Immigrants' educational mismatch and the penalty of over-education*

Eleni Kalfa
University of Kent

Matloob Piracha
University of Kent and IZA

November 2013

Abstract

This paper analyses immigrants' educational mismatch as well as its impact on wages in Spain. Using cross-sectional data from the National Immigrant Survey of Spain 2007, we estimate a probit model taking into account the possible problem of selection bias. We show that the incidence of immigrants' education-occupation mismatch in the Spanish labour market can largely be explained by the incidence of education-occupation mismatch in the last job held in the home country. The probability of having been over-educated at home shows to have a higher effect on the probability of being over-educated in the first job upon arrival. In addition, our results show that those who were over-educated in their first job after arrival are more likely to continue in being over-educated in their current/last job in Spain. Furthermore, using a log wage equation as well as predicted and counterfactual values distinguishing between immigrants being in the correctly matched occupation and those who are over-educated, we show that after controlling for previous mismatched work experience on current wages, over-educated immigrants earn significantly lower wages compared to their correctly-matched counterparts, while over-educated immigrants' would have earned a slightly larger amount if the same individuals were employed in a correctly matched job instead. Significant differences are also apparent when restricting the models to the level of education with higher persistence of wage effects on the relatively better educated.

Corresponding author:

Matloob Piracha
School of Economics
University of Kent
Canterbury, Kent CT2 7NP
United Kingdom
E-mail: M.E.Piracha@kent.ac.uk
_____

1. Introduction

A job mismatch typically occurs if an individual is employed in an occupation which requires a lower or higher level of education than the one formally obtained. For instance, if a worker has formal qualifications above (below) the level required for the job then he is considered to be over-educated (under-educated). The significance of labour market mismatch as an economic problem arises from its link with productivity and, in turn, its consequence on domestic wage inequality. Mismatched workers do not use efficiently their competences and this inefficiency is costly to the individuals involved, as they do not receive a salary commensurate with their abilities. It is also costly to society, as it does not make an efficient use of the finite stock of human capital available to it. Within the over-/ under-education literature, a line of research has consistently found that immigrants are significantly more over-educated than comparable natives. While most of the existing literature argues that imperfect transferability of human capital and/or discrimination are the main explanations for the relatively higher incidence of immigrants' mismatch, little attention has been paid to the role a mismatch in the home country plays in the host country labour market.[1] We contribute to the limited literature by analysing the role of previous, home country mismatch, on both the incidence of mismatch and the associated wage penalty in Spain.

Chiswick and Miller (2010a) argue that over time the incidence of over-education declines as immigrants tend to adjust to the requirements of the host country's job market, gain relevant work experience and are therefore more likely to obtain jobs that match their educational qualifications. Piracha et al (2012) explicitly focus on the role of home country labour market experience and argue that besides imperfect transferability of human capital and/or discrimination, the incidence of a previous job mismatch in the country of origin plays a significant role in the determination of a mismatch in the host country.[2]

We build our analysis upon Piracha et al (2012) to give new evidence on the role of home country labour market experience focusing on the signal host country employers receive from a previous mismatched work experience. In addition, we examine the impact of over-

---

[1] For a general survey of the literature, see Hartog (2000), McGuiness (2006) and Leuven and Oosterbeek (2011). For a literature survey specific to immigrant mismatch, see Piracha and Vadean (2013).
[2] McGuiness (2008) and Mavromaras et al (2009) have also shown that previous mismatch has a significant impact on current mismatch, though their papers were more explicitly on over-education of natives in Northern Ireland and Australia, respectively.

education on immigrants' wages, using two different specifications; a standard log wage equation in which over-educated immigrants are compared to the correctly matched individuals, and a counterfactual analysis by asking the following question: how much more would have over-educated immigrants earned had they been correctly matched?

We use the National Immigrant Survey of Spain 2007 which contains detailed information about immigrants' education as well as their occupation level and the sectors they work in, for three different stages/periods: last job held in the home country as well as first and the current jobs held in Spain. Using probit with selection, we show that 40% (49%) of over-education (under-education) incidence in the first job in the host country for males and 31% (29%) of the similar types of mismatch for females can be explained by the corresponding incidence of mismatch in the home country. The incidence of over-/under-education increases substantially when considering the mismatch from the previous to the current job in Spain, showing that domestic signal of worker quality plays an even stronger role than the one from the home country job. In addition, we find that over-educated earn substantially lower wages compared to their correctly matched counterparts. A significant wage loss in the current job is also observed for those who have been previously mismatched in both, home country and first job in Spain. However, having been over-educated in the first job in Spain has a higher impact on wages than those over-educated in the home country. Finally, the results reveal higher penalties for relatively higher educated immigrants compared to those with a lower education level.

The rest of the paper is organised as follows. Section 2 discusses theoretical and empirical background on the incidence of over-education including its effects on wages while Section 3 presents the data and construction of variables. Section 4 provides the empirical methodology and Section 5 discusses the results. Last section concludes.

2. Literature Review

A large body of literature exists on over-education endeavouring to explain mismatch and its effects on wages. However, even with a number of recent papers comparing the effects of over-education on natives and immigrants, there are still aspects of over-education for immigrants that have not been explored in the literature. A number of studies argue that immigrant's job mismatch may be a result of immigrants' discrimination against natives, or

imperfect international transferability of human capital (eg. cultural and language dissimilarities and/or differences in labour market skill requirements between host and home countries). Using Australian and US data, Chiswick and Miller (2008, 2009) argue that immigrants' education-occupation mismatch can mainly be explained by the imperfect human capital transferability across borders as well as by the low host country language skills. More specifically, using data from the 2000 US Census, Chiswick and Miller (2008) argue that while over-education is associated with a less than perfect transferability of human capital, under-education is linked to favourable selection in immigration. Green et al (2007) compared immigrants in Australia with natives and showed that immigrants have a higher probability of being over-educated than their native counterparts, especially those originating from non-English speaking countries.

Additionally, Battu and Sloane (2004) compare mismatch for ethnic minorities with those for white natives and analyse the existence of possible discrimination against non-whites in the UK labour market. Their study reveals that it is more difficult for the non-whites in the UK to find a job that matches their educational qualifications and are therefore more likely to be employed in a job that is below their education level. Another extension put forward is to distinguish between immigrants with a host country degree and those with a foreign degree. Nielsen (2007) studied the effects of over-education of immigrants in Denmark by distinguishing between those with a foreign degree and those with a host country education degree and found that immigrants with local education are three times less likely to be over-educated compared to immigrants with foreign qualifications. Battu and Sloane (2002) on the other hand argue that foreign employers in the host country are more likely to recognise foreign qualifications, compared to local employers. They found that non-whites in the UK are less likely to be over-educated if they are hired by a non-white employer. Besides this, a number of studies have also focused on unobservable factors such as motivation or cognitive ability (Chiswick and Miller 2009; Dolton and Silles 2008; Nordin et al 2010) to affect employment and wages of immigrants.

In order to capture the effects and consequences of over-education on wages, most of the existing literature uses the ORU (over-required-under education) model in which years of schooling are decomposed into required, surplus and deficit years of schooling, to analyse the returns to required and surplus education (see Duncan and Hoffman, 1981; Sicherman, 1991; Dolton and Vignoles, 2000). Chevalier (2000) distinguishes between apparently and genuinely over-educated graduates (less skilled graduates who felt that their qualifications

3

were ideal for their job and those who felt their qualifications were very inappropriate) and found that apparently over-educated individuals earn 7 percent lower wages compared to matched graduates, while the pay penalty for genuinely over-educated workers is 33 percent. Chiswick and Miller (2010b) argue that cultural and language similarities between home and host country tend to improve the international transferability of human capital by not only reducing the incidence of over-education, but also by increasing the returns to education. Using data for Australia, they find that immigrants from English speaking countries earn 2.4 percent more compared to those from non-English speaking backgrounds. In addition, Sanroma et al (2008) studied the immigrant assimilation in Spain and found that Latin Americans have higher returns to required and surplus education compared to Africans and immigrants from Eastern European countries. Additionally, using data from Denmark, Nielsen (2007) shows that immigrants with a host country degree had 2.6 percent higher returns to each year of over-education and 0.7 percent higher returns to each year of required education compared to immigrants with a foreign degree.[3]

Budria and Moro-Egido (2008), on the other hand, study the penalty of over-education using the level of education instead of the ORU model. They distinguish between over-qualification, incorrect qualification and strong mismatch and found an income penalty ranging from 13-27 percent for strong mismatches, while no wage penalties were observed for over-and incorrect-qualifications. Nording et al (2010) control for field of education to explore the income penalty of higher educated males and females in Sweden and find large penalties for field of education-occupation mismatches. Instead of using the ORU model, they capture the income penalty by distinguishing between two indicator variables – mismatched (a field of education that does not match any occupation) and weakly matched (a field of education that weakly/not perfectly matches with one or more occupations).[4]

Education-occupation mismatch is a dynamic process that is theorised to be affected by the individual's experience in the labour market. For instance, search-and-match theory (Groot and Maassen van den Brink 2000; Hartog 2000) supports that a mismatch arises from imperfect information about a host country's labour market, whereas the human capital theory suggests that experience gained through on-the-job training could, in many cases, be a

---

[3] Sanroma et al (2009) used the National Immigrant Survey of Spain 2007 to study the effects of human capital origin and education on wages and found that immigrants with host country degrees have high returns to education regardless of their country of origin, compared to those with foreign degrees.
[4] Vahey (2000) and Battu and Sloane (2002;2004) also used dummies for education-occupation mismatch instead of years of schooling

substitute to formal schooling (Sicherman 1991). Nevertheless, both theories support that the process of over-education is affected by experience acquired over time and predict a negative relationship between host country labour market experience and over-education. These theories are supported by Chiswick and Miller (2009) who found that time spent in the US and experience acquired about the host country's labour market tend to help immigrants in finding a better matched job over time. They found that the probability of being over-educated decreases after 30 years of residency, while the probability of under-education increases. However, when studying the returns to over-education on earnings, Chiswick and Miller (2010a) found that surplus years of schooling appear to have relatively low increases in earnings, where earnings are more likely to be related to the occupational position of an immigrant rather than to the actual education level. They argue that earnings are more likely to be related to occupations rather than to the immigrant's level of schooling. Additionally, Dolton and Silles (2008) distinguished between over-education in the first and current job and found that individuals' earnings are reduced by 33-41 percent in their first job and 66-68 percent in the current job. McGuiness and Sloane (2011) studied labour market mismatches among UK graduates and found that 30 percent of workers who were over-educated in their initial employment were still overeducated even 5 years after graduation.[5] In addition, Mavromaras and McGuinness (2012) use a dynamic random effect probit model to estimate the dynamics of overskilling distinguishing between education levels and find that workers with a higher degree experience the highest state dependence.

