, tax authorities, etc. More specifically, detailed information on individuals' socio-demographic characteristics, place of residence, education history, and job market performances is available. We can also track individuals over time. In this paper, we study labour market outcomes of master students who graduated from one of the thirteen academic universities in the Netherlands between 2006 to 2014. Their labour market outcomes can be traced up until 2016.[5] All master students are native graduates whose parents are both Dutch. They are aged 22-27 at the year of graduation. The duration between the graduation year of the master programme and the graduation year of the bachelor programme is limited to 3 years or below.[6]

4 Results are based on calculations by Erasmus University Rotterdam using non-public microdata from Statistics Netherlands. Under certain conditions, these microdata are accessible for statistical and scientific research. For further information: microdata@cbs.nl.

5 Different cohorts have varying years of observation. For example, students who graduated in 2006 can be observed for 10 years, while students who graduated in 2014 can only observed for 2 years.

6 The duration of master programmes in the Netherlands ranges between 1 and 2 years. We set the threshold to 3 years in order to include students who might have a gap year after the completion of the bachelor programme.

3.1 Definition of international programmes

The key independent variable is a dichotomous variable equal to 1 if a student graduated from an international study programme and 0 otherwise. In Figure 1, we demonstrate a hierarchical structure within a university. A university has many detailed fields of study, which are classified according to the International Standard Classification of Education (ISCED) in 2013. We take the most detailed 4-digt code for fields of education and training. The detailed field of marketing and advertising at 4-digit level, for example, belongs to a narrow field of business and administration at 3-digit level and a broad field of business, administration and law at 2-digit level. Graduates with similar education and training in a field are very close substitutes to each other on the labour market. The difference between programmes under the same detailed field of study is often neglected by employers, who usually write very broad conditions for job requirements. Thus, our identification comes from whether one study programme is international or not under the same detailed field of study in the same university. With this logic, detailed fields that are completely internationalized or domestic are left out of the analysis. In Figure 1, chemical and engineering process is one of such detailed fields.

[Figure 1 about here]

Here we explain how we define whether a university study programme is international or not. A straightforward measure would be to observe whether a study programme started to provide (at least) an English-taught track. However, a limitation of the data is that the most detailed identification number recorded at the administrative system is at the study programme level, not at the lower track level. Hence, we compute proxies for programme-level internationalization based on detailed information of students' ethnic composition. We classify all students into different cells by year of graduation and study programme. For each cell, we make a count of "most likely English-taught foreign students" that satisfy three criteria: First, they are first-generation immigrants. A person born outside Netherlands with at least one parent born outside Netherlands is defined to be a first-generation immigrant. Second, they have never lived in the Netherlands before they start master programmes. This ensures to some extent that they come to the Netherlands for their master degree instead of other things. In addition, the students should have little exposure to Dutch language training before they do their master

programmes.[7] Third, they are originally from non-Dutch-colony areas, non-Dutch-speaking countries or non-German-speaking countries.[8] More specifically, we exclude the following countries of origin: Suriname, the Netherlands Antilles, South Africa, Indonesia, Belgium, Austria, Hungary, Switzerland, Liechtenstein and Luxembourg. After this restrictive selection of students, the 75th percentile of the total number of "most likely English-taught foreign students" is 4 per programme per year and the 75th percentile of the share of "most likely English-taught foreign students" is about 0.25 per programme per year. Our preferred measure is that when the number of these students exceeds 4 or the share of these students exceeds 25% for the first time, the study programme is regarded as an international one from that year onwards.[9]

Figure 2 shows the dynamics of international master programmes across broad fields of study (ISCEDF 2-digit) over year. The X-axis is year of graduation. In the left panel, the five lines on top refer to the field of arts and humanities, the field of social sciences, journalism and information, the field of natural sciences, mathematics and statistics, the field of business, administration and law and the field of engineering, manufacturing and construction. These fields experience a sizable growth in numbers from 2005 to 2013. On average, there are 30 to 50 more programmes that became international during the time period. The other lines below refer to fields that experience a slight growth in numbers. It is less obvious from the figure due to limited study programmes in total. To make the dynamics of international master programmes more informative, we show the share of international programmes instead of the total number in the right panel of Figure 2. Except for the fully internationalized field of agriculture, forestry, fisheries and veterinary, all other fields grow to some extent in terms of share. The least international field is education, which serves mainly for domestic educational institutes at all levels.

[Figure 2 about here]

[7] Some foreign students do both their bachelor and master programmes in English. They might already spend some time in acquiring Dutch language during the bachelor study. Therefore, we do not treat them as "most likely English-taught" students.

[8] The linguistic similarity between German and Dutch is quite high. It is relatively easy to acquire Dutch language skill for a German native speaker.

[9] Our measure is close to other reports of English-taught programmes in the Netherlands (Becker and Kolster 2012; Wächter and Maisorm 2014). We also check other thresholds for selection in the robustness check.

It is noteworthy that our measure of internationalization does not mean that the students are taught in English during their master programmes. In some universities, the policy is to provide a tentative English-taught track while keeping its Dutch-taught track. In that case, the mixed programmes will still be regarded as an international one. Therefore, it is not only a matter of knowing the English language, but being exposed to different cultures, being inserted in large international networks for the rest of their lives, etc.

3.2 Other variables

Our dependent variable is the before-tax wage for the whole year from all sources of jobs. This variable is recorded for all employees. The self-employed are thus excluded from the analysis due to data limitation. We calculate the average wage per calendar working day, and multiply it with 365.[10] We are able to observe a student's wage level in all years after graduation (10 years maximum).

In Figure 3, we show the unconditional differences in the yearly starting wage level between students in international programmes and domestic programmes upon graduation. Here we take yearly wage in the 1st calendar year after graduation as the starting wage level.[11] Even though the 2008 global financial crisis has a negative impact on the wage level for all students, we see a very stable wage premium of about 3000 euros gross per year (11% higher) for graduates from international programmes across different cohorts.

[Figure 3 about here]

In Figure 4, we compute the wage between graduates in international programmes and domestic programmes in all years after graduation. We plot the wage gap for all years of each single cohort. The earlier the cohort is, the longer time period we can observe. In the 1st calendar year after graduation, we still see a stable wage premium of about 3000 euros for all cohorts. This wage premium goes up with

10 The measure is equivalent to using reported yearly wage and include the number of working days as a control variable. In the Netherlands, regarding the number of working days as a proxy for the real working hours is a fair assumption. According to OECD statistics, the Netherlands ranks high as one of countries with the least working hours. Overworking is not much of a concern here.

11 The month of graduation is usually in the end of August. In the Netherlands, the duration between graduation and starting a new job on average is four months.

the accumulated years of working experience on the labour makret. It reaches about 6,000 euros (14% higher) in the 5th year after graduation for several cohorts. It reaches about 12,000 euros (22% higher) in the 10th year after graduation, which can be observed only for the cohort that graduated in 2006 though.

[Figure 4 about here]

We also look into the following dependent variables about the first job's characteristics and the number of firm switches. Firm location of the first job: a dichotomous variable equal to 1 if the firm of the first job is located in the "Big 4" cities (Amsterdam, Rotterdam, The Hague, Utrecht) of Netherlands and 0 otherwise. These cities lie in central-western Netherlands and are the most vibrant cities in terms of economic development and population growth. First job's sector: a dichotomous variable equal to 1 if the firm of the first job is in the private sector and 0 otherwise. Firm size of the first job:the total number of employees in the firm of the first job. Contract type of the first job: a dichotomous variable equal to 1 if the contract is fixed and 0 if it is temporary. Share of foreign-born workers: it is the share of foreign-born employees among the whole workforce in the employee-employer matched dataset. Share of bachelor degree holders: it is the share of native workers with at least a bachelor degree among the whole native workforce.[12] Firms with trade business: a dichotoumous variable equal to 1 if firm import or export any goods and 0 otherwise. This information is only available from 2010 to 2016. Firm switch: it is the total number of firms one ever worked in within a specific period of time. Only firms providing fixed contracts are counted in this variable.

