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Overeducation among Immigrants in Sweden: Incidence, Wage Effects and State-dependence[*]

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Abstract

The utilization and reward of the human capital of immigrants in the labor market of the host country has been studied extensively. In the Swedish context this question is of great policy relevance due to the high levels of refugee migration and inflow of tied movers. Using Swedish register data covering the period 2001–2008, we analyze the incidence and wage effects of overeducation among non-Western immigrants. We also analyze whether there is state-dependence in overeducation and extend the immigrant educational mismatch literature by investigating whether this is a more severe problem among immigrants than among natives. In line with previous research we find that the incidence of overeducation is higher among immigrants and the return to overeducation is lower indicating that immigrants lose more from being overeducated. We find a high degree of state-dependence in overeducation both among natives and immigrants, but to a higher extent among immigrants.

Key words: educational mismatch, immigrants, wages, state-dependence
JEL-codes: J61, I21, J24, J31, F22.

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1. Introduction

Sweden has been an immigration country since WW2. During the 1950s, 1960s and early 1970s mainly labor migrants arrived, but since the 1980s the majority of entrants has been refugees and tied movers. In 2004 and 2007, when the European Union accepted twelve new member states, Sweden decided not to impose any transitional rules regarding mobility of workers from the new member states, and starting in December 2008 it also became easier for workers from countries outside EU/EES to get work permits. This makes Sweden one of the most open countries in the world.

Although employment has traditionally been higher among labor migrants than among refugees or tied movers, since the 1970s both groups have had employment rates below that of the natives. In 2009 the employment rate for foreign born men was about 68 percent compared to about 78 percent among native men. Among foreign born men and women from countries outside Europe the employment rate was only 57 percent (Eriksson 2011). Differences in human capital characteristics such as education, work experience and Swedish language proficiency but also discrimination are likely explanations for this gap. The educational attainment of immigrants is on average about the same as for natives, but the variation is larger. Many immigrants have higher education but many also have below completed secondary level education. The variation in educational attainment is large between immigrants arriving from different countries.

The utilization and reward of the human capital of immigrants in the labor market of the host country has been analyzed in a large number of studies. This is a question of great policy relevance in the Swedish context due to the high levels of refugee migration and inflow of tied movers to Sweden together with the low levels of employment of these groups.

Another question related to the employment situation of immigrants is to what extent they are correctly matched on the labor market. It is often assumed that due to limited

transferability of human capital an initial mismatch, or overeducation, can be expected. For Sweden it has been estimated that between 10 and 20 percent of native born workers are overeducated for their job, i.e. their educational qualifications exceed the norm in the occupation. The large variation in the estimate is due to different measurement methods as well as due to whether the estimate is reported for both genders together or separately by gender. Independently of how overeducation is measured, the incidence of overeducation is higher among immigrants than among natives (Dahlstedt 2011, Nielsen 2011, Wald & Fang 2008).

According to the career mobility hypothesis (Sichermand & Galor 1990) overeducation is a temporary phenomenon and should be seen as an investment in work experience which could lead to better employment opportunities in the future. A prerequisite for this to be true is however that choosing a job for which one is overeducated is voluntary. For many, and perhaps immigrants in particular, being overeducated is not voluntary but a result of mismatches on the labor market, difficulties for employers to recognize foreign credentials, or discrimination in the sense that employers do not trust the education of immigrants as a signal of ability, at least not in the same way as for natives, and require a higher educational level of immigrant applicants than what is actually needed for the job.

Recently there have been a few papers that investigate the dynamic aspects of overeducation, or overskilling. Mavromaras, Mahuteau, Sloane & Wei (2012) differentiate between simple persistence and state-dependence, where the former can be interpreted as the length of time an individual stays overeducated while the latter refers to previous overeducation having a causal effect on future overeducation. That is, state-dependence is present if an effect of lagged overeducation on future overeducation is found even after controlling for background factors that caused the overeducation in the first place. They find

using Australian HILDA data that there is a high degree of state-dependence in overskilling which contradicts the idea of overskilling being a temporary phenomenon.

Analyzing young unemployed Flemish (Belgian) graduates who accept a job below their level of qualifications, Baert, Cockx & Verhaest (2012) find that it takes a longer time for them to get at job which corresponds to their qualifications than what it would have taken had they continued to be unemployed. They conclude that these jobs do not act as stepping stones.

The perhaps most researched question regarding overeducation is what effect it has on wages. A persistent finding in the literature is that overeducated workers earn more than correctly matched workers in the same types of jobs but earn less than correctly matched workers with the same years of schooling (see e.g. Chiswick & Miller 2008, 2009b, Duncan & Hoffman 1981, Hartog 2000, Korpi & Tåhlin 2009). Studies focusing on the wage effects of overeducation for immigrants tend to find that the return to overeducation is lower for immigrants than for natives meaning that immigrants lose more from being overeducated than natives do (Nielsen 2011, Wald & Fang 2008).[1]

In this paper we address the questions of the incidence and wage effects of overeducation, thus bringing evidence on these issues in the Swedish case, and we also extend the analysis to include estimations of state-dependence. In particular, we study if state-dependence is a more severe problem for immigrants than for natives, which is a novel question in the literature on overeducation of immigrants. If this is the case, this is an indication of that overeducation is not only a passing problem for immigrants but that it may have scarring effects affecting the integration of immigrants also in the long run.

