# Assessing selection patterns and wage differential of high-skilled migrants. Evidence from the AlmaLaurea dataset on Italian graduates working abroad

by

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# Assessing selection patterns and wage differential of high-skilled migrants.
## Evidence from the AlmaLaurea dataset on Italian graduates working abroad

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**Abstract**

This paper aims at investigating the phenomenon of graduates' migration from an OECD country at microeconomic level in order to offer an insight into the scholarly debate on migration decision of high-skilled workers living in a developed country. By merging data on working conditions on Italian graduates with the results of an ad-hoc survey on Italian graduates working abroad, the paper assesses the selectivity of migration choices, the wage premium associated to migration decision on their earnings, and the determinants of the earning function for those graduates that work abroad. Results partially confirms the applicability of the Borjas model on selectivity of migration choice. It also shows the existence of a substantial wage premium associated with the decision to work abroad in line with an extended human capital approach. However, it also suggests a greater complexity of both the selection and the earning function of high-skilled workers, due to their longer and differentiated educational career, the stronger weight attached to preference variables, the degree of skills' portability attached to university's location and fields of study, and, in general, to the capability of a tertiary education system to provide their graduates with the skills required by international labour markets.

**1. Introduction**

Expectations on human capital returns are usually regarded as one of the main factors behind graduates' migration and the international provision of human capital. Their increasing divergence between developed countries has contributed to a substantial growth of the migration flows of graduates who work abroad across the OECD and the European Union over the last years within a context of an increasing proportion of tertiary educated migrants at global level. In particular, since 2000 European countries have experienced both an increase in the average level of education of the labour force (Maselli, 2012) and one of the highest increase in emigration rates, mainly concentrated among the young and highly educated cohorts (OECD, 2013). The main drivers of this process have been identified in four factors: the internationalization of labour markets and educational systems; the enlargement and integration processes of the European Union; the asymmetric consequences of the economic crisis in European countries; the diffusion of policies for acquiring human capital from abroad in many high-income countries. On the other hand, while the overall issue of migrant selection has been extensively studied, outlining sound theoretical predictions, there is much less research on the pattern of selection of high-skilled migrants.

In this framework, the Italian context represents an interesting case for studying the migration flow of graduates because of the coexistence of two forces: pulls from the formation of European labour markets; pushes from the economic crisis. In early 2000s Italy has experienced a sudden rise in the number of graduates due to the increasing participation in tertiary education and to the implementation of the so-called "3+2" system. The reform represents the implementation of the "Bologna process" in Italy and it is based on a two-cycle degree structure consisting of a first-level (a three-year bachelor's-type degree) and a second-level (a two-year master's-type degree), with some programmes maintaining a five/six-year single-cycle, replacing the programmes of the old university system lasting at least four years. This reform has induced a sizeable expansion in the number of graduates entering the labour markets, and, combined with the economic decline that hit the country before and during the global crisis, raised growing concerns for a proper employability of Italian graduates and for the wage penalty attached to the low qualification of the job structure.

This combination of a net expansion in supply side and a shrinkage in the demand side of labour markets has triggered an increasing migration flow of graduate workers. Most of them relocates into European countries, mainly in the UK, France and Germany, where they obtain higher earning on average, but are subject to an increasing risk of over-qualification (European Union, 2014). Among the determinants of this outflow, there are also some structural factors. Especially, in Italy the quality of job structure, proxied by indicators about both the dynamics of wages and the educational attainment of employment, is rather poor in comparison to other European countries. Actually in

Italy only 20.4% of the individuals employed have obtained a tertiary education degree in 2014, well below both the average level in European Union and all the other European countries, with the exception of Romania. In addition, wages have been stagnating since the beginning of the century and their average level is significantly below that of Germany, France, United Kingdom and Spain. Starting from a supply side perspective, the aim of this article is to assess the returns from international migration in terms of human capital outcomes among Italian graduates and investigate the characteristics of those graduates that get the greatest benefits from migration. Hence, this paper is a contribution to the scientific debate on the process of migration of highly skilled workers (so-called "brain-drain") who live in a developed country. By running a regression model a wide set of qualitative and quantitative variables is taken into account. In this way not only will we be able to measure the net benefit from migration for Italian graduates, but also to correlate it with their educational pipeline, individual characteristics and family background. The originality of the contribution mainly lies in the focus of the analysis, which is restricted to the selection of high-skilled migrants exiting a developed country, and in the inclusion of a wide set of retrospective information on graduates' educational pipeline combined it with her/his socio-economic background graduates' and personal expectations. Conversely, most of the existing research compare high-skilled with low-skilled workers and refer to migration coming from developing countries.

The structure of the paper is as follows. Section 2 summarizes the main stylized facts on international migration of highly educated individuals with particular attention to the European context. Section 3 reviews the economic literature regarding international and the brain-drain phenomenon, deriving the research questions to be addresses. Section 4 describes the dataset and describes the descriptive statistics. Section 5 outlines the estimation strategy. Section 6 discusses the results. Section 7 concludes.


## 2. Main stylized facts

The international migration of highly educated individuals is an increasingly widespread phenomenon that goes beyond the traditional topic of human capital outflow from developing to developed countries, usually designed as "brain drain". Globally, migration rates increased by 70% in the past decade to reach 27 million in 2010/11 while about 30% of all migrants in the OECD area were highly educated (OECD, 2013). Although most of this surge refers to transfers from low-income to high-income countries, notably from the south to the north of the world, the number of highly educated emigrants from high-income OECD countries has also increased. Overall, in 2013 young migrants arriving from high-income countries as adults account for 23% in the OECD and

36% in the EU (OECD, 2014). Notably, across Europe, migrants are increasingly young and highly-educated. At the European level, 63% of intra-EU movers in 2009-13 were aged 15-34, while this age category only accounted for around 34% of the labour force in the EU. These cohorts of migrants are also characterized by a high share of graduates. The proportion of highly educated among recent intra-EU movers has risen from 27% in 2004-2008 to 41 % in 2009-2013 (European Union, 2014). In particular, the majority of migrants from Southern Europe have a tertiary-level degree, while for Italy this figure almost reaches 60% (OECD, 2014). Italian labour market has been particularly affected by both tendencies. First, the changes in the higher education institutional framework that took place around the beginning of the new century (Bologna Process) induced a sizeable expansion in the number of graduates entering the labour market, which rose from around 172,000 to approximately 295,000 in 2008 (AlmaLaurea, 2010). Second, in the aftermath of the economic crisis that severely hit the country, the net migration rate became negative for the first time after the 70s (ISTAT 2016). Moreover, while incoming migrants are low skilled, the outflow is increasingly composed by graduates and high-skilled workers. Most recent data show that the shares of graduates working abroad five years after the degree doubled from 3% to 6% between 2008 and 2013 (AlmaLaurea, 2014). Overall, this tendency has been viewed as a form of brain drain towards countries involved in processes of human capital agglomeration and characterized by higher wages.

## 3. Related literature

The analysis of highly skilled migration is an important branch of the research on migratory dynamics (Blitz, 2010). As standard analysis on economic migration, research in this field departs from the optimal behaviour of migrants, which is driven, basically, by income differences between the source and the host countries and the level of migration costs (Sjaastad, 1962, Harris and Todaro, 1970; Borjas, 2014). In particular, following the human capital theory, the individual's decision to migrate after studying depends on the expected rate of return to skills in the host country relative to that in the home country. Returns can be primarily measured in terms of expected income, which depends on the wage differential paid for a given amount of human capital, that the individual can obtain in the host country (Borjas, 1987). Such differential is a function of four factors: (i) the quality of higher education in the source country which affects the stock of human capital, (ii) an idiosyncratic factor specific to the individual, (iii) the wage per unit of human capital in the host country, (iv) migration costs, which include geographic distance and cultural differences between the country of origin and the country of destination (Grogger and Hanson, 2011). The second factor is often viewed as a black-box, but it is quite interesting for our research. It is

influenced by the role of pre-university educational pipeline, family background and embeddedness, expectations and preferences. On the other hand, with respect to migration costs, the economic literature usually assumes that due to costs of adjustment and a preference for living in her/his home country, the individual's valuation of a dollar of consumption abroad is discounted to a coefficient whose value lies between 0 and 1 (Katz and Rapoport, 2005). However, it is important to notice that, whereas international students that decide to remain in the host countries become familiar with the customs and the culture of the country while studying, graduate workers that migrate at the end of their educational path face non-monetary cost related to their integration in the foreign labour market (Beine et al., 2014).

