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THE EFFECT OF A UNIVERSITY DEGREE IN ENGLISH ON INTERNATIONAL LABOUR MOBILITY

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The Effect of a University Degree in English on International Labour Mobility*

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ABSTRACT

I investigate the effect of studying in English language on international labour market mobility for university graduates from a non-English speaking country. I exploit the introduction of Master of Arts degrees in English when students where enrolled in their Bachelor as an instrument for studying in English. I find that studying in English increases the individual's probability of working abroad by 11.2 percentage points. I also estimate the effect of an English degree on wages, and I find that graduates in English benefit almost a 60 percent increase in wage compared to graduates in national language. Finally, I provide evidence that the strong effect on wages can be explained because individuals who study in English self-select into more remunerative labour contracts and economic sectors.

JEL Classification: I21, I23, I26, J24, J61

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1 Introduction

Does a university degree in English, obtained in a non-English speaking country, foster migration? On the one hand, the first instinct might be to answer positively to this question, reasoning on the fact that a professional English knowledge may open the field for international work opportunities. On the other hand, a more skeptical answer would suggest a negative graduates' migration response for the fact that a degree in English may improve competitiveness on the national labour market, providing better labour conditions that may discourage migration. Even though both answers are intuitively simple and reasonable, however, provide a causal relation between these two phenomena is challenging because there are many heterogeneity factors affecting both the choice of studying in English and migrating. In this paper, I estimate the causal effect of studying in English, in a non-English speaking country, on university graduates' probability of working abroad.

Despite the fact that the link between studying abroad and international labour mobility is well recognized (Oosterbeek and Webbink, 2011; González et al., 2011; Parey and Waldinger, 2011), the link between studying in English in a non-English speaking country and graduates' migration decisions is still unexplored, and it is of key importance to understand the determinants of youth labour mobility. Indeed, European Union priorities for 2020 include flagship initiatives for fostering education and labour mobility in order to stimulate youth employment at home and abroad (EC, 2011). For this reason, understanding labour market outcomes of graduates in English language is central for the analysis of the growing investments in these degree programs that European universities made in the last decade, and to verify if these programs contribute to the European labour mobility goal.

Ideally, one would observe labour market outcomes of students that were

randomly assigned to university programs held in English and those in the native language. In the absence of such a natural experiment, establishing a causal link between attaining a degree in English and working abroad after graduation is a challenging task, because students who decide to attend a program in English are in many ways different from students who attain a degree in their mother tongue, also because the intent to move abroad may induce students to study in English. The unobserved heterogeneity may directly affect the decision of working abroad after graduation, leading to biased OLS estimations.

In this article, I estimate the causal effect of interest by exploiting an exogenous change in the probability of studying in English. I use the introduction of a Master of Arts (MA) in English during the period of the Bachelor of Arts (BA) degree[1] as an instrument for studying in English. In particular, my instrument takes value one for students exposed to the introduction of a MA in English in their university and discipline, while they were enrolled in their BA. This avoids that students self-select into programs that offer MA in English according to their future migration intentions. Different universities introduced the possibility to study in English for different fields of study at different points in time that are unlikely to be predicted by students (Card, 1993, 2001; Parey and Waldinger, 2011).

The Italian university scenario suits properly as case of analysis to investigate the impact of studying in English on international mobility. Since 2008 Italian universities have increased the availability of degree programs[2] in English: the fraction of English programs over the total degrees supply rose sharply from 1 percent in 2008 to roughly 8.5 percent in 2016. Moreover, within the same uni-

[1] For the sake of simplicity, I refer to the second cycle degree as "Master of Arts" (it lasts two years), and I refer to the first cycle degree (three years duration) as "Bachelor of Arts".

[2] Degree programs in English differ from those in Italian exclusively for the language feature. The number of the exams as well as number of credits devoted to specific disciplinary areas are imposed equally to all degree programs by national rules (see Reform 270/04).

versity, different fields started offering degrees in English in different academic years. The competitiveness of the Italian university on the European market, and the internationalization of Italian graduates represent the two main objectives of this supply increase.

In order to asses the effect of studying in English on international labour mobility, I use a survey of Italian graduates provided by the AlmaLaurea consortium of Italian universities. Moreover, I merge this data with a complete list of MA in English, activated in each year since 2008 from each Italian university and for every disciplinary area that is provided by the Italian National Ministry of Education (MIUR). I do this in order to determine the student's exposure to MA in English and to identify graduates in English.

Results suggest that studying in English has a strong causal effect on graduates' labour market mobility. In particular, I find that attaining a MA in English increases the individual's probability of working abroad, one year after graduation, by 11.2 percentage points. This is a relatively large effect when compared to the sample average probability of working abroad that increases almost fivefold for those with an English degree.

I present several robustness checks for this result. First, since I define my instrument according to a weak monotonicity assumption (i.e., it takes value zero if English degree was already in place while student was in BA), I implement the model using a different definition of the instrument and of the sample, allowing for strong monotonicity in order to analyse the powerful of the treatment measure and to check how the coefficient reacts to this change in the assumption. In particular: on the one hand, I remove from the sample individuals enrolled in their BA with already existing degrees in English; on the other hand, I define a new instrument that takes value equal to one if either MA in English degree

was introduced or was already in place while student was in BA.[3] Second, I remove cohorts of graduates one by one to test migration heterogeneity in different time periods. Third, I remove fields of study one at a time to check if fields for which there is no MA in English inflate standard errors. Finally, I also run my regressions removing regions of study one at a time to assess migration heterogeneity to border proximity. My results are not circumscribed to particular time periods, fields of study or regions, and are highly robust for all these sensitivity analyses.

Furthermore, I investigate the effect of a MA in English (vs national language) on wages as a mechanism of the migration choice. Along this line, I find that graduates with a MA in English have a 60 percent higher wage than graduates in Italian language, independently on working abroad. This is a large effect given that the difference in means between those who get a MA in English and those who do not is almost 9 percent in the OLS specification. I provide evidence that the large effect is due to the fact that wages are observed one year after graduation, and the first year of employment is characterized by a sharp heterogeneity in terms of sector of employment, types of contract, and full-time or part-time jobs. More specifically, I show that graduates in English obtain a higher wage because they increase their probability of being employed in a full-time job or even in highly remunerative job sectors. For this reason, since I observe graduates after one year from graduation, and the initial career path is generally characterized by a sharp heterogeneity in terms of type of works and contracts, it is still difficult to relate labour mobility to potential differences in wage premiums between Italy and foreign countries.

This paper relates to three different strands of the literature: the effect of college education decisions on labour mobility, the role of language knowledge

[3] I voluntarily introduce endogeneity in the definition of the new instrument in order to test for the strong monotonicity.

on migration and on labour outcomes, and finally the effect of studying abroad on labour mobility. On one hand, Kodrzycki et al. (2001) report a descriptive evidence that US college graduates are more likely to migrate than those without a college degree. Groen (2004) documents that the choice of studying in a particular state positively affects the probability of working in that state after the end of the studies; he solves for selection bias treating endogeneity as an omitted variable, so he used the set of states among which individuals can apply for as a way to control for heterogeneous location preferences. Moreover, Malamud and Wozniak (2010) study how college completion and attendance in US affect the probability of a long-distance move outside the birth place. They find that attending college increases the probability of residing out-of-state by 35 percentage points, using an instrumental variable approach. On the other hand, Adsera and Pytlikova (2015) use a classical gravity model for studying migration adding linguistic distances. They find that migration rates increase with linguistic proximity. Aparicio Fenoll and Kuehn (2016) study the effect of introducing foreign language into compulsory school on subsequent migration across European countries; they find that it increases the total number of emigrants by 20 percent. Furthermore, with respect to the labour market outcomes, knowledge of a foreign language is commonly found to have a positive effect on employment and wage outcomes of migrants (Dustmann and Fabbri, 2003; Chiswick and Miller, 2010, 2014). In particular, Stöhr (2015) shows that using English as a working language in Germany leads to an increase of 0.12 log points in wage, and Ginsburgh and Prieto-Rodriguez (2011) provide similar evidence in nine European countries.

To the best of my knowledge, the current paper is the first analysing the link between the completion of a MA in English in a non-English speaking country and international labour mobility. One potential reason is data availability:

most surveys do not contain information on the language of the degree, and this is due also to the sharp increase in the supply of MA in English that only occurred recently. The strand of the literature more closely related to this paper is the one looking at the link between studying abroad and labour mobility. Oosterbeek and Webbink (2011) investigate whether studying abroad increase the probability to live abroad later in life, they use an instrumental variable approach based on cut-offs in the Dutch ranking for a scholarship program to study abroad. They find that the number of months spent studying abroad strongly and positively affects the likelihood of living abroad. Furthermore, the work of Parey and Waldinger (2011) is particularly relevant for this work. The authors use the introduction of the ERASMUS program as an instrument to estimate the causal effect of studying abroad on labour market mobility. They find an increase of 15 percentage points in the probability of working abroad of German graduates.

This work provides evidence on the fact that a degree in English, obtained in the home country, is a very important determinant of labour mobility after one year from graduation. Moreover, graduates in English obtain better labour conditions in terms of type of contract, type of work (i.e., sector, part-time or full-time job), and higher wages. These results indicate that authorities should foster the supply of MA in English for promoting youth mobility and labour market outcomes. In particular, this work suggests that supporting the supply of MA in English is a good policy instrument to foster graduates' mobility. However, data do not allow yet to investigate the role of MA in English on migration decision in the medium-run. For this reason, it is not possible to estimate return to investment in human capital or brain drain effects, although these are potential interesting and relevant questions for future research.