However, limited attention has been given to the labour market experience gained in the home country in explaining over-education in the host country. Chiswick and Miller (2009) is one of the few studies who considered this effect. Using data for the US, their results show that home country labour market experience does not improve job matches in the US. Piracha et al (2012) on the other hand focus on the role of home country labour market experience taking into consideration possible previous job mismatches in the home country. Using data for Australia, they analyse the effect of home country labour market experience on the education-occupation mismatch in the host country and show that a significant proportion of the incidence of over-/under-education in the host country can be explained by having been over-/under-educated prior to immigration. They argue that the incidence of a mismatch is determined by the actual signal of 'real' productivity from a previous mismatched work

---

[5] Similar results were found by Dolton and Vignoles (2000) and McGuinness (2003).

experience. We build our analysis upon Piracha et al (2012) and use Spanish data to study the incidence of a mismatch taking into account a possible mismatch in the home country.

There are three main approaches typically used in the literature to measure the incidence of a mismatch. The first approach is the worker self-assessment which is based on survey data, where individuals are asked about the minimum educational qualification required for their job.[6] The second approach is the realized matches method which was first developed by Verdugo and Verdugo (1989) where over-education is measured using mean levels of required education for a particular job. The third approach used in the literature is the job analysis method which is considered to be an objective measure as it is based on documents and formal studies used by countries and labour organisations (Rumberger 1987 and Green et al. 2007). We measure the incidence of over-and under-education using the job analysis method which will be explained in the following section.

3. Data and construction of variables

We used the National Immigrant Survey of Spain (NIS 2007) which was conducted between November 2006 and February 2007. In the survey, 15,465 individuals were interviewed of which each person corresponds to one household, is a foreign-born person living in Spain and is 16 years of age or older. Among a set of socio-demographic and socio-economic individual characteristics, the survey contains information about immigrants' employment status prior to arrival in Spain (last job held in home country) as well as about their current job in Spain (job held at survey date) and their first job in Spain (if the job at survey date was not their first job in Spain). This enables us to capture the education-occupation mismatch of immigrants in three different time periods - last job held in the home country, first job in Spain upon arrival and current job in Spain (job at survey date).

Figure 1 illustrates how the individuals were asked about their employment status upon arrival. If an individual responded that he is currently in employment, he was asked detailed information about his employment status including his occupation and the sector of activity. He was then asked whether this was his first job in Spain. If the response was yes, then these individuals only had one job upon arrival as their current job is also their first job in Spain.

---

[6] Studies that used the worker self-assessment approach include Sicherman (1991) and Dolton and Vignoles, (2000).

Those who responded that this was not their first job in Spain, they were also asked about their occupational status in their first job. Those individuals who responded that they are not currently employed (unemployed job seekers) were asked about whether they have previously worked in Spain. The previously employed were then asked to provide detailed information about their first employment after arrival. Those who responded that they have not previously worked are the ones who have been unemployed throughout their stay in Spain and are still looking for employment.

Immigrants' wages are defined as the net monthly income in euros from the main job including the monthly proportional part corresponding to 'extraordinary pay checks' and other 'extraordinary income' regularly received. Since 14 percent of employed males and 13 percent of employed females did not state the exact amount of their wages, they were given the option to state their approximate amount with given wage intervals. We have therefore calculated midpoints for each of the given intervals provided in the questionnaire in order to estimate wages for this group. However, our wage analysis is restricted to the effects of current and previous mismatch (first job in Spain and last job in the home country) on current wages only as we do not have information on immigrants' wages in their home country or in the first job in Spain.

One problem with the cross section data is that all the information captured could be contemporaneous, which in our case is a cause for concern as we don't know, for instance, if the individual was married before their first job in Spain or not. In order to address this problem, we have furthermore estimated approximate 'lagged' variables which reflect the period in which immigrants were employed in their first job in Spain. The new 'lagged' variables created are marital status, obtained Spanish nationality after arrival, renting a dwelling, house payments pending as well as regional controls. Since the survey provides information on the year of arrival as well as the length of the period the individual remained unemployed until they found the first job in Spain, we estimate the year the immigrant found his first job according to the year of arrival in Spain. We used this information to create marital status in first job and Spanish nationality by the time employed (or close to the time employed) in the first job. For regions of residence in Spain as well as renting and house payments we created 'lagged' variables for those who have changed residence since arrival. Since the survey also provides detailed information on the first residence of the immigrant

upon arrival, we have approximated the first residence in Spain to be closely linked to the first job obtained.

For the presence of dependent children, we do not observe the age of the child, but we do have information on the presence of dependent children between 0-4 years old. However, we cannot treat those as having no children if their first job was found more than 4 years ago since those families might still have older children (eg 16 years or less) and could not be treated as not having children. Nevertheless, since the time spent in Spain covers a period of 10 years in our sample, even if individuals found their first job before having children, they were likely to have been planning to have children in the next 2 or 3 years and would therefore possible act similar to someone who already has dependent children at home. We have furthermore restricted our sample to the labour force by excluding all the inactive population as well as those who state that they had Spanish nationality since birth. Our final sample consists of 5,811 observations with an almost equal number of males (2,933) and females (2,878).

Table 1 provides the descriptive statistics. At time of arrival, both males and females were generally young and were/are therefore at an economically active age. Around 40 percent have dependent children in the household. Furthermore, both males and females have spent an average of 6 years in Spain (the average year of arrival is 2001). Looking at the educational qualifications, it's clear that just about half of both males and females have only finished secondary education, though females seem to be more educated than males (23 percent of females state to have a higher education degree (first and second stage tertiary education) while just about 16 percent of the males sample report education at that level. In addition, there are substantial wage differences between males and females. While male immigrants earn an average of 1,182 euro/month (6.99 log points), female immigrants earn around 785 euro/month (6.57 log points). Finally, a relatively high percentage of females (47 percent) are engaged in unskilled occupations while 28 percent of the male sample is in the same category. As expected, majority of the men work in construction and machinery sector while females are more likely to be engaged in sectors such as hospitality, education, health care etc.

To analyse the determinants of education-occupation mismatch, we compare the actual level of education obtained by the migrant with the level of education which is required for a specific occupation using the definitions in International Standard for the Classification of

Occupations (ISCO). The ISCO (2008) maps 9 major groups of occupations to 4 skill levels which are represented in the Appendix. Managers and Professionals who are classified in the ISCO occupational categories 1-2 are assigned to skill level 4 which is defined as "First and Second Stage of Tertiary Education leading to an advanced research qualification". Technicians and Associate Professionals (ISCO category 3) are assigned to skill level 3, "First stage of tertiary education". For Clerical Support Workers, Services and Sales Workers, Skilled Agricultural, Forestry and Fishery Workers, Craft and Related Trades Workers, Plant and Machine Operations and Assemblers (ISCO categories 4-8) the educational requirement is skill level 2, "Lower or Upper Secondary level of education". For those working in elementary occupations (ISCO category 9) the required education is Skill level 1, "Primary level of education". Over-educated immigrants are considered those who work in occupations that require a lower level of education than the one acquired by the immigrant, while under-educated are all those immigrants working in occupations which require a higher education level than the one obtained.

Tables 2a-2c and 3a-3c represent the transition matrix of immigrants' job mismatch across three different time periods (i) the transition between the job held in the home country and the first job in Spain after arrival (ii) the transition between the job held in the home country and the current job in Spain (iii) and the transition between the first and the current job in Spain. Looking at the transition matrix for males (Table 2a), we can clearly see that approximately 72% of males who have been over-educated in the last job held in their home country were also over-educated in their first job in Spain upon arrival. Similarly, 54% of those having been under-educated at home were also under-educated in their first job in Spain and 55% of those who were correctly matched at home have also been correctly matched in their first job upon arrival. Similar effects are observed in the transition matrix for males between the last job in their home country and the current job in Spain (Table 2b), and the transition between first job and current job in Spain (Table 2c). In all three matrices, we can observe a diagonal along the three match/mismatch effects. While similar effects are observed for the transition matrix for females (Tables 3a-3c), we can furthermore observe that a relatively large number of over-educated females in both current and first job in Spain had been correctly-matched back home. This shows evidence that there is a somewhat imperfect transferability of human capital effect in Spain. However, the fact that this downgrading of job-match from home to host country is highly observed for females than for males could imply that female

immigrants are more likely to give up their jobs in the home country in order to emigrate with their spouses.

4. Empirical Approach

4.1 Incidence of over-education

In modelling the determinants of a job mismatch between required education and the actual education obtained, we only observe employed immigrants. However, if those employed were non-randomly selected from the host country's population, the use of a standard probit model would lead to biased and inconsistent estimates of over/under-education. In order to control for potential sample selection into employment, we use a binomial probit model first introduced by Van De Ven and Van Praag (1981). The model is set up with the following two linear equations:

$$y^*_{1\,ij} = x'_i \beta + u_i \qquad (1)$$

where $y_{1ij} = 1$ if the individual has obtained the corresponding match/mismatch $(y^*_{1ij} > 0)$ and $y_{1ij} = 0$ if not $(y^*_{1ij} \leq 0)$

$$y^*_{2i} = z'_i \gamma + v_i \qquad (2)$$

where $y_{2i} = 1$ if the individual is employed $(y^*_{2i} > 0)$

and $y_{2i} = 0$ if not $(y^*_{2i} \leq 0)$.