Like most of the migration processes, the outflow of high-skilled workers is selective (Mora and Taylor, 2006). Emigrants who move from a source with low returns to education to a destination with high returns are selected according to their characteristics as long as they affect their returns or their non-monetary migration cost. Individual, family, and community characteristics of migrants are thus different from the ones of those who remain in their home country. In particular, *ceteris paribus*, migrants are deemed to be more skilled than non-migrants given the higher relative expected return to skills associated with the decision to migrate (Borjas, 1987; Borjas and Bratsberg, 1996).

Borjas (1987, 1994, 2014) has developed a theoretical framework departing from the Roy's model (1951). His contribution discusses the rationale to explain self-selection of workers with different skills on the basis of different income distribution between the origin and the host country. Particularly, if the level of income inequality in the host country is higher than in the origin country, then high skill migrants will choose to migrate towards this country. On the other hand low-skilled workers will be attracted by a country whose income distribution is more equal than in their country. Yet, Borjas shows that these relations between income distribution and self-selection hold only if the correlation between earnings for the same skill in the origin and the host countries exceeds a certain threshold. Borjas interprets this correlation as an indicator of skill portability between the origin and the destination. In a more recent paper, Chiswick (2011) draws a useful general framework within the human capital approach aimed at explaining self-selection of migrants with different skills towards alternative destinations. Basically, in his model the explanatory variables are the following:

a) wage in the destination country for high ability workers ($W_{b,h}$), b) wage in the origin country ($W_{a,h}$) for high ability workers; c) wage in the destination country for low ability workers ($W_{b,l}$), d) wage in the origin country ($W_{a,l}$) for low ability workers; e) k is the ratio between the origin and the destination wage for low ability workers, f) h is the ratio between the origin and the destination

wage for high ability workers; g) $C_D$ is the level of direct costs of migration, which can vary according to the degree of workers' ability; h) $C_F$ is the level of opportunity costs of migration, which increase as the worker's ability increases. The model implies that one can observe skill selectivity whenever the return from migration between high skill and low skill workers differs. Chiswick calculates the rate of return from migration for both high skilled and low skilled workers using this simple formula: $r = \frac{W_b - W_a}{C_F + C_D}$.

This straightforward analytical framework previews the following relations among these variables:

i) the higher is h, the ratio between the origin and the destination wage for high ability workers, with respect to k, the ratio between the origin and the destination wage for low ability workers, the higher is the degree of skill selectivity. This statement does not differ too much from Borjas' analysis despite Chiswick's criticism of this approach.

ii) if high ability workers are more efficient than their low ability colleagues and either incur in lower direct costs ($C_D$) or spend less time in managing their investment in migration than low ability workers, then one can observe a skill selectivity in favour of high skilled workers.

However, there are a couple of elements missing from these models. First of all, the demand side is completely neglected. Of course one can state that the demand sides of both the destination and the origin economies are implicit in the indicators of income distribution, in Borjas' model, and in the ratio between the earnings in the origin and the host country for the same workers in Chiswick's model. However, one cannot easily identify how specific components of the demand side in either the host or the origin country can affect these indicators of income distribution. In this way the role of demand on the attractiveness of a country remains unclear and substantially unexplained. Secondly, these models do not consider how immigration policies in the host country can influence the behaviour of workers.

Moreover, the first relation of the model proposed by Chiswick, consistently with Borjas' model, can be questioned when observing only high-skilled migrants. On the one hand, it can be assumed that they face "lower costs and fewer formal restrictions to migration" (Parey et al., 2015, p. 36), suggesting that the predictions of the Roy/Borjas model should be confirmed and even strengthened when focusing on graduate workers living in a country belonging to the European Union. On the other hand, the decision to migrate of high-skilled workers can be more strongly associated with preferences, socio-economic background, pre-university educational attainments, and less strongly linked with the expected income to be had from migration or with macroeconomic factors (Gibson and McKenzie, 2011). This hypothesis is also suggested by the finding that the most talented graduates are not necessarily more tempted to move to an unequal country (Gould and Moav, 2016). Thus, if we look at the most talented cohort of graduates, migration choices of this relatively

small, but qualitatively significant group of migrant workers, can be explained to a wider extent by other factors such as social, cultural and institutional distinguishing features of both source and destination countries. Concerning the association between ability indicators and propensity to migrate among high-skilled graduates, it can be traced on the positive effect that ability can have on portability of individual skills. The scarce literature on this issue suggests that high-skilled migrants are positively selected in terms of university grades (Parey et al., 2015), but also that the intensity of selectivity is eventually attenuated and that their higher ability is not necessarily associated with a high propensity to migrate (Saxenian, 2006).

*H1: The decision to migrate is positively affected by the degree of income inequality of the destination country (Roy/Borjas model). An important role is also played by individuals' expectations on their future career (stability, consistence, earnings) and the degree of portable skills acquired in their university career. On the one hand one can expect a positive effect of ability indicators on wage, and a relatively lower effect on the propensity (decision) to migrate, without correlating on the income inequality of the country. Notably, graduated migrants are expected to be positively selected in terms of university grades, regardless of relative earnings inequality in their home and destination countries.*

In parallel, in line with the human capital approach, one can formulate the hypothesis that high-skilled migrants looks for substantial wage gains that are able to outweight the migration costs. Wage differentials can even be magnified in a country like Italy, where the "dramatic increase in the supply of human capital that occurred in the last decades, in a context of sluggish economic growth and innovation rates has acted as a powerful push factor for highly skilled workers to migrate towards regions where human capital is expected to be better rewarded" (Nifo and Vecchione, 2014, p. 1631)

*H2: All else being equal, the wage premium attached to migration decision of Italian graduates' workers expatriated after the crisis is positive and relatively high.*

Then, one can develop an ad-hoc specification for the selection of high-skilled migrants taking into account the degree of skills' portability. This characteristic of skills is likely to depend on the field of study, on the institutional constraints arising from the professional system of the country of origin, and on the ability of a university system to provide its graduates with the skills required by international labor markets. This hypothesis is in line with the idea that the selection depends on the

relative amount of general skills that could be rewarded in a foreign country, which creates a strong incentive to migrate (Gould and Moav, 2016). On the contrary, a worker highly endowed with country-specific skills will lose most of his success in a foreign country, and thus is unlikely to move abroad. Even if income inequality in the foreign country is very high, a person may be enticed to move there if this high level of inequality is due to highly country-specific skills.

*H3: The field of study is an indicator of skills' portability. As such, it affects not only the wage premium but also the decision to migrate. One can expect that graduates in techno-scientific disciplines show a higher propensity to migrate because the attached skills are more portable than those developed in humanities or other country-specific disciplines such as law.*

Finally, the explanatory variables of the wage equation in foreign labour markets can be quite different from the ones of the domestic function. It is therefore possible that the impact of skills and other individual characteristics on human capital returns have different magnitudes if we estimate the human capital equation in the host or in the source country. Some characteristics that affect human capital outcomes in the source country can have limited or no effect in the host country. Such differences may not affect the decision to migrate, but they can influence its actual return in terms of human capital outcome.

