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**Working Paper**

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GLO Discussion Paper, No. 219

**Provided in Cooperation with:**  
Global Labor Organization (GLO)

*Suggested Citation:* Ulceluse, Magdalena (2018) : Self-employment as a stepping stone to better labour market matching: a comparison between immigrants and natives, GLO Discussion Paper, No. 219, Global Labor Organization (GLO), Maastricht

This Version is available at:  
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# **Self-employment as a stepping stone to better labour market matching: a comparison between immigrants and natives**

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**JEL Classification:** J15, J24, J61

**Keywords:** self-employment; immigrants; skills mismatch; overeducation

## **Acknowledgements**

The Author acknowledges the financial support of the EDUWORKS Marie Curie Initial Training Network Project (PITN-GA-2013-608311) of the European Commission's 7th Framework Program. The author is particularly grateful to Michael Dorsch and Martin Kahanec for feedback and useful discussions that helped improved this manuscript significantly.

**Abstract**

The paper investigates whether self-employment represents a way to reduce overeducation and improve labour market matching, in a comparative analysis between immigrants and natives. Using the EU Labour Force Survey for the year 2012, and controlling for a list of demographic characteristics and general characteristics of 30 destination countries, I find that the likelihood of being overeducated decreases for self-employed immigrants, with inconclusive results for self-employed natives. The results shed light on the extent to which immigrants adjust to labour market imperfections and barriers to employment and might help explain the higher incidence of self-employment that immigrants exhibit, when compared to natives. This is the first study to systematically study the nexus between overeducation and self-employment in a comparative framework. Moreover, the paper tests the robustness of the results by employing two different measures of overeducation, contributing to the literature of the measurement of overeducation.

## Introduction

Immigrants generally exhibit a higher incidence of overeducation *and* self-employment than the native population. This might not be a coincidence. When immigrants arrive in a new country, they often find it difficult to carry over their human capital to the new labour market. This can happen for many reasons<sup>1</sup> - like in the case of language abilities - or because the skills they have acquired in the country of origin are not perfectly transferable to the new context (Chiswick and Miller 2009, 1992). Thus, at least in the short run, immigrants are likely to be employed in jobs for which they have more years of education than their native counterparts. Chiswick (1978) also notes that since immigrants are usually positively self-selected, their average educational level will likely be higher than that of the native population. But, overeducated individuals often endure wage penalties, experience less job satisfaction and have a higher probability to quit than well-matched individuals<sup>2</sup>. It seems thus intuitive to assume that they would try to find or create opportunities that would match their level of education and skills.

One such opportunity is self-employment. On the one hand, immigrants may turn to self-employment in order to avoid overeducation. If the existing paid employment opportunities do not adequately meet their educational level and experience, by starting a business, they can create a job for themselves that matches their level of skills and education. In this case, self-employment becomes a strategy through which they reduce the incidence of overeducation. On the other hand, however, there is the possibility that immigrants become self-employed because they cannot find *any* paid employment, not necessarily an ill-fitted one. This becomes a type of necessity self-

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<sup>1</sup> Reasons may include no recognition of qualifications, lack of language skills, delayed adjustment to the new context, etc.

<sup>2</sup> See Mavromaras and McGuinness 2012; Verhaest and Omey 2010; Bennett and McGuinness 2009; Battu and Sloane 2004; Chevalier 2003; Allen and Van der Velden 2001; Hartog 2000; Tsang and Levin 1985; Duncan and Hoffman 1981.

employment<sup>3</sup>, in which case the incidence of over-education may in fact increase. *Is self-employment, therefore, increasing or decreasing skills mismatch? Moreover, is this effect stronger for immigrants than for the native population?*

The present study intends to provide an answer to precisely these questions. It investigates how immigrant overeducation interacts with self-employment, in an attempt to enrich our understanding of three critical areas of policy interest: immigrant integration, skills mismatch and self-employment/entrepreneurship. I employ two different measures of overeducation, in an attempt to test the robustness of the results. Moreover, the analysis compares immigrant and native self-employment, comparison motivated by the assumption that by virtue of being outsiders to the labour market, immigrants encounter more barriers to finding a job, which might increase their mismatch and by extension their propensity to become self-employed. This phenomenon might help explain the significantly higher incidence of both overeducation and self-employment that immigrants generally exhibit compared to the native population.

Given the high policy relevance of matching skills to jobs and promoting self-employment, we know surprisingly little about the way these two phenomena interact. To date, there are only two studies that analyse directly the relationship between mismatch and self-employment, and they present contradictory results. In a cross-sectional study, and using a sample of workers in the science and engineering fields, Bender and Roche (2013) investigate whether mismatch differs across different types of employment – salary and self-employment jobs – and what are the effects of mismatch on wages and job satisfaction. They focus on the US and utilize the 2003 National Survey of College Graduates, from the US National Science Foundation. The dataset comprises workers who have obtained at least a Bachelor’s degree in hard or social science, technology,

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<sup>3</sup> See Reynolds et al. 2005.

engineering or mathematics field and/or are currently working in that field. The study employs a subjective measure of mismatch<sup>4</sup>, and the analysis is conducted using three models: a probit, a linear model with instrumental variables<sup>5</sup> and a recursive bivariate probit model. They find that self-employed individuals are more likely to report being mismatched than employed individuals. Moreover, there seems to be a larger wage penalty for mismatched self-employees, although they find this does not affect job satisfaction.