The latent dependent variable $y^*_{1\,ij}$ denotes the probability of a migrant being mismatched where j represents the presence of a mismatch (over-educated or under-educated). y^*_{2i} is the probability of being in employment which is represented by a dummy variable equal to 1 if the migrant is employed, 0 otherwise and y_{1ij} is only observed if $y_{2i} = 1$. Although equation (2) is fully observed and can be estimated separately, equation (1) may suffer from selection bias due to potential correlations between the two error terms u_i and v_i. That is, after controlling for a fully observed sample (in our case immigrants who are in employment), those who are employed may have somewhat different characteristics from the total sample due to unobservable characteristics such as motivation, ability etc. We estimate the probit model with sample selection using a maximum likelihood approach which is represented as follows:

$$\ln L_j(\beta, \gamma, \rho) = \sum_i^N \{ y_{1ij} y_{2i} ln\Phi_2(x_i'\beta, z_i'\gamma; \rho)$$

$$+ (1 - \gamma_{1ij}) y_{2i} \ln \Phi_2 (-x_i' \beta, z_i' y; -\rho)$$

$$+ (1 - \gamma_{2i}) \ln(1 - \Phi(z_i' y)) \} \qquad (3)$$

where ρ represents the correlation coefficient between the error terms u_i and v_i

$\Phi_2(.)$ is the bivariate standard normal cumulative distribution function and

$\Phi(.)$ represents the univariate standard normal cumulative distribution function.

The parameters of the first two equations are estimated jointly by maximising the log-likelihood function (eq. 3) with respect to the coefficient vectors β and γ and the correlation coefficient ρ. When dealing with selection models, one concern is to identify valid exclusion restrictions, that is, variables which are included in eq. (2) but excluded from eq. (1). The exclusion of a set of independent variables from eq. (1) is of great importance in such models for two main reasons. First, it reduces possible collinearity between the two equations and second, it identifies the generated selectivity bias. Besides the exclusion restrictions (variables that are included in the selection equation but not in the outcome equation) we use a set of dummy variables included in the outcome equation but not in the selection equation, since a number of variables are only observed for the employed individuals (eg self-employed, had a job offer prior to immigration etc).

Our primary covariates of interest are over-educated, under-educated and correctly-matched in the last job held in the home country and are therefore only used in the outcome equation, after having controlled for selection into employment. Other variables included in the empirical estimations are age at arrival, marital status, dummies for country of origin, Spanish nationality[7], year of arrival which is equivalent to time spent in Spain, dummy variables on whether individuals have validated their studies in Spain, had a job offer prior to arrival and whether they are self-employed, a dummy for those who have more than one job (other than their main job) as well as controls for regions of residence in Spain. We introduce 4 exclusion covariates which are important in determining the probability of being in employment but not the probability of an individual being mismatched: two dummies representing the status of house ownership in Spain (renting a house and owning a house with

---

[7] This variable only includes those who have obtained Spanish nationality after birth at a later stage in life (marriage with Spaniards etc.)

payments pending), a control for whether the immigrant had any funds or loans at the time of arrival and a variable indicating the presence of dependent children in the household (16 years or younger). Paying rent might increase the pressure of taking up employment and is expected to be positively correlated with the selection into employment. However, we do not expect renting a house to be related to the probability of being mismatched. Similarly, house owners with payments pending are also more likely to take up employment. Having debts at time of arrival may also increase the probability of employment since immigrants who face liquidity constraints (e.g had to take a loan for travel expenses) may also be under more pressure in taking up employment in order to pay back their loans (see Green et al., 2007; Piracha et al., 2012). The presence of dependent children in the household is also expected to increase the probability of employment, at least for male immigrants (see Lundberg and Rose, 2002). However, since not all restrictions are significant in all our specifications, we test their joint significance in which we reject the null hypothesis indicating that the restrictions are jointly significantly different from zero. We have furthermore tested the validity of the restrictions by including them as additional covariates in the outcome equation, and the variables of interest are not affected (see Rodríguez-Planas et al., 2012).

4.2 Penalty of over-education: The impact of over-education on wages

In order to model the effect of over-education on immigrants' wages, we base our analysis on the existing literature by introducing a dummy variable in the wage specification that captures the effect of the mismatch (Verdugo and Verdugo, 1989; Dolton and Vignoles, 2000; Lindley and McIntosh 2010). The impact of the job mismatch on wages is represented by a log linear wage equation as shown below:

$$lnW_i = \alpha + \beta_0 OE_i + \beta_1 UE_i + \beta_2 X_i + \varepsilon_i \qquad (4)$$

where lnW_i represents the log monthly wages of individual i, OE_i and UE_i are dichotomous variables indicating the corresponding mismatch (over/under-education), X_i indicates a number of socio-economic characteristics which are similar to those used in the over/under-education equations including both first job in Spain and home country mismatched work experience[8], and ε_i is the error term. The coefficient on the dichotomous variable OE_i is

---

[8] For the wage equations we also control for log hours worked per week, levels of education as well as sectors of activity.

expected to be negatively correlated with wages indicating the penalty of over-education, while UE_i is expected to be positively correlated with wages.[9] The default category is an individual being correctly-matched. Controlling for previous mismatched work experience on current wages enables us to reduce the possibility of unobserved heterogeneity of current over-education. That is, if immigrants do indeed have an unobserved ability (eg motivation), this unobservable is more likely to be fixed and therefore was already present in the previous two periods (first job and home country job). By that, we expect the negative effect of current mismatch on wages to decline or stay the same once previous mismatched experience is controlled for. In order to effectively analyse the effect of current and previous mismatched work experience on wages, we estimate separate models by first including only the mismatch effects of one period at a time.

Furthermore, in order to account for possible selection into employment, we estimated the wage equation using a maximum likelihood selection model (Heckman selection model). Similar to the probit selection model, the probability of being employed is modelled using a probit estimation, from which we calculate the inverse mills ratio and include it in the wage equation.[10] The exclusion covariates which are included in the selection equation but not in the wage equation are the same as the ones used in the mismatch equation, i.e., renting a house, owning a house with payments pending, debts at time of arrival and the presence of dependent children in the household. Following Chiswick and Miller (2010a), we furthermore disaggregate the model by distinguishing between those with a tertiary degree and those with a secondary degree or less in order to capture possible differences in the wage penalty of over-education according to the level of formal qualifications.

4.3 Penalty of over-education: Predicted values and counterfactuals

We furthermore extend our analysis of the over-education wage penalty by using a counterfactual decomposition technique to study the mean outcome differences between predicted and counterfactual mean values. The counterfactual analysis enables us to extract differences in the observed and the counterfactual wage distribution of over-educated, had they faced the same wage structure as the correctly matched group as well as possible

---

[9] Unlike existing literature, the effects of a mismatch in the wage equation are captured by mapping the occupations to the corresponding level of education instead of years of schooling.
[10] The results of the probability in being employed from the Heckman maximum likelihood estimation are not represented in this paper, but are available upon request.

unobserved characteristics (ability, motivation etc) between the over-educated and the correctly matched group. If, for example, the counterfactual wage is higher (lower) than the one obtained from the standard wage analysis, then the over-educated immigrants appear to have higher (lower) skills and motivation compared to the ones who are actually correctly matched. We can capture the penalty of over-education by asking the following question: what would have been the monthly wages of over-educated immigrants, had they been correctly matched? In order to address this question, we disaggregate equation (4) into two groups as shown below:

$$lnW(OE)_i = \beta X_i + \varepsilon_i \qquad (5)$$

where $lnW(OE)_i$ represents the wage equation restricted to only those who are over-educated and

$$lnW(CM)_i = \beta X_i + \varepsilon_i \qquad (6)$$

where $lnW(CM)_i$ represents the wage equation restricted to only those who are employed in a correctly matched job.

The penalty of over-education can be expressed as the difference in the predicted wages of immigrant i_{OE} and the counterfactual wage of an over-educated immigrant i_{OE}, if he was correctly matched, using the following expression:

$$lnW_{OEi}^{hyp} = \hat{\beta}_{OE} X_{OEi} - \hat{\beta}_{CM} X_{OEi} \qquad (7)$$

The first term ($\hat{\beta}_{OE} X_{OEi}$) represents the predicted values of over-educated immigrants which are captured from the regression estimates of equation (5), while the second term ($\hat{\beta}_{CM} X_{OEi}$) represents the counterfactual value: the estimated coefficients of the correctly matched individuals obtained from equation (6) applied to the characteristics of the over-educated immigrants X_{OEi}. While equation (4) presents the wage penalty of over-education by comparing over-educated immigrants with the correctly matched, equation (7) captures the wage penalty by comparing the predicted wage of over-educated immigrants with the wage they would have earned if they were correctly matched by measuring the contribution of differences in the coefficients of the two groups. As a last step, we have also disaggregated the model further into tertiary education and secondary education or less to capture the

different penalties according to the level of education. The migration literature generally supports that the transferability of skills and education level from one country to another is more difficult for higher educated immigrants, who therefore face a larger pay penalty than those with relatively lower educational qualification. We are therefore estimating the wage equation by levels of education in order to capture possible differences in the wage earnings of over-educated immigrants according to the highest qualification obtained. We expect higher educated immigrants to suffer from a significantly higher wage penalty, while lower educated immigrants are expected to face a relatively low or no wage loss.

5. Results

5.1 Incidence of over/and under-education and its determinants

Tables 4 and 5 present the results obtained from the Probit selection models for the probability of being mismatched (over/under-educated) conditional on being employed in the first and current job in Spain. Following the standard labour market literature, we carry out separate analysis for males and females. Table 4 demonstrates the probability of being mismatched in their first job in Spain where columns (1) and (2) show the probability of being over-educated in the first job for males and females respectively, while columns (3) and (4) represent the results obtained for the probability of being under-educated for males and females. Similarly, Table 5 presents the probability of being mismatched in the current job, with columns (1) and (2) representing the probability of being over-educated and columns (3) and (4) representing the probability of being under-educated.

The estimate of ρ is significantly different from zero for the over-education specification for males in the current job (Table 5), indicating that the coefficients of eq. (1) would have been biased if a standard binomial probit would have been used without taking into consideration the possible selection problem. The positive coefficient of the error term indicates a positive selection into employment where the error term of the selection equation is positively correlated with the error term of the over-education equation for males. The significant and negative coefficient of the error term for females on the other hand indicates a negative selection into employment for the probability of over-education for the female group. However, ρ appears to be insignificant for the probability of over/under-education in the first job (Table 4). This could be due to the fact that that only 3 percent of males and around 6 percent of females have been unemployed throughout their stay in Spain.