## 4. Dataset and descriptive statistics

The empirical analysis presented in this article is based on a merge of two dataset coming from the AlmaLaurea dataset on Italian graduates. AlmaLaurea is a Consortium of Italian Universities aimed at fostering highly qualified labour demand and supply matching for graduates, universities and the business world. Every year, AlmaLaurea collects extensive data on the graduates of each cohort and on their early working career path. This complex information is gathered in two stages. At the time of graduation, students fill in a questionnaire providing their personal data and information concerning their social and family background, educational path and performances, intrinsic motivation and other subjective features. Then, graduates are interviewed one, three and five years after graduation on their career paths and/or their post-graduate studies. The first dataset refers to the occupational status of the last cohort of graduates whose information is fully available. This cohort includes individuals graduated in either a two-year Master's degree or a five/six-year university degree (such as Medicine and Law faculties) in 2008, who completed their two-step survey in 2013. The relevant population is composed by graduates from 49 Italian universities, representing over the 75% of the Italian graduates in that year (73 universities members nowadays

of the Consortium, representing over the 90% of the Italian graduates). The subsample of second-level graduates who answered the questionnaire five years after their graduation is composed by almost 40,000 individuals. The second dataset is derived from a dedicated survey on 1,522 (777 interviewed) Italian graduates working abroad conducted on a representative subsample of the overall cohort of graduates employed abroad at the end of the first survey. Both datasets are weighted in order to represent the population of reference. For the dedicated surveys a second weight is added in order to take into account the non-response rate. After having excluded those graduates living abroad at the time of the degree, the number of observation amounts to 29,997 for the main survey and to 1,522 for the dedicated survey on graduates working abroad. The percentage is 5.3 and corresponds to the sample of the dedicated survey.

Table 1a, 1b, 2a and 2b present some descriptive statistics of the results of the two surveys, since we are primarily interested in drawing a comparison between the population of migrants and non-migrants. Migrants report on average a more brilliant university career. They are 1.5 years younger than non-migrants while their degree mark is slightly higher, as well as their diploma mark. Moreover, they are more regular in complying with the expected duration of the degree program. In terms of field of study, the share of migrants is higher in engineering, political and social sciences, and science. On the contrary, graduates in law, medicine and economics are less likely to migrate. This derives not only from the dichotomy between competitive/non-competitive labour markets at the international level, but also to the peculiar institutional barriers that characterize the access to legal and medical professions that characterize the Italian regulatory regime.

Concerning other graduates' characteristics, most migrants come from the north of Italy and an even higher share has studied in a University located in that area of the country. Therefore, they come from the wealthiest Italian regions, and are closer to the majority of host countries as 82% of migrants live in Europe, mainly in the UK, France, Germany and Switzerland. These characteristics combine with a more favorable socio-economic background. The share of graduates reporting that their parents' educational attainment is at the degree-level is higher among migrants. The same holds with regard to the diffusion of high-qualified occupation in the families of origin. Overall, this comparison show that migrants are more likely to have economic resources in order to afford the migration decision and to incur in lower migration costs. As discussed by the literature, substantial selection issues in the migration strategy are thus in place and need to be addressed through the econometric analysis.

Concerning the working career of migrants, descriptive statistics reports more successful outcomes for migrants associated with a higher variability. Five years after graduation migrants' average net earnings are 66.4% higher than those of non-migrants. Interestingly, this gap substantially widens

according to the working experience: one year after the degree it amounted to 17.4% only. Even in terms of job satisfaction, which can be considered as a further human capital outcome, the gap is positive for migrants. They report a degree of job satisfaction scaled at 8 out of 10 on average, which is 0.5 higher than the one declared by non-migrants. Migrants also self-assess a higher level of skills' and educational matching: 55.9% of them report a high level of skill use on the job post while more than 80% evaluate their job consistent with their second-level degree. This result is in line with the expectations of migrants at the time of the degree, which are more oriented towards career's opportunity than towards job stability (see Tables 1a, 1b, 2a and 2b in the Statistical Annex).

Then, we analyse a selected correlation matrix that reports Pearson's coefficients between variables used in the dedicated survey (Table 3 in the Statistical Annex). As expected, the correlation is positive and significant between alternative measures of human capital outcomes (wage, job satisfaction, wage and skills use) although the magnitude is quite low and the coefficient is not significant between job satisfaction and skills use. Correlation is very high and significant between experience, tenure and wage, thus supporting the assumption that experience and tenure should be included in the wage equation in line with the Mincerian earning function. Finally, the variable derived from the interaction between the degree of inequality and the GDP per capita of the host country (GDP xGini) is positively related with both wage and skills use, as expected, but not with job satisfaction. Such variable is also positively related with distance, which is our proxy of monetary migration costs. This points to the literature's proposition that the wealthier and more unequal a country is the more graduates are willing to move there, in spite of the distance from their country of origin and the associated migration costs (Table 3).

## 5. Empirical strategy

Basically, our analysis looks at earnings of graduates as a function of their decision to stay in Italy or migrate after graduation. Following the human capital approach we control for a wide bundle of qualitative characteristics of the educational pipeline at both high school and university, the family background, and the initial job experience. Additionally, we take into account individual expectations and motivations at the time of their degree in order to acknowledge the role played by these determinants when analyzing migration decisions and wage premium within a population of high-skilled individuals.

The empirical strategy is twofold in order to allow for the possibility that unobservable characteristics that lead an individual to be employed or to choose migration will also affect her/his

wage and career satisfaction. First, we estimate the premium/penalty to migrate by addressing the sample selection according to the employment status. Second, we consider migration as an endogenous treatment variable that enters in both the selection and in the outcome equation. We measure selection using information on both individuals' educational pipeline and personal characteristics, including family background, high-school education (including school grades), university education (including the specific university, subject, and final grades), and information on mobility during university.

At a further level, we look at the determinants of wage among graduates working abroad by using additional information derived from the dedicated survey carried on by AlmaLaurea. In this analysis the covariates include both economic and non-economic costs to migrate as well as industry and firm characteristics together with the pursued educational pipeline. In line with the relevant literature (Borjas. 1987, 1994) the selection equation of migrants includes a measure of the relative income inequality of the host country in interaction with its GDP per capita. Finally, we estimate the determinants of the propensity to return to Italy among graduates working abroad as an alternative model that provides robustness to our results.

*Model specification*

In order to address the potential endogeneity of the migration decision with respect to human capital outcomes, we need to take into account the endogenous relationship between the choice to migrate (M) and human capital outcomes. Accordingly, in our model the variables proxying human capital outcomes are assumed to depend on the endogenous dummy $M_i$ and a K × 1 vector of explanatory variables. In line with these assumptions, the chosen estimation technique is the extension to the Heckman correction firstly proposed by Maddala (1983) in which the treatment variable is endogenous. Thus, our specification takes into account the endogeneity of the status of immigrant and comprises two stages: (i) a main equation that explains the human capital outcome of Italian graduates' 5 years after the degree, in terms of the natural logarithm of the monthly wage, and (ii) a treatment equation that models the choice to migrate through a binary variable $M_i$ that indicates whether the individual has migrated or not. In matrix form this equation can be written as follows:

(1) $M_i = X_i\beta + \varepsilon_{1i}$

where $X_i$ is the vector of explanatory variable for migration choice and $\varepsilon_{1i}$ a normally disrtributed error term. From this equation we calculate the Inverse Mill's Ratio (φ) that becomes an explanatory variable of the human capital outcome equation accounting for the endogeneity

between the latter and migration decision. The main equation is thus given by (2) that measures how the choice to migrate affect worker's wage:

(2) $lnW_i = \beta_0 + \beta_1 Z_i + \beta_2 \varphi_i M_i + \varepsilon_{2i}.$

where $W_i$ is the worker's wage, $M_i$ is our migration variable among the covariates, $\varepsilon_{2i}$ a normally distributed error term, and $Z_i$ is a vector of control variables that include, individual characteristics (marital status, age, socio-economic background), the educational curriculum (type of high school, diploma mark, field of study, degree mark, Erasmus) regional variables (university area, area of residence), linguistic skills, subjective expectations at the time of the enrollment, post-educational experience (tenure), industry, type of contract. This set of controls is in line with the economic literature on migration models.

Like the Heckman correction, this method is fully acceptable only if the dataset contains variables that can be used to identify the selection equation. In absence of appropriate exclusion restrictions a multicollinearity problem is likely to arise. The richness of the AlmaLaurea dataset allows us to address this issue. Notably we employ three exclusion restrictions: (a) whether the individual migrated to attend university; (b) whether the individual wrote the thesis abroad; (c) whether the individual spent a period abroad during his his/her course of study. All these variables are assumed to be strongly correlated with the migration decision and at the same time to be exogenous to the outcome equation. The relevance of the variable is controlled through pairwise correlation coefficients. On the other hand, in order to test the exogeneity assumption we carry on two tests by using a simple instrumental variable (IV) model: the Durbin-Wu-Hausman test for endogeneity and the Sargan tests of overidentifying restrictions. As a robustness check we use an instrumental variable (IV) estimator by using our exclusive restrictions as instruments of the second-stage equation.