In a longitudinal study this time, Sanchez et al (2015) analyse the impact of the transition from salaried employment to self-employment on self-reported skill mismatches. They employ the European Community Household Panel (ECHP) for the period 1994-2001, for the EU-15<sup>6</sup> countries. They too use a subjective measure of mismatch, and estimate a random effects probit model, complemented by a pooled bivariate probit model to account for endogeneity<sup>7</sup>. They find that self-employed individuals are less likely to declare being skill mismatched, and that individuals who transition from salaried employment to self-employment reduce their probability of being mismatched after the transition.

The two studies present a rather inconsistent picture of the relationship between skills mismatch and self-employment, which might be explained by significant differences in their respective research designs. While Bender and Roche (2013) focus on the US, analyse a specific dataset of college graduates and employ a cross-sectional analysis, Sanchez et al (2015) analyse the EU-15 member states, utilize a representative sample of these countries' populations and

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<sup>4</sup> Defined by the question "Thinking about the relationship between your work and your education, to what extent is your work related to your highest degree? Closely related, somewhat related, or not at all related."

<sup>5</sup> They use as instruments: (1) the number of published articles (grouped at zero, 1–10, 11–20, and 21 plus), assuming that research is less likely to be necessary in self-employment, and (2) the month that the highest degree was awarded, assuming that firms will hire entry level jobs cyclically and so wage and salary jobs will not be as available in nonstandard graduation months (such as May, June, or December) (Bender and Roche 2013, p90).

<sup>6</sup> Denmark, the Netherlands, Belgium, France, Ireland, Italy, Greece, Spain, Portugal, Austria and Finland

<sup>7</sup> The authors use a variable that indicates whether the individual holds a permanent labour contract, as an exclusion restriction. A Wald test leads them to conclude there is no endogeneity.

conduct a longitudinal analysis. Nevertheless, the contradictory results of these two studies reflect our lack of clear understanding of the self-employment-overeducation relationship. In this context, the current study intends to improve our current knowledge of the dynamic between the two processes, and to further it, by systematically comparing natives and immigrants. Since the latter generally exhibit a higher incidence of overeducation than the native population, I expect to observe significant differences between the two groups.

The paper is structured as follows. Section 2 provides a theoretical incursion into the existing knowledge of immigrant overeducation and the potential mechanism behind the overeducation-self-employment relationship. Section 3 presents the data sources with descriptive statistics of the main variables, and the methodology employed. Section 4 presents the results of the analysis, while section 5 discusses the implications and relevance of these results and identifies new research directions.

## **A theoretical perspective on immigrant overeducation**

Four main theories have been put forward to explain the existence of overeducation in the labour market, and their hypotheses can be extrapolated to explain immigrant overeducation too: search and match theory, human capital theory, signalling theory and technological change theory.

According to *search and match theory*, immigrant overeducation is the result of imperfect (and asymmetric) information in the labour market. When immigrants arrive into a country, as outsiders, they have limited knowledge of the available jobs and of the functioning of the local labour market. To get their foot in the door, they may take up jobs for which they are overqualified, with the intention of advancing up the occupational ladder once they get acquainted with the new labour market structure and gain local job experience (see Groot and Maassen van den Brink 2000).

The adjustment process is especially pronounced among immigrants originating from countries with significantly different labour markets and institutions (Chiswick and Miller 2009). According to the *search and match theory*, thus, overeducation appears as a necessary adjustment to new employment environments. The *searching* ability is impaired as compared to locals. Once immigrants familiarize with the local job market and have removed the necessary hurdles in adjusting to the new environment, they should, the theory concludes, be able to match employment to their education level. Overeducation in this case is viewed as a temporary phenomenon, as immigrants are expected to eventually find jobs that match their level of education.

The *human capital theory*<sup>8</sup>, too, considers overeducation to be a temporary phenomenon. When they arrive in the destination country, immigrants often find it difficult to transfer (or have recognized) the skills they have acquired in the country of origin (Chiswick and Miller 2009). Overeducation becomes then an adjustment mechanism, a strategy they employ to enter the new labour market, with the purpose of gaining experience that smooths out the path for a matching job in the future. Thus, in time, with residence length and the accumulation of locally recognized human capital, the incidence of overeducation is likely to decline (Piracha and Vadean 2013).