Looking at the selection into employment for both, current and first job, as expected, renting a house, owning a house with payments pending and having debts at time of arrival are all positively correlated with the probability in being employed in most of our specifications. The selection into employment is furthermore highly and negatively correlated with the year of arrival in Spain. This indicates that more recent arrivals are less likely to be employed compared to those who have spent a longer period in the host country. Additionally, the presence of dependent children in the household (16 years or younger) are positively correlated with the probability in being employed for males and negatively correlated with the probability of being employed for females. A plausible explanation for these opposite signs could be that while male immigrants with children would be under a higher pressure for taking up employment in order to provide financial support and welfare for their family, females would rather stay at home and take care of their children.

After controlling for employment, our main variables of interest are the effect of over/under-education in the home country on the probability of being mismatched (over/ under-educated) in the Spanish labour market. Our results show that a large variation in the probability of being over/under educated in Spain in the first job after arrival and partly the variation in the current job, can be explained by the incidence of having been over/under-educated in the last job held in the home country. It therefore seems that Spanish employers do seem to take into account signals about immigrants' previous mismatched labour market experience acquired in the home country. Specifically, Table 4 shows that male immigrants who have been over-educated in the last job held in their home country are 40 percent more likely to be over-educated in their first job in Spain upon arrival. Similarly, female immigrants who have been over-educated in their last job in the home country are about 31 percent more likely to be over-educated in their first job upon arrival. Similar patterns are observed for the probability of being under-educated. Those who have been under-educated in the home country are positively correlated and more likely to be under-educated in the first job upon arrival (49 percent for males and 29 percent for females). When comparing these effects to the effects of the home country on the current job in Spain (Table 5), we can see that the coefficient of having been over-educated in the home country has dropped to 16 percent for males and 19 percent for females. Similarly, males and females who have been under-educated at home are 20 percent and 11 percent, respectively, more likely to be under-educated in the current job in Spain which is a substantial reduction compared to the results in Table 4. As outlined by Piracha et al (2012), a more recent signal of the real productivity of the mismatched work

experience of the previous job has a relatively stronger effect on the probability of being mismatched (over/under-educated). Nevertheless, although the effects decline, immigrants appear to continue being mismatched even in their current job in Spain. Additionally, when controlling for the probability of having been over/under-educated in the first job in Spain, we observe a substantially higher effect on the probability of being over/under educated in the current job than the one obtained from the incidence of over/under-education prior to immigration. In particular, those who have been over-educated in their first job are 38 percent (males) and 55 percent (females) more likely to be over-educated in the current job, while those who had been under-educated in the first job are 59 percent (males) and 49 percent (females) more likely to be under-educated even in their current job.[11]

In both estimates (first and current job), we observe a size difference for male immigrants between the effects of over- and under-education in the home country on respective mismatch in Spain. That is, while male immigrants who had been over-educated at home are 40 percent and 16 percent more likely to be over educated in their first and current job in Spain, respectively, those who have been under educated at home are 49 and 21 percent more likely to be under educated in their first and current job. A possible explanation could be that immigrants might constitute a non-randomly selected sub-sample from the home country's population, which however cannot be controlled for due to limited information about the socio-economic characteristics of individuals in the home country. If that is the case and immigrants constitute a positively selected group (eg having unobserved abilities and higher motivation) then they are expected to be more motivated in putting effort in finding a better matched job upon arrival (Chiswick 1978). By this, the 'best' of the over-educated in the home country are less likely to be over-educated in the host country's labour market and the 'best' of the under-educated at home might have a higher probability of being under-educated in Spain which results in lower coefficients for the over-educated and higher coefficients for the under-educated group. Furthermore, this size difference is larger for the first job in Spain indicating that this positive motivation for male immigrants might decline after having spent some time in Spain. However, opposite effects are observed for the two types of mismatch for the female population.

---

[11] These findings are similar to those obtained by Dolton and Vignoles (2000) who found that 38 percent of graduates were over-educated in their first job and 30 percent were still over-educated six years later. This scarring effect has also been observed by McGuiness (2003) and McGuiness and Wooden (2009).

Controlling for the year of arrival, we observe that a more recent arrival increases the incidence of over-education and decreases the incidence of under-education in the current job due to the fact that immigrants with a longer duration of stay in the host country gain more experience over time in the Spanish labour market. However, the coefficients for both males and females are very low indicating that the mismatch incidence does not necessarily improve over time which is consistent with a number of studies indicating that the incidence of over-education is more likely to be permanent (eg. Dolton and Vignoles, 2000; Lindley and McIntosh, 2010; Nordin, 2010; Mavromaras and McGuiness, 2012).

Another interesting result to note is the relationship between Latin Americans and over/under-education in both, current and first job. Our results show that Latin Americans appear to have a higher probability in being over-educated and a lower probability in being under-educated compared to immigrants originating from developed economies. Latin Americans are highly associated with Spanish fluency and would be expected to have a lower-incidence of over-education due to cultural and language similarities. However, these findings are supported by Chiswick and Miller (2010b) who state that there is evidence of a strong complementarity between formal educational qualifications and knowledge of the host country's language. If higher educated immigrants are mainly those who also speak fluent Spanish, then language proficiency complements higher education. In addition to this, immigrants originating from other less developed countries also have a higher probability of being over-educated and a lower probability of being under-educated.

Thus, besides the 'signal of ability' Spanish employers receive from real productivity of a previous mismatched work experience, our results show evidence of a signal of imperfect transferability of human capital. Specifically, the higher qualifications obtained by immigrants in the home country may not be perfectly transferrable to the host country's labour market. Foreign degree holders from less developed countries may be assessed by Spanish employers as having lower skills and abilities than those obtained from an industrialised country.[12] As supported by Duleep and Regets (1999), the higher the qualification obtained, the more difficult the transferability from one country to another.

---

[12] See Sanroma et al (2009) for a more detailed analysis of the link between origin country human capital and employment/wage assimilation in Spain.

5.2 The penalty of over-education

Table 6 presents the results obtained from the Heckman corrected wage equation (4) for males and females respectively. Columns (1) and (2) include only controls for over/under education in current job, columns (3) and (4) include only the effects of having been over/under-educated in the first job in Spain on current wages, columns (5) and (6) include only controls of having been over/under-educated in the home country and columns (7) and (8) reports the wage penalty of over-education including controls for previous mismatch experience (all controls). The indicator variable represented by the mismatch effect (over-educated) obtained from the first two specifications has, as expected, a highly significant and negative coefficient for both males column (1) and females column (2). Since our specification also controls for the levels of education, the indicator variable captures the wage differences between matched and mismatched individuals with the same level of education. Over-educated males earn 0.11 log points less compared to males who are employed in jobs that match their formal qualifications, while wages for over-educated females are reduced to 0.12 log points. When only over/under-education variables of first job in Spain are controlled for in the wage specification columns (3) and (4), we observe a significant wage penalty of 0.08 log points for both genders indicating a persistent wage effect throughout their stay in Spain. A significant pay penalty of 0.05 log points also exists when adding the indicator variables over/under-education of home country job for both genders columns (5) and (6). Similarly, under-education of previous job and home country job also have a significant positive impact on current wages. However, the effects of previous mismatch in Spain have a slightly higher coefficient than the home country mismatch effect indicating that the effect of home country mismatches on current wages declines. When all past mismatch experience variables are included in the model together with the indicator variables over/under-education in current job columns (7) and (8) , the pay penalty of over-education falls to 0.09 log points for males and 0.10 log points for females but still remains significant. The previous mismatched variables however become insignificant with the exception of first job over-education for males, indicating that previous and current mismatch effects are highly correlated.[13] While time of arrival in Spain does not show to have an important impact on male wages, it appears to play a highly significant role on female monthly wages which is consistent with the hypothesis that time spent in the host country increases immigrants' experience in the host country's labour market, acquiring the host country's skill

---

[13] These findings are similar to those obtained by McGuiness and Sloane (2011) for the UK.

requirements as well as reputation, enabling them to relocate to higher paid jobs that match their educational qualifications. However, even though highly significant (at least for females), the coefficient is relatively low, indicating a very slow wage recovery over time.

Interestingly, immigrants originating from Latin America earn lower wages compared to immigrants from developed countries. While one would expect Latin Americans to earn more due to their cultural and language similarities to the Spanish society, our results show that imperfect transferability of human capital is difficult even for those with perfect host country language skills. In addition, those taking up employment in unskilled occupations (eg babysitters or housekeeping) are not required to be fluent in Spanish in order to be hired by their employers. Therefore, even though they have excellent knowledge of the host country's language, they might not get the chance in using Spanish proficiency as an additional 'skill' for a job application.

5.3 The penalty of over-education by levels of education

In order to capture the effects on wages according to education level, we have extended our analysis by differentiating between those who have obtained a tertiary education degree and those who have only completed secondary education or less. The results are shown in Tables 7 and 8 for males and females respectively. The first 4 columns show the results obtained for immigrants with a higher education degree, while the latter 4 columns report the wage penalties for lower educated immigrants (secondary education or less). While columns (1) and (5) include only controls for current over/under-education, columns 2-3 and 6-7 include only controls for first job and home country mismatch. Columns (4) and (8) include mismatch effects for all three time periods (over/under-education in current and first job in Spain and over/under-education in the last job held in the home country). It is noticeable that immigrants with a tertiary education (both males and females) have a substantially higher pay penalty compared to those with only secondary education. The penalty for males increases to 0.26 log points (Table 7 column 1), while females' wage penalty increases to 0.28 log points (Table 8 column 1). Conversely, male immigrants without a university degree (with secondary qualification or lower) experience a relatively low pay penalty of 0.05 log points (Table 7 column 5) while lower educated females do not appear to suffer from any wage penalty (Table 8 column 5). This dramatic change in the wage earnings according to educational qualifications is consistent with the hypothesis, as outlined in the previous

section, that international transferability of educational qualifications is more difficult for higher educated individuals. When controlling for previous mismatches on current wages, we observe large wage penalties of having been over-educated in the first job in Spain for higher educated immigrants. More specifically, higher educated male immigrants who had been over-educated in their first job in Spain suffer a wage penalty of 0.27 log points (Table 7 column 2), while female immigrants with a previous mismatched work experience in the host country suffer a wage penalty of 0.32 log points (Table 8 column 2). Significant wage penalties of 0.10 log points for males and 0.13 log points for females are also observed for those having been mismatched in the home country (column 3 in Tables 7 and 8). Although the effects are lower compared to the host country effects, our results indicate that the persistence for higher-educated mismatched immigrants exists even from a home countries mismatched work experience. However, no persistent wage effect from any time period (first job or home country job) is observed for lower educated immigrants. Columns 4 and 8 report the estimated wage penalty when previous mismatch effects are included. Controlling for previous mismatch effects, the penalty of over-education for the higher educated group is substantially reduced to 0.15 log points for males and 0.13 log points for females. However, no difference in the wage penalties are observed when previous mismatched controls are added for the lower educated.

