

Back to Basics – Literacy Proficiency, Immigration and Labour Market Outcomes in Sweden

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Abstract

We explore how education, literacy skills and migrant origin affect employment and over-qualification mismatch, using a simple model of human capital, standard regression methods and data from the OECD Survey of Adult Skills (PIAAC). Sweden is an interesting case, as a compressed wage distribution makes thresholds to enter the labour market high for those with low education and low skills. Skill and education levels are high among the native-born. At the same time, the high influx of humanitarian and family reunion migrants, who are on average less educated and less skilled than natives, increases the supply of low-skilled labour. We find that substantial employment penalties all but disappear when controlling for migrants' lower literacy proficiency. In contrast, the high incidence of over-qualification mismatch among immigrants is little sensitive to literacy proficiency and demographic profiles. However, having participated in education and training activities in Sweden improves matching considerably, in particular if such activities are manifested in formal qualifications.

Keywords

Literacy; Sweden; Labour market outcomes; Immigrants; OECD Survey of Adult Skills (PIAAC)

Introduction

Ever since the onset of the Great Recession, the integration of disadvantaged groups in the labour market has gained increasing interest across Europe (Cahuc *et al.* 2013; Galgoczi *et al.* 2013). Furthermore, in the context of an uncertain economic situation, high inflows of migrants are being perceived as hollowing out the welfare state, feeding support for right-wing populism in some countries, including Sweden (Nordensvard and Ketola 2015). The dominant response to a high level of unemployment has been to increase

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participation in formal educational and work practice. In contrast, the role of basic skills, such as literacy, has received less attention (Scarpetta *et al.* 2010). Understanding the impact of literacy on labour market outcomes can help retarget education and active labour market policies to promote employment and job quality for natives and immigrants alike.

Sweden is an interesting case: a compressed wage distribution with high entry-level wages poses hurdles to employment for the low-qualified and low-skilled. Skills and qualifications are generally high among natives, but substantial humanitarian and family reunion migration increases the incidence of low skills and qualifications.

To better understand how literacy, education and migrant origins affect labour market outcomes in Sweden, we seek answers to the following questions: (1) How do education and foreign background affect literacy proficiency?; (2) How do education, literacy and foreign background affect employment and job quality, measured as over-qualification mismatch, given the Swedish compressed wage structure?; (3) To what extent, and through which channels can education and training improve employment prospects and job quality for immigrants?

To explore these questions, we develop a simple model of human capital accounting for how education, basic skills and migrant background will affect labour market outcomes in the presence of taxes and benefits.

We explore determinants of literacy proficiency and test the model predictions on data from the OECD Survey of Adult Skills (PIAAC).¹ We find that education, adult education and training and migrant background strongly affect literacy scores. Employment penalties for migrants are largely due to lower education and literacy proficiency than natives, and the penalties all but disappear when controlling for both these factors. Concerning job quality, defined as over-qualification mismatch, the foreign-born are highly likely to be mismatched, but over-qualification does not seem to be much influenced by the variables, including literacy, which explain employment. However, participation in education and training activities in Sweden improves matching, and having obtained formal qualifications in the host country reduces mismatch considerably.

The rest of the article is structured as follows: the second section summarizes the relevant literature and provides some background on forces acting in Sweden; the dataset, main variables and descriptive statistics are presented in the third section; the theoretical model is developed in the fourth section; the fifth section presents the results from the empirical analysis; and the sixth section summarizes and concludes.

Background

A vast literature within human capital theory analyzes the issue of education, skills, migration and labour market outcomes. We focus on a body of research that looks at the determinants of literacy and labour market outcomes; and migrants' literacy and labour market outcomes. Furthermore, we outline some essential background on education, skills, migration and the labour market functioning in Sweden.

Literacy and labour market outcomes

Including literacy when analyzing labour market outcomes reflects skills beyond the mere educational attainment, and may allow researchers to understand why, at a similar educational level, some groups are less likely to succeed in the labour market (Chiswick *et al.* 2003).

The impact of literacy on labour market outcomes is less researched than that of educational attainment, since data are less available (Daerden *et al.* 2000) and difficult to assess (McIntosh and Vignoles 2001). Existing contributions using non-self-assessed measures of literacy show that literacy is positively correlated with higher employment, earnings and wages (Dustmann and Fabbri 2003; McIntosh and Vignoles 2001; Vignoles *et al.* 2011 for the UK). Other contributions from Canada and Australia show similar results. Charrette and Meng (1998) found that in Canada reading ability is a relevant explanatory factor for labour market outcomes even when controlling for years of schooling. Similarly, Chiswick *et al.* (2003) showed that in Australia the effect of education on labour market outcomes is actually due to higher literacy and numeracy.

Family background has been found to have a strong effect on literacy levels (Daerden *et al.* 2000; McIntosh and Vignoles 2001; OECD/EU 2014). Furthermore, Charrette and Meng (1998) found that the years of schooling affect literacy for Canadian men, and that other socio-demographic variables such as parental schooling, immigration status and cohort age have an effect on literacy primarily through their effect on education. Mother's education and cohort age still have a direct effect on Canadian women's literacy.