In a similar vein, the *screening theory* (Arrow 1973; Spence 1974) considers education to be a signal individuals send concerning their labour productivity and abilities. The theory presupposes that hiring someone represents an investment involving risk and uncertainty and that formal education reduces uncertainty by sending a signal about a person's abilities and skills. The theory is rooted in the asymmetric nature of information about employees' skills and the fact that employers face lots of uncertainties in assessing job applicant, thus they rely on their educational

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<sup>8</sup> The premise of the human capital theory is similar to that of the career mobility theory of Sicherman and Galor (1990), according to which workers accept jobs for which they are overqualified in order to acquire work experience and enhance the chances of finding a better job match.



degrees, in which case they assume that individuals with a higher educational level (an observable signal) also have higher skills (initially difficult to observe for employers) (Ghaffarzadegan et al 2017). Formal education becomes particularly relevant for immigrants, as they need to signal employers – who might be apprehensive about the quality and content of foreign education - a measure of their ability. Therefore, recent immigrants would experience a higher incidence of overeducation, which should however decrease over time once their skills are recognized.

The above theories of overeducation can be extrapolated to motivate the decision to become self-employed too. Self-employment itself can be a transitional process towards finding paid employment. Particularly for immigrants, who as outsiders often lack information about the local labour market, and whose hiring constitutes an investment implying greater risks, self-employment can represent a period of transition, in which they get accustomed to the new labour market and build up the necessary human capital to acquire paid employment in the new destination.

A latest explanation for the overeducation phenomenon focuses on the effects of *technological change* (see Mendes de Oliveira, Santos, and Kiker 2000; Kiker, Santos, and de Oliveira 1997). This theory argues that the rapid pace of technological development generates the need for more school-acquired skills than those possessed by other employees in the same position. If the requirements for the same positions are higher today than they used to be in the past, then those people employed today may seem overeducated in comparison to their older colleagues who were employed at a time at which the required skill level was lower. But, in this case overeducation is more of a perceived phenomenon rather than an actual one; individuals in fact have the required level of education to keep up with technological advancements, they just seem overqualified when compared to previous employee cohorts. This implies that the incidence of overeducation is not

expected to decrease with time, as there was none to begin with. According to this theory, the perceived incidence of overeducation is expected to be higher the larger the discrepancy in terms of technological advances between the immigrants' origin and destination countries.

The above theories and their predictions are not mutually exclusive, but rather different facets of the same process of immigrant labour market integration. When first arriving in the destination country, immigrants do have a limited knowledge of the local labour market (search and match theory), for which they need a strategy (human capital theory), while employers have limited knowledge of their abilities for which they need a signal (screening theory). Overeducation becomes thus an adjustment mechanism to overcome existing labour market inefficiencies, which should in time disappear. There is plenty of empirical evidence, however, to suggest this is not always the case. Rather, immigrant overeducation has been found to persist and not diminish with the length of stay in countries such as Italy (Dell'Aringa and Pagani 2011), Spain (Fernández and Ortega 2008), Sweden (Joonas, Gupta, and Wadensjö 2014), or in a multi-country context (Visintin, Tijdens, and van Klaveren 2015).

These papers, however, do not explicitly study the self-employed. Yet, the nature of self-employment could have important spillover effects on the incidence of overeducation. If self-employment is necessity-based because there are no opportunities in paid employment (or if the gains associated with self-employment surpass those associated with a well-matched job), then the incidence of mismatch might increase. Conversely, if self-employment is taken up as an alternative to a mismatched job, then the incidence of overeducation might decrease. The next sections attempt to provide more information with regards to the direction of the self-employment-overeducation relationship.

## Measuring overeducation

The concept of overeducation, as employed in this paper, refers to the instance in which workers have more years of education than required for the job they are performing. Relatively unambiguous and with an intuitive interpretation, the concept has been employed extensively in studies of mismatch over the past decades. Yet measuring overeducation is not straightforward and previous studies have shown that the incidence of overeducation is sensitive to the method of measurement (see Groot and Maassen van den Brink 2000). Currently, four main approaches to mismatch measurement have been identified in the existing literature.

The *job analysis* (or normative) approach is an objective method that derives information concerning the required level of education for an occupation from occupational classification databases, like the O\*NET or ISCO (e.g. Chevalier 2003; Piracha and Vadean 2012). The *realized matches* (statistical) approach derives the level of education necessary for a particular occupation by taking the mean (or mode) of years of schooling of all individuals employed in that occupation. Individuals with a standard deviation above the mean (mode) are considered overeducated (e.g. Chiswick and Miller 2007, 2009). The *income-ratio* approach equates overeducation with income inefficiency and computes overeducation as the ratio between potential and actual income (e.g. Jensen, Gartner, and Rässler 2010; Guironnet and Peypoch 2007). Proponents of this measure argue that income maximization is an important reason why individuals invest in education, and that this measure “allows the inclusion of income and efficiency aspects of overeducation ignored by the well-established objective or subjective measures focusing on some (ordinal) matching aspects” (Jensen, Gartner, and Rässler 2010, p. 34). The *self-assessment* approach consists in asking individuals whether they have more or less education than required for the job (direct

assessment) or the minimum level of education required for the job they perform (indirect self-assessment).