Table 9 presents the results obtained from the differences between the predicted and the counterfactual wage values of over-educated immigrants. The first column shows the results obtained from the predicted mean wages of over-educated immigrants (including previous mismatch controls), while the second column represents the counterfactual mean wages. In the last column, we extracted the penalty of over-education. Wage differences between actual and counterfactual mean values are highly significantly different from zero for both genders when all individuals are included (higher and lower educated). Our results show that immigrants would have earned a significantly higher wage if they were correctly-matched. When comparing the predicted wage values obtained from the regression estimates with the counterfactual values, we observe that over-educated immigrants have a substantially lower wage compared to the one they would have received had they been correctly matched. Over-educated male immigrants would have earned 0.11 log points more if they were employed in a job that matches their actual qualifications. Similarly, wages of over-educated females would increase by 0.10 log points. When distinguishing between education levels, the results change drastically for higher educated women, with a pay penalty of 0.28 log points, while no

significant difference is observed for those with only a secondary education. On the other hand, no significant change is observed between the predicted and counterfactual value for male immigrants across education levels .

Table 10 compares the results obtained from equations (4) to the results obtained from the methodology used in equation (7), converted in percentages. Comparing these two different measures of the over-education wage penalty, it is noticeable that the counterfactual predictions show a slightly higher wage penalty for males than the ones obtained from the regression estimates (shown in Table 6), while female immigrants face similar penalties in both types of methodologies. However, by distinguishing between higher and lower education qualifications obtained, and using the two different methodologies, the penalties for lower educated male immigrants become insignificant, while wage penalties for lower educated female remain insignificant. Large penalty differences on the other hand are observed for higher educated males and females, though in the opposite direction. Higher educated women face a higher wage penalty (32 percent) using the counterfactuals compared to the actual penalty obtained using standard regression coefficients (14 percent), while male immigrants earn 16 percent lower wages compared to their correctly matched counterparts, but would not suffer from any wage penalty if they were correctly matched. Our results show that over-educated female immigrants with a university degree appear to have higher motivation and unobserved abilities which would enable them to earn a higher wage had they been correctly matched, compared to the wage the actual correctly-matched immigrants earn.

6. Conclusion

The objective of this paper was to analyse the determinants of the incidence of education-occupation mismatch as well as its impact on wages in the Spanish Labour market. Using the National Immigrant Survey of Spain 2007, we use a probit selection model to estimate the incidence of a mismatch in the first and current job as well as a wage analysis to estimate the penalty of over-education by comparing differences in the wage earnings of over-educated and correctly matched immigrants as well as comparing over-educated immigrants' wages to those they would have earned, if they were correctly matched.

Using the job analysis method to measure the incidence of a mismatch, our main findings reveal that Spanish employers do take into consideration job experience acquired prior to immigration. Immigrants' job mismatch in the home country in both first and current job can

also be explained by the incidence of a mismatch in the home country. However, the effect appears to be larger in the first job upon arrival implying that more recent signals of a previous mismatched job experience have a stronger effect on the probability of over-education. Similar to this, the productivity/ability signal of a previous mismatched work experience in Spain (first job) has also a strong effect on over-/under-education in the current job indicating the existence of path dependency in over-/under-education in the Spanish labour market. In addition, our results show evidence of the existence of an imperfect transferability of human capital between Spain and immigrants' home country.

Regarding the impact of over-education on wages, over-educated immigrants earn a significantly lower wage compared to their correctly matched counterparts, while over-educated immigrants' would have earned an even larger amount if the same individuals were employed in a correctly matched job instead. Furthermore, our results show important effects of previous mismatched work experience on current wages, confirming the existence of wage persistence. After controlling for previous mismatched work experience on current wages and reducing the possibility of any bias arising from an unobserved ability throughout the three time periods, the penalty of over-education declines, but remains significant. We furthermore extend our analysis across levels of education and find that immigrants with tertiary education experience a relatively larger wage loss compared to those with secondary education or less, while wage persistence of over-educated immigrants shows to be more of a concern for the higher educated group. Similarly, the duration of stay in Spain shows to have a very slow effect of wage recovery over time, indicating that the wage penalty as well as the 'stigma' of over-education might be a permanent issue for most immigrants.

References

Battu, H. and Sloane P.J. (2002). To what extent are ethnic minorities in Britain overeducated? *International Journal of Manpower,* 23(3), 192-208.

Battu, H., Sloane P.J. (2004). 'Over-education and ethnic minorities in Britain', *The Manchester School* 72(4), 535–559.

Budria S. and Moro-Egido A. (2008). Education, educational mismatch, and wage inequality: Evidence for Spain, *Economics of Education Review* 27(3), 332–341.

Chevalier A. (2000). Graduate over education in the UK. Centre for the Economics of Education, London School of Economics and Political Science ,ISBN 0 7530 1438 6.

Chiswick, B.R. (1978). The effect of Americanization on the earnings of foreign-born men. *Journal of Political Economy,* 86(5), 897-921.

Chiswick, B. R. and Miller, P. W., (2008). "Why is the Payoff to Schooling Smaller for Immigrants*?", Labour Economics,* 15(6), 1317-1340.

Chiswick, B.R. and Miller P.W. (2009). The international transferability of immigrants' human capital skills. *Economics of Education Review* (2), 162–169

Chiswick, B.R and Miller P.W. (2010a). Education mismatch: Are high-skilled immigrants really working at high-skilled jobs and the price they pay if they aren't? In: Chiswick BR (ed) High Skilled Immigration in a Global Labor Market. *American Enterprise Institute Press, Washington DC*, 111–154.

Chiswick, B. R. and Miller, P.W. (2010b). The effects of educational-occupational mismatch on immigrant earnings in Australia, with international comparisons. *International Migration Review,* 44(4), 869-898.

Dolton, P. J. and M.A.Silles, (2008). The effects of over-education on earnings in the graduate labour market. *Economics of Education Review,* 27(2), 125 – 139.

Dolton P.J., Vignoles A (2000). The incidence and effects of overeducation in the UK graduate labour market. *Economics of Education Review,* 19(2), 179–198

Duleep, H., Regets, M. (1999). Immigrants and human capital investment. *American Economic Review,* 89(2), 186-191.

Duncan, G., Hoffman, S. (1981). The incidence and wage effects of over-education. *Economics of Education Review,*1(1), 75–86.

Groot, W., Maassen van den Brink, H. (2000). Overeducation in the labour market: A meta-analysis. *Economics of Education Review,* 19(2), 149–158.

Green, C., Kler, P., Leeves, G. (2007). Immigrant overeducation: Evidence from recent arrivals to Australia. *Economics of Education Review* 26 (4), 420–432.

Hartog, J. (2000). Over-education and earnings: Where are we, where should we go? *Economics of Education Review,* 19(2), 131–147.

Leuven, E. and H. Oosterbeek (2011), 'Overeducation and mismatch in the labor market', IZA Discussion Paper No. 5523, Bonn.

Lindley, J., McIntosh S. (2010). Is the over-education wage penalty permanent? Sheffield Economic Research Paper Series, SERP Number: 2010004

Lundberg S., Rose E. (2002) The effects of sons and daughters on men's labor supply and wages. *The Review of Economic and Statistics* 84(2), 251–268

Mavromaras K, McGuinness S, (2012). Overskilling dynamics and education pathways. *Economics of Education Review,* 31, 619-628

Mavromaras K, McGuinness S, Fok Y.K. (2009). Assessing the incidence and wage effects of overskilling in the Australian labour market. *The Economics Record*, 85(268), 60-72.

McGuinness, S. (2003). Overeducation as a sheepskin effect: Evidence from Northern Ireland. *Applied Economics*, 35(5), 597–608

McGuinness, S. (2006), 'Overeducation in the labour market', *Journal of Economic Surveys*, 20(3), 387–418.

McGuiness, S. (2008). How biased are the estimated wage effects of overeducation: A propensity score matching approach. *Applied Economics Letters*, 48(2), 145-151.

McGuinness S., Sloane P.J. (2011). 'Labour market mismatch among UK graduates: An analysis using REFLEX data', *Economics of Education Review*, 30, 130-145.

McGuinness, S., Wooden M. (2009). Overskilling, job insecurity and career mobility. *Industrial Relations: A Journal of Economy and Society*, 48(2): 265-86.

Nielsen, C.P. (2007). Immigrant overeducation: Evidence from Denmark. Policy Research Working Paper Series 4234, The World Bank.

Nordin M., Persson I., Rooth D. (2010). Education-occupation mismatch: Is there an income penalty? *Economics of Education Review*, 29(6), 1047-1059

Piracha, M, Tani, M., Vadean, F. (2012). Immigrant over-and under-education: the role of home country labour market experience. *IZA Journal of Migration 1:3*.

Piracha, M., Vadean, F. (2013). Migrant educational mismatch and the labour market. In *International Handbook on the Economics of Migration*, eds A. Constant and K. Zimmermann, Edward Elgar, Cheltenham, UK.

Rodriguez-Planas, N, Vegas, R. (2012) Moroccons', Ecuadorians' and Romanians' assimilation in Spain. IZA Discussion Paper No 6542.

Rumberger, R.W. (1987). The impact of surplus schooling on productivity and earnings. *Journal of Human Resources,* 22(1), 24-50.

Sanroma, E., Ramos, R., Simon H., (2008). The portability of human capital and immigration assimilation: Evidence from Spain. IZA Discussion Paper No 3649.