Migrants, skills and labour market outcomes

The value of a particular set of skills in the labour market may vary between pairs of origin and destination countries. Migrants' human capital may be less relevant in the host country than that of natives for a number of reasons, including differences in educational quality, lack of recognition of formal qualifications, lack of networks and knowledge of host country labour market functioning (Aleksynska and Tritah 2013; Borjas 1994; Behtoui 2008; Chiswick 1978; OECD/EU 2014). Host-country specific human capital can be accumulated over time. The faster the process of assimilating host country human capital and transferring their home country human capital, the faster the economic assimilation will be (Aleksynska and Tritah 2013; Dustmann and Fabbri 2003). Migration at an early age increases the likelihood of acquisition of qualifications recognized in the host countries (Böhlmark 2008).

However, those immigrants staying temporarily may invest less in training than natives, and employers may also reduce the amount of training they offer, slowing the acquisition of country-specific skills (Kalter and Kogan 2006). Immigrants who initially chose poor jobs to reduce job search costs might be caught in a vicious circle of low-status and badly paid work (Heath 2007). Difficulties in entering the labour market and low job quality can also be due to statistical discrimination, employer's preferences for workers of similar origins (Åslund *et al.* 2014), or forming part of homogeneous networks

that only give access to information about jobs that are already in the ethnic community's domain (Portes and Rumbaut 2001).

Moreover, the literature on self-sorting makes the link between host country labour market and welfare characteristics and migrants' skills. Authors argue that countries with large skill-related wage differences attract a higher share of the higher educated migrants, while the less educated tend to choose destinations with a high base wage and lower skill premium, such as Sweden (self-selection, see e.g. Borjas 1994; Chiswick 1978). Pareliussen (2017, forthcoming) shows, by comparing destination countries, that Nordic countries attract migrants with lower qualifications and less portable skills.

The Swedish Context

In Sweden, the increasing demand for high skills in the economy and an overall expansion of the higher education system (Thunborg and Bron 2012), have pushed up educational attainment, particularly among the younger cohorts. The share of young adults (aged 25–34) with tertiary education was 45 per cent in 2013, compared with a European average of 36 per cent; while the share of young adults with low educational attainment (lower secondary or less) remained stable at 13 per cent between 2000 and 2013 (Eurostat 2014).

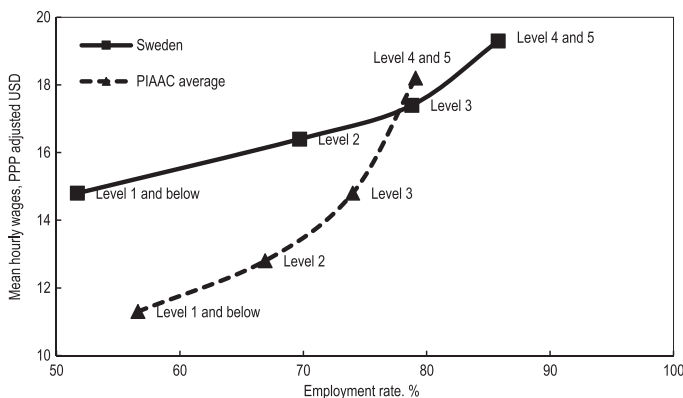
Adult education and training helps adults to improve their work-related skills or retrain in a specific subject, but it also functions as second chance school for those who dropped out during their studies. For instance, in 2000, 30 per cent of adults who took part in municipal adult education continued into higher education later on; similarly, almost half of young dropouts went back to higher education after participating in municipal education (Nordlund *et al.* 2013).

Sweden is also a strong performer on all the skills measured by PIAAC. It ranks above the Organisation for Economic Co-operation and Development (OECD) average on all three key competences – literacy, numeracy and problem solving in technology-rich environments. In literacy, Sweden ranks just below the top performers; and its mean score in numeracy is similar to those of Denmark, Norway, the Netherlands and Flanders (Belgium) (OECD 2013).

High skills are also very much in demand from employers. The compressed wage structure creates thresholds to enter employment, and both education and literacy skills affect employment opportunities. The share of adults with very low literacy skills (at most Level 1 in literacy proficiency) is smaller than the PIAAC average (13 and 16 per cent, respectively), but employment for the low-skilled is lower in Sweden than in the PIAAC average country. In contrast, employment is higher for all other skill levels. The groups with the highest literacy proficiency (Levels 4 and 5) have an employment rate of 86 per cent, compared to the PIAAC average of 79 per cent (figure 1). The mean literacy score for the unemployed and people out of the labour market is 30 points lower than for the employed. This gap is twice as high as on average in countries participating in PIAAC. Moreover, when excluding students, the gap increases to 45 points.

Figure 1

Wage compression, literacy and employment



Source: OECD 2015.

Sweden has a higher share of migrants in its population than the OECD average. In 2015, 17 per cent of the Swedish population was foreign-born. The immigrant share of the population has been growing steadily for some time, and labour migration has been largely replaced by humanitarian and family reunion migration during the past decades, with an impact on the skills composition of the migration population (Åslund *et al.* 2014; OECD 2012, 2016). This has an impact on their labour market outcomes and earnings (Bevelander and Pendakur 2014). For instance, family migrants and refugees are not selected according to employment-related criteria, and their skills might not match local needs (Bevelander and Irastorza 2014). The foreign-born are overrepresented among the unemployed and low-income workers (Åslund *et al.* 2014; Bonfanti and Nordlund 2012; Cedefop 2011; Nordlund *et al.* 2015). However, labour market outcomes vary substantially between ethnic groups (Åslund and Skans 2010).