Then a separate estimate of the earning function (equation 3) is carried out through a standard two-step Heckman approach that addresses sample selection issues with respect to the condition to be employed or not (equation 4) provided that migration/non-migration decision is observed only for graduates that are working at the time of the interview.

(3) $lnW_i = \beta_0 + \beta_1 Z_i + \beta_2 M_i + \varphi_i + \varepsilon_{2i}.$

(4) $E_i = X_i \beta + \varepsilon_{1i}$

Where $E_i$ is a dummy variable related to the employment status of the graduate i.

Finally, as a second regression, we apply another straightforward Heckman correction (equation (5) and (6)) in order to estimate the earning function of graduates' working abroad after having controlled for selection bias for migration through equation.

(5) $lnW_i = \beta_0 + \beta_1 Z_i + \beta_2 logD_i + \beta_{32} C_i\, \varphi_i + \varepsilon_{2i}.$

(6) $M_i = Y_i\beta + \varepsilon_{1i}$

Thanks to the additional variables derived from the ad-hoc survey on graduates working abroad, in this specification we add two proxies of migration costs in the earning function: the log of the distance for proxying out-of-the-pocket costs, and migration obstacles for taking into account non-economic factors. Additionally, the vector $Y$ in the selection equation includes the variable obtained by the interaction of income inequality (Gini coefficient) multiplied by the real GDP per capita of the host country in the selection equation.

## 6. Results

Table 4 presents the results of the determinants of the earning function, controlled for selection on migration decision and employment status, respectively. Both estimates confirm the existence of a substantial average wage premium for Italian graduates working abroad that ranges from 50% (controlling for employment status) to 78% (controlling for migration decision) across different models and specifications (Hypothesis H2).

Industry, field of study, location of the university, sex and age are the most significant control variables of the main equation. In line with theoretical expectations, females and young workers are penalized in terms of earnings. On the other hand, studying in a university located in the northern part of Italy has positive effects, 10-11% on average. Partially in contrast with human capital theory, the role of tenure and working experience after graduation is quite weak. Experience is only significant across the first two specifications, in which the knowledge of foreign language has not been included yet. On the contrary, having working experience during university is associated with a 4-6% increase in earnings on average. In terms of field of study, workers holding a humanistic degree are generally penalized. Finally, socio-economic background has a lower effect than expected on earnings. Only the father's qualification has a positive and slightly significant effect (see Table 4 in the Statistical Annex).

On the other hand, once looking at the determinant of the migration decision (Table5, Statistical Annex), coefficients are partially different. Migration decision is significantly influenced by sex, marital status, previous attitude to migrate, individual motivations and expectations, and socio-economic background. Parameters have the same sign of the earning function for gender dummy and university's location dummy: women are less likely to migrate than men while universities located in the northern part of Italy are associated with a significant increase in the probability to migrate. Socio-economic background is significant only if referred to the mother's occupational and educational status, at odds with the results of the earning function where only father's qualification play a role. Then we find a set of variables associated with the personal attitude towards migration and the studying experience abroad during university: migrant_resid, Est_Tesi, disp_Eur_lav, disp_extr, Eur_lav, stud_est. All these variables show a positive effect on the propensity to migrate, as expected. On the other hand, preferences and individual expectations affect the propensity to migrate only with respect to the desire of stability. Individuals that give high importance to the need of stability, basically risk adverse workers, are less likely to migrate. Finally, there is no significant effect for graduates reporting a high final degree and diploma grades and having obtained the degree earlier than the average. Only the average grade at the exams is positively associated with migration decision. This result partially supports the hypothesis of the selective nature of the migration flows (Hypothesis H1, i.e. what we can call the case of "top brains drain") with respect to ability. Accordingly, positive selectivity does not fully apply when the analysis is carried on within an homogeneous group of workers in terms of educational attainment, but it only works well when comparing different educational levels (Table 5).

When looking only at the graduates working abroad (see Table 6 in the Statistical Annex) our analysis shows that the relative inequality of the host country positively affects the migration decision in line with the evidence shown in the literature. Accordingly, the selection function of Italian graduates is consistent with the predictions of the Roy/Borjas model. The relative inequality of the destination country positively affect the individual's decision to migrate and is therefore a significant driver of the migration decision (Hypothesis H1). As well, in line with the standard model, the economic cost of migration is positively related to the wage premium. On the contrary this is not the case for non-economic costs, proxied by the existence of cultural and social obstacles, which do not affect migrants' earnings (they are only significant in modelling the propensity to return to Italy). Human capital outcomes are also affected by sex, graduates' age (namely, young graduates seem to have more opportunity abroad than in Italy), duration of the staying in the host country, type of firm, some industries and field of study. Overall, despite the short period spent

abroad after the degree, Italian graduates are not penalized in terms of skills' transferability compared to their peers who studied in the host country. Italian graduates are likely to find a skilled job in line with their expectations, which is in line with the literature on international migration from developed countries. On the contrary, experience is relevant only if it has been maturated abroad. Having worked in Italy before migrating is not an advantage. This means that graduates get higher wage premia if they migrate immediately after the degree instead of starting their career in Italy.

In addition, one can observe that, consistently with the seminal analysis developed by Lee (1966), the decision to migrate of the highly-skilled is positively affected by the so-called pull factors, whereas a push factor such as the lack of opportunity in the source country does not affect significantly the decision to migrate, despite a high percentage of graduate migrants indicates it as one of the driver of this decision. Again, some indicators of individual ability, but not all of them, affect the decision to migrate: the age at the graduation with a negative sign whereas the average mark at university courses affects positively the likelihood to migrate. Results also confirm that the final degree grade does not play a statistically significant role in the decision to migrate. Finally, our estimate confirms the hypothesis of a higher portability of the field of studies related to the hard sciences and a lower portability for the humanities and country-specific disciplines (Hypothesis H3). Migrants do not suffer from low or poorly transferable skill levels if they choose a field of study that is not institutionally bound to domestic labour market. This means that Italian tertiary education system is able to provide their graduates with a high component of portable skills that are not idiosyncratic to the source country (Table 6).

## 7. Conclusion

The international labour migration of highly-educated people is increasing worldwide. About forty years ago Portes (1976, p. 490) raised a remark, which is relevant also nowadays for the study of this topic: "...given the…attractions of emigration, the real question is often not why some professionals migrate but why so few in fact leave". In particular, we do not know much on the propensity to migrate of highly-educated people and in spite of this fact and the interest it represents for the study of the impact on globalisation and regional integration, the international literature is still limited. Our paper tries to contribute in filling this gap, by presenting some evidence, which is

relevant well beyond the Italian and European case. The source of the data used in our paper[5] is a strong element of originality at least in the European setting and allows for a deeper attention to the effects of the educational pipelines on migrant selection and graduates' earnings.

The results of this paper are threefold. First, it shows a positive selection on ability and socio-economic background only with respect to certain variables, namely average grade at the exams and mother's educational and occupational status. We can speak therefore of a partially positive selection among high-skilled workers, but we cannot state that migrants are the best and the brightest academic performers, nor that they enjoy of a higher social status. Major determinants of the decisions to migrate are instead the field of study and the university's location. The location of the academic organizations together with the degree of transferability of the acquired skills are the main discriminant factors of both migration choices and labour market returns. Second, according to evidence the wage premia obtained by Italian graduates through their decision to work abroad are fully consistent with an extended human capital approach that underlies the workers' objective of maximizing the return of their investments in education. Third, given that there are striking differences in the occupational attainment of immigrants with similar educational backgrounds from different countries (Mattoo et al., 2008), results show that highly educated Italian immigrants are likely to find jobs whose tasks match with their educational attainment. This indicates that the Italian university system provide its graduates with highly transferable skills widely appreciated in the foreign labour markets. Despite the poor job opportunities offered by the Italian labour markets, this is an encouraging sign of the persistent quality and flexibility of the Italian higher education system. This is an encouraging result in term of the quality of the Italian university system, although it is not homogenous and a deeper investigation on specific groups of universities will probably lead to more nuanced results as the effects of university's location suggest. The migration of Italian graduates is not associated therefore to the phenomenon of "brain waste" where high-skilled workers make little use of their education and skills in the host country. Rather, it seems that, by increasing fairness in the access to tertiary education, the reform of 2001 has offered opportunities to new cohorts of  students that after having obtained the degree in highly productive fields such as economics, finance and engineering. decided to migrate after the degree in order not to waste their potential.