Other individual covariates that are included in our analysis are the following. Age upon graduation: it is calculated as year of graduation from the master programme minus year of birth. Interval between the graduation of bachelor and master programmes: it is the number of years between a student's graduation from the master programme and graduation from the bachelor programme. Male: a dichotomous variable equal to 1 if the student is male and 0 otherwise. Cultural diversity in bachelor programmes: It is measured as an index of fractionalization, $1 - \sum_{i=1} s_i^2$, where s_i is the share of

[12] The previous educational history of foreign-born workers is not known from the data.

foreign group i over the total population of students in study programme. It is a proxy for students' foreign exposure during their bachelor programmes.[13] Father's yearly wage in student's year of graduation: the variable is similarly calculated as the wage variable for students. We multiply the average wage per calendar day with 365. This is a proxy for students' family economic status. Share of academic-type among university graduates in the neighbourhood of residence at age 15: There are two types of university in the Netherlands, applied and academic. The variable is the share of academic-type university graduates among all university graduates calculated at the neighbourhood level, where a student once lived during age 15. This is a proxy for the neighbourhood level of human capital. Age 15 is a critical age to be exposed to higher-educated people. Students' choices related to their tertiary education are likely to be influenced by these people.

4. Methodology

4.1 Coarsened Exact Matching

The aim of this paper is to investigate whether native graduates of international programmes earn wage premia after graduation, relative to other native graduates of domestic programmes within the same detailed field of study. A naïve estimation strategy would consist of regressing wages on the internationlisation dummy plus our control variables. This estimate would merely provide the correlation between types of study programmes attended and the wage level of students. An obvious question would be that attending an international programme is a strategic decision made by better students in the cohort and, in turn, this would introduce self-selection and omitted-variable bias in the estimated impact of attending an international programme on wages. If this bias exists, the coefficient from a naïve OLS regression would overestimate the wage premium obtained from attending international programmes.

We employ a nonparametric matching method, coarsened exact matching (CEM), which has been used in recent quantitative research to create a matched control group for the treated group (Blackwell

[13] We exclude the native group from the calculation. If the native group is included, this index will have much less variation and the values are mostly close to 0.

et al. 2009; King and Nielsen 2019). The main idea of CEM we adopt is to create unique strata based on the coarsened values of covariates, assign each individual to a stratum, and only keep strata in which each treated student is matched to 1 or more control students. The sample is then truncated to a group of more comparable individuals within the same detailed field of study, the same university and the same year of graduation.

In the first step, we use CEM to match students based on covariates at bachelor programme level and individual level. A broad selection of covariates ensures that students graduating from international programmes and their matched peers in domestic programmes have similar socio-demographic characteristics, economic statuses, foreign exposure before their enrolment in master programmes, and exposure to highly-educated contemporaries during youthhood. For categorical variables, we choose male, year of graduation and detailed field of study-university fixed effects. For continuous variables, we choose cultural diversity in bachelor programmes, Percentage of academic type among university graduates at the neighbourhood during youthhood, and father's yearly wage in student's year of graduation. For each continuous variable, we create 2 strata based on the median value of each variable. Students with the values of a specific continuous variable above the median belong to one strata, while the rest belong to the other strata. Combining strata for all variables will produce even many more strata, a maximum value of 2 (male/female)*9 (year of graduation)*296 (detailed field of study-university fixed effects)*2 (cultural diversity strata)*2 (percentage of academic type among university graduates strata)*2 (father's yearly wage strata)=42624. However, lots of these strata are empty because there are no students satisfying some combinations of these characteristic. Our main analysis is implemented on only those matched bins containing one or many treated students or control students. We can further restrict the sample by realizing 1-to-1 match. That means, each treated student can only have one control student. We use ϕ_m to denote these matched bins.

Table 1 presents the descriptive statistics of students' characteristics by types of study programmes. The first four columns are for the full sample. The middle four columns are for the matched sample, where we allow for 1-to-n match. The last four column is the most restrictive sample, where we only allow 1-to-1 match. For some covariates, the differences between students from international

programmes and students from master programmes are reduced. The differences almost completely disappear in 1-to-1 matched sample, which leaves us with only 7980 (=3990*2) graduates, about 14% of the full sample. Even though 1-to-1 matched sample is the most preferred one in terms of t-test statitsitcs, the sample size is too small. In the subsequent analysis, we mainly use 1-to-n matched sample of 16235 (=8332+7903) graduates.[14]

[Table 1 about here]

In the second step, we include these matched bins ϕ_m as controls in the regression. As we are able to track all students' wages over time, we use the following specification in order to analyse the evolution of the wage change up to the 5th calendar year after graduation:

$$\ln W_{i,p,c,t} = \beta_0 + \sum_{k=1}^{5} \beta_k INT_{p,c} * PostYearGrad_{c,k} + \gamma_k PostYearGrad_{c,k} + \delta_t + \phi_m + u_{i,p,c,t}.$$

The dependent variable here $\log W_{i,p,c,t}$ is the natural logarithm of yearly wage of student i in programme p in cohort c measured in year t. INT_{pc} is a dichotomous variable equal to 1 if a study programme p is international for students in cohort c and 0 otherwise. ϕ_m, are the matched bin fixed effects from the first step of CEM. $PostYearGrad_{c,k}$ is a dichotomous variable equal to 1 if the year that the wage is observed is the kth calendar year after graduation for students in cohort c and 0 otherwise. It is a proxy for students' potential work experience.[15] δ_t are year fixed effects that captures the aggregate time trend in wage levels across all individuals. Thus, β_k reflect the percentage differences in wage level for different years after graduation between graduates from international study programmes and graduates of similar characteristics from domestic programmes in the same detailed field of study, in the same university and in the same cohort.

4.2 Potential concerns

[14] Results using these 1-to-n and 1-to-1 matched sample are qualitatively and quantitatively similar, as shown in Table 4 in Section 5.

[15] The maximum value of years since graduation is 10, but only the earliest cohort graduating in 2006 contributes to identification. Therefore, we choose 5 years as the maximum length of observation. The results remain robust to the inclusion of more years.

The identification also relies on two important assumptions at the programme level. First, the internationalisation process does not depend on the average wage level of graduates in the programme. If high-salary programmes are more (less) likely to become international, the estimated coefficient will have an upward (downward) bias. Second, foreign students do not make these international programmes more selective for native students' admission. If the admission standard becomes higher for native students due to a massive competition worldwide, the composition of students enrolled in international programmes will have a systematically higher quality compared to pre-internationalisation periods. The estimated coefficient will have an upward bias.

To assuage the first concern, we calculate the average starting wage level of students who graduated in 2004 at the university-study programme level, and check whether the average starting wage level is positively correlated with programmes' likelihood of being internationalised. Table 2 presents the linear probability model results at the programme level for different cohort years. All the coefficients are statistically insignificant with p values larger than 5%. The internationalization decision does not seem to depend on the potential job prospects of programmes, but more on the propensity to sharpen the international profile of the institution or other reasons irrelevant to the lucrativeness of programmes.

[Table 2 about here]

Next, we show circumstantial evidence that foreign students' inflow does not make international programmes more selective for native students. On the aggregate level of students' inflow, Figure 5 shows the total number of foreign and native students across different broad fields of study. Business/ Administration/ Law and Social Science/ Journalism/ Information are the two most popular broad fields for students. Native students show a much higher growth rate than foreign students in these two fields. In other broad fields represented by lower lines in the figure. Native and foreign students show very similar trend of growth. We do not see that native students' enrolment is suppressed due to the inflow of foreign students. On the detailed programme level, we count the number of native and foreign students enrolled in each programme and regress the number on whether the programme has become internationalized or not. Table 3 presents the enrolment change in response to programme

internationlisation. Programmes experienced a size expansion by 4 to 5 students on average in response to internationlisation, which is mainly driven by the increase in first-generation foreign students coming from abroad. The total number of second-generation foreign students and native students are hardly affected.