Among the few work migrants from outside the EU, 80 per cent of those registered as residents in 2009 had a tertiary degree. Within the more numerous group of non-EU migrants with permanent residency for asylum reasons, more than 40 per cent had not completed upper secondary education (OECD 2011). The gap in literacy proficiency between native and foreign-born adults is considerably higher in Sweden (54 points) than in most other OECD countries (29 points on average), partly because the average score of natives is relatively high.

Relating this context to our research questions, we would expect that natives' high education and skills, along with high skill requirements from Swedish employers will make labour market integration of people born abroad challenging. This should be reflected in lower employment rates, lower wages and higher incidence of over-qualification mismatch compared to natives. Inferior labour market outcomes may reflect a lack of skills,

including education, language and processing skills, or the inability to fully exploit their home-country human capital (e.g. Bonfanti and Nordlund 2012; Cedefop 2011; Nordlund *et al.* 2015). On the other hand, Sweden has a long-standing extensive, multicultural and favourable immigration policy (Kogan 2003). Upskilling activities include intensive courses of Swedish for Immigrants (SFI), which are found to positively influence earnings and probabilities of being employed (Bonfanti and Nordlund 2012), formal education and other adult education and training activities. Such activities are expected both to increase migrants' skills and to enable better use of their existing human capital in the Swedish context.

Description of the Dataset and Key Variables

Using micro-data from the OECD Survey of Adult Skills (PIAAC), we first explore determinants of literacy in a standard ordinary least square (OLS) regression. Then we test the importance of literacy and migrant status on employment and job quality, defined as over-qualification mismatch, in logistic regressions, and how different forms of education can alleviate disadvantages. This section explains key variables from the PIAAC survey. Further controls are explained in order of appearance in the empirical section of the article.

The PIAAC micro-dataset includes test scores in literacy, numeracy and problem-solving in technology-rich environments as well as a rich set of background variables for individuals aged 16–64 residing in 24 participating regions and countries at the time of data collection in 2011 and 2012. Trained interviewers supervised the test and filled in the background questionnaire. Tests were taken in the official language(s) of the participating country, and completed either on a computer or on paper, depending on the respondents' computer skills. Respondents with very low skills took a test of basic reading skills instead of the full test. Sample sizes in the different countries and regions range from approximately 4,500 to 27,300. The total sample size for Sweden is 4,469, which reduces to slightly below 4,000 when removing full-time students. A detailed description of the dataset can be found in OECD (2013). A discussion of advantages and limitations of the dataset affecting migrants in particular can be found in Chapter 8 of OECD/EU (2014).

Origin

For the purpose of this article only the foreign-born are defined as migrants. To overcome limited sample sizes of migrants from individual origin countries, the population is split into four origin groups roughly reflecting geographical distance, economic development, language and cultural proximity; natives; migrants from North America and Western Europe; migrants from Central and Eastern Europe and migrants from other origin countries.² The latter group includes migrants from the Middle East, Africa, Asia and South America. It is not possible to break down PIAAC data by migration channel, but most humanitarian migrants are likely to be found in this group. Natives have higher literacy scores than the migrant groups,

higher employment, higher likelihood of having participated in adult education and training the last 12 months, lower incidence of over-qualification and lower incidence of low education. However, differences between migrant groups are also substantial. North American and Western European immigrants score higher than the two other migrant groups and almost compare with natives on most measures. Migrants from the Middle East, Africa, Asia and South America have the lowest literacy scores, the lowest employment and the highest incidence of only basic education. On the other hand, these immigrants are relatively likely to have earned their highest qualification in Sweden (table 1).

Table 1

Descriptive statistics

	Native	North America and Western Europe	Central and Eastern Europe	Other origin countries
Tertiary education	0.29 (0.46)	0.31 (0.46)	0.33 (0.47)	0.38 (0.49)
Upper secondary	0.53 (0.5)	0.38 (0.49)	0.38 (0.49)	0.36 (0.48)
Lower education	0.18 (0.38)	0.31 (0.46)	0.28 (0.45)	0.26 (0.44)
Literacy score	5.84 (0.8)	4.47 (1.24)	4.69 (1.16)	5.51 (0.96)
Employment rate	0.84 (0.36)	0.70 (0.46)	0.77 (0.42)	0.83 (0.37)
Participated in AET	0.62 (0.48)	0.53 (0.5)	0.49 (0.5)	0.60 (0.49)
Foreign with host qualification		0.54 (0.5)	0.43 (0.5)	0.49 (0.5)
Over-qualified	0.16 (0.37)	0.34 (0.47)	0.24 (0.43)	0.20 (0.4)
Population share	0.83	0.07	0.05	0.05
N	3,307	275	186	176

Note: Standard deviations in parentheses.

Education and training

Education refers to the highest completed level of education, and is divided into three categories: tertiary, upper secondary and below upper secondary education.³ Having obtained one's highest qualification in the host country has been found to have a positive impact on immigrants' labour market outcomes (OECD/EU 2014). Our dummy variable for having obtained qualifications in the host country has been constructed by matching the year of immigration with the year of obtaining the highest qualification.