The paper is structured as follows. Section (2) describes the institutional

background of the Italian case and the evolution of the supply of degrees in English. Section (3) presents the data. Section (4) explains the identification strategy. Section (5) reports descriptive statistics and balance tests. Section (6) shows and discuss the results on the individual's probability of working abroad. Section (7) analyses labour market outcomes. Section (8) concludes.

2 The Italian Case: Institutional Background

The Italian university system is basically structured in two main degree cycles. The first cycle *Laurea Triennale* is comparable to the *Bachelor of Arts* (BA) and it has a legal duration of three years, whereas the second cycle, *Laurea Magistrale*, is comparable to the *Master of Arts* (MA) with legal duration of two years.[4]

Since 2008 Italian universities started increasing the availability of degree programs in English.[5] The fraction of MA in English over the total MA supply rose from 1 percent in 2008 to 8.5 percent in 2016, and it increased sharply from 2013 with a rate of increase of approximately 2 percentage points per year.

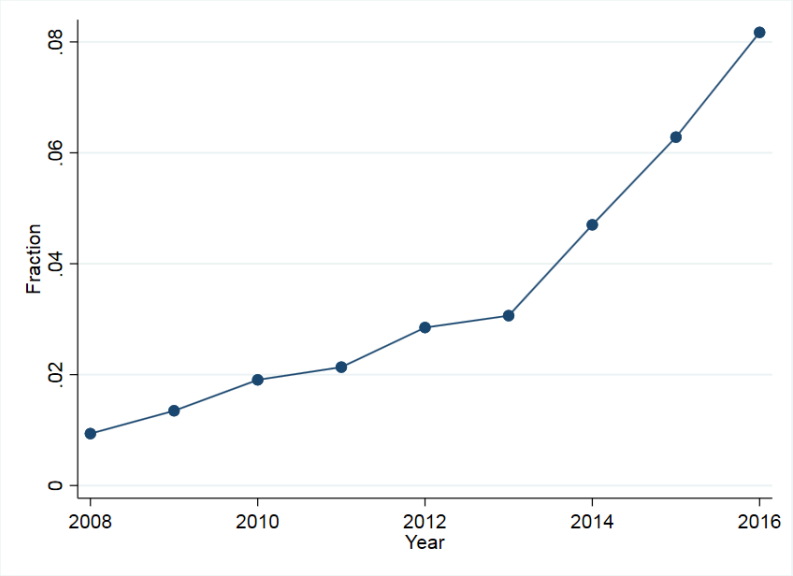
Figure (1) shows the dynamic of the supply of MA in English over the horizon 2008-2016. The observed trend is principally due to the internationalization objective of the Italian universities that aim to represent an attraction pole for

[4] There is an exception called *Laurea Magistrale a Ciclo Unico* that is basically a MA with legal duration of four to six years. Medicine and Law are the two main disciplinary areas characterized by this type of MA program. However, I do not take in consideration this type of degrees in the analysis.

[5] One caveat on the Italian supply of degrees in English is that Italian universities have to declare the language in which the degree program is given exclusively from 2008, with the introduction of a new reform of the academic system (Act 270/04). For this reason, I consider only graduates under the new sorting. The new reform has been introduced in the a.y. 2008/2009 and all universities have to adopt the new regime by the a.y. 2010/2011. However, changes forced by the reform do not directly relate to the English feature of the degrees. The reform generally aimed to create a homogeneous structure of the degree programs across Italian universities. Moreover, even though language declaration is in force since 2008, however, only few MA in English were already in place with the old sorting, and they were principally available from private universities that are not taken into consideration for this work. For more details on the reform see Stefani and Zara (2009).

international students, researchers and scholars in competition with the other European institutes.

Figure 1: Fraction of Active MA in English (2008-2016)

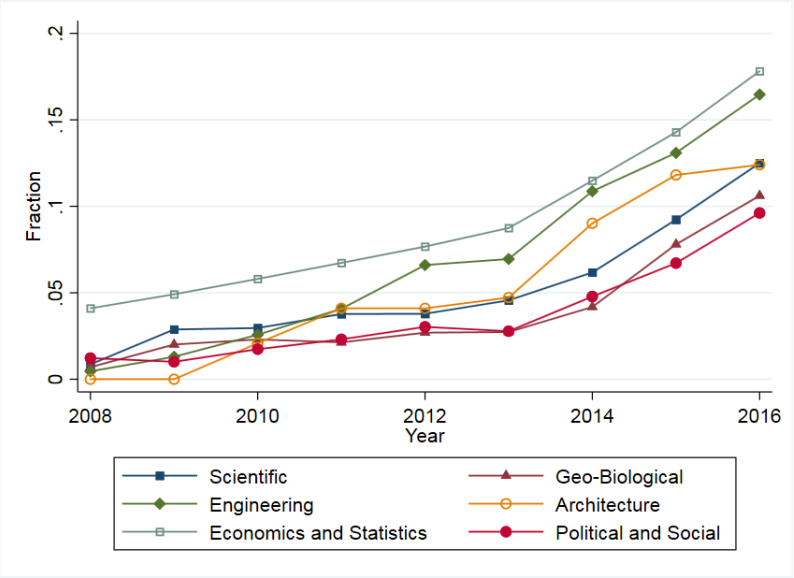


Note: The curve reports the fraction of MA in English over the total MA supply. The fraction is computed on data provided by MIUR.

Figure (1) considers the aggregation of all universities and all fields of study. The sharp increase observed from 2013 is mainly due to the adoption of MA in English by more universities and fields. In Italy, university degrees are grouped in sixteen different disciplinary areas in accordance to the national system of classification (Act 341/90). Fields of study include both Bachelor and Master degrees of the same subject. The increase in the supply of MA in English was heterogeneous among fields as described on Figure (2).

More specifically, Figure (2) shows the supply of MA in English as a fraction over the total MA supply by disciplinary area. Analysing the curves, the fields of study in sciences, technology, engineering and mathematics (STEM) are those that experienced a sharp increase in the availability of MA in English. In particular, Economics and Engineering have shown a rise that reaches a peak above

Figure 2: Fraction of Active MA in English by Field of Study (2008-2016)



Note: The curves report the fraction of MA in English over the total MA supply. Graph takes into consideration exclusively fields that showed an intensive increase in the supply. The supply trend of the low-frequency fields is available upon request. The fraction is computed on data provided by MIUR.

15 percent in 2016. However, also the other fields experienced a similar trend over the observed period of time, even if with a reduced magnitude. Furthermore, since 2013 all the curves become steeper showing a stronger progressive increase in the supply of MA in English for the adoption of these programs by a larger number of universities.

3 Data

I use data provided by the AlmaLaurea[6] consortium of Italian universities collecting information about graduates at the time of graduation (*Profilo Laure-*

[6] AlmaLaurea covers approximately the 85 percent of Italian university with exception for some private institutions (e.g., Bocconi, LUISS, etc.) without taking into account telematic universities.

ati) and follow-up interviews after one, three and five years from graduation to investigate the employment condition of graduates (*Condizione occupazionale dei laureati*). The *Profilo Laureati* includes demographic, academic and socio-economic condition of the graduates (e.g., citizenship and residence, high school and BA final grades, parents' educational level and occupation). The *Condizione occupazionale dei laureati* collects data on the employment status including info on wages, the type and location of the job[7] (Italy or abroad), the sector of employment, and the type of contract. Response rate are remarkably high: 82-90 percent one year after graduation, approximately 80 percent three years after graduation, and 72 percent after five years as it is shown in the Table (1) below.[8]

Moreover, I use data provided by the Italian Ministry of Education (MIUR), basically a list of all active degree programs in English from 2008 that I match with AlmaLaurea data in order to identify graduates with a MA in English.

For this work, I take into consideration cohorts of graduates from 2010 to 2015, and I restrict the attention to MA graduates under the new reform due to the supply evolution of English MA presented above and to the availability of the information on language from 2008. The final sample constitutes of 242,070 observations.[9]

[7] Unfortunately, info on the specific destination country is not available for all cohorts and all follow-up interview spells. For this reason, I use the generic variable reporting if graduates work in Italy or abroad.

[8] AlmaLaurea surveys students with the following methods. On the one hand, the first interview is on-line on the university website, and it is made at the time of the graduation and all students have to fulfill the questionnaire in order to obtain a certificate that allows them to obtain the graduation title. Administrative data (i.e., type of degree, year of enrollment, year of graduation, final grade, contacts info, etc.) are full and provided directly by universities. For this reason, response rates at graduation are not full because AlmaLaurea recovered administrative data from some institutions that were not associated in the past. On the other hand, follow-up interviews are sent via mail, and graduates have a specific period of time to answer. If graduates do not answer on time, AlmaLaurea starts surveying by phone calls using contacts information provided by universities.

[9] The number of observation is net of foreign students. Those observation were dropped from the sample to avoid biases in the estimation of the working abroad probability. Moreover, I remove from the sample National Defense and Law disciplinary areas because are structured

Table 1: Universities Participation and Students' Response Rate

Cohort	Number of Universities	Students' response rate: At graduation	1 year after	3 years after	5 years after
2010	57	0.916	0.891	0.799	0.721
2011	61	0.919	0.856	0.768	0.686
2012	63	0.906	0.854	0.748	n.a.
2013	64	0.910	0.829	0.731	n.a.
2014	64	0.905	0.821	n.a.	n.a.
2015	71	0.877	0.816	n.a.	n.a.