In order to determine which immigrants and natives are overeducated, I employ both the normative and statistical approaches. Each method presents a number of benefits and drawbacks (Verhaest and Omey 2010; Hartog 2000)., therefore the comparison enables me to test the robustness of the results. For the normative (job analysis) measure, I compare the required level of education for an occupation against the current level of education of the individual. For this purpose, I use the International Standard Classification of Occupations (henceforth ISCO-08) and the International Standard Classification of Education (henceforth ISCED-97) and their correspondence as developed by the ILO (ILO 2012, 2014). The nine Major Occupational Groups in ISCO correspond to four skills levels, which in turn correspond to the six educational classifications (see Annex A for correspondence). Individuals which exhibit an educational level above the corresponding one are considered overeducated. The approach has been successfully employed elsewhere, to measure skills mismatch and its determinants (see, for instance, Chevalier 2003; Sutherland 2012; Tarvid 2012). It presents a number of advantages, including a relative easiness to measure mismatch and consistency over time. In addition, unlike the self-assessed and the income-ratio approaches, for instance, it is a rather objective measure. However, the approach has a number of limitations too. Firstly, it assumes constant mapping over all jobs of a given occupation, not taking into account that in some countries with a high share of educational attainment, the average educational level for a job would be higher (ILO 2014). Moreover, the approach clusters together groups of occupations for which the educational level required varies significantly (for instance, there is substantial variation between ISCO groups 4-8, which results in an underestimation of the number of overeducated individuals in this case).

For the realized matches approach (statistical measure), I compute the mode<sup>9</sup> of educational level for each particular occupation and consider those individuals that present an educational attainment level one standard deviation above this mode, to be overeducated. The approach has been successfully employed elsewhere (e.g. Chiswick and Miller 2009; Kiker, Santos, and de Oliveira 1997) and presents the advantage of considering the actual educational level of workers within a particular occupation, at any given time.

## **Data and methodology**

### The data

The analysis in this paper relies on the European Union Labour Force Survey's (EU LFS) for the year 2012. The EU LFS is the largest European household sample survey, providing annual data on labour participation of people aged 15 and over and on persons outside the labour force (Eurostat 2007). The data provide information on individual socio-economic characteristics, occupation, education, as well as on individual's country of birth, which enables the distinction between natives and immigrants, and length of residence in the country. Further, the study only considers immigrants from outside the EU and EFTA<sup>10</sup>, as the latter technically share the same labour market rights as the native population. There are thirty countries covered in the sample, the EU-28 Member States and Switzerland and Norway. The sample includes 74,727 non-EU immigrants, 12 percent of which are self-employed.

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<sup>9</sup> To reflect the most common level of education for an occupation.

<sup>10</sup> European Free Trade Association

The dependent variable

The dependent variable is overeducation, a dummy variable equal to 1 if the individual is overeducated and 0 otherwise. The variable is derived using information on occupations, educational levels and country of origin from the EULFS. Tables 4.1-4.3 compare the incidence of overeducation between immigrants and natives across a number of demographic characteristics, using both the normative and the statistical approach to computing overeducation.

Table 4-1 presents the incidence of overeducation disaggregated by major region of origin. By far the highest incidence of overeducation seems to be experienced, surprisingly, by immigrants from the EU10 Member States<sup>11</sup>, followed by immigrants from South East Asia, South America, and the Near Middle East. Perhaps not surprisingly, the native population exhibits the lowest incidence of mismatch. There are substantial differences in the incidence of overeducation for each region, when we compare the two different measurements, yet no clear pattern emerges. If we compare the statistical measure of overeducation against the baseline normative measure, some origin regions or group of countries experience an increase in the incidence of overeducation (e.g. Australia and Oceania, EU10 and EU15), while others experience a decrease (e.g. East Asia, EU3 or South East Asia).

In terms of occupations (table 4-2), immigrants register a significantly higher level of overeducation in all but one major occupational group. Notably, individuals employed in elementary occupations present a disproportionate level of overeducation compared with the other major groups, and in this case only, more natives seem to be mismatched than immigrants. The incidence of overeducation for both groups increases substantially when the statistical measure of overeducation is employed, sometimes significantly so, as in the case of natives skilled

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<sup>11</sup> Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia

agricultural, forestry and fishery workers. The disparity is to be expected if we bear in mind that the normative measure groups a number of occupations into the same skill level (see Annex A for reference), which means less variability and by extension, a tendency to underestimate the level of mismatch.