A dummy for participation in adult education and training has been included. Formal and non-formal adult education and training includes any type of organized learning activity in which the person has participated the 12 months preceding the PIAAC survey, work-related or not, which might be still ongoing and lasted for at least one hour. Almost two-thirds of the Swedish adult population had participated in formal or non-formal adult education and training. Half participated for job-related reasons and 14 per cent participated for non-job related reasons. Participation in adult education

and training is high in an international context, but similar shares taking part in adult education and training are found in the other Nordic countries.

Across the PIAAC countries, the likelihood of participating in adult education and training is significantly higher for those having at least Level 3 literacy proficiency compared to those having literacy scores below Level 1. However, the differences in the probability of participating in adult education and training across literacy level groups are less pronounced in Sweden than in other countries most likely due to the easy access and widespread promotion of adult education and training (OECD 2013).

Literacy

Literacy is measured on a 500-point scale; a higher score corresponds to higher proficiency. Literacy measures both language skills and processing skills, as participants in the survey have to read and understand texts of varying complexity before answering to assignments corresponding to different proficiency levels, all in the native language of the country where the test was taken. Score points are divided into a 6-level scale describing different levels of functional literacy, ranging from 'Below Level 1' (175 PIAAC score points and below) to 'Level 5' (equal to or higher than 376 points). Individuals scoring at level 5 are highly skilled and able to search, integrate and utilize complex information on unfamiliar subjects to make high-level inferences, while those scoring at or below Level 1 can at best understand short, simple texts on familiar topics and solve simple assignments (OECD 2013).

Literacy proficiency increases with education level. Tertiary graduates in Sweden score 308 points on average on the PIAAC test, which is slightly above the OECD average among tertiary graduates, and almost 70 points (approximately 1.5 standard deviations) above the Swedish average for those with less than upper secondary education. However, variation within education levels is high, and origins affect both the literacy level and variation considerably. Natives generally score higher than immigrants for each education level, and the distribution is narrower for natives than for any of the migrant groups. North American and Western European tertiary graduates score almost at par with natives, but with somewhat higher variation. The other two migrant groups score significantly lower and exhibit considerably higher variation (figure 2).

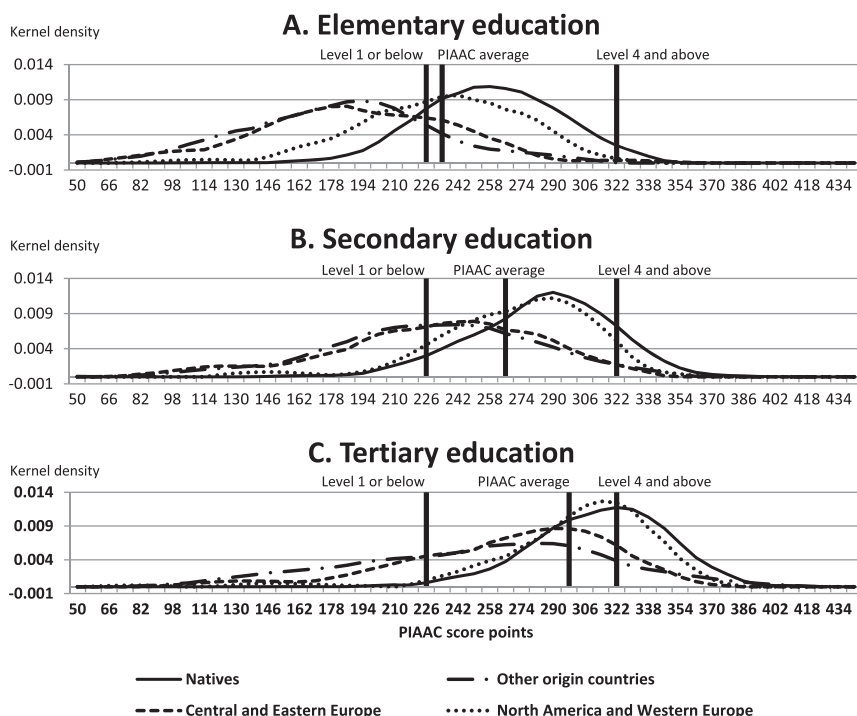
Labour market outcomes

The indicator for employment includes both those in full-time work and those who are working while studying part-time, but full-time students are excluded from the dataset.

The indicator of qualification mismatch is defined as follows: a benchmark of 'appropriate' qualifications⁴ required to get the job is created, based on the following question: 'If applying today, what would be the usual qualifications, if any, that someone would need to get this type of job?'. If the person has a qualification above (below) this benchmark, they are classified as over-qualified (under-qualified). Such self-reported measures of mismatch can be

Figure 2

Literacy scores by education level and origin



Source: The OECD Survey of Adult Skills 2012.

Note: The Kernel density is estimated using the Epanechnikov function.

subject biased due to the wording of the question or the impact of external variables, some of which may be country-specific. Their advantage is that they are job-specific, in contrast to mismatch measures based on occupational codes (Adalet McGowan and Andrews 2015).