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[5] AlmaLaurea's dataset is almost unique for the evaluation of the higher education system and the assessment of the Bologna Process outcomes thanks to its capacity to get timely, updated information on graduates and their employment outcomes (Cammelli et al., 2010).

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**Statistical Annex**

*Table 1a – Descriptive statistics on the overall sample of Italian graduates. Continuous variables*

| | Total | | | Migrants | | | Non-Migrants | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | Mean | Standard deviation | N | Mean | Standard deviation | N | Mean | Standard deviation |
| Net earnings (5 years after graduation) | 28977 | 1358 | 586.80 | 1480 | 2182 | 805.873 | 27497 | 1311.47 | 534.06 |
| Net earnings (1 year after graduation) | 17220 | 1130 | 472.76 | 599 | 1317 | 638.169 | 16621 | 1121.55 | 462.48 |
| Age at graduation | 29943 | 26.73 | 5.24 | 1522 | 25.18 | 2.215 | 28421 | 26.82 | 5.34 |
| Index of duration compliance | 29943 | .65 | 1.092 | 1522 | .56 | .811 | 28421 | .66 | 1.106 |
| Diploma mark | 29844 | 85.31 | 12.33 | 1504 | 89.04 | 11.60 | 28340 | 85.11 | 12.34 |
| Duration of master studies | 29943 | 3.19 | 1.72895 | 1522 | 2.87 | 1.28 | 28421 | 3.21 | 1.7490 |
| Studied abroad during the degree program | 29943 | 10.43 | 27.554 | 1522 | 5.58 | 19.42 | 28421 | 10.65 | 27.85 |
| Degree grade | 29943 | 107.80 | 6.17436 | 1522 | 109.35 | 5.31728 | 28421 | 107.725 | 6.20 |

*Table 1b – Descriptive statistics on Italian graduates working abroad. Continuous variables*

| | Migrants (dedicated survey) | | |
|---|---|---|---|
| | N | Mean | Standard deviation |
| Distance in Km | 753 | 2568 | 3110.83 |
| Tenure working abroad (years) | 753 | 0.55 | 0.11 |

*Table 2a – Descriptive statistics on the overall sample of Italian graduates. Relative frequencies of categorical variables*

| | | Total | Non-migrants | Migrants |
|---|---|---|---|---|
| **Skill matching** | | 50.6 | 50.3 | 55.9 |
| **Overeducation** | | 29.9 | 23.6 | 36.1 |
| **Job satisfaction (Likert scale 1-10)** | | 7.6 | 7.5 | 8.0 |
| **Marital status (married or living with partner)** | | 42.9 | 55.8 | 57.2 |
| **Children** | | 17.4 | 82.9 | 93.4 |
| **Males** | | 42.9 | 42.2 | 56.6 |
| **Field of study** | Agriculture | 2.2 | 2.3 | 1.6 |
| | Architecture | 6.4 | 6.5 | 5.9 |
| | Pharmaceutical | 4.5 | 4.6 | 3.7 |
| | Security/defense | 0.7 | 0.7 | 0.1 |
| | Economics-Statistics | 16.0 | 16.2 | 12.3 |
| | Sport science | 1.1 | 1.2 | 0.2 |
| | Geo-Byologycal | 4.2 | 4.1 | 6.9 |
| | Law | 9.8 | 10.2 | 3.6 |
| | engineering | 15.9 | 15.1 | 28.9 |
| | Teaching | 6.6 | 6.9 | 0.4 |
| | Humanities | 5.5 | 5.5 | 5.6 |
| | Foreign Language | 3.3 | 3.1 | 6.3 |
| | Medicine | 5.1 | 5.3 | 2.3 |
| | Political and social sciences | 10.6 | 10.4 | 14.3 |
| | Psychology | 5.3 | 5.5 | 1.7 |
| | Scientific | 2.6 | 2.4 | 6.4 |
| **University's location** | North | 52.2 | 51.4 | 66.8 |
| | Centre | 25.2 | 25.4 | 21.3 |
| | South | 16.8 | 17.3 | 7.5 |
| | Islands | 5.8 | 5.9 | 4.4 |
| **Regularity in graduation time** | | 56.4 | 56.3 | 58.2 |
| **Studied abroad during the degree program** | | 12.9 | 6.7 | 26.0 |
| **Area of residence during the degree program** | North-west | 28.8 | 28.6 | 32.2 |
| | North-East | 18.3 | 18.2 | 19.7 |
| | Centre | 20.3 | 20.5 | 17.2 |
| | South | 24.1 | 24.5 | 17.1 |
| | Islands | 8.2 | 8.1 | 8.8 |
| | Abroad | 0.4 | 0.1 | 5.0 |
| **Mother's qualification** | Manager or entrepreneur | 10.6 | 10.3 | 16.4 |
| **Father's qualification** | Manager or entrepreneur | 34.1 | 33.7 | 43.7 |
| **Mother's educational attainment** | Degree | 17.6 | 17.0 | 28.8 |

| | | | | |
|---|---|---|---|---|
| **Father's educational attainment** | Degree | 20.5 | 19.8 | 32.1 |
| **Type of diploma** | Gymnasium-Technical | 89.6 | 89.4 | 92.7 |
| | Vocational | 10.3 | 10.4 | 6.9 |
| **Exam's grade** | Higher than median | 51.7 | 51.3 | 58.6 |
| **Expectations** | | | | |
| | Earnings | 50.2 | 50.3 | 48.0 |
| | Career's opportunity | 57.9 | 57.7 | 61.6 |
| | Job's stability | 55.9 | 56.9 | 37.7 |
| **Number of exams taken abroad** | | 5.4 | 5.1 | 6.8 |

*Table 2b – Descriptive statistics on Italian graduates working abroad. Relative frequencies of categorical variables*

| | |
|---|---|
| **Job satisfaction (dummy variable)** | 80.1 |
| **Time spent abroad after migration** | |
| Less than one year | 5.8 |
| 1 year ago | 9.2 |
| 2 years ago | 18.0 |
| 3 years ago | 11.9 |
| 4 years ago | 13.4 |
| 5 years ago | 19.3 |
| more than 5 years | 22.4 |
| **Working experience in Italy** | **51.6** |
| **Working experience abroad** | **40.1** |
| **Host country** | |
| UK | 16.5 |
| France | 14.5 |
| Switzerland | 11.9 |
| Germany | 11.7 |
| USA | 8.1 |
| Belgium | 7.3 |
| Spain | 5.7 |
| **Macroarea of migration** | |
| Europa | 81.8 |
| Africa | 3.1 |
| Asia | 1.7 |
| America | 10.2 |
| Oceania | 1.8 |
| **Main cause of migration** | |
| Lack of opportunity in Italy | 38.3 |
| Job offer received from abroad | 23.8 |
| Personal reasons | 14.7 |
| **Migration Obstacles** | |
| Knowledge of foreign language | 33.3 |
| Life style | 32.0 |
| Travel and logistics | 19.6 |

| | |
|---|---:|
| Higher costs | 17.1 |
| No obstacles at all | 37.3 |
| **Nationality of the employer** | |
| Italian firm | 3.8 |
| Foreign firm | 34.2 |
| Multinational | 29.6 |
| University/Research Centre | 24.3 |
| International Organization | 7.2 |
| **Adequateness of net earnings** | **90.2** |
| **Skills' level compared to graduate colleagues** | |
| Higher | 42.2 |
| Equivalent | 49.2 |
| Lower | 4.5 |
| Not working with graduates | 4.1 |
| **Probability of returning in Italy** | |
| High | 11.1 |
| Low | 28.2 |
| Very low | 42.2 |
| **Satisfied with migration's decision** | **98.1** |