Sanroma E., Ramos R., Simon H., (2009). Immigrant wages in the Spanish labour market: Does the origin of human capital matter? IZA Discussion Paper No 4157.

Sicherman, N. (1991). Overeducation in the labour market. *Journal of Labour Economics,* 9(2), 101–122.

Vahey, S.P (2000). The great Canadian training robbery: evidence on the returns to educational mismatch. *Economics of Education Review,* 19 (2000) 219-227.

Van De Ven, PMM, Van Praag, M.S. (1981). The demand for deductibles in private health insurance: A probit model with sample selection. *Journal of Econometrics* 17(2), 229–252.

Verdugo, R., Verdugo, N. (1989). The impact of surplus schooling on earnings. *Journal of Human Resources,* 24(4), 629–643.

Figure 1 Employment status in Spain

Employment status in Spain
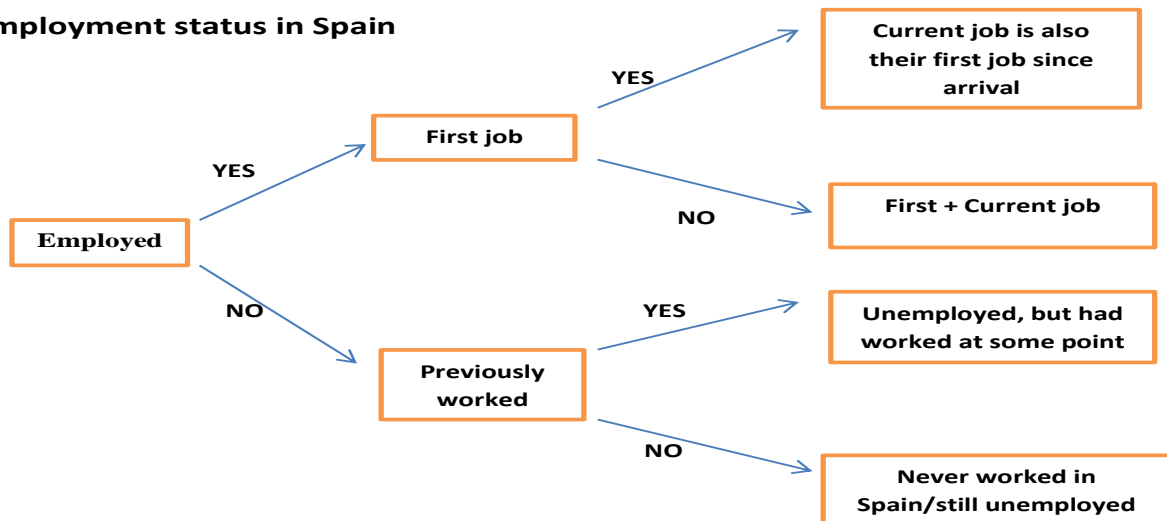
Table 1 Descriptive statistics of employed males and females

Variables	Male		Female	
	Mean	s.d.	Mean	s.d.
log(wage)	6.99	0.39	6.57	0.47
Wage in euros	1,181.89	596.85	785.13	361.39
Age at arrival	29.87	8.41	30.65	8.99
Married	0.52	0.50	0.48	0.50
Married at time of first job	0.39	0.49	0.37	0.48
Presence of dependent children (16 years or younger)	0.37	0.48	0.41	0.49
Average year of arrival	2001	2.25	2001	2.25
Country of origin: Developed countries	0.13	0.33	0.08	0.27
Country of origin: Latin America	0.46	0.50	0.60	0.49
Country of origin: Africa	0.17	0.37	0.05	0.21
Country of origin: Other developing economies	0.24	0.43	0.27	0.45
Spanish nationality	0.06	0.23	0.07	0.26
Spanish nationality at time of first job	0.02	0.14	0.02	0.16
Educational qualifications				
Incomplete primary or less	0.09	0.29	0.06	0.25
Primary education	0.17	0.37	0.14	0.35
Secondary	0.58	0.49	0.57	0.50
First stage Tertiary	0.14	0.35	0.22	0.41
Second stage tertiary	0.02	0.12	0.01	0.10
Validated studies in Spain	0.05	0.21	0.06	0.23
Occupations				
Managers	0.03	0.16	0.01	0.11
Technical and scientific professionals	0.04	0.19	0.04	0.19
Technicians and Associate Professionals	0.04	0.19	0.04	0.20
Administrative employees/clerical support worker	0.02	0.15	0.06	0.24
Service and Sales Workers	0.10	0.30	0.31	0.46
Skilled Agricultural, Forestry and Fishery Workers	0.02	0.15	0.00	0.07
Craft and Related Trades Workers	0.37	0.48	0.03	0.18
Plant and Machine Operators and Assemblers	0.10	0.31	0.03	0.17
Elementary Occupations (Unskilled)	0.28	0.45	0.47	0.50
Sectors				
Agriculture, hunting, and forestry	0.10	0.30	0.04	0.19
Manufacturing, fishing, mining and quarrying, production distribution of electricity , gas and water	0.17	0.37	0.08	0.26
Construction	0.41	0.49	0.01	0.09
Trade, repair of motor vehicles and goods	0.08	0.28	0.11	0.32
Hospitality	0.08	0.26	0.19	0.39
Transport, storage and communications, financial intermediation	0.06	0.25	0.03	0.17
Real estate and business services	0.05	0.21	0.10	0.31
Other (including education, social services and household activities)	0.06	0.23	0.44	0.50

Had a job offer prior to arrival	0.20	0.40	0.16	0.36
Self-employed	0.08	0.26	0.09	0.29
Self-employed in first job	0.05	0.22	0.09	0.28
Has more than one job	0.03	0.18	0.10	0.29
Had more than one job at time of first job	0.03	0.16	0.05	0.23
Log hours worked per week	3.75	0.25	3.57	0.49
Renting	0.68	0.47	0.59	0.49
Renting (first residence)	0.69	0.46	0.59	0.49
House payments pending	0.20	0.40	0.18	0.38
House payments pending (first residence)	0.01	0.10	0.01	0.10
Debts at time of arrival	0.25	0.43	0.36	0.48
Region of residence (Autonomous Communities)				
Centre	0.26	0.44	0.27	0.45
Andalusia, Ceuta and Melilla	0.06	0.24	0.07	0.26
Catalonia and Aragon	0.18	0.39	0.16	0.37
Valencia and Murcia	0.20	0.40	0.16	0.37
Cantabrian coast	0.21	0.40	0.23	0.42
Balearic Islands	0.06	0.23	0.07	0.25
Canary Islands	0.04	0.19	0.03	0.17

Table 2a Transition between last job held in home country and first job in Spain (Males)

Job mismatch in home country	Job mismatch in Spain (first Job)				
	Over-educated	Under-educated	Correctly-matched	Unemployed	Total
Over-educated	72.18	4.2	20.73	2.89	100
Under-educated	15.89	53.48	27.83	2.8	100
Correctly-matched	36.74	5.54	55.11	2.61	100
Not working	34.66	22.39	36.81	6.13	100
Total	34.27	22.98	39.65	3.1	100

Notes: The 'Not working' group in the case of job mismatch in the home country also include individuals not in the labour force at home since some of them were searching for employment after arrival in Spain.

Table 2b Transition between last job held in home country and current job in Spain (Males)

Job mismatch in home country	Job mismatch in Spain (current Job)				
	Over-educated	Under-educated	Correctly-matched	Unemployed	Total
Over-educated	55.38	5.51	25.98	13.12	100
Under-educated	11.53	54.52	22.33	11.63	100
Correctly-matched	20.35	6.81	61.05	11.8	100
Not working	23.31	20.55	37.12	19.02	100
Total	22.33	23.83	41.12	12.72	100

Notes: The 'Not working' group in the case of job mismatch in the home country also include individuals not in the labour force at home since some of them were searching for employment after arrival in Spain.

Table 2c Transition between first job and current job in Spain (Males)

Job mismatch in Spain (first job)	Job mismatch in Spain (current Job)				
	Over-educated	Under-educated	Correctly-matched	Unemployed	Total
Over-educated	57.21	2.29	30.15	10.35	100
Under-educated	0.3	82.34	7.12	10.24	100
Correctly-matched	6.71	10.4	73.52	9.37	100
Unemployed	-	-	-	100	100
Total	22.33	23.83	41.12	12.72	100

Notes: There are no observations between the unemployed individuals in the first job in Spain and any type of mismatch in the current job since those who were unemployed in the first job and employed in the current job are the ones whose first job is the same as the current job.

Table 3a Transition between last job held in home country and first job in Spain (Females)

Job mismatch in home country	Job mismatch in Spain (first Job)				
	Over-educated	Under-educated	Correctly-matched	Unemployed	Total
Over-educated	74.35	3.46	16.71	5.48	100
Under-educated	37.34	30.26	26.72	5.69	100
Correctly-matched	47.13	4.6	42.71	5.57	100
Not working	36.97	21.58	32.05	9.4	100
Total	45.59	15.53	32.66	6.22	100

Notes: The 'Not working' group in the case of job mismatch in the home country also include individuals not in the labour force at home since some of them were searching for employment after arrival in Spain.

Table 3b Transition between last job held in home country and current job in Spain (Females)

Job mismatch in home country	Job mismatch in Spain (current Job)				
	Over-educated	Under-educated	Correctly-matched	Unemployed	Total
Over-educated	61.67	3.46	16.71	18.16	100
Under-educated	27.79	29.51	25.11	17.6	100
Correctly-matched	36.16	4.16	40.76	18.92	100
Not working	29.91	17.95	25.85	26.28	100
Total	35.51	14.52	30.37	19.6	100

Notes: The 'Not working' group in the case of job mismatch in the home country also include individuals not in the labour force at home since some of them were searching for employment after arrival in Spain.

Table 3c Transition between first job and current job in Spain (Females)

Job mismatch in Spain (first job)	Job mismatch in Spain (current Job)				
	Over-educated	Under-educated	Correctly-matched	Unemployed	Total
Over-educated	67.3	2.74	17.68	12.27	100
Under-educated	1.57	71.36	12.08	14.99	100
Correctly-matched	14.04	6.7	62.55	16.7	100
Unemployed	-	-	-	100	100
Total	35.51	14.52	30.37	19.6	100

Notes: There are no observations between the unemployed individuals in the first job in Spain and any type of mismatch in the current job since those who were unemployed in the first job and employed in the current job are the ones whose first job is the same as the current job.