Note: Response rates refer exclusively to MA graduates (i.e., 2 years of legal duration). Administrative information is provided by universities and it is full.
Source: Survey and reports' statistics are available at: www.almalaurea.it/en

For this sample, I construct an indicator variable, named *WorkAbroad*, that takes value 1 if MA graduates work abroad after one year from graduation, while 0 if they work in Italy or they do not work. I look at the information one year after graduation in order to construct the variable homogeneously among cohorts, since information at three and five years is not available yet for all graduates (Table (1)). Moreover, the dummy variable *MAinEnglish* takes value 1 if individuals get a MA in English, and 0 otherwise. I also consider high school and BA final grades, and I collect detailed information on the educational level and occupation of the parents. Moreover, I construct an indicator variable, called *SameRegion*, taking value 1 if students are resident in the same region in which the university is located, while 0 if regions are different. Data allow also to observe both BA and MA university and disciplinary areas, as well as birth and residence regions. Section (5) reports sample descriptive statistics.

differently from BA and MA, and so do not allow for identification of the phenomenon. Finally, I do not consider the Université de la Vallée D'Aoste for its multilingual didactic feature (i.e., Italian, French, and English) that may affect the results of this work. However, students from Aosta Valley observed in the sample were very few (less than 500 observations).

4 Identification Strategy

In order to scrutinize the relationship between MA in English and working abroad, I estimate the following equation:

$$WorkAbroad_i = \beta_0 + \beta_1 MAinEnglish_i + \beta_2 X_i + \beta_3 UBA_i + \beta_4 UMA_i + \\ + \beta_5 DBA_i + \beta_6 DMA_i + \beta_7 Cohort_i + \mu_i \quad (1)$$

The variables *WorkAbroad* and *MAinEnglish* are the two dummy variables described in the previous section that identify graduates working abroad and that have studied in English, respectively. The vector X includes a set of individual characteristics such as gender, age, parents' educational level, parents' work status, and the variable *SameRegion* to partially capture unobservable propensity to migrate. Moreover, it includes a complete set of dummies controlling for the born region, the residence region, BA and high school final grades to partially capture individual unobservable ability or motivation, since students with better performances are usually highly characterized by those features (Sorrenti, 2017). I also include the logarithm transformation of the unemployment rate and GDP,[10] considered at provincial and regional level, respectively (Oreopoulos et al., 2012). Finally, I include a set of control dummies for graduates' university of the Bachelor (UBA_i) and of the Master of Arts (UMA_i), disciplinary area of the BA (DBA_i) and of the MA (DMA_i), and cohorts of graduation ($Cohort_i$).

Even though I control for many observable characteristics, however, there is empirical evidence in the sample of existing differences between graduates working abroad and working in Italy. Many sources of this heterogeneity (e.g.,

[10] Time series data on unemployment rates and GDP comes from the Italian National Statistic Institute (ISTAT). Source: http://dati.istat.it

propensity to migrate, ability, and ambition) are likely to be unobservable and related both to the choice of studying in English and the choice of working abroad producing biased estimation of the coefficient β_1 whether OLS estimations are performed. For this reason, I adopt an instrumental variable approach to estimate the causal relation of interest.

First stage equation:

$$MAinEnglish_i = \delta_0 + \delta_1 Intro_i + \delta_2 X_i + \delta_3 UBA_i + \delta_4 UMA_i + \\ + \delta_5 DBA_i + \delta_6 DMA_i + \delta_7 Cohort_i + \varepsilon_i \quad (2)$$

where *Intro* represents the instrumental variable, while control variables are the same as in Equation (1).

I use the introduction of a MA in English (*Intro*) as an instrument for the variable *MAinEnglish* in order to estimate the local average treatment effect (Imbens and Angrist, 1994; Angrist et al., 1996). In particular, the variable *Intro* is a dummy variable taking value 1 for those graduates who experienced the introduction of a MA in English in their university and in their disciplinary area while they were enrolled in the BA.[11] The instrument is equal to zero if students were never exposed to the introduction of a MA in English, or if there were already existing MA in English when they enrolled in the first cycle degree program. According to this measure, students exposed to the introduction of a MA in English are intended to be treated. Furthermore, the instrument is built

[11] Since the information on language is available only from 2008, in order to avoid measurement errors in the construction of the instrument, I contact the presidents of the executive boards of all the English MA programs activated in the reform transition period (2008-2010) to know if the course was already given in English under the old sorting. Response rate is approximately 75 percent. Moreover, I recover the remaining information looking at the old MA regulation, using the Google way-back machine getting access to the old administrative documents of MA. Among controlled MA in English only few of them were already existing under the old sorting, and for them the year of introduction is set before 2008 according to the recovered information.

considering a window of four years from the time of enrollment in the BA.[12]

Then,

$$Intro_i = \begin{cases} 1 & \text{if MA in English introduced in 4 years from enrollment to BA;} \\ 0 & \text{otherwise.} \end{cases}$$

Even though universities decide to introduce a new degree program looking at the market, however, students randomly face the introduction of the MA at a particular point in time that is unlikely to be predictable.

Finally, I estimate the second stage equation:

$$WorkAbroad_i = \gamma_0 + \gamma_1 \widehat{MAinEnglish}_i + \gamma_2 X_i + \gamma_3 UBA_i + \gamma_4 UMA_i + \\ + \gamma_5 DBA_i + \gamma_6 DMA_i + \gamma_7 Cohort_i + \psi_i \quad (3)$$

where the parameter γ_1 identifies the causal relation of interest.

I assume that the introduction of a MA in English is unrelated to changes in students' expected ability in the major-university group and discipline. The argument in favor of this assumption is that the primary university's intent of introducing a MA in English is to be competitive on the Italian and European university market also attracting international students. This intent seems to be unrelated to students' changes in ability. Moreover, I assume that students exposed to the new introduction do not exert extra efforts during BA in order to apply to the MA in English. This assumption is supported by the fact that in general MA in English do not have special entry requirements different from similar MA on the same subject offered in Italian language. In general, the main

[12] Results go through also with the three years window (BA legal duration), and there are small differences between these approaches. However, the four years option is more realistic for this dataset. In Italy, the average completion time of the study is above the European average, and it is approximately 4 years for the BA (EP, 2015).

entry requirement is to have a BA in the same discipline and a basic knowledge of the English language (level B2) that usually does not have to be supported by an official certificate, but it is internally verified by the MA executive board.[13] Moreover, this assumption supports the idea that a potential selection into subjects occurs at the Bachelor level and not at the time of MA enrollment. Finally, the instrument is defined under a weak monotonicity assumption since it is equal to 0 also for those students who enrolled in their BA in a university that was already offering a MA in English. I choose to estimate the model (3) under this weak monotonicity assumption since it is more realistic for this sample (Manski, 1997; Manski and Pepper, 2009). However, in section (6.3) I provide two specific robustness checks that fulfill strong monotonicity and allow to test the coefficient for this change in the assumption.

5 Descriptive Statistics

Table (2) reports descriptive statistics on the subgroups defined by the instrument that covers the 14.5 percent of the sample. Approximately, the 3 percent of graduates works abroad one year after graduation, and roughly the 50 percent is employed,[14] and the 2.3 percent of graduates has a MA in English. The fraction of graduates in English is relatively small because we observe graduates on the period 2010-2015 that relates approximately to the smoother supply period 2008-2013 showed in Figure (1). Moreover, the variables referring to high

[13] This scenario might be different for private universities that somehow show more challenging requirements for MA in English. However, this sample does not take into consideration Italian private institutes.

[14] Individuals involved in remunerated activities of training or education are not considered as employed in the AlmaLaurea survey. Employment statistic, according to the ISTAT definition, rises approximately by 15 percentage points.

school and BA final grades[15] show that treated individuals performed slightly better in the high school and slightly worse in the BA, when compared to the control group. Finally, roughly 17 percent of the sample have university graduate parents and the majority of parents report the working status of employee. Whereas there are sharp differences between parents in the proportion of self-employed. In particular, only the 10 percent of mothers are self-employed in contrast with the 28 percent showed by fathers.

I compute sample tests on instruments to verify the random distribution of graduates' characteristics in the subgroups defined by the treatment. First, I compute a balance test (Column 4, Table (2)) regressing each variable on the instrument, including all the controls described in Equation (1). Test results show that except for the age variable all other individual characteristics do not show statistically significant differences between the two subgroups, and are almost close to zero.[16] Individuals result to be younger in the treatment subgroup, with an average of 25 years old with respect to the 26 average observed in the control group. Second, I compute a randomization test (Column 5, Table (2)) regressing the instrument (*Intro*) on the full set of controls. In particular, I implement the Wald test on each coefficient for the hypothesis of being equal to zero. Also the randomization test performs well on the overall set of controls. In particular, Wald F-statistics are above 10 points exclusively for the age characteristics, according also to the balance test result, and for the variable identifying graduates in English. The latter result is in line with the fact that universities introduce MA in English looking at the market. However, from the student perspective, the introduction of a MA in English occurs randomly at a particular point in time.

[15] In Italy, the high school final grade is measured out of 100 points, and the university degree final grade is out of 110 points.

[16] Balance test results for the variables *Work Abroad* and *MA in English* may be interpreted as the reduced form and the first stage estimates, respectively.