[Figure 5 about here]

[Table 3 about here]

5. Results

In this section, we present results of wage equation and show whether students graduating from international programmes indeed obtain wage premia after graduation. We also explore possible mechanisms both in the short run and in the long run through which the wage premia come from. Furthermore, we investigate heterogeneous returns to attending international programmes by characteristcs of the programme and students themselves. Lastly, robustness checks on different threshold values to create the internationalization variable are implemented.

5.1 Baseline results

Table 4 presents the baseline results of the dynamic wage evolution after graduation. Column (1) present the preferred specifications. It contains matched bin fixed effect for a coarsened exact matched sample (1-to-n match). Starting from the 1st year, students from international programmes start to gain a wage premium ranging from 2.3% (about 653euros) to 5.9% (2,630 euros) up to the 5th year after graduation.[16]

To assess the impact of the identification strategy, Table 4 presents alternative specifications that incorporate different steps in the identification. Column (2) runs the same regression for the matched sample, but drops the matched bin fixed effect. The estimate measures the average difference in yearly wage between students from different types of study programmes within the matched sample. The coefficient turns more significant and much larger, implying that heterogeneity exists even within the

[16] The monetary value is calculated based on cohort 2006's wage levels.

matched sample. Column (3) runs a simple OLS regression on the full sample, showing a significant impact of international study programmes on the starting yearly wage (10%), and a wage premium of 12% in the 5th year after graduation. This implies not controlling for self-selection issue could leads to a substantial positive bias in the coefficient.

In the most preferred specification in Table 4, we do not include information on industry and job location. If being in an international study programme is a prerequisite to enter certain industry, to sort into particular prosperous regions for work, or end up in a specific type of firms, we should not include them as control variables. In that case, the real value of international study programme will be underestimated. To see to what extent the selection of industry and job location accounts for the wage premium, we gradually add more fixed effects. In column (4), we add firm location fixed effects in all years after graduation. In column (5), we add industry fixed effect in all years after graduation. In these two strict specifications, we see a substantial part of the total wage premium remains, particularly for later years after graduation. Column (6) then introduces the strictest specification with firm fixed effects. Much of the impacts become absorbed, implying choice of firms is crucial to explain the wage dynamics. Only 50% of the impacts for the 4^{th} and the 5^{th} years after graduation remains.

In column (7), we use the same specification as in the preferred specification column (1), except for replacing the 1-to-n matched sample with the 1-to-1 matched sample. The sample size drops substantially because we randomly remove extra persons within each matched cell. As the estimates in column (1) and (6) are similar in magnitude and significance, we will stick to the 1-to-n matched sample throughout the following analysis for consistency.

[Table 4 about here]

5.2 Mechanisms

Where do the wage premia come from? In the subsection, we test three mechanism that are most likely to bring about the different wage level between students from international programmes and students from domestic progrmames.

First, the first job of graduates might differ greatly so that it initiates different wage growth tracks. As shown in column (6) of Table 4, firm fixed effects absorbs much of the wage premium, implying the selection of firms might be the most important factor. Take the contract type for an example, school leavers in general earn significantly less under other types of contracts compared to permanent-contract employment (Gebel 2009). Therefore, we check several characteristics of the first job to see if students from different types of programmes sort into different types of jobs upon graduation. Table 5 presents the results of first job's characteristics, i.e., job location, private/public sector, firm size, fixed/temporary contract, share of foreign-born workers, share of educational level, firms' involvement in trade business. Several job characteristics stand out. Column (3) shows that the difference in firm size is huge. Graduates from international programmes tend to sort into firms that are 20% larger in size than graduates from domestic programmes. Column (4) shows that graduates from international programmes are more likely to obtain fixed contracts (with definite or indefinite ending period) instead of temporary contract. However, the magnitude is quite small. 0.01 pp is equivalent to 1% change, as 96% of graduates in our sample started with fixed contract. The biggest difference shows up in the share of foreign-born workers in column (5). 1.4 pp is about 16% difference between types of firms chosen by graduates from international programmes and those chosen by graduates from domestic programmes. Column (7) is about the degree of firm's internationalization. If firm has ever imported or exported goods, it is regarded as having trade business. Here we also see a significant and positive estimate (0.05pp, about 10% increase). For other characteristics such as location of first job, public/ private sector and educational level of firms in columns (1)(2)(6), there is no significant difference at 5% significance level.

[Table 5 about here]

Second, cross-firm mobility is a widely acknowledged contributor to wage growth (Bagger et al. 2014; Rogerson, Shimer, and Wright 2005; Topel and Ward 1992). To verify this mechanism, we test whether students attending international programmes switch firms more often than students attending domestic programmes. Table 6 presents the results of total number of firms worked in different time windows. Columns (1) to (5) denote different windows. All columns show insignificant results.

Students attending international programmes show a similar rate of changing firms as students attending domestic programmes. This lays no foundation for cross-firm mobility mechanism at all.

[Table 6 about here nofirms.xls]

Third, the role of position changes or human capital accumulation within firms is also regarded as an important source of wage growth (Baker, Gibbs, and Holmstrom 1994a, 1994b; Dohmen, Kriechel, and Pfann 2004). If graduates from international programmes are better at English proficiency and are more open and tolerant to culturally diverse environments, these become human capital assets and might lead to better performances at work. A better performance can be directly converted to higher chances of promotion or performance-based bonus. To test this mechanism, we replicate the wage regression for a subsample of graduates who have never switched firms. Table 7 presents the result for different time windows. For every time window, we compare the results with and without fixed effects of the first firm. We fail to observe continuing wage premia after graduation once the first firm fixed effects are introduced. Much of the wage premium has been picked up by the selection of the first firms, with substantially different characteristics (as shown in Table 5).

[Table 7 about here]

Collecting all these results, the wage premia from attending an international programme can be explained neither by wage increase via cross-firm mobility, nor by faster upward mobility within firm. Instead, the evidences of mechanism point towards the differential characteristics of the first job upon graduation. Graduates from international programmes are much more likely to choose large firms that have a higher share of international employees and have business of trade immediately upon graduation. They are endowed with initial wage advantages that persist in the long-run. It is probable that these firms chosen by graduates from international programmes are multinational firms, which can afford a better wage scheme than domestic firms.[17]

5.3 Heterogeneity analysis

[17] Unfortunately, working firms' ownership structure is not known from the data.

There is likely some heterogeneity in effects across different dimensions. In this subsection, we explore the heterogeneous returns to attending international programmes. We are mostly interested in four dimensions: gender, broad fields of study, quality of university and working location. First, many studies have found that men and women are very similar on entry to the labour market but 10 years later a sizeable gender gap in earnings will emerge (Bertrand, Goldin, and Katz 2010; Manning and Swaffield 2008). However, the gender impact of foreign languages on wages of workers is much less studied in the literature. The possible existence of wage discrimination lead to glass ceiling or female workers, thus limiting the wage premia to a certain level (V. Ginsburgh and Prieto-Rodriguez 2013). We run the regression for male and female samples respectively to test it. Second, every broad field of study has distinctive training packages of skill requirements for students. International study programmes could be extremely helpful in fields that require foreign language proficiency and social skill, while unhelpful in fields that focus for example on mathematic-related skills. To test this dimension, we divide all fields of study into two types. One type is Science, Technology, Engineering and Mathematics (STEM) and the other type is non-STEM. Third, the quality of university might matter. Our data shows that higher-ranked universities have more international programmes in the starting year 2006 already. Besides, university ranking is particularly informative for foreign students when they make applications. Naturally, higher-ranked universities might end up with more foreign students enrolled than lower-ranked universities, making them even more international. It leaves us to investigate the environmental factors that might lead to differential wage premia. We divide all universities into "Top 100" and "Outside 100" based on the Times Higher Education Ranking. Fourth, location matters. On one hand, urban wage premium is usually a lot larger mainly due to sorting and learning. The level of wage premium is closely associated with degree of agglomeration (Glaeser and Maré 2001; Puga 2010; Rosenthal and Strange 2004). On the other hand, cities are places where abundant labour supply of workers with international competence exist. In less urbanized areas, graduates with international competence might be rewarded more due to shortage of skills. To investigate this dimension, we split the sample to graduates who choose the "Big 4" cities in the Netherlands and those who choose the rest.