A Model of Human Capital, Wage Structure and Labour Market Outcomes

To explore how education and training, skills and migrant background affect labour market outcomes in the presence of taxes and benefits, we develop a simple model of individual worker productivity. We start by assuming that the productivity of a worker is a linear function of her human capital (h), determined fully by her education level (s), basic skills, (b) and a broadly defined measure of skills portability between the country of origin and destination ($0 \leq (d) \leq 1$), which takes the value one for a native. This measure of portability of skills captures the productivity disadvantage of being

foreign-born, and can include various elements, such as geographical distance and differences in language and culture.⁴ White noise (ε_i) accounts for individual characteristics. For a person (i), emigrating from country 1 to country 2, her human capital would then be:

$$h_i = \alpha_0 + \alpha_1 s_i + \alpha_2 b_i + \alpha_3 d_{12} + \varepsilon_i$$

Productivity (p) would furthermore depend on the production structure of the country of residence including capital structure and institutions, here defined as a constant (a):

$$p_i = ah = a(\alpha_0 + \alpha_1 s_i + \alpha_2 b_i + \alpha_3 d_{12} + \varepsilon_i) \quad (1)$$

$$p_i = \beta_0 + \beta_1 s_i + \beta_2 b_i + \beta_3 d_{12} + \varepsilon_i$$

We model the compressed Swedish income distribution with a relatively high wage floor by introducing progressive taxation and a universal benefit. Disposable income is defined as a constant share ($1-\tau$) of a worker's productivity ($0 \leq \tau \leq 1$) exceeding a wage floor ($\bar{w}$) set by non-taxable benefit entitlements that are the same for all, regardless of employment status, education and background.⁵ For simplicity, it is assumed that the benefit level also sets the lower limit for earned income, and we thereby disregard the effect of any earned income tax credits. Individual i 's wage in employment is then given by the following equation:

$$w_i = \bar{w} + (1 - \tau)(\beta_0 + \beta_1 s_i + \beta_2 b_i + \beta_3 d_{12} - \bar{w} + \varepsilon_i),$$

which simplifies to:

$$w_i = (1 - \tau)(\beta_0 + \beta_1 s_i + \beta_2 b_i + \beta_3 d_{12} + \varepsilon_i) + \tau \bar{w}, \quad (2)$$

Assuming that individuals maximize disposable income, the breaking point between employment and inactivity is found in the point where benefits equal wages:

$$\bar{w} = (1 - \tau)(\beta_0 + \beta_1 s_i + \beta_2 b_i + \beta_3 d_{12} + \varepsilon_i) + \tau \bar{w},$$

which simplifies to:

$$\bar{w} = \beta_0 + \beta_1 s_i + \beta_2 b_i + \beta_3 d_{12} + \varepsilon_i \quad (3)$$

We define the function E_i , which takes the value 1 if the individual is employed, and 0 if not. We see that a higher benefit level will lower the likelihood of employment. In other words, individual human capital needs

to be higher to pass employment thresholds in the presence of a high wage floor. More productive capital structure and institutions reduce the employment threshold, directly and indirectly, through better utilization of human capital (4):

$$E_i = \begin{cases} 1 & (\beta_0 - \bar{w}) + \beta_1 s_i + \beta_2 b_i + \beta_3 d_{12} + \varepsilon_i > 0 \\ 0 & \text{else} \end{cases}, \quad (4)$$

Expressing (4) as a logistic regression, we define the indicator function I_{Ei} as follows, with k as the constant, encompassing both β_0 and $\bar{w}$:

$$I_{Ei} = \ln \left(\frac{P(E_i = 1)}{1 - P(E_i = 1)} \right) = k + \beta_1 s_i + \beta_2 b_i + \beta_3 d_{12} + \varepsilon_i \quad (5)$$

Over-qualification mismatch, individuals who work in jobs with lower formal requirements than their education level ($s_i > \bar{s}$), can be defined in a similar way. For a job, normally requiring a given education level ($\bar{s}$), and where over-qualification mismatch fully reflects productivity differentials, mismatch needs to be balanced by lower basic skills (b) or lower portability (d) than the average, well-matched colleague:

$$s_i > \bar{s} \Rightarrow \beta_2 (b_i - \bar{b}) + \beta_3 (d_{12} - \bar{d}) + \varepsilon_i < 0,$$

which simplifies to:

$$c + \beta_2 b_i + \beta_3 d_{12} + \varepsilon_i < 0,$$

$$\text{where the constant } c = -(\beta_2 \bar{b} + \beta_3 \bar{d}).$$

Keeping education constant yields the following mismatch function:

$$M_i = \begin{cases} 1 & c + \beta_2 b_i + \beta_3 d_{12} + \varepsilon_i < 0 \\ 0 & \text{else} \end{cases} \quad (6)$$

Expressing (6) as a logistic regression, we define the indicator function I_{Mi} as follows:

$$I_{Mi} = \ln \left(\frac{P(M_i = 1)}{1 - P(M_i = 1)} \right) = c + \beta_2 b_i + \beta_3 d_{12} + \varepsilon_i \quad (7)$$

Empirical Results and Discussion

Using the data from the PIAAC survey, we start by mapping how socio-economic background affects skills, notably for immigrants. Then we explore how skills affect employment and job quality, as outlined in the model. In

particular, we study whether migrants face additional difficulties not embedded in lower literacy, education and other relevant controls. We also study factors potentially improving outcomes, including adult education and training and formal qualifications. The regressions presented in this section should be interpreted with care, as they do not necessarily establish causal relationships between the variables in question.