Table 2: Descriptive Statistics and Sample Tests on Instrument

Variable	Whole Sample	Introduction = 0	Introduction = 1	Balance Test	Randomization Test
Introduction of MA in English	0.145	0.000	1.000		
	(0.352)	(0.000)	(0.000)		
Work Abroad	0.029	0.027	0.036	0.003**	0.41
	(0.167)	(0.163)	(0.187)	(0.001)	(0.522)
Employed	0.540	0.526	0.624	0.007	0.00
	(0.498)	(0.499)	(0.484)	(0.006)	(0.979)
MA in English	0.023	0.016	0.064	0.028***	11.92***
	(0.150)	(0.125)	(0.245)	(0.007)	(0.000)
Female	0.591	0.612	0.471	0.006	1.49
	(0.492)	(0.487)	(0.499)	(0.005)	(0.223)
Age	26.055	26.180	25.317	-0.391***	20.19***
	(2.794)	(2.899)	(1.909)	(0.076)	(0.000)
Same Region (uni-home)	0.271	0.271	0.277	0.000	2.36**
	(0.445)	(0.444)	(0.448)	(0.000)	(0.019)
Mother's Education:					
Graduate	0.165	0.161	0.188	0.002	0.38
	(0.371)	(0.367)	(0.391)	(0.002)	(0.538)
High School	0.551	0.551	0.552	-0.002	0.29
	(0.497)	(0.497)	(0.497)	(0.003)	(0.593)
Lower Secondary	0.221	0.221	0.220	0.001	0.21
	(0.415)	(0.415)	(0.414)	(0.003)	(0.648)
Elementary	0.058	0.062	0.035	-0.001	0.47
	(0.233)	(0.240)	(0.184)	(0.001)	(0.495)
No schooling	0.006	0.006	0.005	0.001	1.09
	(0.076)	(0.078)	(0.067)	(0.000)	(0.296)
Missing Mother's Education	0.145	0.149	0.121	0.001	1.09
	(0.352)	(0.356)	(0.326)	(0.001)	(0.296)
Father's Education:					
Graduate	0.181	0.176	0.213	0.004	1.26
	(0.385)	(0.381)	(0.409)	(0.003)	(0.262)
High School	0.525	0.526	0.517	-0.002	1.13
	(0.499)	(0.499)	(0.500)	(0.004)	(0.289)
Lower Secondary	0.232	0.233	0.226	0.001	0.03
	(0.422)	(0.422)	(0.418)	(0.003)	(0.860)
Elementary	0.056	0.059	0.040	-0.002	1.51
	(0.230)	(0.235)	(0.196)	(0.001)	(0.220)
No Schooling	0.006	0.006	0.005	0.000	0.21
	(0.078)	(0.079)	(0.070)	(0.000)	(0.648)
Missing Father's Education	0.143	0.149	0.119	0.001	0.65
	(0.350)	(0.356)	(0.324)	(0.001)	(0.422)
Mother's Work Status:					
Self-employed	0.108	0.106	0.125	0.001	0.29
	(0.311)	(0.307)	(0.331)	(0.002)	(0.592)
Employee	0.654	0.648	0.693	-0.001	0.03
	(0.476)	(0.478)	(0.461)	(0.003)	(0.853)
House Worker	0.238	0.247	0.182	-0.000	0.21
	(0.426)	(0.431)	(0.386)	(0.002)	(0.646)
Missing Mother's Work Status	0.163	0.168	0.131	-0.001	1.08
	(0.369)	(0.374)	(0.337)	(0.001)	(0.300)
Father's work type:					
Self-employed	0.277	0.272	0.307	0.005	0.29
	(0.448)	(0.445)	(0.461)	(0.004)	(0.592)
Employee	0.718	0.723	0.690	-0.006	0.76
	(0.450)	(0.447)	(0.462)	(0.004)	(0.385)
House Worker	0.004	0.005	0.003	0.000	0.32
	(0.067)	(0.068)	(0.054)	(0.000)	(0.571)
Missing Father's Work Status	0.157	0.162	0.127	-0.001	0.66
	(0.364)	(0.369)	(0.333)	(0.001)	(0.418)
Graduates' Final Grade:					
High School Final Grade	84.949	84.807	85.786	-0.157	(0.60)
	(12.004)	(12.001)	(11.983)	(0.187)	(0.438)
Missing HS Final Grade	0.040	0.001	0.013	0.007**	4.12**
	(0.197)	(0.023)	(0.115)	(0.003)	(0.043)
BA Final Grade	101.519	101.796	99.886	0.193	0.51
	(7.381)	(7.242)	(7.959)	(0.216)	(0.474)
Missing BA Final Grade	0.000	0.001	0.000	-0.000	3.42*
	(0.022)	(0.023)	(0.013)	(0.000)	(0.065)
Observations	242070	206998	35072	242070	242070

Note: The table contains sample means and standard deviations in parenthesis. All the variables are dummies excepting for age, high school grade, and BA grade that are linear. Missing values have been replaced with sample means. Balance test is computed regressing each variable on the instrument, including all the controls described in Equation (1). Randomization is computed regressing the instrument on the full set of controls, table reports Wald test F-statistics and p-values in parenthesis of the hypothesis that each coefficient is equal to zero. This process has been implemented multiple times to take into account also reference group variables. *, **, *** indicate statistical significance at 10%, 5%, and 1% level, respectively.

6 Results

Tables of results presented in this section have all the same structure. I report eight columns of estimations gradually adding controls and fixed effects to test the sensitiveness of the parameter of interest.[17] First, I show OLS and first stage results in section (6.1). Second, I present instrumental variable estimates in section (6.2). Finally, (6.3) describes the sensitivity analyses. Reduced form results are reported and discussed in Appendix (A).

6.1 OLS and First Stage Results

Table (3) shows the OLS results and in particular the last column (8) refers to the specification described by the Equation (1). The OLS estimates[18] for the parameter β_1 suggest an increase of 8.3 percentage points in the probability of working abroad one year after graduation for those who graduate in English. The result is strongly and statistically significant for each specification, and the parameter is robust to the introduction of controls and fixed effects. In this sense, the magnitude of the parameter slightly decreases from 0.9 to 0.83, from the first specification without controls to the one described by the Equation (1) in column (8).

Focusing on control variable estimates, *Female* and *Age* variables show small and negative effects on the probability of working abroad, whereas highly educated parents play a positive role on the probability of interest.

[17] For all the model specifications presented in this section, I consider high school as parental education reference group, and house worker as parental work status reference group. Standard errors are clustered at MA disciplinary area and university (541 clusters). Specifically, I construct an interaction variable between the two different dimensions of MA university (71) and disciplinary area (14) observed in the sample.

[18] The binary feature of both the endogenous and instrumental variables puts limit to the estimation of the model using non-linear probability models (e.g., instrumental variable Probit). However, this work investigates the local average causal effect, and 2SLS is accurate and appropriate for this purpose (Freedman and Sekhon, 2010; Angrist and Pischke, 2008).

Table 3: OLS Estimates

Dep. Variable: Work Abroad	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MA in English	0.090***	0.087***	0.085***	0.084***	0.084***	0.084***	0.083***	0.083***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Individual Characteristics:								
Same Region (uni-home)			0.017***	0.017***	0.017***	0.017***	0.017***	0.017***
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Female				-0.009***	-0.009***	-0.009***	-0.009***	-0.009***
				(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age				-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age squared				-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mother's Education:								
Graduate					0.005***	0.005***	0.005***	0.005***
					(0.001)	(0.001)	(0.001)	(0.001)
Lower Secondary					-0.001	-0.001	-0.001	-0.001
					(0.001)	(0.001)	(0.001)	(0.001)
Elementary					-0.001	-0.001	-0.001	-0.001
					(0.002)	(0.002)	(0.002)	(0.002)
No Schooling					-0.001	-0.001	-0.001	-0.001
					(0.004)	(0.004)	(0.004)	(0.004)
Father's Education:								
Graduate					0.003**	0.003**	0.003**	0.002**
					(0.001)	(0.001)	(0.001)	(0.001)
Lower Secondary					-0.004***	-0.004***	-0.004***	-0.004***
					(0.001)	(0.001)	(0.001)	(0.001)
Elementary					-0.001	-0.001	-0.001	-0.001
					(0.001)	(0.001)	(0.001)	(0.001)
No Schooling					0.002	0.002	0.003	0.003
					(0.005)	(0.005)	(0.005)	(0.005)
Mother's Work Status:								
Self-employed					0.005***	0.005***	0.005***	0.005***
					(0.001)	(0.001)	(0.001)	(0.001)
Employee					0.001	0.001	0.001	0.001
					(0.001)	(0.001)	(0.001)	(0.001)
Father's Work Status:								
Self-employed					-0.004	-0.004	-0.005	-0.005
					(0.005)	(0.005)	(0.005)	(0.005)
Employee					-0.005	-0.005	-0.005	-0.005
					(0.005)	(0.005)	(0.005)	(0.005)
Unemployment Rate in logs.						-0.003	-0.003	-0.003
						(0.002)	(0.002)	(0.002)
GDP per capita in logs.						-0.048	-0.049	-0.049
						(0.034)	(0.034)	(0.033)
Fixed Effects:								
Cohort		✓	✓	✓	✓	✓	✓	✓
BA University		✓	✓	✓	✓	✓	✓	✓
BA Disciplinary Area		✓	✓	✓	✓	✓	✓	✓
MA University		✓	✓	✓	✓	✓	✓	✓
MA Disciplinary Area		✓	✓	✓	✓	✓	✓	✓
Control Dummies:								
Born Region			✓	✓	✓	✓	✓	✓
Residence Region			✓	✓	✓	✓	✓	✓
BA Final Grade							✓	✓
High School Final Grade								✓
Observations	242070	242070	242070	242070	242070	242070	242070	242070
F-stat	73.96	215.39	77.61	787.65	988.09	>1000	>1000	>1000

Note: Parental work status reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Standard errors are clustered at MA disciplinary area and university level (541 clusters). *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively.