Results are reported in Figure 6. In panel A, males and females show very similar patterns in the growth of the wage premium, alleviating the concern of possible wage discrimination on the Dutch labour market at least in very early career. The largest divergence occurs in the dimension of fields of study in panel B. The benefit of international programmes is pronounced in non-STEM majors that demand communication, linguistic and social skill in daily jobs. STEM graduates from international programmes do not benefit. One explanation is the using English for study crowds out students' time for studying their subjects. Another explanation is that the use of English instead students' mother tongue might weaken students' understanding of the content in class. In panel C, we also find differential wage premia between top universities and less top universities. The benefit of international programmes is concentrated in students from less top universities, where the international environment is weaker. The point estimate in the 5th year after graduation is as high as about 10%, while the marginal premium for top universities is insignificant. Similarly, panel D points towards the fact that graduates from international programmes are more rewarded in places in shortage of international skills. Urban wage premium seems to exist for all graduates regardless of programme type.

[Figure 6 about here]

5.4 Robustness checks

We implement robustness checks on the definition of international programme to corroborate our findings and present the results in Table 8. Recall that in data section, we select "most likely English-taught foreign students" out of each programme. We use the 75th percentile value of the total number of "most likely English-taught foreign students" and the 75th percentile value of the share of "most likely English-taught foreign students" as thresholds to construct dummy variable for international programmes. In this subsection, we run regressions with new independent variables constructed with varying threshold values. Results are reported in Table 8.

[Table 8 about here]

Columns (1)-(3) use less strict definition than what we use in the main analysis. In column (1), the dummy variable for international programme is constructed with the median value of the total number

(1) and the median value of the share (0.04). In the subsequent columns (2) and (3), we increase the value of the number by 1 and the value of the share by 0.07 each time and redefine international programmes. Columns (4)-(6) use stricter definition. In the main analysis, the threshold values are 4 for number of "most likely English-taught foreign students" and 0.25 for the share of these students. We increase the value of the number by 2 and the value of the share by 0.08 each time and redefine international programmes. The threshold values in column (6) in the end is close to the 90th percentile of the number and the share. The results are qualitatively and quantitatively similar in all columns.

6. Conclusion

We investigate whether native graduates obtain wage premia from attending international study programmes, using national microdata of Dutch graduates of master degree programmes between 2006 and 2014. A study programme is defined to be international once it started to provide at least one English-taught track. The treatment variable of programme-level internationalization is constructed based on detailed information of students' ethnic composition. In order to correct for possible self-selection bias in the attending international programmes variable, we restrict the comparison of wage difference within cohort-university-detailed field of study cell. Ensuring a relatively similar set of skills trained in university both for treated and control students enables us to attribute the difference in wage to the type of programmes attended. We further apply coarsened exact matching approach to minimize the difference in individual aptitude within cohort-university-detailed field of study cell, using highly relevant individual determinants affecting the propensity of attending international programmes.

To sum up, students from international programmmes obtain a wage premium of 2.3% starting from the 1st calender year after graduation, ceteris paribus. The wage premium keeps increasing by about 1% every year. The benefit of attending international programmes is pronounced in non-STEM fields of study, students from lower-ranked universities, and students who choose less prosperous cities for the first job. We suggest that the wage premia are largely driven by the initial wage advantage by their choices of the first firms. Graduates from international programmes get a head start immediately upon graduation, and the initial wage advantage persists in later years of work. We exclude the channel of cross-firm mobility by checking the frequency of students' job switching behaviours. Students

attending international programmes are found to have a similar rate of switching firms like students attending domestic progrmmes in all years after graduation. We also exclude the channels of faster upward mobility within firm by checking the wage dynamics of the subsample of graduates who have only workerd in one firm. Our findings merit consideration of neglected substantial positive spillovers of international programmes on native students of the host country. They shed light on better prospects in an open higher education market in Europe.

Our estimate serves just as a lower bound for the wage premium of attending international programmes for two reasons. First, we are unable to track students working abroad. Graduates from international programmes are more likely to continue studying abroad or apply for jobs abroad. Either of the two scenarios ensures potentially higher wages. Second, programme-level identifier is the most detailed information recorded in the Dutch education system. But there are some study programmes running English-taught track and Dutch-taught track at the same time. By defining a programme to be international, it might include some students enrolled in the Dutch-taught track in an international study programme. These students are likely to be less affected by internationalization compared to students in English-taught track, yet we still count them as treated units.

The impact of attending international study programmes evaluated in this paper combines the language effect of the English as the teaching medium and spillovers effect from foreign peers.[18] One limitation is that there are two types of spillovers effect from foreign peers in some programmes running both English-taught and Dutch-taught tracks. Native students in English-taught tracks have frequent interaction with foreign students in daily learning activities such as attending lectures, working on assignments, etc. On the contrary, native students in Dutch-taught tracks might only meet these foreign students in activities organized at the programme level, and hence they have less frequent interaction with foreign students. A future direction of research could continue to delve into the impact of English-taught track on native students compared to those in local language track within the same study programme. In this way, spillovers effect from foreign peers is focused on the frequent interaction in

[18] Using English as the teaching medium is always positively correlated with the inflow of foreign students. Only if one creates an ad hoc environment with one factor fixed can we separate the two effects in identification.

class directly. Such a quasi-experimental setting is cleaner for identification but also demands more detailed administrative data of programmes and enrolled students.