*Table 3 – Selected pairwise correlations (dedicated survey)*

| | Distance | gdpXgini | Exp | ten_est | ten_ita | Real wage | migr_job_sat | skill_use |
|---|---|---|---|---|---|---|---|---|
| Distance | 1 | | | | | | | |
| gdpXgini | .3687** | 1 | | | | | | |
| exp | .0135 | -.1248** | 1 | | | | | |
| ten_est | -.0298 | .3596** | .1526** | 1 | | | | |
| ten_ita | . | -.3211** | .7657** | -.4377** | 1 | | | |
| Real wage | .2478** | .2324** | .0554** | .4386** | -.2453** | 1 | | |
| migr_job_sat | .0506 | -.0166 | .0841** | .0847** | . | .1619** | 1 | |
| skill_use | -.0054 | .0449** | -.0784** | .0148 | -.0470** | .1138** | .0635 | 1 |

**Significant at 5%

*Table 4 – Earning function controlled for migration as endogenous selection variable and employed status as exogenous selection variable*

| | Migration as endogenous selection variable | | | Employed status as exogenous selection variable | |
|---|---|---|---|---|---|
| | (1) logrealwage | (2) logrealwage | (3) logrealwage | (2) logrealwage | (3) logrealwage |
| Migrant | 0.7765*** | 0.7855*** | 0.7812*** | 0.5268*** | 0.5210*** |
| | (0.0660) | (0.0674) | (0.0672) | (0.0438) | (0.0439) |
| ten_est | -0.0128 | -0.0127 | -0.0110 | 0.0104 | 0.0130 |
| | (0.0184) | (0.0183) | (0.0183) | (0.0172) | (0.0175) |
| ten_ita | 0.0226 | 0.0224 | 0.0236 | 0.0192 | 0.0203* |
| | (0.0152) | (0.0152) | (0.0153) | (0.0122) | (0.0122) |
| exp | 0.0220 | 0.0219 | 0.0209 | 0.0127 | 0.0117 |
| | (0.0171) | (0.0172) | (0.0172) | (0.0140) | (0.0140) |
| Female | -0.1080*** | -0.1048*** | -0.1029*** | -0.0836*** | -0.0832*** |
| | (0.0244) | (0.0246) | (0.0244) | (0.0262) | (0.0262) |
| Age_deg | 0.0106*** | 0.0103*** | 0.0102*** | 0.0008 | 0.0007 |
| | (0.0034) | (0.0034) | (0.0035) | (0.0041) | (0.0041) |
| Delay | -0.0362 | -0.0372 | -0.0349 | 0.0082 | 0.0095 |
| | (0.0391) | (0.0393) | (0.0393) | (0.0346) | (0.0346) |
| Univ_north | 0.1023*** | 0.1037*** | 0.1014*** | 0.0282 | 0.0265 |
| | (0.0282) | (0.0287) | (0.0289) | (0.0316) | (0.0317) |
| Univ_center | 0.0522* | 0.0508 | 0.0496 | -0.0025 | -0.0031 |
| | (0.0316) | (0.0316) | (0.0317) | (0.0345) | (0.0344) |
| Deg_grade | 0.0035 | 0.0066* | 0.0066* | 0.0014 | 0.0016 |
| | (0.0022) | (0.0038) | (0.0039) | (0.0040) | (0.0040) |
| exp_work | 0.0626*** | 0.0628*** | 0.0612*** | 0.0569*** | 0.0562*** |
| | (0.0236) | (0.0234) | (0.0233) | (0.0196) | (0.0196) |
| Regularity | 0.0105 | 0.0104 | 0.0080 | -0.0200 | -0.0217 |
| | (0.0304) | (0.0306) | (0.0306) | (0.0267) | (0.0266) |
| H_sch_grad | -0.0003 | -0.0001 | -0.0001 | 0.0007 | 0.0007 |
| | (0.0010) | (0.0010) | (0.0010) | (0.0011) | (0.0011) |
| Empl_contr | -0.0029 | -0.0029 | -0.0029 | -0.0014 | -0.0014 |
| | (0.0032) | (0.0032) | (0.0032) | (0.0020) | (0.0019) |
| Moth_h_qual | -0.0116 | -0.0109 | -0.0117 | -0.0114 | -0.0127 |
| | (0.0246) | (0.0246) | (0.0245) | (0.0268) | (0.0268) |

| | | | | | |
|---|---|---|---|---|---|
| Fath_h_qual | 0.0407$^*$ | 0.0410$^*$ | 0.0400$^*$ | 0.0217 | 0.0219 |
| | (0.0217) | (0.0218) | (0.0217) | (0.0237) | (0.0238) |
| Moth_deg | 0.0336 | 0.0376 | 0.0382 | 0.0467 | 0.0466 |
| | (0.0277) | (0.0277) | (0.0277) | (0.0305) | (0.0304) |
| Fath_deg | -0.0139 | -0.0126 | -0.0128 | 0.0126 | 0.0130 |
| | (0.0283) | (0.0284) | (0.0283) | (0.0309) | (0.0308) |
| Exam_grad | | -0.0125 | -0.0126 | 0.0020 | 0.0012 |
| | | (0.0128) | (0.0128) | (0.0136) | (0.0136) |
| Exp_earn | | -0.0226 | -0.0226 | -0.0036 | -0.0052 |
| | | (0.0148) | (0.0148) | (0.0122) | (0.0121) |
| for_lang | | | 0.0050 | | -0.0091 |
| | | | (0.0206) | | (0.0228) |
| Exp _stab | | | -0.0225 | | -0.0138 |
| | | | (0.0228) | | (0.0245) |
| Exp_pers_int | | | -0.0012 | | 0.0109 |
| | | | (0.0209) | | (0.0228) |
| Exp_free time | | | 0.0016 | | 0.0020 |
| | | | (0.0207) | | (0.0228) |
| _cons | 1.9900$^{***}$ | 2.0058$^{***}$ | 2.0406$^{***}$ | 2.7245$^{***}$ | 2.7531$^{***}$ |
| | (0.2683) | (0.2679) | (0.2812) | (0.2805) | (0.2948) |
| athrho | | | | | |
| _cons | -0.2655$^{***}$ | -0.2703$^{***}$ | -0.2728$^{***}$ | -1.5600$^{***}$ | -1.5651$^{***}$ |
| | (0.0612) | (0.0611) | (0.0606) | (0.1104) | (0.1119) |
| lnsigma | | | | | |
| _cons | -0.8821$^{***}$ | -0.8818$^{***}$ | -0.8826$^{***}$ | -0.6939$^{***}$ | -0.6944$^{***}$ |
| | (0.0286) | (0.0286) | (0.0287) | (0.0333) | (0.0333) |
| *Field of study dummies* | Yes | Yes | Yes | Yes | Yes |
| *Industry dummies* | Yes | Yes | Yes | Yes | Yes |
| *Occupational dummies* | Yes | Yes | Yes | Yes | Yes |
| Chi2 | 1115.46 | 1128.80 | 1172.77 | 1163.87 | 1171.21 |
| *N* | 2063 | 2063 | 2063 | 2913 | 2913 |

Standard errors in parentheses
$^*$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