In particular, this is the case of university graduate parents that results to have a positive effect, even if small, on the phenomenon of analysis. On contrary, a negative effect is shown by fathers with a lower secondary education level. Furthermore, looking at the parent's work status estimates, I find a positive effect on the probability of working abroad only via the coefficient of self-employed mothers.

Even though I obtain highly significant and stable results for the parameter β_1 and for many other control variables, however, OLS estimates are biased by endogenous factors affecting both the choice of studying in English and of working abroad. For this reason, I adopt an instrumental variable approach using the introduction of a MA in English during the period of the BA as an instrument for studying in English as described in section (4). Table (4) reports the first stage estimates, providing the validity of the instrument in describing the endogenous variable.

Table 4: First Stage Estimates

Dep. Variable: MA in English	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Introduction of MA in English	0.048***	0.028***	0.029***	0.028***	0.028***	0.028***	0.028***	0.028***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Individual Characteristics				✓	✓	✓	✓	✓
Parents' Education					✓	✓	✓	✓
Parents' Work Status					✓	✓	✓	✓
Unemployment Rate & GDP (logs)						✓	✓	✓
Fixed Effects		✓	✓	✓	✓	✓	✓	✓
Control Dummies:								
Born Region			✓	✓	✓	✓	✓	✓
Residence Region			✓	✓	✓	✓	✓	✓
BA Final Grade							✓	✓
High School Final Grade								✓
Observations	242070	242070	242070	242070	242070	242070	242070	242070
F-stat	45.08	46.51	54.72	57.75	83.43	84.43	145.28	266.14
F-stat of Excluded Instrument	45.08	15.41	15.86	15.05	14.91	15.07	14.96	14.90

Note: Parental work status reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Fixed effects include dummies on Cohort of graduates, BA and MA university and disciplinary area. Control variable estimates and standard errors do not change from OLS; results are available upon request. Standard errors are clustered at MA disciplinary area and university level (541 clusters). *, **, *** indicate statistical significance at 10%, 5% and 1% level respectively.

The instrument provides a strong description of studying in English with a 2.8 percentage points increase in the probability of getting a MA in English for those who were exposed to the introduction of this program while enrolled in the BA (Table (4), column (8)). The effect is positively strong when compared to the sample average probability of working abroad (2.3 percent) that more than doubles for the effect of the intention to treat. Results are strong in all specifications with F-statistics of excluded instrument always above 10 points.

6.2 Second Stage Results

Table (5) presents the results of the instrumental variable estimates as described by the Equation (3) in column (8), gradually adding controls.

Table 5: Instrumental Variable Estimates

Dep. Variable: Work Abroad	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MA in English	0.184***	0.140***	0.145***	0.124***	0.121***	0.122***	0.113**	0.112**
	(0.051)	(0.049)	(0.048)	(0.046)	(0.045)	(0.045)	(0.045)	(0.045)
Individual Characteristics				✓	✓	✓	✓	✓
Parents' Education					✓	✓	✓	✓
Parents' Work Status					✓	✓	✓	✓
Unemployment Rate & GDP (logs)						✓	✓	✓
Fixed Effects		✓	✓	✓	✓	✓	✓	✓
Control Dummies:								
Born Region			✓	✓	✓	✓	✓	✓
Residence Region			✓	✓	✓	✓	✓	✓
BA Final Grade							✓	✓
High School Final Grade								✓
Observations	242070	242070	242070	242070	242070	242070	242070	242070
F-stat	12.85	239.78	83.76	854.66	1000	>1000	>1000	>1000
F-stat of Excluded Instrument	45.08	15.41	15.86	15.05	14.91	15.07	14.96	14.90

Note: Parental work status reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level respectively. Coefficient estimates and standard errors do not change from OLS; results are available upon request. Standard errors are clustered at MA disciplinary area and university level (541 clusters). *, **, *** indicate statistical significance at 10%, 5% and 1% level respectively.

I find positive and statistically significant results for the parameter γ_1 of the instrumented variable $MAinEnglish$, showing an overall increase of 11.2 per-

centage points (Table (5), column (8)) in the probability of working abroad after one year from graduation, and the result is closed in magnitude to the corresponding OLS estimate. This result is large when compared to the sample average of working abroad individuals (around 3 percent): the probability increases almost fivefold for those with a MA in English. Moreover, fixed effects, control dummies on the born and residence region, and individual characteristics are those that decrease more the magnitude of the effect (Table (5, columns (1)-(4)). Indeed, the coefficient is quite stable in the estimates reported from column (5) to (8) in Table (5).

This result suggests that studying in English has a strong causal effect on graduates' labour market mobility. Moreover, it provides evidence that fostering international degrees in English is a powerful instrument to stimulate international labour mobility.

6.3 Sensitivity Analysis

I provide several robustness checks for the parameter γ_1. In particular, I restrict the sample excluding individuals with features that might inflate the magnitude of the coefficient or its standard error.

Primarily, since I defined the instrument under a weak monotonicity assumption, I run the model with a different composition of the sample and a new instrument definition that fulfill strong monotonicity. In particular, at first I remove from the sample individuals that enroll in the BA with already existing MA in English in the subject and university they apply for.[19] Second, I build an instrument that is equal to one also for those enrolled in the BA with MA in English already in place (voluntarily introducing endogenity in the instrument

[19] The instrument, *Intro*, as defined in section (4) is equal to zero also for individuals enrolled in the BA with already existing MA in English.

to test standard errors). Table (6) reports results on the strong monotonicity assumption: column (1) restricts the sample and column (2) tests the new instrument. Results go through in both cases with a slight reduction in the magnitude of the coefficient that becomes larger under the new endogenous instrument. Moreover, by construction, F-statistic of excluded instrument is more powerful under strong monotonicity.[20]

Table 6: Robustness Check: Strong Monotonicity

Dep. Variable: Work Abroad **Estimation Method:** IV	(1)	(2)
MA in English	0.092***	0.076***
	(0.029)	(0.022)
Robustness Check:		
Restricted Sample for Strong Monotonicity	✓	
Instrument under Strong Monotonicity		✓
Observations	232581	242070
F-stat	>1000	>1000
F-stat of Excluded Instrument	46.85	42.00

Note: All column estimations refer to specification 8 that includes all the fixed effects describe above. Parental work status reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Control variable estimates and standard errors are available upon request. Standard errors are clustered at MA disciplinary area and university level (541 clusters). *, **, *** indicate statistical significance at 10%, 5% and 1% level respectively.

Moreover, since the availability of degrees in English differs subject by subject and year by year, I test the coefficient by removing cohorts of graduates and disciplinary areas one at time. Tables (7) and (8) show these results. On the one hand, results on cohorts of graduates are robust excepting for the years 2013 and 2015 in which the magnitude of the coefficient slightly decreases and looses statistical significance. However, this result is driven by the reduced form that

[20] One caveat about the restricted sample (232581 obs.) that fulfills strong monotonicity is that it is slightly unbalanced on some parental characteristics. This made prudent the choice of relaxing the monotonicity assumption in the main analysis.

does not provide evidence of difference in the working abroad variables. On contrary, the first stage is still powerful for each cohort with F-statistic on instrument always above 10 points. It is reasonable to think that graduates from cohorts 2013 and 2015 are particularly mobile with respect to the others, however there is no evidence of particular pushing factors for migration in those years. Results that relate to the other removed cohorts are highly robust with no particular deviations in magnitude with respect to the results presented in Table (5).

Table 7: Robustness Check Estimates on Cohorts of Graduates

Dep. Variable: Work Abroad	**Removed Cohorts**					
	2010	2011	2012	2013	2014	2015
MA in English	0.107**	0.117***	0.138***	0.071	0.152**	0.087
	(0.045)	(0.042)	(0.050)	(0.048)	(0.067)	(0.054)
Observations	235812	217030	198750	186400	187092	185266
F-stat	>1000	>1000	>1000	674.11	>1000	>1000
F-stat of Excluded Instrument	15.32	15.80	10.84	15.32	16.03	14.97
Clusters	541	541	541	541	541	538

Note: Instrumental Variable estimates. All column estimations refer to specification 8 that includes all the fixed effects describe above. Parental work status reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Control variable estimates and standard errors are available upon request. Standard errors are clustered at MA disciplinary area and university level. *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively. P-values of the estimated *MA in English* referring to the removed cohorts 2013 and 2015 are 0.139 and 0.106, respectively.

On the other hand, results on subjects are robust for all sample restrictions excepting for the case of Engineering (Table (8), column (5)) that reports a drop in the magnitude of the coefficient and a lack of statistical significance. However, in contrary with the previous case, this results is driven by the first stage estimate that is no more highly significant with an F-statistic of instrument below 10 points. This is due to the fact that Engineering is the subject that experienced the highest increase in the supply of MA in English as represented in Figure (2). However, statistical significance is close to 10 percent level. Further-

more, all other restrictions are highly robust, and standard errors do not seem to be inflated by fields that have not introduced MA in English. In particular, coefficient estimates are alway around 11 percentage points and also standard errors are stable at the same level observed for the result showed in Table (5).