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Figures

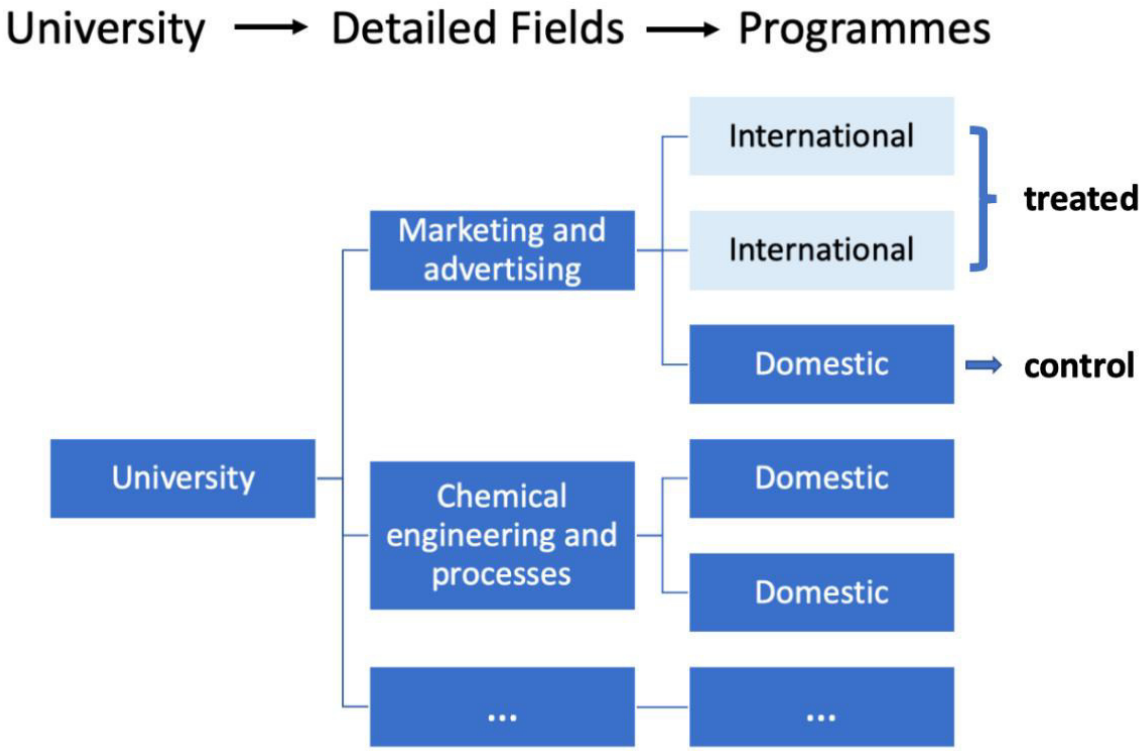

Figure 1 International Programmes versus Domestic Programmes

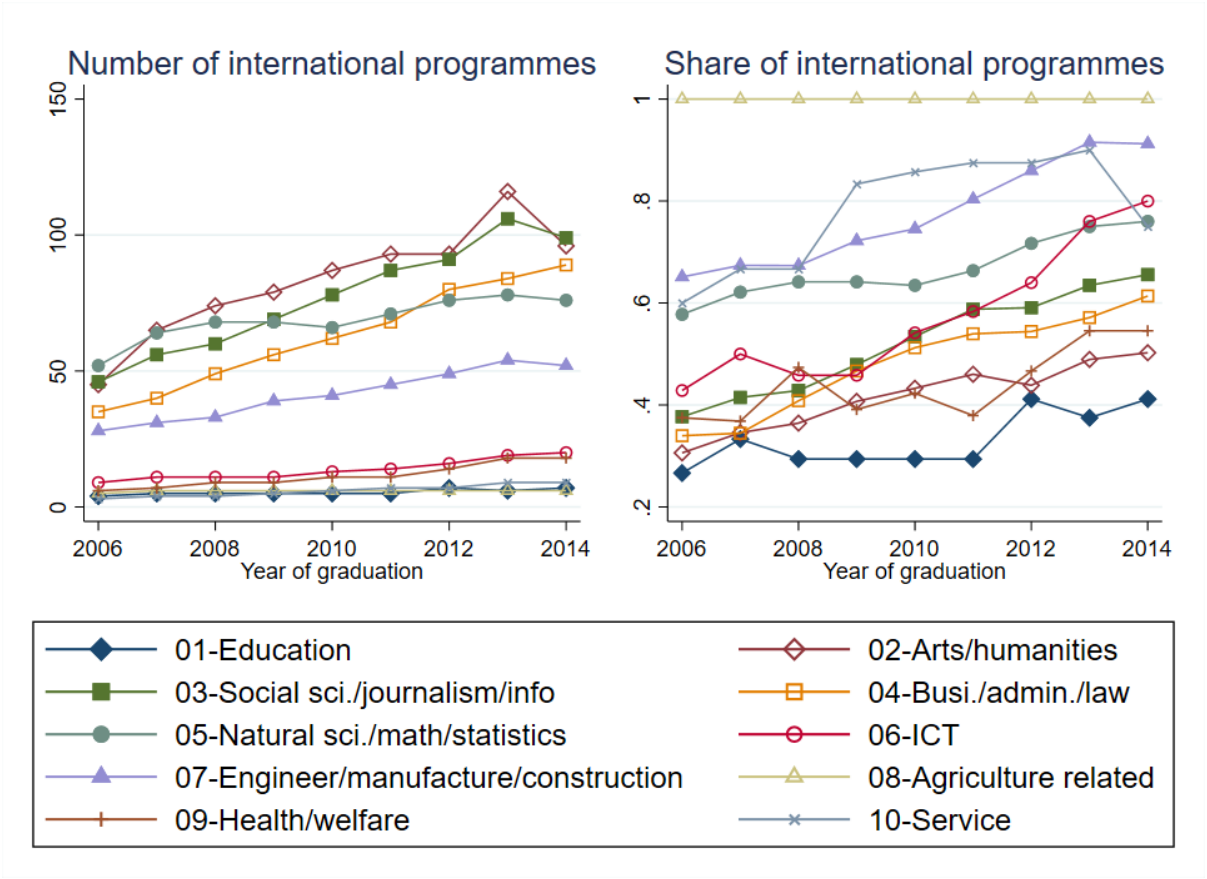

Figure 2 Dynamics of International Master Programmes across Broad Fields of Study