Table 4 Probability of over/under-education in first job and selection into employment (Marginal effects)

Variables	Over-education(first job)		Under-education (first job)	
	(1)	(2)	(3)	(4)
	Male	Female	Male	Female
Age at arrival	0.005***	0.001	-0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Married	-0.033	0.006	0.014	0.020
	(0.021)	(0.022)	(0.018)	(0.015)
Country of origin: Latin America	0.173***	0.222***	-0.164***	-0.144***
	(0.035)	(0.041)	(0.023)	(0.029)
Country of origin: Africa	0.172***	0.067	-0.057***	0.055
	(0.041)	(0.060)	(0.022)	(0.040)
Country of origin: Other developing economies	0.242***	0.358***	-0.174***	-0.157***
	(0.040)	(0.041)	(0.019)	(0.021)
Year of arrival	-0.005	-0.005	0.009**	0.005
	(0.007)	(0.006)	(0.004)	(0.004)
Spanish nationality	-0.097	0.039	0.020	0.048
	(0.066)	(0.066)	(0.064)	(0.048)
Validated studies in Spain	-0.015	0.038	-0.020	0.022
	(0.047)	(0.044)	(0.036)	(0.031)
Had job offer prior to arrival	-0.118***	-0.011	0.032	0.001
	(0.023)	(0.028)	(0.020)	(0.018)
Self-employed	-0.133***	0.065*	0.163***	0.047*
	(0.039)	(0.035)	(0.046)	(0.026)
Has more than 1 job	-0.048	0.016	-0.030	-0.008
	(0.058)	(0.044)	(0.046)	(0.030)
Mismatch effect HC: over-educated	0.397***	0.313***	-0.057**	-0.041*
	(0.029)	(0.029)	(0.026)	(0.024)
Mismatch effect HC: under-educated	-0.219***	-0.092***	0.493***	0.291***
	(0.020)	(0.023)	(0.022)	(0.024)
Mismatch effect HC: not working	0.016	-0.064**	0.260***	0.235***
	(0.032)	(0.030)	(0.038)	(0.033)
Selection into employment				
Age at arrival	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Married	-0.001	-0.023***	-0.001	-0.023***
	(0.001)	(0.006)	(0.001)	(0.006)
Country of origin: Latin America	0.000	0.024***	0.001	0.022**
	(0.001)	(0.009)	(0.001)	(0.009)
Country of origin: Africa	-0.001	-0.031*	-0.001	-0.034*
	(0.001)	(0.018)	(0.001)	(0.018)
Country of origin: other developing economies	0.001	0.019***	0.001	0.019***

	(0.001)	(0.006)	(0.001)	(0.006)
Year of arrival	-0.002**	-0.011***	-0.002**	-0.011***
	(0.001)	(0.002)	(0.001)	(0.002)
Spanish nationality	0.000	-0.017	0.000	-0.013
	(0.001)	(0.018)	(0.001)	(0.018)
Validated studies in Spain	-0.002	-0.010	-0.002	-0.007
	(0.002)	(0.011)	(0.002)	(0.011)
Presence of dependent children in the household (16 years or below)	-0.000	-0.010**	-0.000	-0.010**
	(0.001)	(0.005)	(0.001)	(0.005)
Renting	0.009***	0.020***	0.008***	0.017***
	(0.003)	(0.004)	(0.003)	(0.005)
House payments pending	0.002*	0.015***	0.002*	0.015***
	(0.001)	(0.005)	(0.001)	(0.004)
Debts at time of arrival	-0.000	0.012***	-0.000	0.012***
	(0.001)	(0.004)	(0.001)	(0.004)
Observations	2933	2878	2933	2878
Censored	91	179	91	179
ρ	0.169	-0.356	-0.402	-0.163
	(0.705)	(0.306)	(0.335)	(0.371)
Wald chi2	434.6	242.73	748.93	387.66
Log likelihood	-1835.556	-2171.516	-1328.207	-1426.776

Standard errors in parentheses ***p<0.01, ** p<0.05, * p<0.1

Notes: In all specifications we control for regions of residency. The reference group for the Mismatch effect HC is 'correctly matched'. The reference group for country of origin is 'developed countries'.

Table 5 Probability of over/under-education in current job and selection into employment (Marginal effects)

	Over-education (current job)		Under-education (current job)	
	(1)	(2)	(3)	(4)
VARIABLES	Male	Female	Male	Female
Age at arrival	0.003***	0.003*	0.000	-0.000
	(0.001)	(0.002)	(0.001)	(0.001)
Married	-0.022*	-0.004	0.001	0.009
	(0.012)	(0.025)	(0.019)	(0.011)
Country of origin: Latin America	0.015	0.161***	-0.009	-0.066***
	(0.020)	(0.048)	(0.023)	(0.018)
Country of origin: Africa	0.008	0.183**	0.000	-0.058***
	(0.025)	(0.078)	(0.029)	(0.007)
Country of origin: other developing economies	-0.003	0.188***	-0.062***	-0.066***
	(0.021)	(0.051)	(0.023)	(0.012)
Year of arrival	0.009***	0.026***	-0.017***	-0.003
	(0.003)	(0.005)	(0.004)	(0.002)
Spanish nationality	-0.032	0.036	-0.029	0.053*
	(0.026)	(0.053)	(0.030)	(0.029)
Validated studies in Spain	0.012	-0.136**	-0.017	0.054
	(0.030)	(0.055)	(0.034)	(0.036)
Had a job offer prior to arrival	-0.005	-0.014	-0.016	0.018
	(0.015)	(0.033)	(0.018)	(0.016)
Self-employed	-0.052***	0.144***	0.154***	0.051*
	(0.017)	(0.043)	(0.051)	(0.029)
Has more than 1 job	0.020	0.062	0.019	-0.009
	(0.033)	(0.042)	(0.045)	(0.017)
Mismatch effect HC: over-educated	0.159***	0.193***	0.026	0.001
	(0.027)	(0.041)	(0.031)	(0.020)
Mismatch effect HC: under-educated	0.032**	-0.013	0.205***	0.119***
	(0.016)	(0.028)	(0.038)	(0.024)
Mismatch effect HC: not working	0.074***	0.076**	0.091***	0.085***
	(0.025)	(0.038)	(0.035)	(0.023)
Mismatch effect (first job): over-educated	0.382***	0.546***	-0.131***	-0.053***
	(0.024)	(0.042)	(0.016)	(0.012)
Mismatch effect (first job): undereducated	-0.161***	-0.329***	0.589***	0.494***
	(0.013)	(0.056)	(0.073)	(0.081)

Selection into employment

Age at arrival	0.000	0.003***	0.000	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Married	0.015	-0.019	0.012	-0.015
	(0.014)	(0.016)	(0.015)	(0.016)
Country of origin: Latin America	-0.003	0.036	-0.002	0.037
	(0.021)	(0.029)	(0.021)	(0.029)
Country of origin: Africa	-0.098***	-0.214***	-0.112***	-0.219***
	(0.030)	(0.050)	(0.030)	(0.050)
Country of origin: other developing economies	-0.030	0.020	-0.035	0.023
	(0.024)	(0.028)	(0.024)	(0.029)
Year of arrival	-0.019***	-0.024***	-0.020***	-0.024***
	(0.003)	(0.004)	(0.003)	(0.004)
Spanish nationality	-0.026	-0.012	-0.037	-0.017
	(0.036)	(0.034)	(0.034)	(0.033)
Validated studies in Spain	-0.008	-0.001	-0.004	0.009
	(0.028)	(0.032)	(0.028)	(0.035)
Presence of dependent children in the household (16 years or below)	0.034**	-0.055***	0.033**	-0.062***
	(0.013)	(0.017)	(0.013)	(0.017)
Renting	0.056***	0.024	0.055***	0.027
	(0.017)	(0.018)	(0.019)	(0.018)
House payments pending	0.062***	0.027	0.056***	0.022
	(0.016)	(0.025)	(0.017)	(0.027)
Debts at time of arrival	-0.009	0.041***	-0.016	0.035**
	(0.014)	(0.016)	(0.014)	(0.017)
Observations	2933	2878	2933	2878
Censored	373	564	373	564
ρ	1.993***	-0.886*	1.409	1.310
	(0.519)	(0.461)	(0.993)	(0.962)
Wald chi2	796.44	225.81	353.6	300.3
Log likelihood	-1857.365	-2312.171	-1609.272	-1829.327

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Notes: In all specifications we control for regions of residency. The reference group for the Mismatch effect HC and first job is 'correctly matched'. The reference group for the country of origin is 'developed countries'.