Table 8: Robustness Check Estimates on Disciplinary Areas

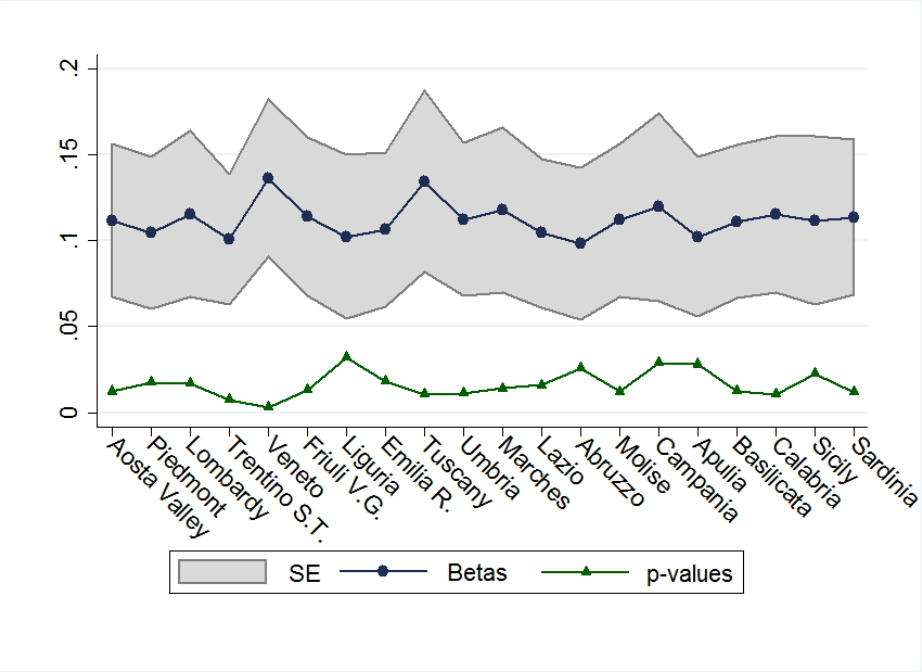
Dep. Variable: Work Abroad	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MA in English	0.105**	0.116**	0.128**	0.110**	0.081	0.117**	0.118***
	(0.044)	(0.047)	(0.052)	(0.045)	(0.052)	(0.058)	(0.045)
Removed Subjects:							
Scientific	✓						
Chemical-Pharmaceutical		✓					
Geo-Biological			✓				
Medicine				✓			
Engineering					✓		
Architecture						✓	
Agriculture-Veterinary							✓
Observations	232603	238079	220940	238399	204955	232088	237033
F-stat	>1000	>1000	>1000	>1000	>1000	>1000	>1000
F-stat of Excluded Instrument	17.50	14.01	11.71	14.86	8.79	13.07	14.66
Clusters	503	509	492	506	497	517	519
Dep. Variable: Work Abroad	(8)	(9)	(10)	(11)	(12)	(13)	(14)
MA in English	0.135***	0.085**	0.119**	0.132***	0.108**	0.104**	0.110**
	(0.050)	(0.043)	(0.050)	(0.046)	(0.045)	(0.044)	(0.045)
Removed Subjects:							
Economics-Statistics	✓						
Political-Social		✓					
Literary			✓				
Linguistic				✓			
Education					✓		
Psychological						✓	
Physical Education							✓
Observations	194993	212845	214380	228114	235157	219688	237636
F-stat	>1000	>1000	>1000	>1000	>1000	>1000	>1000
F-stat of Excluded Instrument	12.36	13.33	12.46	14.02	14.65	15.27	14.78
Clusters	486	487	487	496	511	512	511

Note: All column estimations refer to specification that includes all fixed effects and controls. Parental work status reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Control variable estimates and standard errors are available upon request. Standard errors are clustered at MA disciplinary area and university level. *, **, *** indicate statistical significance at 10%, 5% and 1% level respectively. P-value of the estimated *MA in English* referring to the removed subject of Engineering is 0.115.

Finally, since the probability of working abroad is heterogeneous among Italian regions, with a higher mobility observed in the north than in the south due

also to the fact that northern regions are the only ones closed to European borders, I test the coefficient of interest removing regions of study one at a time. Figure (3) provides a graphical representation of these results. Results on regions are robust for all the sample restrictions. Changes in the magnitude of the coefficient are almost flat, and statistical significance is always below 5 percent level.

Figure 3: Robustness Check on Regions of Study



Note: Graph reports IV estimates computed on the full model specification provided by Equation (1). Parental work status reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Control variable estimates and standard errors are available upon request. Standard errors are clustered at MA disciplinary area and university level. Results on Aosta Valley are the same reported in column (8) of Table (5), so can be taken as a benchmark.

7 Studying in English and Labour Market Outcome

Due to the increased demand of workers with an English proficiency, here I focus on the relation between graduates with a MA in English and their labour market performance measured as individual wage.[21] Moreover, I estimate the effect on wages in order to scrutinize if the wage premium is a push factor or a deterrent for the migration choice Antolin and Bover (1997).

Then, I estimate the following wage equation:

$$log(Wage)_i = \alpha_0 + \alpha_1 MAinEnglish_i + \alpha_2 X_i + \alpha_3 UBA_i + \alpha_4 UMA_i + \\ + \alpha_5 DBA_i + \alpha_6 DMA_i + \alpha_7 Cohort_i + \eta_i \quad (4)$$

Moreover, I instrument the endogenous variable, $MAinEnglish$, according to the Equation (2) and I estimate the following second stage equation:

$$log(Wage)_i = \theta_0 + \theta_1 \widehat{MAinEnglish}_i + \theta_2 X_i + \alpha_3 UBA_i + \alpha_4 UMA_i + \\ + \alpha_5 DBA_i + \alpha_6 DMA_i + \alpha_7 Cohort_i + \phi_i \quad (5)$$

where θ_1 identifies the causal effect of interest on wages, whereas controls vector X and fixed effects are the same described in section (4).

I estimate the model (5) conditioning on working individuals that are approximately 50 percent of the sample[22] as showed in Table (2). For this reason,

[21] To limit measurement error in wage reporting, AlmaLaurea consortium collects the monthly wage information into classes of 250 euros. For this reason, according to Sorrenti (2017) I impute wage as the average class value, e.g., if the first class is bounded between 0 and 250 euros, individuals in this class are characterized by a 125 euros wage. Moreover, wages are net of taxation and social security contribution, and are not adjusted for Purchasing Power Parity (PPP) due to the unavailable information on the destination country for working abroad graduates.

[22] Earnings for students that are involved in specialization schools are not observed and there-

since the sample sharply reduces in size, I further restrict the number of observations according to the strong monotonicity assumption in order to ensure the instrument strength. Then, I end up with 104,082 observations. However, in Appendix (B) I present the same analysis I describe in this section, but implemented on the whole sample of graduates.[23]

Table (9) shows results on wages. In particular, the OLS estimation of the Equation (4) is on the first column, the reduced form on the second column, the first stage estimates on the third column, and finally the instrumental variable estimation described by the Equation (5) is on the fourth column. Results on Table (9) show that the instrument is strong in the first stage and in the reduced form. Specifically, the reduced form that provides the first inference of causal effect (Chernozhukov and Hansen, 2008) shows a positive increment of 2 percent in wages for those exposed to the introduction of a MA in English, whereas the result of the first stage is not dissimilar from that one showed in Table (4) but it is slightly increased in magnitude for the sample size effect. For the same reason, also the powerful of the instrument, measured by the F-statistic of the excluded instrument, is increased. Furthermore, I find a positive and statistically significant effect on wages for graduates with a MA in English. In particular, graduates in English language benefit almost a 60 percent increase in wages with respect to graduates in Italian language. This is a large result given that the difference in means between those who get a MA in English and those who do not is almost 9 percent in the OLS specification (Table (9), column (1)). Moreover, even though it is not the purpose of this work to investigate gender discrimination in the labour market, however, the coefficient for female explains a decrease

fore are set to missing. Moreover, among working individuals (AlmaLaurea definition) there are some missing reporting information on wages that were not replaced by zeros in the logarithmic analysis in order to avoid biased estimates of LATE.

[23] In this case, wages of individuals that are missing for any reason (i.e., not observed because unemployed or in specialization school, or unreported) are set equal to one.

of 16 percent in wages when compared to the male counterparts, confirming the existence of a gender wage gap in the Italian labour market (Del Bono and Vuri, 2011). Also the unemployment rate show a negative effect on wage: the higher the unemployment rate the larger is the negative effect on wage.

Table 9: Estimations on Wage in Logarithms

Dependent Variable:	Wage (in logs)	Wage (in logs)	MA in English	Wage (in logs)
	(1)	(2)	(3)	(4)
Estimation:	**OLS**	**Reduced Form**	**First Stage**	**IV**
Introduction of MA in English		0.021**	0.036***	
		(0.010)	(0.006)	
MA in English	0.086***			0.598*
	(0.023)			(0.310)
Female	-0.163***	-0.164***	-0.005***	-0.161***
	(0.006)	(0.006)	(0.002)	(0.007)
Unemployment Rate in logs.	-0.025*	-0.026*	-0.001	-0.025*
	(0.013)	(0.013)	(0.003)	(0.014)
Observations	104082	104082	104082	104082
F-stat	>1000	657.42	407.16	>1000
F-stat of Excluded Instrument	-	-	40.19	40.19

Note: Columns refer to OLS, reduced form, first stage, and instrumental variable estimation, respectively. These specifications include all the fixed effects described above. Parental work type reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Standard errors are reported in parenthesis and are clustered at MA disciplinary area and university level (540 clusters). *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively.