*Table 5 – Selection on migration – dependent variable: working abroad*

| | (1) | (2) | (3) |
|---|---|---|---|
| migranti_resid | 0.0660* | 0.0721* | 0.0698* |
| | (0.0365) | (0.0369) | (0.0370) |
| Abr_Thes | 0.6955*** | 0.6749*** | 0.6703*** |
| | (0.1207) | (0.1212) | (0.1213) |
| Delay | -0.0375 | -0.0270 | -0.0410 |
| | (0.0897) | (0.0913) | (0.0893) |
| Age_deg | -0.0530** | -0.0498* | -0.0441* |
| | (0.0257) | (0.0270) | (0.0261) |
| H_Sch_grade | 0.0054 | 0.0037 | 0.0042 |
| | (0.0043) | (0.0044) | (0.0045) |
| Female | -0.1823* | -0.2240** | -0.2092** |
| | (0.0962) | (0.0966) | (0.0976) |
| Univ_North | 0.4700*** | 0.4699*** | 0.4444*** |
| | (0.1282) | (0.1285) | (0.1320) |
| Univ_Center | 0.3010** | 0.2956** | 0.2703* |
| | (0.1402) | (0.1406) | (0.1428) |
| Deg_grade | -0.0237 | -0.0264* | -0.0260 |
| | (0.0157) | (0.0160) | (0.0159) |
| agr_stud | -1.5950*** | -1.6424*** | -1.5417*** |
| | (0.3317) | (0.3330) | (0.3307) |
| arc_stud | -1.0601*** | -1.0776*** | -1.0848*** |
| | (0.2127) | (0.2181) | (0.2185) |
| chim_stud | -0.6502*** | -0.6593*** | -0.6645*** |
| | (0.2436) | (0.2487) | (0.2519) |
| econ_stud | -1.2736*** | -1.3445*** | -1.3464*** |
| | (0.2058) | (0.2076) | (0.2119) |
| geobio_stud | -0.5442** | -0.5311** | -0.5104** |
| | (0.2381) | (0.2360) | (0.2382) |
| giuri_stud | -1.4523*** | -1.4783*** | -1.4613*** |
| | (0.2584) | (0.2593) | (0.2567) |
| ing_stud | -0.7261*** | -0.7302*** | -0.7240*** |
| | (0.1759) | (0.1773) | (0.1798) |

| | | | |
|---|---|---|---|
| ins_stud | -1.5167*** (0.3245) | -1.5924*** (0.3265) | -1.5380*** (0.3223) |
| lett_stud | -1.0984*** (0.2219) | -1.1926*** (0.2254) | -1.2280*** (0.2300) |
| ling_stud | -0.8468*** (0.2280) | -1.0780*** (0.2289) | -1.0700*** (0.2331) |
| med_stud | -1.1421*** (0.3050) | -1.1687*** (0.3121) | -1.1866*** (0.3200) |
| polit_stud | -0.8963*** (0.2002) | -1.0561*** (0.2019) | -1.0645*** (0.2071) |
| psic_stud | -1.1552*** (0.2825) | -1.1041*** (0.2852) | -1.1459*** (0.2846) |
| Eur_work | 0.6580*** (0.1525) | 0.6195*** (0.1546) | 0.5790*** (0.1553) |
| extr_Eur_work | 0.4107*** (0.1003) | 0.3963*** (0.1019) | 0.4020*** (0.1035) |
| stud_abr | 0.5334*** (0.1047) | 0.4211*** (0.1071) | 0.3815*** (0.1092) |
| Moth_h_qual | 0.2369** (0.0986) | 0.2494** (0.0995) | 0.2268** (0.0999) |
| Fath_h_qual | -0.0496 (0.0880) | -0.0608 (0.0886) | -0.0757 (0.0897) |
| moth_degree | 0.2941*** (0.1086) | 0.2566** (0.1092) | 0.2713** (0.1111) |
| fath_degree | 0.1056 (0.1043) | 0.0937 (0.1046) | 0.1038 (0.1052) |
| Exam_grade | 0.1203** (0.0511) | 0.1337** (0.0525) | 0.1279** (0.0532) |
| Married | 0.3000*** (0.0841) | 0.2803*** (0.0841) | 0.2889*** (0.0839) |
| child | -0.1161 (0.1001) | -0.1008 (0.1025) | -0.0981 (0.1003) |
| For_lang | | 0.2780*** (0.0568) | 0.2829*** (0.0575) |

|  |  |  |  |
|---|---|---|---|
| Exp_earn | | | 0.0933 |
| | | | (0.0900) |
| | | | |
| Exp _stab | | | -0.3290*** |
| | | | (0.0926) |
| | | | |
| Exp_pers_int | | | 0.1236 |
| | | | (0.0861) |
| | | | |
| Exp_free time | | | -0.0140 |
| | | | (0.0870) |
| | | | |
| _cons | -2.2215* | -2.0140* | -1.5872 |
| | (1.1614) | (1.1623) | (1.3272) |
| athrho | | | |
| _cons | -0.2655*** | -0.2703*** | -0.2728*** |
| | (0.0612) | (0.0611) | (0.0606) |
| lnsigma | | | |
| _cons | -0.8821*** | -0.8818*** | -0.8826*** |
| | (0.0286) | (0.0286) | (0.0287) |
| *Industry dummies* | Yes | Yes | Yes |
| *Occupational dummies* | Yes | Yes | Yes |
| Chi2 | 1115.46 | 1128.80 | 1172.77 |
| *N* | 2063 | 2063 | 2063 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

*Table 6 - Earning function of graduates' working abroad controlled for migration as exogenous selection variable*

|  | (1) logrealwage | (2) logrealwage | (3) logrealwage |
|---|---|---|---|
| ten_est | -0.0003 (0.0163) | 0.0015 (0.0165) | 0.0060 (0.0182) |
| exp | 0.0161 (0.0153) | 0.0117 (0.0159) | 0.0101 (0.0179) |
| migr_ost | -0.0108 (0.0127) | -0.0094 (0.0132) | -0.0130 (0.0163) |
| It_firm | -0.3417*** (0.1260) | -0.3537*** (0.1322) | -0.5085*** (0.1396) |
| Imn_firm | -0.4623*** (0.1036) | -0.4779*** (0.1048) | -0.5077*** (0.1182) |
| For_firm | -0.5219*** (0.0974) | -0.5213*** (0.0987) | -0.5693*** (0.1070) |
| uni_firm | -0.3784*** (0.1159) | -0.3770*** (0.1183) | -0.4020*** (0.1437) |
| Perm_abroad | 0.0682*** (0.0216) | 0.0771*** (0.0241) | 0.0886*** (0.0289) |
| female | -0.1517*** (0.0335) | -0.1413*** (0.0334) | -0.1564*** (0.0403) |
| Age_deg | -0.0228** (0.0097) | -0.0230** (0.0103) | -0.0386** (0.0192) |
| Delay | -0.0775 (0.0589) | -0.0817 (0.0578) | -0.0165 (0.0650) |
| Univ_norrh | 0.0326 (0.0486) | 0.0318 (0.0490) | -0.0001 (0.0482) |
| Univ_cent | -0.0135 (0.0558) | -0.0188 (0.0562) | -0.0762 (0.0598) |
| Deg_grade | 0.0009 (0.0050) | 0.0016 (0.0051) | 0.0032 (0.0058) |
| exp_wor | 0.0426 (0.0400) | 0.0428 (0.0385) | 0.0510 (0.0452) |

| | | | |
|---|---|---|---|
| Regul | 0.0517 | 0.0578 | 0.0191 |
| | (0.0469) | (0.0469) | (0.0570) |
| H_Sch_grade | 0.0004 | 0.0003 | -0.0015 |
| | (0.0016) | (0.0016) | (0.0019) |
| Empl_contract | -0.0576*** | -0.0569*** | -0.0375 |
| | (0.0212) | (0.0217) | (0.0233) |
| Mother_highqual | 0.0501 | 0.0439 | 0.0656 |
| | (0.0409) | (0.0410) | (0.0458) |
| Father_highqual | 0.0505 | 0.0566 | 0.0414 |
| | (0.0354) | (0.0346) | (0.0407) |
| Mother_degree | 0.0632* | 0.0604* | 0.1253*** |
| | (0.0359) | (0.0355) | (0.0393) |
| Fath_degree | -0.0114 | -0.0194 | -0.0645 |
| | (0.0374) | (0.0364) | (0.0406) |
| Exam_grade | 0.0187 | 0.0133 | 0.0053 |
| | (0.0171) | (0.0185) | (0.0221) |
| log_dist | 0.1201*** | 0.1317*** | 0.1185*** |
| | (0.0235) | (0.0251) | (0.0286) |
| lack_opp_It | | 0.0382 | 0.0648 |
| | | (0.0642) | (0.0706) |
| off_job | | 0.1238* | 0.1469* |
| | | (0.0696) | (0.0780) |
| Empl_req | | 0.1229 | 0.2270** |
| | | (0.0943) | (0.1093) |
| mot_pers | | 0.0197 | 0.0352 |
| | | (0.0790) | (0.0818) |
| Skill_lev_host | | | 0.0368 |
| | | | (0.0290) |
| _cons | 2.8734*** | 2.8802*** | 3.3699*** |
| | (0.5270) | (0.5159) | (0.7914) |
| Migrated(Selection) | | | |
| migr_resid | 0.0398 | 0.0349 | 0.0349 |
| | (0.0339) | (0.0344) | (0.0363) |
| Abr_Thes | 0.5035*** | 0.4935*** | 0.5808*** |
| | (0.1121) | (0.1127) | (0.1167) |