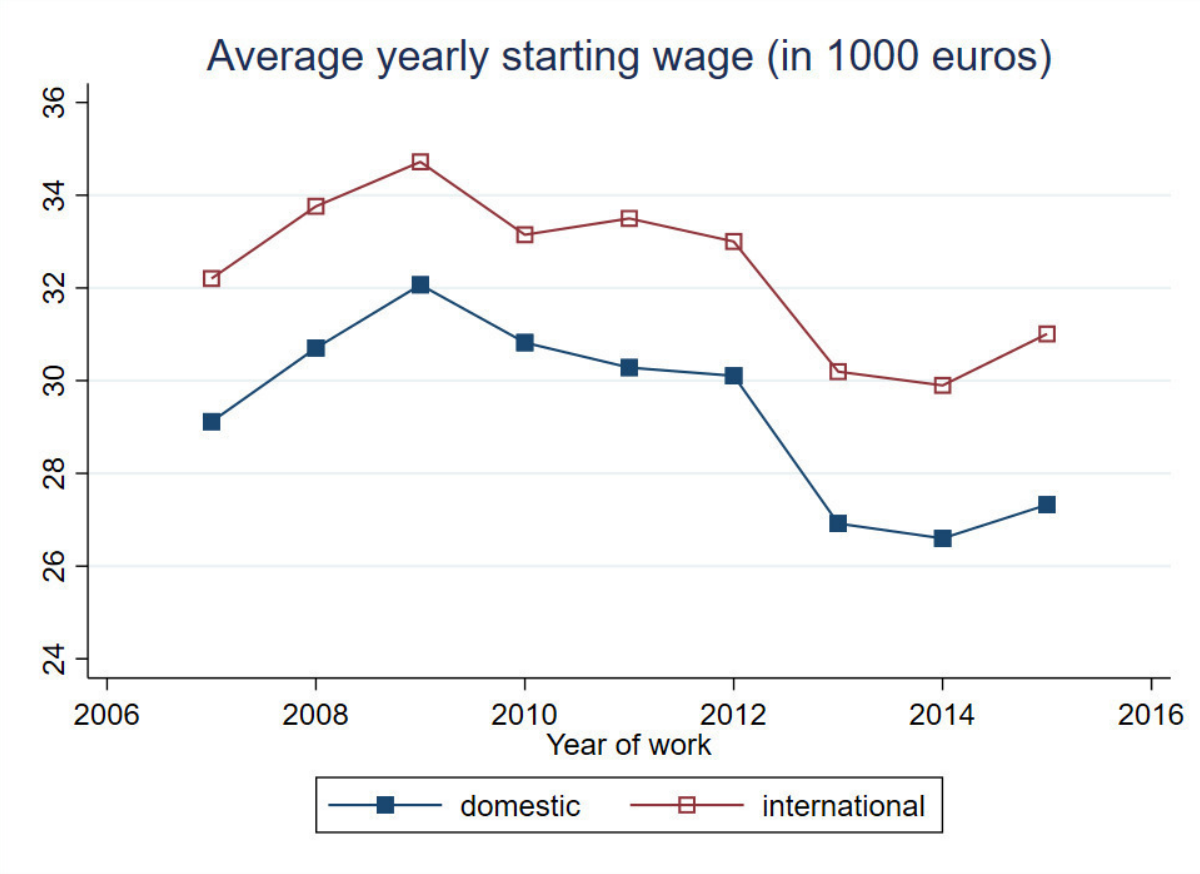

Figure 3 Starting Wage Level for Graduates upon Completion of Master Programmes

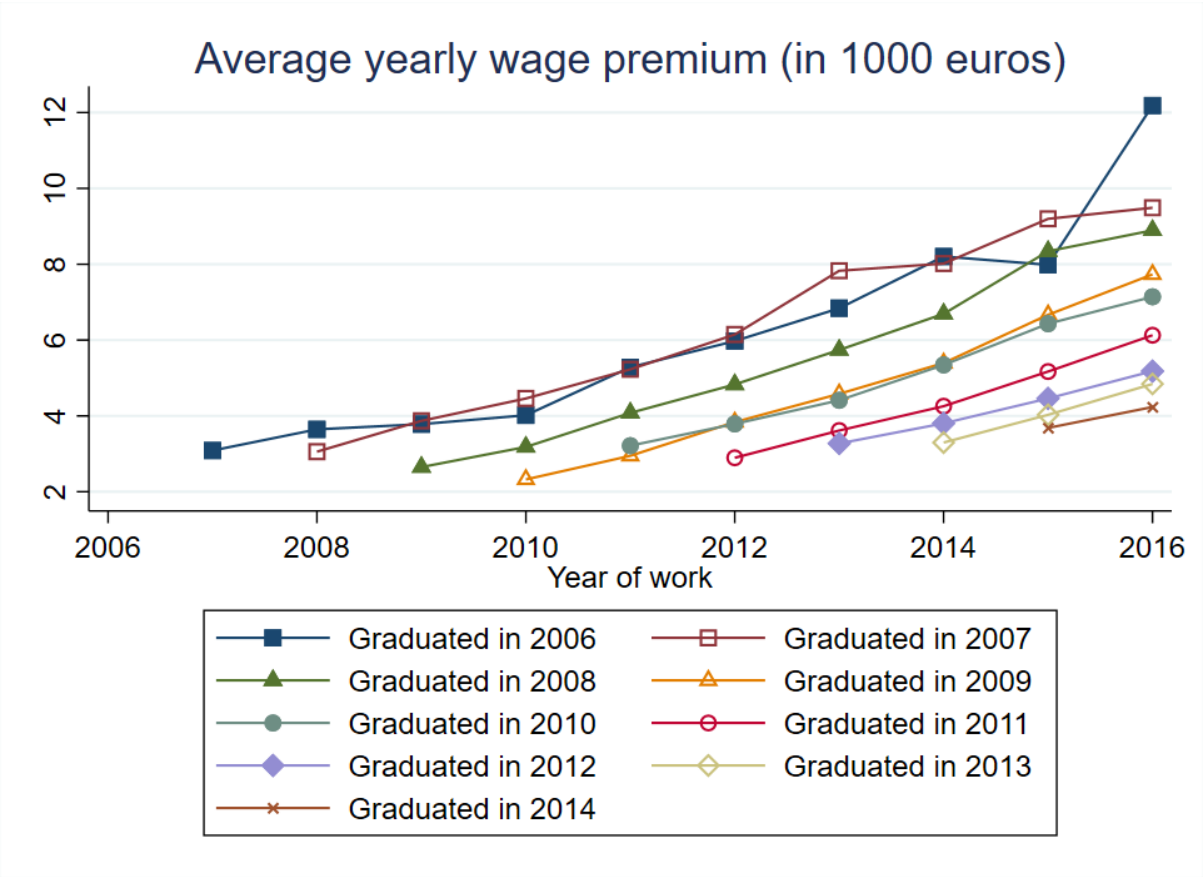

Figure 4 Unconditional Wage Premium of Graduates from International Programmes

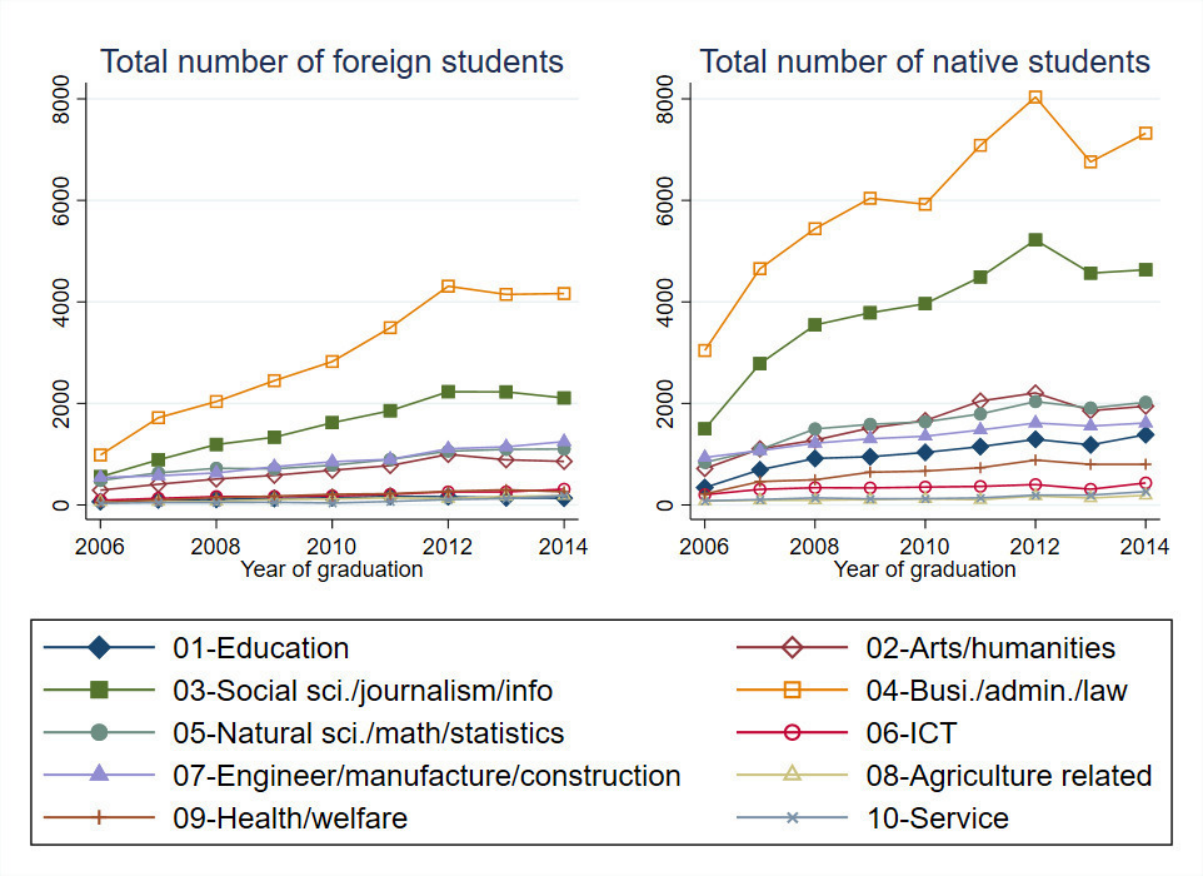

Figure 5 Dynamics of Students Inflow across Broad Fields of Study

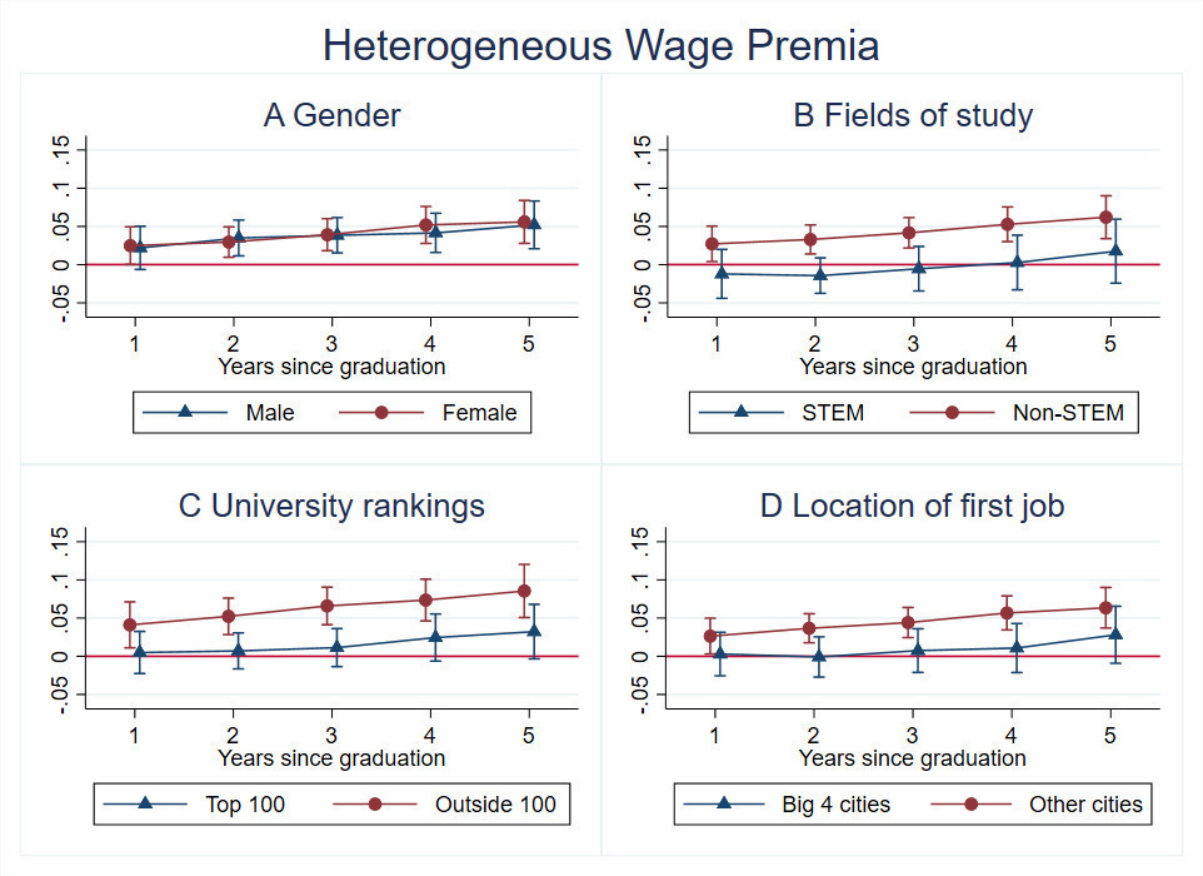

Figure 6 Heterogeneity by Gender, Fields, University and Location

Tables

Table 1 Descriptive Statistics of Students' Characteristics by Types of Study Programmes

	Full sample				1-to-n matched sample				1-to-1 matched sample			
	International		Domestic		International		Domestic		International		Domestic	
	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
Age upon graduation from master programmes	24.66	1.30	24.45	1.33	24.52	1.28	24.48	1.32	24.53	1.27	24.56	1.33
Years between graduation of master and bachelor programmes	1.88	0.82	1.71	0.85	1.85	0.82	1.84	0.82	1.90	0.80	1.84	0.84
Male	0.54	0.50	0.32	0.47	0.47	0.50	0.34	0.47	0.42	0.49	0.42	0.49
Cultural diversity in the bachelor programmes	0.79	0.22	0.77	0.24	0.80	0.21	0.78	0.22	0.78	0.22	0.76	0.24
Share of academic type among university graduates in neighborhood of residence	0.45	0.13	0.43	0.12	0.46	0.13	0.44	0.12	0.45	0.13	0.45	0.12
Education	0.01	0.12	0.13	0.34	0.01	0.12	0.09	0.29	0.03	0.17	0.03	0.17
Arts/humanities	0.06	0.24	0.08	0.27	0.05	0.21	0.05	0.22	0.06	0.24	0.06	0.24
Social sci./journalism/info.	0.17	0.38	0.29	0.45	0.18	0.39	0.25	0.43	0.22	0.41	0.22	0.41
Business/admin./law	0.46	0.50	0.34	0.47	0.66	0.47	0.50	0.50	0.56	0.50	0.56	0.50
Natural sci./math/statistics	0.10	0.30	0.07	0.25	0.04	0.20	0.07	0.25	0.07	0.26	0.07	0.26
ICT	0.02	0.14	0.02	0.14	0.01	0.08	0.01	0.09	0.01	0.10	0.01	0.10
Engineer/manufacture/construction	0.10	0.30	0.03	0.16	0.01	0.12	0.01	0.09	0.01	0.11	0.01	0.11
Agriculture related	0.01	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Health/welfare	0.04	0.20	0.04	0.20	0.03	0.17	0.03	0.16	0.04	0.19	0.04	0.19
Service	0.02	0.13	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Father's yearly wage upon student's graduation from master programmes	80151.19	307005.34	67073.56	91880.73	79799.97	255218.50	70658.76	121049.81	74255.64	85844.07	70677.94	82289.82