Table 0-1 The incidence of overeducation by major region of origin

Major Geographical Region	Normative measure of overeducation %	Statistical measure of overeducation %	Total obs.
Native	16	19	1,511,594
EU15	21	22	30,079
EU10	45	48	10,546
EU3	34	28	9,896
EFTA	19	19	2,641
North Africa	25	20	10,931
Near Middle East	34	33	2,143
East Asia	25	22	2,148
South East Asia	38	29	8,329
North America	29	32	1,547
Central America	33	27	855
South America	34	26	4,648
Australia and Oceania	22	28	542
Total	17	19	1,642,096

Note: The figures cover 30 destination countries. Source: Own calculations using EU LFS 2012

Table 0-2 The incidence of overeducation by major occupational ISCO-08 group

ISCO-08	Immigrants			Natives		
	Norm	Stat	Obs.	Norm	Stat	Obs.
1. Managers	0	1	2,883	0	1	81,254
2. Professionals	9	9	10,184	5	5	266,457
3. Technicians and Support Workers	31	46	6,565	20	36	241,464
4. Clerical Support workers	37	38	3,836	21	23	143,813
5. Services and sales workers	20	21	17,127	12	14	251,448
6. Skilled agricultural, forestry and fishery workers	11	33	1,081	5	29	93,099
7. Craft and Related trades workers	9	12	9,512	5	9	184,632
8. Plant and Machine operators and assemblers	13	16	6,719	4	6	118,622
9. Elementary occupations	79	43	16,449	88	50	117,201

Note: The figures cover 30 destination countries. Source: Own calculations using EU LFS 2012. Norm=normative measure of overeducation; Stat= statistical measure of overeducation.

In terms of gender, women experience more overeducation than men, although interestingly, there does not seem to be much of a difference between native and immigrant women. The incidence of overeducation among self-employed immigrants is higher than that of the corresponding native population, and almost half of all recent immigrants (with less than 5 years residence in the destination country) are mismatched. There are interesting differences to be noted between the two measures of overeducation, especially the sudden increase in the incidence of overeducated self-employed natives.

Table 0-3 The incidence of overeducation by gender and occupations status

	Normative	Statistical
Female Native	53.9	51.0
Female Immigrant	53.8	51.8
Self-employed native	10.7	18.3
Self-employed immigrant	20.5	20.1
Recent immigrant	40.4	36.6

*Note:* The figures cover 30 destination countries. Source: Own calculations using EU LFS 2012

### Independent variables

The existing theories of immigrant overeducation already point to a number of relevant explanatory factors. The incidence of overeducation should decrease with age, which enables the accumulation of local work experience and human capital. Previous literature has also found significant differences in mismatch by gender (see Groot and Maassen van den Brink 2000). General characteristics of the destination country economies, such as gross domestic product per capita and the unemployment rate of the native population, are also considered, factors found relevant by the existing literature. High levels of unemployment have direct implications for the assignment of workers to available jobs (Sattinger, 1993). Competition for jobs is more intense generally, and educated workers may compete with the less educated for any job available,



irrespectively of occupation. Hence, we expect a higher overall incidence of over-education in an economy with higher levels of unemployment (Aleksynska and Tritah 2013).

### **The Empirical Model**

In order to disentangle the effects of various factors on individual's propensity to be overeducated, I estimate the following empirical base model:

$$Y_i = I(Y_i > 0) = I(\beta_1 X_i + \beta_2 Z_i + \varepsilon_i > 0) \quad (1)$$

Where  $Y_i$  is the main outcome variable, a dummy equal to 1 if the individual is overeducated and zero otherwise;  $I(.)$  is a binary indicator function taking the value 1 if the argument is true and 0 otherwise;  $X_i$  represents the explanatory variable self-employment, a dummy variable equal to 1 if the individual is self-employed,  $\beta_1$  its slope and the main parameter of interest,  $i$  refers to the cross-national units, while  $\varepsilon$  is the error term.  $Z_i$  represents a vector of the control variables previously mentioned, which include both individual and country level characteristics. Since the dependent variable has a discrete outcome, a probability model is more suitable than a linear regression model. Using the latter would result in biased and inconsistent estimates, because the fitted probabilities can be less than 0 or greater than 1 (as they are not constrained to the unit interval), the model imposes heteroscedasticity and the partial effect of the explanatory variables (appearing in level form) is constant (Wooldridge 2013).