| | | | |
|---|---|---|---|
| Delay | 0.0462 | 0.0421 | 0.0763 |
| | (0.0499) | (0.0500) | (0.0570) |
| Age_deg | -0.0271 | -0.0242 | -0.0666*** |
| | (0.0198) | (0.0197) | (0.0244) |
| H_Sch_grad | 0.0079** | 0.0079** | 0.0058 |
| | (0.0036) | (0.0036) | (0.0038) |
| female | -0.4040*** | -0.3851*** | -0.4226*** |
| | (0.0809) | (0.0809) | (0.0886) |
| Univ_north | 0.2104* | 0.1983 | 0.1780 |
| | (0.1199) | (0.1210) | (0.1294) |
| Univ_center | 0.0221 | 0.0089 | 0.0302 |
| | (0.1283) | (0.1292) | (0.1407) |
| Deg_grade | -0.0032 | -0.0025 | -0.0044 |
| | (0.0129) | (0.0130) | (0.0138) |
| Eur_work | 0.6174*** | 0.5908*** | 0.5976*** |
| | (0.1331) | (0.1326) | (0.1511) |
| extr_Eur_work | 0.3413*** | 0.3428*** | 0.3264*** |
| | (0.0847) | (0.0862) | (0.0931) |
| stud_abr | 0.5997*** | 0.5783*** | 0.5167*** |
| | (0.0918) | (0.0956) | (0.1012) |
| Madre_highqual | 0.3028*** | 0.2954*** | 0.3361*** |
| | (0.0882) | (0.0891) | (0.0944) |
| Padre_highqual | -0.0280 | -0.0323 | -0.0292 |
| | (0.0772) | (0.0779) | (0.0839) |
| Mother_degree | 0.1036 | 0.1102 | 0.1226 |
| | (0.0908) | (0.0914) | (0.0972) |
| Fath_degree | 0.1270 | 0.1364 | 0.1341 |
| | (0.0892) | (0.0900) | (0.0942) |
| Exam_grade | 0.0870* | 0.0844* | 0.0674 |
| | (0.0450) | (0.0454) | (0.0481) |
| exp_work | -0.0653 | -0.0816 | -0.0709 |
| | (0.0903) | (0.0929) | (0.0998) |
| married | 0.2916*** | 0.2880*** | 0.3709*** |
| | (0.0734) | (0.0745) | (0.0804) |

| | | | |
|---|---|---|---|
| child | -0.1025 | -0.0786 | -0.0913 |
| | (0.0800) | (0.0839) | (0.0969) |
| | | | |
| gdpXgini | 0.0045$^{***}$ | 0.0045$^{***}$ | 0.0043$^{***}$ |
| | (0.0006) | (0.0006) | (0.0006) |
| | | | |
| Exp_earn | | 0.0390 | 0.0456 |
| | | (0.0801) | (0.0853) |
| | | | |
| Exp _stab | | -0.3148$^{***}$ | -0.3829$^{***}$ |
| | | (0.0799) | (0.0861) |
| | | | |
| Exp_pers_int | | 0.1223 | 0.1611$^{*}$ |
| | | (0.0832) | (0.0915) |
| | | | |
| Exp_free time | | -0.0303 | 0.0173 |
| | | (0.0789) | (0.0847) |
| | | | |
| _cons | -8.9145$^{***}$ | -8.6817$^{***}$ | -6.6949$^{***}$ |
| | (1.2943) | (1.3044) | (1.3808) |
| athrho | | | |
| _cons | 0.3001$^{***}$ | 0.2568$^{**}$ | 0.3761$^{***}$ |
| | (0.0845) | (0.1075) | (0.1348) |
| lnsigma | | | |
| _cons | -1.0524$^{***}$ | -1.0640$^{***}$ | -1.0671$^{***}$ |
| | (0.0892) | (0.0864) | (0.1001) |
| $N$ | 2973 | 2970 | 2837 |
| Field of study | Yes | Yes | Yes |
| Industry | Yes | Yes | Yes |
| Occupations | Yes | Yes | Yes |
| Chi2 | 300.37 | 343.58 | 312.06 |

Standard errors in parentheses
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

# APPENDIX - Legend of the employed variables

| Acronym | Definition |
|---------|-----------|
| Overed | Overeducation (self-assessed) |
| Ten_est | Tenure working abroad |
| Exp | Experience (years) |
| Migr_ost | Obstacles living abroad |
| It_firm | Italian firm |
| Imn_firm | Multinational firm |
| For_firm | Foreign firm |
| Uni_firm | University/research |
| Age_abr | Years living abroad |
| Female | Gender (female) |
| Age_deg | Age at the degree |
| Delay | delay at graduation |
| agric | Industries dummy |
| metalm | Industries dummy |
| const | Industries dummy |
| chem | Industries dummy |
| othman | Industries dummy |
| retail | Industries dummy |
| credit | Industries dummy |
| transp | Industries dummy |
| consul | Industries dummy |
| inform | Industries dummy |
| busserv | Industries dummy |
| pubamm | Industries dummy |
| edu | Industries dummy |
| health | Industries dummy |
| Univ_north | University region-North |
| Univ_centr | University region-Center |
| Deg_grade | Degree grade |
| exp_work | Working experience while attending university |
| Regul | Time Regularity of the graduation path |
| H_Sch_grade | High school mark |
| Empl_contr | Employment contract |
| Moth_highqual | Mother high-qualified |
| Fath_highqual | Father high-qualified |
| Moth_deg | Mother educational attainment: degree |
| Fath_deg | Father educational attainment: degree |
| agr_stud | Field of study dummy |
| arc_stud | Field of study dummy |
| chim_stud | Field of study dummy |
| difesa_stud | Field of study dummy |
| econ_stud | Field of study dummy |
| edfis_stud | Field of study dummy |
| geobio_stud | Field of study dummy |
| giuri_stud | Field of study dummy |

| | |
|---|---|
| ing_stud | Field of study dummy |
| ins_stud | Field of study dummy |
| lett_stud | Field of study dummy |
| ling_stud | Field of study dummy |
| med_stud | Field of study dummy |
| polit_stud | Field of study dummy |
| psic_stud | Field of study dummy |
| Occup_other | Occupational dummy: other |
| Occup _prof | Occupational dummy: professionals |
| Occup _teach | Occupational dummy: teacher |
| Occup _soft | Occupational dummy: soft skills' use |
| Exam_grade | Exams average degree |
| log_dist | Distance in Km from Italy (in log) |
| lack_opp_It | No opportunity in Italy (dummy) |
| off_job | Interesting job offer coming from abroad (dummy) |
| Empl_req | Migrated due to employer request (dummy) |
| mot_pers | Personal motivations (dummy) |
| Mot_oth | Other motivations (dummy) |
| gdpXgini | Gdp multiplied by gini index |
| lev_skills_host | Skills' levels of graduates living in the host country |
| migranti_resid | Migrated for attending university |
| Abr_Th | Thesis prepared abroad |
| Married | Married |
| Child | With children |
| avail_Eur_work | Available to work in a European country |
| avail_extr_Eur_work | Available to work in a extraEuropean country |
| for_lang | Knowledge of Foreign Languages |
| Exp_earn | Expectations_earnings |
| Exp_car | Expectations _career |
| Exp _stab | Expectations _stability |
| Exp _cons | Expectations _consistency with the field of study |
| Exp_pers_int | Expectations_personal interests |
| Exp_aut | Expectations_autonomy |
| Exp_free time | Expecations_free time |