Literacy scores and socio-economic background

We investigate the drivers of literacy proficiency in Sweden using an OLS multivariate regression. Controls are included for family situation, age, and parents' education. Education is included with controls for highest qualifications and whether or not an individual has participated in adult education and training for the past 12 months. Migrant dummies are included, according to the grouping explained above, and migrant-specific controls of language spoken at home, time of stay in Sweden and whether the highest qualification was attained in Sweden or elsewhere (table 2).

Table 2
Ordinary least square regression of literacy proficiency

	Literacy
North America and Western Europe	-0.21 (0.12)
Central and Eastern Europe	-0.95 (0.14)**
Other countries	-1.20 (0.16)**
Less than upper secondary education	-0.38 (0.04)**
Tertiary education	0.53 (0.03)**
Adult education and training	0.19 (0.04)**
Highest qualification obtained in host country	0.41 (0.09)**
Woman in couple	-0.10 (0.04)**
Single woman	-0.12 (0.04)**
Single man	-0.11 (0.05)*
Mother of child below 4 years of age	-0.15 (0.08)
Age less than 25	0.05 (0.06)
Age 25–34	0.04 (0.05)
Age 45–54	-0.18 (0.04)**
Age 55 and above	-0.42 (0.04)**
Neither parent has upper secondary education	-0.16 (0.04)**
At least one parent has tertiary education	0.13 (0.04)**
Immigrated less than five years ago	-0.43 (0.13)**
Native born, foreign language	-0.12 (0.10)
Foreign born, foreign language	-0.30 (0.12)*
Constant	5.88 (0.06)**
R^2	0.44 (0.02)**
N	3,756.00 (207.85)**

Notes: The reference group is a man with upper secondary education aged between 35 and 44. He is native-born, and at least one of his parents has attained upper secondary education. * $p < 0.05$; ** $p < 0.01$.

As expected, educational attainment is a good predictor for literacy scores. On average, those holding a tertiary degree score a half standard deviation higher than adults holding an upper secondary degree, while those having attained at most lower secondary education score significantly lower. Participation in adult education and training is also associated with significantly higher literacy. Average literacy scores decrease with age, especially for those aged over 45. Women and single men score on average somewhat lower than men in couples. In line with the literature, family background, measured as parents' educational attainment, has a significant impact on literacy scores (McIntosh and Vignoles 2001; OECD/EU 2014).

Foreign-born adults from all three destination groups have significantly lower literacy scores than the native-born, but the difference between groups is considerable. Migrants born in North America and Western Europe score only slightly below natives, and the difference is not statistically significant. The other two groups score approximately one standard deviation below natives. This corresponds to approximately one level below on the 6-level literacy scale, which implies significantly weaker functional literacy skills. As found in previous research (Aleksynska and Tritah 2013), the variable indicating the time spent in Sweden clearly shows that the longer people stay, the more they acquire literacy competences in Swedish, which is likely to lead to easier social and economic integration. Moreover, having obtained one's highest qualification in Sweden also implies significantly higher literacy.

Skills, origins and employment

In order to investigate the influence of skills and migrant background on employment, we start by running a logit regression on the log odds of being employed. Recalling equation 5 in the model section, we expect employment to be related to education and literacy levels, as well as migrant background. We include the same controls as in the literacy regression. However, we do not include the dummy for participation in adult education and training since the majority of participants, who participated for job-related reasons, were by definition employed during the past 12 months. We run the regression with and without controlling for literacy scores, and finally we run one regression where we only control for education, literacy and migrant origin (table 3).

Both literacy and educational attainment are statistically significant, which shows that high formal qualifications and high skills proficiency are both to some degree necessary to gain employment in Sweden.⁶ Controls for household type have a strong predictive power on employment in both specifications with the full set of controls. Age also matters, with younger and older cohorts less likely to be employed.

The labour market performance of immigrants varies with their region of origin. Significant employment penalties for the Central and Eastern Europe group and the group consisting of migrants from the Middle East, Asia, Africa and Latin America (table 3, column A) lose significance when controlling for literacy (column B). This implies that the employment penalties experienced by these groups are closely related to low language and processing

Table 3

Logit regressions on employment

	No literacy A	Literacy B	Basic C
Literacy proficiency		0.61 (0.08)**	0.73 (0.06)**
North America and Western Europe	-0.13 (0.22)	0.15 (0.24)	0.28 (0.22)
Central and Eastern Europe	-0.85 (0.24)**	-0.03 (0.27)	0.47 (0.25)
Other countries	-1.08 (0.23)**	-0.15 (0.28)	0.27 (0.22)
Less than upper secondary education	-0.80 (0.13)**	-0.57 (0.13)**	-0.66 (0.11)**
Tertiary education	0.67 (0.12)**	0.36 (0.13)**	0.34 (0.12)**
Highest qualification obtained in host country	0.16 (0.21)	-0.11 (0.25)	
Woman in couple	-0.51 (0.15)**	-0.48 (0.15)**	
Single woman	-0.86 (0.15)**	-0.82 (0.16)**	
Single man	-0.81 (0.18)**	-0.77 (0.19)**	
Mother of child below 4 years of age	-1.06 (0.23)**	-0.96 (0.24)**	
Age less than 25	-0.60 (0.24)*	-0.64 (0.24)**	
Age 25–34	-0.20 (0.21)	-0.22 (0.21)	
Age 45–54	-0.03 (0.20)	0.08 (0.21)	
Age 55 and above	-1.53 (0.17)**	-1.31 (0.17)**	
Neither parent has upper secondary education	-0.19 (0.17)	-0.07 (0.18)	
At least one parent has tertiary education	0.11 (0.17)	0.05 (0.17)	
Immigrated less than five years ago	-0.31 (0.33)	-0.04 (0.38)	
Constant	3.05 (0.22)**	-0.54 (0.46)	-2.33 (0.34)**
Pseudo R ²	0.15 (0.01)**	0.18 (0.02)**	0.12 (0.01)**
N	3,756.00 (207.85)**	3,756.00 (207.85)**	3,942.00 (219.73)**