Equation (1) does not account for a potential endogeneity issue, which might stem from the fact that a number of unobserved factors could affect both the probability of being self-employed and the probability of being overeducated. If left unaccounted for, endogeneity will lead to inconsistent and biased estimates of equation (1). Given that both the dependent and the

independent variables have discrete outcomes, thus both the first stage and the second stage equations are probit models, a maximum likelihood bivariate probit (Heckman 1978) is the optimal choice. Any other two-stage model which would mimic 2SLS would produce inconsistent estimators<sup>12</sup> (Greene 2012; Wooldridge 2002). To account for endogeneity bias, I estimate the following empirical model, which simultaneously estimates equation (1) and the stage defined below:

$$X_i = I(X_i > 0) = I(\beta_3 Z_i + \mu_i > 0) \quad (2)$$

Where  $X_i$  is a dummy variable equal to 1 if the individual is self-employed and 0 otherwise,  $Z_i$  is a vector of the same explanatory variables as used in equation (1), and  $\mu_i$  is the error term. As mentioned, I obtain unbiased and asymptotically efficient estimates of the simultaneous equation model consisting of equations (1) and (2), by employing a maximum likelihood estimation of a bivariate probit model.

## Results

The paper investigates the effect of self-employment on immigrants' and natives' probability to be overeducated. This section presents the results of the empirical analysis.

I begin by exploring the correlation between overeducation and the variables used in the empirical specifications (Table 4-4). Self-employment appears to be negatively correlated with both measures of overeducation, albeit rather weakly. Overeducation also seems to be higher among women and to decrease with age.

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<sup>12</sup> Sometimes called the “forbidden regression” (Wooldridge 2002)

Table 0-4 Correlation matrix

	Normative measure of overeducation	Statistical measure if overeducation
Self-employment	-0.0681	-0.0111
Age	-0.0610	-0.062
Female	0.0682	0.044
Married	-0.0350	-0.0208
GDP per capita	0.0241	0.0452
Unemployment	0.0283	0.0216

The probability of an immigrant or a native being overeducated as a function of self-employment is summarized in table 4-5, where both measures of overeducation are presented, for comparison purposes (the table presents average marginal effects; for coefficients please refer to Annex B). There are a number of interesting observations one can infer from these results. To begin with, if we consider the normative measure, the probability of being overeducated decreases for the self-employed, by 9 percentage points for immigrants and 5 percentage points for natives. For immigrants, the effect seems to be slightly larger, although a t-test indicates that the difference is not statistically significant. Being female increases the likelihood of being overeducated for both immigrants and natives, likelihood that seems to slightly decrease with age for natives.

Most of these results are confirmed by the estimates using the statistical measure of overeducation. Self-employment decreases the probability of being mismatched for immigrants, although it seems to increase it for natives, in this case. Moreover, a t-test indicates that the difference between the two coefficients is statistically significant when using this measurement to mismatch. Again, women have a higher likelihood of being overeducated, in accordance with the existing literature, and GDP per capita, a proxy for the level of economic development of a country, seems to positively contribute to mismatch.

Table 0-5 Determinants of overeducation

	<i>Normative measure of overeducation</i>		<i>Statistical measure of overeducation</i>	
	Probit immigrant	Probit natives	Probit immigrant	Probit natives
Self-employed	-0.09*** (0.01)	-0.05*** (0.01)	-0.04*** (0.01)	0.02** (0.01)
Female	0.09*** (0.02)	0.04*** (0.003)	0.06*** (0.02)	0.03*** (0.004)
Age	-6.91 (0.001)	-0.001*** (0.0002)	0.0004 (0.001)	-0.002*** (0.0003)
Married	0.005 (0.008)	-0.02*** (.002)	0.002 (0.01)	0.01 (0.003)
Unemployment	0.001 (0.002)	0.003*** (0.001)	0.01* (0.003)	0.003 (0.002)
GDP per cap	3.19 (7.91)	1.68 (2.99)	2.02** (9.24)	1.13** (4.99)
Observations	73,571	1,501,433	73,571	1,501,433

*Data Source:* Data are from the 2012 EU LFS and cover 30 destination countries.

*Note:* Robust standard errors in parentheses, clustered at regional level. All coefficients have been transformed in average marginal effects. \*Statistical significance at the 10% level. \*\*Statistical significance at the 5% level. \*\*\*Statistical significance at the 1% level

## Endogeneity

As previously mentioned, immigrants might become self-employed precisely because they are overeducated for the job they perform, in which case over-education has an influence on the decision to become self-employed. Thus, the dependent and main explanatory variables might be endogenous. To account for a potential endogeneity bias, I employ a maximum likelihood bivariate probit model. While the data source does not contain suitable candidates for a strong instrument<sup>13</sup> that would satisfy the exclusion restriction, two potential variables, derived from external sources, are included: (1) the number of patents per million population, and (2) expenditure on research

<sup>13</sup> Since the survey (EU LFS) concerns labour market conditions and experience, most variables are related to both overeducation and self-employment.

and development as percentage of GDP, both variables at the regional level.<sup>14</sup> There is an extensive literature that positively links the number of patents to increased entrepreneurship and self-employment (see Acs and Sanders 2012; Acs et al. 2009; Allred and Park 2007; Lee, Florida, and Acs 2004). The underlying mechanism behind this relationship has been formalized in innovation driven models which argue that intellectual property rights, and thus patents, are key institutions that allow investors to market their inventions and thereby recover their costs (Acs and Sanders 2012). Patent creation should thus provide incentives for business formation to collect the benefits of this initial investment (Kitch 1977). The second instrument is derived from previous studies which have found that spill over effects from research and development contribute to business creation (see Kirchhoff et al. 2007; Acs and Varga 2005). Research and development produces knowledge and ideas, which contribute to the creation of new services or goods, and thus new entrepreneurial opportunities. Expenditure on research and development as a percentage of GDP is employed in this context as a proxy for these entrepreneurial opportunities. The Wald statistic reported in table 4-6 indicates the presence of endogeneity for all but the biprobit immigrant model that uses the normative measure of overeducation.