Graduates' yearly wage	43012	21223	39508	17500	42757	17514	39609	16954	42892	17069	40947	19199
First working firm located in Big 4 cities	0.25	0.43	0.22	0.41	0.27	0.44	0.25	0.43	0.27	0.44	0.24	0.43
First working firm in private sector	0.79	0.40	0.74	0.44	0.79	0.41	0.75	0.44	0.76	0.43	0.76	0.43
Total number of employees in the first working firm	4122.20	9237.26	4147.23	9755.70	4721.32	10086.36	4309.98	9920.82	4842.14	10073.60	4321.55	9871.07
With a fixed contract at the first working firm	0.96	0.20	0.94	0.23	0.96	0.20	0.94	0.24	0.95	0.21	0.94	0.23
Share of foreign-born employees at the first working firm	0.11	0.10	0.08	0.08	0.10	0.09	0.09	0.08	0.10	0.10	0.09	0.09
Share of bachelor degree holders at the first working firm	0.27	0.20	0.24	0.19	0.27	0.21	0.26	0.20	0.26	0.20	0.26	0.20
First working firm with trade business	0.77	0.42	0.62	0.49	0.76	0.43	0.64	0.48	0.75	0.43	0.69	0.46
Total number of firms worked until 2 years after graduation	1.21	0.41	1.22	0.42	1.22	0.41	1.23	0.42	1.22	0.41	1.22	0.42
Total number of firms worked until 3 years after graduation	1.38	0.57	1.41	0.59	1.39	0.57	1.41	0.58	1.40	0.58	1.40	0.59

Total number of firms worked until 4 years after graduation	1.51	0.69	1.57	0.71	1.52	0.69	1.54	0.69	1.54	0.70	1.53	0.69
Total number of firms worked until 5 years after graduation	1.61	0.77	1.68	0.80	1.61	0.78	1.64	0.77	1.65	0.80	1.63	0.78
Observations	146535		155158		39524		39200		19749		19749	
# Students	29815		27031		8332		7903		3990		3990	

Table 2 The Impact of Wage on the Likelihood of Internationalisation at the Programme Level

VARIABLES	(1) 2006	(2) 2007	(3) 2008	(4) 2009	(5) 2010	(6) 2011	(7) 2012	(8) 2013	(9) 2014
Log of average yearly starting wage for cohort 2004	-0.00351	-0.0116	0.0320	-0.0184	-0.0593+	0.00138	-0.00476	0.00495	-0.0115
	(0.0492)	(0.0328)	(0.0198)	(0.0282)	(0.0347)	(0.0216)	(0.0196)	(0.0199)	(0.0350)
Observations	255	261	254	243	241	241	237	218	170
R-squared	0.397	0.469	0.347	0.405	0.412	0.283	0.393	0.391	0.326
Univeristy-detailed fields FE	yes	yes	yes	yes	yes	yes	yes	yes	yes