The gap between OLS and IV estimates is principally due to the fact that wages are observed one year after graduation. The first year of the career path is characterized by a large heterogeneity in terms of types of contract, types of employment (e.g., full-time or part-time jobs), sectors of activity, and types of company. For these reasons, it seems that MA in English do not provide a large wage premium *per se*, but that individuals who study in English self-select into more remunerative labour contracts and economic sectors. Moreover, one year after graduation, the percentage of part-time workers is relatively high (i.e., almost 35 percent of working individuals) and there are sharp differences in wages between part-time and full-time workers.

In order to test these hypotheses, I estimate a wage saturated model, including in equation (5) a full set of control dummies on the job activity sector, the types of contract, and the type of employment. Moreover, since the sample is conditioned on working individuals, independently on the location of the job (Italy or abroad), I estimate Equation (5) including also the indicator variable *WorkAbroad* in order to capture potential wage differences due to working abroad. Even though including all these controls in equation (5) is problematic because there might be reverse causality with wage, however, the scope of this implementation is not to infer a causal effect, but rather to investigate how (and if) the large effect on wage showed in Table (9) is absorbed by these heterogeneity factors.

Table 10: IV Model Saturation on Wage in Logarithms

Dep. Variable: log(Wage) **Estimation Method:** IV	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MA in English	0.598*	0.562*	0.511*	0.302	0.265	0.110	0.085
	(0.310)	(0.311)	(0.285)	(0.256)	(0.213)	(0.191)	(0.182)
Female	-0.161***	-0.154***	-0.158***	-0.132***	-0.098***	-0.091***	-0.088***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.005)	(0.005)	(0.005)
Unemployment Rate in logs.	-0.025*	-0.024*	-0.021*	-0.025**	-0.016	-0.016	-0.014
	(0.014)	(0.013)	(0.012)	(0.012)	(0.010)	(0.010)	(0.009)
Work Abroad		0.423***					0.270***
		(0.014)					(0.011)
Permanent Contract			0.473***				0.337***
			(0.016)				(0.012)
Fixed-term Contract			0.405***				0.297***
			(0.016)				(0.013)
Full-time Job					0.804***	0.742***	0.681***
					(0.010)	(0.008)	(0.008)
Control Dummies:							
Job Activity Sector				✓		✓	✓
R^2	0.256	0.272	0.339	0.327	0.456	0.479	0.528
Observations	104082	104082	104082	104082	104082	104082	104082
F-stat	>1000	>1000	>1000	>1000	>1000	>1000	>1000
F-stat of Excluded Instrument	40.19	40.05	40.21	41.27	40.05	40.32	41.00

Note: All column estimations include all the fixed effects described above. Parental work type reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Standard errors are reported in parenthesis and are clustered at MA disciplinary area and university level (540). *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively.

Table (10) reports the IV estimates of the wage saturated model.[24] Column (7) of the table shows that the wage coefficient sharply decreases when I include all the controls. In particular, the wage premium drops from 59.8 percent to 8.5 from column (1) to (7). Among all the added control variables, the ones that present a higher impact on wages are full-time and job activity sector: the coefficient of wage decreases by almost 30 percentage points when I control for the activity sector and it drops even sharply when the full-time dummy is included (Table (10), columns (4) and (5)). Moreover, this is also showed by the positive magnitude of the coefficient of the full-time variable that is sharply large and statistically significant at the one percent level. In general, all heterogeneity variables show a large and strong positive and statistically significant effect on wages. These results support the idea that the large wage premium is a mixture of all these components. Finally, also for these specifications, the coefficient for the female variable shows a negative effect that slightly decreases when I gradually saturate the model (5). This result is very strong and persistent in all the specifications and it opens the field for future investigations.

Results provided by the saturated model strengthen the hypothesis that graduates in English increase their probability of being employed in highly remunerative sectors, and of being full-time employed. In order to provide more evidence of these hypotheses, Appendix (B) replicates estimates of Tables (9) and (10) on the whole sample, showing that the dynamic presented in this section does not relevantly change. Moreover, in Appendix (C) I run the model (5) using the probability of being employed in a full-time job as a dependent variable. I find that study in English increases this probability by almost 40 percentage points and I provide evidence that also in this case the large effect is given by a composition of multiple factors.

[24] Columns (1) in Table (10) simply replicates the estimation of column (4) in Table (9).

8 Conclusions

This work represents the first attempt to investigate the role of MA in English on work-related migration decisions after graduation. In particular, the migration decision is observed one year after the end of the MA, and for this reason it is likely to influence future individual work opportunities in terms of earnings and job positions. The exclusiveness of this work is due to the fact that the supply of this type of degrees is recent and the Italian university market is a proper case of analysis because it experienced a sharp increase in the supply of MA in English only in recent years. For this reason, I analyse the phenomenon on the first cohorts of graduates exposed to this offer, in relation to the probability of working abroad, and afterward I investigate graduates' labour market performances.

My results suggest that graduates with a MA in English increase their probability of working abroad by 11.2 percentage points that is in line with the result provided by Parey and Waldinger (2011) on studying abroad. This result, when compared to the sample average of working abroad graduates (3 percent), indicates that the probability increases almost fivefold for those who graduate in English. However, this increase seems unrelated to different wage opportunities between Italian and foreign labour markets since results on wages show that graduates with a MA in English generally have a 60 percent higher wage than graduates in Italian language, independently on working abroad. This results is supported by the fact that the first year of the career path is characterized by a sharp heterogeneity in terms of types of job, types of contracts, and sectors of employment. Indeed, I provide evidence that graduates in English self-select into high remunerative job sectors and in full-time jobs. These channels reflects the large increase in wages experienced in the first year of career by graduates in English.

Finally, from an institutional perspective, this work shows the importance of international MA in English and how the market absorbs and remunerates this skill. The results suggest that supporting the supply of MA in English is a good policy instrument to foster graduate mobility. Moreover, my findings spark debate on return to investment in human capital for the Italian university system. This means that the field is open for the investigation on the medium-run (e.g., five years) migration decision, analysing if those who work abroad after one year from graduation then come back to work in Italy or remain abroad (Becker et al., 2004).

References

Adsera, A. and Pytlikova, M. (2015). The role of language in shaping international migration. *The Economic Journal*, 125(586).

Angrist, J. D., Imbens, G. W., and Rubin, D. B. (1996). Identification of causal effects using instrumental variables. *Journal of the American statistical Association*, 91(434):444–455.

Angrist, J. D. and Pischke, J.-S. (2008). *Mostly harmless econometrics: An empiricist's companion*. Princeton university press.

Antolin, P. and Bover, O. (1997). Regional migration in spain: the effect of personal characteristics and of unemployment, wage and house price differentials using pooled cross-sections. *Oxford bulletin of Economics and Statistics*, 59(2):215–235.

Aparicio Fenoll, A. and Kuehn, Z. (2016). Does foreign language proficiency foster migration of young individuals within the european union? *The Economics of Language Policy*, page 331.

Becker, S. O., Ichino, A., and Peri, G. (2004). How large is the" brain drain" from italy? *Giornale degli Economisti e Annali di Economia*, pages 1–32.

Card, D. (1993). Using geographic variation in college proximity to estimate the return to schooling. Technical report, National Bureau of Economic Research.

Card, D. (2001). Estimating the return to schooling: Progress on some persistent econometric problems. *Econometrica*, 69(5):1127–1160.

Chernozhukov, V. and Hansen, C. (2008). The reduced form: A simple approach to inference with weak instruments. *Economics Letters*, 100(1):68–71.

Chiswick, B. R. and Miller, P. W. (2010). Occupational language requirements and the value of english in the us labor market. *Journal of Population Economics*, 23(1):353–372.

Chiswick, B. R. and Miller, P. W. (2014). International migration and the economics of language. *Handbook of the Economics of Immigration*, pages 211–269.

Del Bono, E. and Vuri, D. (2011). Job mobility and the gender wage gap in italy. *Labour Economics*, 18(1):130–142.

Dustmann, C. and Fabbri, F. (2003). Language proficiency and labour market performance of immigrants in the uk. *The Economic Journal*, 113(489):695–717.

EC, E. C. (2011). Youth on the move: analytical report. survey conducted by the gallup organization, hungary upon the request of directorate-general education and culture. Technical report.

EP, E. P. (2015). Internationalisation of higher education. Report, Available at: http://publications.uni.lu/bitstream/10993/24760/1/EP%20study_Intl%20of%20HE_IPOL_STU%282015%29540370_EN.pdf.

Freedman, D. A. and Sekhon, J. S. (2010). Endogeneity in probit response models. *Political Analysis*, 18(2):138–150.

Ginsburgh, V. A. and Prieto-Rodriguez, J. (2011). Returns to foreign languages of native workers in the european union. *ILR Review*, 64(3):599–618.

González, C. R., Mesanza, R. B., and Mariel, P. (2011). The determinants of international student mobility flows: An empirical study on the erasmus programme. *Higher Education*, 62(4):413–430.

Groen, J. A. (2004). The effect of college location on migration of college-educated labor. *Journal of Econometrics*, 121(1):125–142.

Imbens, G. W. and Angrist, J. D. (1994). Identification and estimation of local average treatment effects. *Econometrica*, 62(2):467–475.

Kodrzycki, Y. K. et al. (2001). Migration of recent college graduates: evidence from the national longitudinal survey of youth. *New England Economic Review*, pages 13–34.

Malamud, O. and Wozniak, A. K. (2010). The impact of college education on geographic mobility: Identifying education using multiple components of vietnam draft risk. Technical report, National Bureau of Economic Research.