The estimates of the biprobit models, which control for endogeneity, generally confirm the estimates of the probit models. A notable difference is the negative effect that self-employment has on overeducation, for natives when the statistical measure is employed: the probability of being overeducated seems to decrease by 9 percentage points for native self-employees in this case.

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<sup>14</sup> Data sourced from Eurostat's regional statistics.

Table 0-6 Determinants of overeducation, accounting for endogeneity

	<i>Normative measure of overeducation</i>		<i>Statistical measure of overeducation</i>	
	Biprobit immigrant	Biprobit natives	Biprobit immigrant	Biprobit natives
Self-employed	-0.06** (0.03)	-0.05*** (0.02)	-0.08*** (0.02)	-0.09*** (0.02)
Female	-0.04** (0.02)	-0.03*** (0.01)	-0.05*** (0.02)	-0.05*** (0.01)
Age	0.002*** (0.001)	0.002*** (0.0004)	0.002*** (0.001)	0.003*** (0.001)
Married	0.01** (0.004)	0.0003 (0.002)	0.01** (0.004)	0.01*** (0.003)
Unemployment	0.001 (0.001)	0.002*** (0.001)	0.001 (0.001)	0.003*** (0.001)
GDP per cap	-7.70** (3.63)	-5.56*** (1.60)	-7.60* (4.34)	-7.86*** (2.91)
Observations	73,571	1,501,433	73,571	1,501,433
Wald statistic	P=0.111	P=0.001	P=0.039	P=0.001

*Data Source:* Data are from the 2012 EU LFS and covers 30 destination countries.

*Note:* Robust standard errors in parentheses, clustered at regional level. All coefficients have been transformed in average marginal effects. \*Statistical significance at the 10% level.

\*\*Statistical significance at the 5% level. \*\*\*Statistical significance at the 1% level

## Discussion

The paper explores how overeducation interacts with self-employment in a comparative analysis between immigrants and natives, in an attempt to enrich our understanding of three critical areas of policy interest: immigrant integration, skills mismatch and self-employment/entrepreneurship. Controlling for a list of demographic characteristics and general characteristics of the destination country, the results seem to suggest that being self-employed reduces the probability of being overeducated, at least for immigrants. This probability seems to decrease with age for the native population, and to be higher for females in both groups. This study confirms the findings of Sanchez, Diaz-Serrano, and Teruel (2015), who conduct a similar analysis in a longitudinal study. If correct, the results would imply that self-employment represents a

strategy to minimize overeducation, at least for immigrants. By virtue of being outsiders to the labour market, immigrants encounter more barriers to employment, which make them more likely to be overeducated. In order to minimize or avoid overeducation altogether, immigrants can become self-employed. This hypothesis could help explain the higher incidence of self-employment that immigrants exhibit, when compared to natives. To confirm it, however, a longitudinal study, in a similar fashion to Sanchez et al (2015), following immigrants in and out of self-employment and investigating how overeducation fluctuates, would be necessary and desirable. Nevertheless, the results are important and provide insight into a phenomenon which has been long hypothesised, but little researched.

The findings have also broader research and policy implications and contribute to scholarship in a number of ways. To start with, they confirm overeducation's sensitivity to definition and measurement. The normative measure of overeducation seems to generally underestimate the incidence of overeducation, with some exceptions. Further, while self-employment seems to decrease the probability of an individual being overeducated when we employ the normative measure, the results are not as clear-cut when the statistical measure is used instead. This sensitivity has been remarked in previous studies (see CEDEFOP 2010; Groot and Maassen van den Brink 2000), and should be accounted for when translating these studies into policy-making.

Second, despite this sensitivity, the effect of self-employment in reducing the probability of being overeducated seem to hold for immigrants regardless of the approach to overeducation employed. This robustness to measurement and estimation models suggests a strong negative relationship between the two concepts for this particular group. Given the observed high incidence

of both phenomena that immigrants generally experience, these results would seem to suggest a mechanism through which they minimize mismatch, by becoming self-employed.

Further research, however, should look into the nature of self-employment, as it is unclear at the moment whether this type would be productive, or more akin to necessity self-employment. The difference has important implications for policy making. The latter has been associated with low productivity, job creation and job satisfaction, which in the long term would represent an underutilisation of human resources and a failure to tap into the potential that immigration represents. The former is the type of self-employment that policy-makers would want to incentivize, that brings about innovation and job creation.