Table 6 Penalty of over-education (Maximum likelihood selection model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Male	Female	Male	Female	Male	Female	Male	Female
Age at arrival	0.001	-0.001	0.001	-0.001	0.000	-0.002	-0.000	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Married	0.027*	-0.023	0.027*	-0.021	0.027*	-0.021	0.027*	-0.023
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Country of origin: Latin America	-0.093***	-0.117***	-0.088***	-0.140***	-0.132***	-0.173***	-0.084***	-0.115***
	(0.027)	(0.037)	(0.026)	(0.037)	(0.028)	(0.038)	(0.026)	(0.037)
Country of origin: Africa	-0.099***	-0.145**	-0.089**	-0.184***	-0.140***	-0.213***	-0.084**	-0.139**
	(0.036)	(0.061)	(0.036)	(0.060)	(0.037)	(0.061)	(0.036)	(0.061)
Country of origin: Other developing economies	-0.039	-0.099**	-0.030	-0.123***	-0.075**	-0.166***	-0.023	-0.095**
	(0.028)	(0.039)	(0.028)	(0.038)	(0.030)	(0.039)	(0.028)	(0.039)
Year of arrival	-0.00425	-0.016***	-0.007	-0.017***	-0.006	-0.017***	-0.006	-0.016***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Spanish nationality	-0.003	-0.023	0.000	-0.015	0.005	-0.017	-0.006	-0.024
	(0.031)	(0.029)	(0.031)	(0.029)	(0.031)	(0.030)	(0.031)	(0.029)
Primary education	0.055**	0.115***	0.078***	0.093**	-0.006	0.041	0.092***	0.119***
	(0.024)	(0.042)	(0.026)	(0.040)	(0.023)	(0.036)	(0.027)	(0.043)
Secondary education	0.231***	0.256***	0.229***	0.203***	0.068***	0.094***	0.309***	0.281***
	(0.034)	(0.045)	(0.036)	(0.046)	(0.025)	(0.033)	(0.040)	(0.049)
1st stage tertiary education	0.404***	0.413***	0.380***	0.348***	0.206***	0.224***	0.480***	0.442***
	(0.042)	(0.049)	(0.043)	(0.049)	(0.034)	(0.038)	(0.048)	(0.052)
2nd stage tertiary education	0.738***	0.659***	0.715***	0.585***	0.525***	0.487***	0.843***	0.700***
	(0.089)	(0.117)	(0.090)	(0.118)	(0.085)	(0.116)	(0.093)	(0.117)
Validated studies in Spain	0.065	0.128***	0.067	0.161***	0.085**	0.174***	0.061	0.122***
	(0.041)	(0.041)	(0.041)	(0.043)	(0.041)	(0.044)	(0.041)	(0.041)
Had a job offer prior to arrival	0.113***	0.062***	0.109***	0.065***	0.126***	0.070***	0.105***	0.059***
	(0.017)	(0.020)	(0.017)	(0.020)	(0.018)	(0.021)	(0.017)	(0.020)
Self-employed	0.099***	0.118***	0.124***	0.118***	0.147***	0.124***	0.096**	0.116***
	(0.038)	(0.032)	(0.037)	(0.032)	(0.038)	(0.033)	(0.038)	(0.032)
Has more than 1 job	-0.002	0.004	0.002	0.006	-0.003	0.006	-0.008	0.005
	(0.041)	(0.024)	(0.042)	(0.025)	(0.044)	(0.024)	(0.041)	(0.024)
log hours worked per week	0.489***	0.554***	0.486***	0.563***	0.486***	0.562***	0.486***	0.556***
	(0.046)	(0.025)	(0.046)	(0.025)	(0.045)	(0.025)	(0.046)	(0.025)
Mismatch effect: over-educated	-0.113***	-0.119***	-	-	-	-	-0.085***	-0.101***
	(0.017)	(0.019)					(0.018)	(0.020)
Mismatch effect: under-educated	0.191***	0.133***	-	-	-	-	0.124***	0.112***
	(0.026)	(0.032)					(0.026)	(0.038)

37

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mismatch effect (first job): over-educated	-	-	-0.081***	-0.077***	-	-	-0.032*	-0.028
			(0.016)	(0.018)			(0.017)	(0.019)
Mismatch effect (first job): under-educated	-	-	0.189***	0.0987***	-	-	0.104***	0.0217
			(0.028)	(0.032)			(0.029)	(0.038)
Mismatch effect HC: over-educated	-	-	-	-	-0.056***	-0.047*	-0.030	-0.030
					(0.020)	(0.026)	(0.019)	(0.026)
Mismatch effect HC: under-educated	-	-	-	-	0.075***	0.047**	0.040**	0.031*
					(0.019)	(0.018)	(0.018)	(0.018)
Mismatch effect HC: not working	-	-	-	-	-0.022	-0.008	-0.033	-0.010
					(0.023)	(0.021)	(0.023)	(0.021)
Constant	5.092***	4.497***	5.123***	4.525***	5.302***	4.614***	5.051***	4.474***
	(0.183)	(0.124)	(0.183)	(0.128)	(0.178)	(0.125)	(0.185)	(0.128)
Observations	2560	2314	2560	2314	2560	2314	2560	2314
Inverse Mills Ratio	-0.454***	-0.105	-0.481***	-0.085	-0.476***	-0.052	-0.423***	-0.096
	(0.143)	(0.142)	(0.144)	(0.143)	(0.147)	(0.144)	(0.142)	(0.142)
R-squared	0.362	0.498	0.355	0.488	0.335	0.483	0.37	0.5

Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: In all specifications we control for regions of residency and sectors of activity in host country (current job). The reference group for the Mismatch effect is 'correctly matched'. The reference group for the country of origin is 'developed countries'.

Table 7 Penalty of over-education (Maximum likelihood selection model) by level of education (Males)

VARIABLES	Tertiary education				Secondary education or less			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mismatch effect: over-education	-0.261***	-	-	-0.149*	-0.048***	-	-	-0.049***
	(0.072)			(0.088)	(0.016)			(0.018)
Mismatch effect: under-educated	0.0378	-	-	0.008	0.034**	-	-	0.025
	(0.091)			(0.126)	(0.016)			(0.024)
Mismatch effect (first job): over-educated	-	-0.266***	-	-0.151	-	-0.019	-	0.005
		(0.078)		(0.093)		(0.014)		(0.016)
Mismatch effect (first job): under-educated	-	0.037	-	0.019	-	0.039**	-	0.019
		(0.100)		(0.143)		(0.017)		(0.025)
Mismatch effect HC: over-educated	-	-	-0.0948*	-0.041	-	-	-0.0244	-0.011
			(0.057)	(0.057)			(0.019)	(0.020)
Mismatch effect HC: under-educated	-	-	-0.005	-0.005	-	-	0.023	-0.007
			(0.068)	(0.063)			(0.015)	(0.019)
Mismatch effect HC: not working	-	-	-0.041	-0.022	-	-	-0.032	-0.039
			(0.079)	(0.078)			(0.024)	(0.024)
Constant	5.409***	5.462***	5.348***	5.482***	5.252***	5.250***	5.281***	5.272***
	(0.437)	(0.434)	(0.446)	(0.442)	(0.186)	(0.187)	(0.186)	(0.187)
Observations	383	383	383	383	2158	2158	2158	2158
Inverse Mills Ratio	-0.376	-0.341	-0.410	-0.353	-0.426***	-0.429***	-0.403***	-0.405***
	(0.340)	(0.339)	(0.344)	(0.341)	(0.144)	(0.144)	(0.143)	(0.144)
R-squared	0.411	0.410	0.379	0.417	0.322	0.319	0.318	0.323

Table 8 Penalty of over-education (Maximum likelihood selection model) by level of education (Females)

VARIABLES	Tertiary education				Secondary education or less			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mismatch effect: over-education	-0.278***	-	-	-0.131**	-0.022	-	-	-0.028
	(0.062)			(0.060)	(0.019)			(0.022)
Mismatch effect: under-educated	0.114	-	-	0.252**	-0.010	-	-	0.009
	(0.079)			(0.106)	(0.025)			(0.039)
Mismatch effect (first job): over-educated	-	0.317***	-	-0.248***	-	-0.006	-	0.011
		(0.076)		(0.080)		(0.018)		(0.019)
Mismatch effect (first job): under-educated	-	-0.012	-	-0.217*	-	-0.019	-	-0.042
		(0.094)		(0.124)		(0.024)		(0.039)

Mismatch effect HC: over-educated	-		-0.126**	-0.059	-	-	-0.028	-0.029
			(0.053)	(0.051)			(0.033)	(0.033)
Mismatch effect HC: under-educated	-		-0.046	-0.043	-	-	0.021	0.027
			(0.052)	(0.047)			(0.019)	(0.019)
Mismatch effect HC: not working	-		-0.109	-0.120*	-	-	-0.012	-0.006
			(0.068)	(0.067)			(0.022)	(0.021)
Constant	4.858***	4.931***	4.889***	5.011***	4.645***	4.635***	4.625***	4.641***
	(0.222)	(0.226)	(0.232)	(0.221)	(0.141)	(0.140)	(0.140)	(0.142)
Observations	521	521	521	521	1793	1793	1793	1793
Inverse Mills Ratio	-0.115	-0.161	-0.014	-0.136	-0.027	-0.026	-0.014	-0.019
	(0.164)	(0.171)	(0.179)	(0.165)	(0.182)	(0.182)	(0.183)	(0.182)
R-squared	0.510	0.493	0.453	0.525	0.486	0.486	0.486	0.487

Standard errors in parentheses *** p<0.01, **p<0.05, * p<0.1

Table 9 Penalty of over-education (predicted values and counterfactuals): How much would over-educated immigrants earn, if they were correctly matched?

	Predicted values (over-educated)	Counterfactuals (over-educated if they were correctly matched)	Penalty
Males	(1)	(2)	(3)
All	6.92	7.03	0.11****
Tertiary education (first and second stage)	7.01	7.05	0.04
Secondary education or less	6.86	6.89	0.03
Females			
All	6.48	6.58	0.10***
Tertiary education (first and second stage)	6.62	6.91	0.28***
Secondary education or less	6.39	6.41	0.02

Notes: The predicted value (1) gives the predicted wage of over-educated immigrants; the counterfactual values (2) gives the predicted wage for over-educated immigrants if they were employed in a correctly matched job.

Table 10 Comparisons of estimated regression coefficients and counterfactuals (%)

	Penalty (estimated coefficients)	Penalty (counterfactuals)
Males	(1)	(2)
All	9	12
Tertiary education (first and second stage)	16	4$^{\xi}$
Secondary education or less	5	3$^{\xi}$
Females		
All	11	11
Tertiary education (first and second stage)	14	32
Secondary education or less	3$^{\xi}$	2$^{\xi}$

Notes: The wage penalties are converted in percentage. Column (1) presents the wage penalty obtained from Table 6; column (2) presents the wage penalty obtained from Table 7. ξ indicate no significance.

Appendix

Table A1 ISCO 2008 - Occupations mapped to educational skill levels

ISCO major groups	Skill Level	
1 Managers	3 + 4	Second and first stage tertiary education
2 Professionals	4	Second stage tertiary education
3 Technicians and Associate Professionals	3	First stage tertiary education
4 Clerical Support Workers 5 Services and Sales Workers 6 Skilled Agricultural, Forestry and Fishery Workers 7 Craft and Related Trades Workers 8 Plant and Machine Operators, and Assemblers	2	Lower or Upper secondary level of education
9 Elementary Occupations	1	Primary level of education

Source: ISCO-08 'International Standard Classification of Occupations' Volume 1, International Labour Office.