Notes: The reference group is a man with upper secondary education aged between 35 and 44. He is native-born, and at least one of his parents has attained upper secondary education. *p < 0.05; **p < 0.01.

skills, as measured in the PIAAC literacy test. Time of stay and qualifications achieved in the host country also seem to affect employment mainly through their effects on literacy. Indeed, we find no significant employment penalties for the foreign-born when literacy is controlled for, also when we remove all additional controls, and only use the variables included in our model framework; education, literacy and migrant origin (column C).

Skills, origins and mismatch

Employment is only one dimension of labour market success. For a more complete picture, we also investigate the log odds of being over-qualified.

According to equation 7 in the model section, we expect over-qualification among the foreign-born to be captured in the origin dummies if over-qualification is mainly a result of incompatibility of foreign qualifications to Swedish employers' requirements, less efficient networks or lower search intensity because of migrants' shorter time horizons. On the other hand, if over-qualification results mainly from inferior language and processing skills, we expect it to be captured in literacy scores. We run two regressions where we include all the controls from the literacy regression, and also add controls for firm size,⁷ contract type,⁸ part-time workers and public vs private sector. To highlight the effect from education and training in the host country, we exclude participation in adult education and training and qualifications achieved in the host country in the first regression. We also re-run the two regressions, only controlling for literacy, migrant origin, and education and training (table 4).

Foreign-born from all origins are significantly more likely than natives to be over-qualified for their jobs, regardless of specification. Controlling for literacy has no significant effect on over-qualification, contrary to in the employment regressions. Participation in adult education and training (AET) and having completed the highest qualification in Sweden, on the other hand, reduce migrants' odds of mismatch considerably.

Firm size, contract type, working part-time and sector all significantly affect the likelihood of over-qualification, and coefficients are close to identical whether or not participation in adult education and training and qualifications achieved in the host country are controlled for. Neither age, nor parents' education contribute significantly to mismatch, and coefficients change little between specifications. Single persons are more likely to be over-qualified than persons in couples. The coefficient is significant for single women, but insignificant for single men. All coefficients for family situation dummies are close to identical in both specifications (table 4, columns A and B). To verify whether these controls are, nonetheless, affecting migrants differently to natives, we remove all controls except education, literacy and origin and re-run the two regressions (columns C and D). We find that the migrant dummies change only marginally.

These results, notably the strong positive effect of Swedish qualifications, point to the importance of gaining recognition of formal competences and the preference of Swedish employers for Swedish degrees (Åslund *et al.* 2014; Behtoui 2008; Borjas 1994; Chiswick 1978; OECD/EU 2014). Other possible explanations consistent with our results include the lack of networks, homogeneity of networks which may lead to fewer opportunities to find a good match, and workplace segregation (Åslund and Skans 2010; Åslund *et al.* 2014). The findings are also consistent with lower search intensity for immigrants with a shorter time perspective (Kalter and Kogan 2006), but search intensity has been found to be high among migrants to Sweden (Aldén and Hammarstedt 2014). Additional mechanisms that may be behind the high incidence of over-qualification among the foreign-born include discrimination (e.g. statistical discrimination or preference-based discrimination). More generally, the results reflect the importance of accumulating Sweden-specific human capital, also found in Nordlund *et al.* (2015). Our results strongly

Table 4

Logit regressions on over-qualification mismatch

	With all controls		Basic specification	
	A	B	C	D
Literacy	-0.06 (0.09)	-0.02 (0.09)	-0.02 (0.08)	0.05 (0.08)
North America and Western Europe	0.30 (0.31)	0.79 (0.34)*	0.31 (0.29)	0.83 (0.33)*
Central and Eastern Europe	0.78 (0.31)*	1.22 (0.31)**	0.74 (0.28)**	1.15 (0.30)**
Other countries	1.03 (0.23)**	1.74 (0.30)**	1.20 (0.19)**	1.98 (0.25)**
Tertiary education	0.02 (0.15)	0.01 (0.14)	-0.30 (0.12)*	-0.25 (0.12)*
Adult education and training		-0.37 (0.17)*		-0.69 (0.14)**
Highest qualification obtained in host country		-0.95 (0.31)**		-1.12 (0.27)**
Woman in couple	-0.03 (0.15)	-0.02 (0.15)		
Single woman	0.34 (0.17)*	0.35 (0.17)*		
Single man	0.32 (0.18)	0.32 (0.17)		
Mother of child below 4 years of age	-0.16 (0.33)	-0.11 (0.32)		
Age less than 25	0.22 (0.26)	0.14 (0.28)		
Age 25–34	0.04 (0.19)	0.06 (0.18)		
Age 45–54	0.04 (0.18)	0.03 (0.18)		
Age 55 and above	-0.11 (0.23)	-0.13 (0.23)		
Neither parent has upper secondary education	0.01 (0.15)	0.01 (0.15)		
At least one parent has tertiary education	-0.01 (0.14)	0.01 (0.14)		
Immigrated less than five years ago	0.42 (0.34)	0.00 (0.37)		
Firm size 1–10	-0.07 (0.16)	-0.07 (0.16)		