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Standard errors clustered at study program level during master

Table 3 Enrollment Change in Response to Internationalisation

	(1)	(2)	(3)	(4)
VARIABLES	Total no. student	No. foreign student (first-generation)	No. foreign student (second-generation)	No. native students
INT	4.530**	3.266***	0.358	0.907
	(1.548)	(0.524)	(0.238)	(1.054)
Observations	6,296	6,296	6,296	6,296
R-squared	0.865	0.769	0.821	0.874
University-programme FE	yes	yes	yes	yes
year FE	yes	yes	yes	yes

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table 4 Baseline Regression Results with CEM approach

VARIABLES	ln(W)	ln(W)	ln(W)	ln(W)	ln(W)	ln(W)	ln(W)
INT* 1 year since graduation	0.0227*	0.0707**	0.0968***	0.0136	0.00974	-0.00792	0.0270*
	(0.0109)	(0.0244)	(0.0185)	(0.0104)	(0.00851)	(0.00726)	(0.0117)
INT* 2 years since graduation	0.0289**	0.0772***	0.100***	0.0199*	0.0162*	-0.000808	0.0343***
	(0.00903)	(0.0209)	(0.0158)	(0.00861)	(0.00691)	(0.00525)	(0.00878)
INT* 3 years since graduation	0.0379***	0.0822***	0.0990***	0.0282**	0.0237***	0.00940+	0.0391***
	(0.00947)	(0.0217)	(0.0170)	(0.00904)	(0.00716)	(0.00549)	(0.00946)
INT* 4 years since graduation	0.0488***	0.0907***	0.105***	0.0404***	0.0352***	0.0182**	0.0471***
	(0.0108)	(0.0250)	(0.0198)	(0.0104)	(0.00858)	(0.00684)	(0.0103)
INT* 5 years since graduation	0.0585***	0.0984***	0.116***	0.0496***	0.0425***	0.0260**	0.0610***
	(0.0133)	(0.0287)	(0.0229)	(0.0131)	(0.0113)	(0.00921)	(0.0124)
Observations	64,451	64,451	233,899	63,799	63,797	61,038	31,854
R-squared	0.425	0.224	0.212	0.459	0.513	0.725	0.503
Sample	1-n matched	1-n matched	full	1-n matched	1-n matched	1-n matched	1-1 matched
Year of work	yes	yes	yes	yes	yes	yes	yes
Years since graduation FE	yes	yes	yes	yes	yes	yes	yes
Matched bin FE	yes			yes	yes	yes	yes
Municipality of firm FE				yes	yes	yes	
Industry FE					yes	yes	
Firm FE						yes	

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Standard errors clustered at study program level during master

Table 5 Regression Results for the Characteristics of the First Working Firm upon Graduation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Located in Big 4 cities	Private sector	Log firm size	Fixed contract	Share of foreign-born workers	Share of bachelor degree holders	Firms with trade business
INT	0.0186+	-0.00704	0.201**	0.0103*	0.0136***	0.00592	0.0620***
	(0.00985)	(0.0187)	(0.0705)	(0.00423)	(0.00243)	(0.00490)	(0.0129)
Observations	16,235	16,235	16,025	16,235	16,212	16,211	13,676
R-squared	0.178	0.202	0.155	0.151	0.177	0.186	0.206
Sample	matched	matched	matched	matched	matched	matched	matched
Matched bin FE	yes	yes	yes	yes	yes	yes	yes

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Standard errors clustered at study program level during master

Table 6 Regression Results for Total Number of Firms Ever worked

VARIABLES	(1) # Firms ever worked in 2 years	(2) # Firms ever worked in 3 years	(3) # Firms ever worked in 4 years	(4) # Firms ever worked in 5 years
INT	-0.0135	-0.0176	-0.00673	0.00581
	(0.00974)	(0.0147)	(0.0165)	(0.0180)
Observations	16,235	16,235	16,235	16,235
R-squared	0.146	0.166	0.186	0.215
Sample	matched	matched	matched	matched
Matched bin FE	yes	yes	yes	yes
First firm FE	yes	yes	yes	yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Standard errors clustered at study program level during master

Table 7 Regression Results for the Subsample of Workers Never Switching Firms

VARIABLES	(1) Up to 2 years after graduation	(2) Up to 2 years after graduation	(3) Up to 3 years after graduation	(4) Up to 3 years after graduation	(5) Up to 4 years after graduation	(6) Up to 4 years after graduation	(7) Up to 5 years after graduation	(8) Up to 5 years after graduation
INT* 1 year since graduation	0.0238*	-0.00903	0.0170+	-0.0142+	0.0132	-0.0197*	0.0159	-0.0207*
	(0.00986)	(0.00808)	(0.00970)	(0.00788)	(0.0108)	(0.00854)	(0.0111)	(0.00856)
INT* 2 years since graduation	0.0295**	-0.00336	0.0252**	-0.00590	0.0238*	-0.00915	0.0264*	-0.0103
	(0.00967)	(0.00701)	(0.00937)	(0.00625)	(0.0103)	(0.00704)	(0.0107)	(0.00733)
INT* 3 years since graduation			0.0368***	0.00509	0.0369**	0.00332	0.0389**	0.000828
			(0.0111)	(0.00777)	(0.0118)	(0.00756)	(0.0120)	(0.00751)
INT* 4 years since graduation					0.0449**	0.0109	0.0471**	0.00799
					(0.0148)	(0.0107)	(0.0151)	(0.0106)
INT* 5 years since graduation							0.0599**	0.0182
							(0.0184)	(0.0139)
Observations	23,448	23,448	27,267	27,267	28,946	28,946	29,566	29,566
R-squared	0.382	0.767	0.432	0.778	0.475	0.790	0.500	0.799
Sample	matched	matched	matched	matched	matched	matched	matched	matched
Matched bin FE	yes	yes	yes	yes	yes	yes	yes	yes
Year of work	yes	yes	yes	yes	yes	yes	yes	yes
Years since graduation FE	yes	yes	yes	yes	yes	yes	yes	yes
First firm FE		yes		yes		yes		yes

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Standard errors clustered at study program level during master

Table 8 Robustness Checks: Different Definitions of International Programmes

	Less strict definitions			Stricter definitions		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	ln(W)	ln(W)	ln(W)	ln(W)	ln(W)	ln(W)
INT* 1 year since graduation	0.0173	0.0165	0.0270*	0.0252*	0.0302**	0.0318**
	(0.0114)	(0.0107)	(0.0106)	(0.0107)	(0.0112)	(0.0110)
INT* 2 years since graduation	0.0200*	0.0198*	0.0305***	0.0290**	0.0382***	0.0391***
	(0.00979)	(0.00921)	(0.00901)	(0.00912)	(0.00989)	(0.00983)
INT* 3 years since graduation	0.0265**	0.0280**	0.0391***	0.0372***	0.0458***	0.0470***
	(0.0101)	(0.00945)	(0.00921)	(0.00966)	(0.0106)	(0.0104)
INT* 4 years since graduation	0.0300*	0.0350**	0.0433***	0.0502***	0.0555***	0.0536***
	(0.0118)	(0.0109)	(0.0108)	(0.0109)	(0.0115)	(0.0112)
INT* 5 years since graduation	0.0416**	0.0474***	0.0528***	0.0611***	0.0721***	0.0678***
	(0.0142)	(0.0135)	(0.0136)	(0.0131)	(0.0132)	(0.0128)
Observations	61,136	62,888	64,160	64,978	65,671	64,171
R-squared	0.417	0.419	0.415	0.412	0.410	0.416
Sample	matched	matched	matched	matched	matched	matched
Matched bin FE	yes	yes	yes	yes	yes	yes
Year of work	yes	yes	yes	yes	yes	yes

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Standard errors clustered at study program level during master.