Manski, C. F. (1997). Monotone treatment response. *Econometrica: Journal of the Econometric Society*, pages 1311–1334.

Manski, C. F. and Pepper, J. V. (2009). More on monotone instrumental variables. *The Econometrics Journal*, 12(s1).

Oosterbeek, H. and Webbink, D. (2011). Does studying abroad induce a brain drain? *Economica*, 78(310):347–366.

Oreopoulos, P., Von Wachter, T., and Heisz, A. (2012). The short-and long-term career effects of graduating in a recession. *American Economic Journal: Applied Economics*, 4(1):1–29.

Parey, M. and Waldinger, F. (2011). Studying abroad and the effect on international labour market mobility: Evidence from the introduction of erasmus. *The Economic Journal*, 121(551):194–222.

Sorrenti, G. (2017). The spanish or the german apartment? study abroad and the acquisition of permanent skills. *Economics of Education Review*, 60:142–158.

Stefani, E. and Zara, V. (2009). Dentro e fuori dal labirinto. percorso ragionato per la costruzione di corsi di studio ai sensi del dm 270/04. *Fondazione CRUI*.

Stöhr, T. (2015). The returns to occupational foreign language use: Evidence from germany. *Labour Economics*, 32:86–98.

Appendix A Reduced Form Estimates on Work Abroad

Reduced form (RF) estimates provide the first positive result in terms of causal inference (Chernozhukov and Hansen, 2008). Coefficient estimates are robust to the introduction of all the controls, and the difference in means between the subgroups defined by the instrument decreases from 0.9 percentage points to 0.3 in the specification including controls. In particular, I find a positive and strong statistically significant result for the instrument coefficient that show an increase of 0.3 percentage points in the probability of working abroad for those who were exposed to the introduction of a MA in English while they were enrolled in the BA (Column (8)).

Table 11: Reduced Form Estimates

Dep. Variable: Work Abroad	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Introduction of MA in English	0.009***	0.004***	0.004***	0.003**	0.003**	0.003**	0.003**	0.003**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Individual Characteristics				✓	✓	✓	✓	✓
Parents' Education					✓	✓	✓	✓
Parents' Work Status					✓	✓	✓	✓
Unemployment Rate & GDP (logs)						✓	✓	✓
Fixed Effects		✓	✓	✓	✓	✓	✓	✓
Control Dummies:								
Born Region			✓	✓	✓	✓	✓	✓
Residence Region			✓	✓	✓	✓	✓	✓
BA Final Grade							✓	✓
High School Final Grade								✓
Observations	242070	242070	242070	242070	242070	242070	242070	242070
F-stat	18.11	187.68	127.08	655.69	790.78	760.16	>1000	>1000

Note: Parental work status reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Fixed effects include dummies on Cohort of graduates, BA and MA university and disciplinary area. Control variable estimates and standard errors do not change from OLS; results are available upon request. Standard errors are clustered at MA disciplinary area and university level (541 clusters). *, **, *** indicate statistical significance at 10%, 5% and 1% level respectively.

Appendix B Wage Estimates on Whole Sample

I replicate model (5) on the whole sample and I further run the wage saturation model. Also in this case, I find a similar trend to the one showed in Tables (9) and (10). However, the magnitude of the *MAinEnglish* coefficient is even grater than the case of sample conditioned to working individuals. This is explained by the large proportion of graduates that are unemployed or in specialization schools for which wage is set equal to one.

Table 12: Estimations on Wage in Logarithms - Whole Sample

Dependent Variable:	Wage (in logs)	Wage (in logs)	MA in English	Wage (in logs)
	(1)	(2)	(3)	(4)
Estimation:	**OLS**	**Reduced Form**	**First Stage**	**IV**
Introduction of MA in English		0.109**	0.031***	
		(0.052)	(0.005)	
MA in English	1.022***			3.519**
	(0.127)			(1.708)
Female	-0.175***	-0.179***	-0.004***	-0.164***
	(0.028)	(0.028)	(0.001)	(0.028)
Unemployment Rate in logs.	-0.183***	-0.184***	-0.000	-0.183***
	(0.054)	(0.054)	(0.002)	(0.054)
Observations	212290	212290	212290	212290
F-stat	>1000	>1000	612	>1000
F-stat of Excluded Instrument	-	-	40.61	40.61

Note: Columns refer to OLS, reduced form, first stage, and instrumental variable estimation, respectively. These specifications include all the fixed effects described above. Parental work type reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Standard errors are reported in parenthesis and are clustered at MA disciplinary area and university level (540 clusters). *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively.

Table 13: IV Model Saturation on Wage in Logarithms - Whole Sample

Dep. Variable: log(Wage) **Estimation Method:** IV	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MA in English	3.519**	3.272*	1.946	0.533**	0.447***	0.222	0.205
	(1.708)	(1.696)	(1.267)	(0.209)	(0.165)	(0.143)	(0.135)
Female	-0.164***	-0.138***	-0.130***	-0.059***	-0.045***	-0.039***	-0.038***
	(0.028)	(0.027)	(0.021)	(0.003)	(0.002)	(0.002)	(0.002)
Unemployment Rate in logs.	-0.183***	-0.174***	-0.118***	-0.016**	-0.010*	-0.010*	-0.009*
	(0.054)	(0.054)	(0.044)	(0.007)	(0.006)	(0.005)	(0.005)
Work Abroad		3.629***					0.261***
		(0.085)					(0.012)
Permanent Contract			4.406***				0.363***
			(0.065)				(0.013)
Fixed-term Contract			4.364***				0.301***
			(0.059)				(0.013)
Full-time Job					6.965***	6.836***	6.676***
					(0.012)	(0.023)	(0.025)
Part-time Job					6.067***	5.945***	6.037***
					(0.015)	(0.025)	(0.025)
Control Dummies:							
Job Activity Sector				✓		✓	✓
R^2	0.135	0.161	0.396	0.983	0.987	0.988	0.989
Observations	212290	212290	212290	212290	212290	212290	212290
F-stat	>1000	>1000	>1000	>1000	>1000	>1000	>1000
F-stat of Excluded Instrument	40.61	40.50	40.56	41.01	40.12	40.79	40.70

Note: All column estimations include all the fixed effects described above. Parental work type reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Standard errors are clustered at MA disciplinary area and university level (541). *, **, *** indicate statistical significance at 10%, 5% and 1% level respectively.

Appendix C Estimates on Full-time Job

I estimate the effect of studying in English on the probability of being full-time employed. I find that the probability increases by 41.5 percentage points that almost assure graduates in English to be full-time employed when I compare the result to the sample average probability. Also in this case the IV result is far from the corresponding OLS estimate (Table (14)). For this reason, I saturate the model to check if also the probability of being full-time employed is affected by the heterogeneity factors described in section (7) that characterize the first year of the career path. I find that also in this case the effect is provided by a composition of multiple factors (Table (15)).

Table 14: Estimations on Full-time Job

Dependent Variable:	Full-time Job	Full-time Job	MA in English	Full-time Job
	(1)	(2)	(3)	(4)
Estimation:	**OLS**	**Reduced Form**	**First Stage**	**IV**
Introduction of MA in English		0.015**	0.036***	
		(0.006)	(0.006)	
MA in English	0.031***			0.415**
	(0.010)			(0.188)
Female	-0.080***	-0.080***	-0.005***	-0.078***
	(0.004)	(0.004)	(0.002)	(0.004)
Unemployment Rate in logs.	-0.011	-0.011	-0.001	-0.011
	(0.008)	(0.008)	(0.003)	(0.008)
Dependent Variable Sample Mean	0.684	0.684	0.017	0.684
Observations	104082	104082	104082	104082
F-stat	>1000	>1000	407.16	>1000
F-stat of Excluded Instrument	-	-	40.19	40.19

Note: Columns refer to OLS, reduced form, first stage, and instrumental variable estimation, respectively. These specifications include all the fixed effects described above. Parental work type reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Standard errors are reported in parenthesis and are clustered at MA disciplinary area and university level (540 clusters). *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively.

Table 15: IV Model Saturation on Full-time Job

Dep. Variable: Full-time Job **Estimation Method:** IV	(1)	(2)	(3)	(4)	(5)
MA in English	0.415**	0.407**	0.389**	0.259*	0.246
	(0.188)	(0.188)	(0.184)	(0.157)	(0.155)
Female	-0.078***	-0.076***	-0.077***	-0.056***	-0.054***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Unemployment Rate in logs.	-0.011	-0.011	-0.010	-0.013	-0.012
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)
Work Abroad		0.091***			0.073***
		(0.011)			(0.009)
Permanent Contract			0.127***		0.102***
			(0.008)		(0.007)
Fixed-term Contract			0.117***		0.111***
			(0.006)		(0.006)
Control Dummies:					
Job Activity Sector				✓	✓
Dependent Variable Sample Mean	0.684	0.684	0.684	0.684	0.684
R^2	0.257	0.259	0.274	0.325	0.339
Observations	104082	104082	104082	104082	104082
F-stat	>1000	>1000	>1000	>1000	>1000
F-stat of Excluded Instrument	40.19	40.05	40.21	41.27	41.10

Note: All column estimations include all the fixed effects described above. Parental work type reference group: house worker. Parental education reference group: high school. Unemployment rate and GDP are considered at provincial and regional level, respectively. Standard errors are clustered at MA disciplinary area and university level (541). *, **, *** indicate statistical significance at 10%, 5% and 1% level respectively.