(Continued)

Table 4

(Continued)

	With all controls		Basic specification	
	A	B	C	D
Firm size 51–250	-0.36 (0.16)*	-0.34 (0.16)*		
Firm size 251–1,000	-0.80 (0.23)**	-0.79 (0.23)**		
Firm size above 1,000	-0.95 (0.26)***	-0.89 (0.26)**		
Fixed term contract	0.40 (0.24)	0.43 (0.24)		
Other non-regular contract	0.68 (0.29)*	0.64 (0.29)*		
Part-time worker	1.07 (0.20)**	1.00 (0.20)**		
Public sector	-0.62 (0.17)**	-0.58 (0.17)**		
Constant	-0.98 (0.56)	-1.01 (0.57)	-1.23 (0.45)**	-1.22 (0.46)**
Pseudo R ²	0.10 (0.02)**	0.11 (0.02)**	0.02 (0.01)**	0.05 (0.01)**
N	2,213.00 (125.25)**	2,213.00 (125.25)**	2,302.00 (130.74)**	2,302.00 (130.74)**

Notes: The reference group is a man with upper secondary education aged between 35 and 44. He is native-born, and at least one of his parents has attained upper secondary education. In addition, any individual not in employment is excluded from the sample, and the reference person is in addition to the above married or living in a couple, he is working full time on a regular contract in a private sector company with 11–50 employees. *p < 0.05; **p < 0.01.

suggest that over-qualification among the foreign-born is not related to their low literacy proficiency compared to natives.

Summary and Conclusions

Despite the limitations of the analyses, mainly relating to limited samples of foreign-born from individual destinations and the lack of granularity concerning different categories of adult education, some clear results emerge.

We show that educational attainment, parents' education, participation in adult education and training and migrant origin are important determinants of literacy proficiency, as recorded in the OECD PIAAC data. Among the foreign-born, there are also wide differences in literacy proficiency, based on geographical origin and whether their highest qualifications were achieved in Sweden or elsewhere.

Both the level of formal education and literacy proficiency are highly relevant in predicting employment. Migrants' employment rates are substantially lower than that of natives when controlling for education and other relevant background variables. However, we find that this employment penalty is tightly related to, and all but disappear, when also controlling for lower literacy proficiency.

This result could be interpreted to mean that the foreign-born are well-integrated in the Swedish labour market, taking individual backgrounds and literacy into account. However, we see that foreign-born individuals in employment are considerably more likely than natives to work in positions that are of lower status than justified by their formal qualifications. Our hypothesis that over-qualification is related to lower literacy proficiency is thoroughly rejected.

The incidence of migrants' over-qualification is highly sensitive to whether their formal qualifications have been achieved in Sweden or in another country. Participation in adult education and training in Sweden also reduces the incidence of over-qualification, highlighting that the gains from participation in education and training activities in Sweden likely do not only stem from formal qualifications recognized and preferred by Swedish employers, but also a considerable premium from accumulating other Sweden-specific human capital.

Lastly, to bring these findings together, we conclude that investment in the formal education of new immigrants pays triple dividends; formal qualifications boost literacy skills, notably when attained in Sweden; both education and the resulting skills improve employment prospects; and qualifications attained in Sweden strongly improve matching quality for immigrants. Participation in adult education and training, which does not necessarily lead to formal qualifications, has similar positive, but weaker, effects.

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Notes

1. The OECD Survey of Adult Skills is part of PIAAC (Programme for the International Assessment of Adult Competencies). Both terms are used interchangeably in this article.
2. Country coverage: Central and Eastern Europe: ALB, BGR, BIH, BLR, CZE, EST, HRV, HUN, LTU, LVA, MDA, MKD, POL, ROM, RUS, SVK, SVN, TUR, YUG. Western Europe and Northern America: AUT, BEL, CAN, CHE, CYP, DEU, DNK, ESP, FIN, FRA, FRO, GBR, GRC, GRL, IRL, ISL, ISR, ITA, LUX, MLT, NLD, NOR, PRT, SMR, SPM, (SWE), USA.
3. Measured by the International Standard Classification of Education (ISCED). Tertiary corresponds to ISCED 5 and 6, upper secondary to ISCED 3 and 4, and below upper secondary education to ISCED 0–2.
4. Low portability can also stem from sources at the individual level. Different legal frameworks in the origin and destination could for example make a law degree less portable than a medical degree. Such sources of reduced portability are not treated explicitly in this article.
5. A narrow income distribution in Sweden is not only a result of redistribution, but the sources of the narrow distribution are of little relevance to our analysis.
6. As unemployment and inactivity tend to result in skills deterioration, reverse causality may play a role in the relation between skills and employment.
7. Dummies for 1–10, 11–40, 51–250, 251–1,000 and 1,001+ employees.
8. Open ended, fixed term and 'other'.

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