Another implication of these results is that, by implementing measures to promote opportunity self-employment, policy-makers could achieve two objectives with one instrument – increase entrepreneurship *and* decrease mismatch. There is no doubt that if countries intend to make themselves attractive destinations for “the best and the brightest”, they need to tackle these labour market inefficiencies and promote a business creation-friendly environment. This in turn would help smooth out the socio-economic integration of immigrants, who could more easily become productive members of society. More research, however, is needed to understand the exact dynamic between these two labour market processes and how it changes over time and space.

No study is bound to be without limitations, and the present one is no exception. One significant issue right from the start is the potential endogeneity bias, addressed in the methodological section with maximum likelihood bivariate probit estimation. This is the most fitting model for analyses including both a binary dependent and a binary independent variable, as it is this case. The model includes two additional variables used as regressors of self-employment, which fulfil the exclusion restriction of not being correlated with the error term. Lastly, the results



of the study and their implications are bound to be dependent on the context and the time of the analysis.

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## Annex A. Correspondence between ISCO-08 and ISCED-11

International Standard Classification of Occupations Major Groups (ISCO-08)	ISCO-08 Skill Level	International Standard Classification of Education (ISCED-97)
9. Elementary Occupations	<b>1</b>	1. Primary level of education
8. Plant and Machine Operators, and Assemblers 7. Craft and Related Trades Workers 6. Skilled Agricultural, Forestry and Fishery Workers 5. Services and Sales Workers 4. Clerical Support Workers	<b>2</b>	2. Lower secondary level of education 3. Upper secondary level of education 4. Post-secondary, non-tertiary education
3. Technicians and associate professional	<b>3</b>	5b. First stage of tertiary education (short or medium duration)
2. Professionals 1. Managers <sup>15</sup>	<b>4</b>	5a. First stage of secondary education, 1 <sup>st</sup> degree (medium duration) 6. Second stage of tertiary education (leading to an advanced research qualification)

Source: ILO 2012

## Annex B. Coefficients for probit and biprobit regressions

Table 0-1 Normative measure of overeducation

	(1) probit immigrants	(2) biprobit immigrants	(3) probit natives	(4) biprobit natives
Self-employed	-0.28*** (0.03)	-1.18*** (0.41)	-0.23*** (0.03)	-1.03*** (0.19)
Female	0.27*** (0.05)	0.17* (0.09)	0.17*** (0.02)	0.07* (0.03)
Age	-2.02 (0.002)	0.003 (0.002)	-0.006*** (0.001)	-0.0001 (0.002)
Married	0.014 (0.02)	0.02 (0.02)	-0.06*** (0.01)	-0.05*** (0.01)
Unemployment	0.002	0.003	0.01***	0.02***

<sup>15</sup> Managers fall under the 3+4 Skill levels.

	(0.005)	(0.005)	(0.004)	(0.004)
GDP per cap	9.29	-5.32	6.97	-9.36
	(2.30)	(2.44)	(1.24)	(1.16)
Constant	-0.7***	-0.60***	-0.91***	-0.92***
	(0.14)	(0.15)	(0.06)	(0.06)
Observations	73,571	73,571	1,501,433	1,501,433

*Data Source:* Data are from the 2012 EULFS and covers 30 destination countries.

*Note:* Robust standard errors in parentheses, clustered at regional level. \* Statistical significance at the 10% level. \*\* Statistical significance at the 5% level. \*\*\* Statistical significance at the 1% level

Table 0-2 Statistical measure of overeducation

	(1)	(2)	(3)	(4)
	probit immigrants	biprobit immigrants	probit natives	biprobit natives
Self-employed	-0.14***	-1.39***	0.06**	-1.25***
	(0.03)	(0.26)	(0.02)	(0.16)
Female	0.19***	0.03	0.12***	-0.07*
	(0.05)	(0.09)	(0.01)	(0.05)
Age	0.001	0.01***	-0.01***	0.003
	(0.002)	(0.002)	(0.001)	(0.003)
Married	0.01	0.02	0.02*	0.03**
	(0.03)	(0.03)	(0.01)	(0.01)
Unemployment	0.02*	0.02*	0.01	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)
GDP per cap	6.43**	3.27	4.27**	4.75
	(2.84)	(2.86)	(1.83)	(1.78)
Constant	-1.21***	-1.01***	-0.85***	-0.86***
	(0.18)	(0.17)	(0.09)	(0.08)
Observations	73,571	73,571	1,501,433	1,501,433

*Data Source:* Data are from the 2012 EULFS.

*Note:* Robust standard errors in parentheses, clustered at regional level. \* Statistical significance at the 10% level. \*\* Statistical significance at the 5% level. \*\*\* Statistical significance at the 1% level