To empirically investigate the presence of state-dependence we estimate random effects dynamic probit models where we correct for the initial conditions by including controls for initial overeducation as has been suggested by Wooldridge (2005). We also apply the

[1] For an overview of the literature on educational mismatch of immigrants, see Piracha & Vadean (2012).

Mundlak correction for violation of the assumption of independence between the covariates and the error term (Mundlak 1978).

The remainder of the paper is structured as follows. In section two the literature in the area is reviewed, in section three the data, variables and methods are described, in section four the incidence of overeducation is discussed, in section five the returns to actual, required, over- and undereducation are analyzed, and in section six state-dependence in overeducation is analyzed. Section seven summarizes our findings and we draw some conclusions.

2. Previous Research

The literature on educational mismatch among immigrants is small but increasing, linking the immigrant wage assimilation literature founded by Chiswick and Borjas to the literature on overeducation (Duncan & Hoffman 1981, Hartog 2000, Verdugo & Verdugo 1989). Many studies find that immigrants have higher rates of overeducation than natives, though the size of the gap varies by immigrant ethnicity and the destination labor market. For instance, while the rates of immigrant overeducation tend to be higher than those for natives in many countries (see Battu & Sloane 2004 for Britain, Fernández & Ortega, 2008 for Spain, Lianos 2007 for Greece, Green, Kler & Leeves 2007 for Australia, and Nielsen 2010 for Denmark) substantially higher rates of immigrant *undereducation* compared to natives are found for US and Canada (Chiswick & Miller 2008, 2009b).

In the search for reasons underlying the immigrant educational mismatch, a natural starting point is to try to decompose the lower payoff to schooling for foreign born from non-Western countries compared to natives. Chiswick & Miller (2008) present a new decomposition technique that links overeducation to a less than perfect transferability of immigrants' human capital and undereducation to favorable selection in migration. Applying data from the 2000 U.S. Census, they find that while natives and immigrants receive about the

same return to the level of required education in the occupation. The lower payoff to schooling for immigrants is largely accounted for by the higher proportion of undereducated immigrant men relative to native men and their relatively strong wage performance. Thus, the evidence is consistent with the notion of self-selection of immigrants with superior ability or motivation to the US.

The same decomposition technique applied to Canadian data shows that the lower return to schooling of immigrants is not as affected by undereducation as in the US, since the effect is only twice as large as the effect of overeducation, whereas it is about ten times as large in the US (Chiswick & Miller 2009b). Evidence from Australia reveals, somewhat paradoxically, that over and undereducation are equally important in accounting for the lower payoff to schooling for immigrants, indicating that the Australian strict screening policy does not necessarily improve skill transfers across countries (Chiswick & Miller 2009a).

Our paper makes two contributions to this literature. First, evidence on immigrant educational mismatch is sparse in Sweden. Korpi & Tåhlin (2009) track education, wages and wage growth in Sweden over the period 1974-2000 and find significant differences in returns to education across matched categories even after that variation in ability is taken into account. Furthermore, they find that wage growth among overeducated workers does not exceed that of other groups. This means that overeducated workers in Sweden are penalized early on in their careers by a lower rate of return to schooling, and that this effect persists over time. They estimate both cross-sectional and fixed effects models correcting for unobserved ability effects. However, they do not distinguish between natives and immigrants. A recent paper by Dahlstedt (2011) on occupational match based on logistic match regressions run on the LISA database from 2003 confirms that immigrants have lower rates of match and higher rates of overeducation than the native population. He also shows that it is important to differentiate between immigrant groups regarding their country of origin – the Iraqi group in

particular display low levels of match and a high level of overeducation. More evidence from Sweden is needed, in particular for more recent cohorts.

Second, we extend the immigrant educational mismatch research area by estimating the extent to which there exists state-dependence in overeducation and if this appears to be a more severe problem among non-Western immigrants than among natives. Mavromaras & McGuinness (2012) analyze state-dependence in overskilling in the Australian labour market. Overskilling differs slightly from the concept of overeducation. They find evidence of state-dependence in particular among workers with higher education. They find no evidence of state-dependence among workers with vocational education. Their study is based on working age employees but does not distinguish between natives and immigrants.

Piracha, Tani & Vadean (2011) analyze the correlation between educational mismatch in home and host countries for immigrants arriving to Australia. They show that part of the higher incidence of overeducation among immigrants can be explained by that they have been overeducated already in their home country.

Dolton & Vignoles (2000) study persistence in overeducation and find that 38 percent of U.K. graduates were overeducated in their first job and that 30 percent were still overeducated six years later. Frenette (2004) investigates overqualifications among Canadian workers and finds that graduates who enter jobs for which they are overqualified shortly after graduation often remain overqualified in the near future. Analyzing transitions from overeducation using data for two consecutive years, Rubb (2003) finds that three out of four overeducated workers in year t are still overeducated in year $t+1$. In a recent paper, Cuesta & Budría (2011) use the German Socio-Economic Panel to analyze overeducation dynamics and personality. Their results on personality are in line with previous research suggesting that overeducation mainly reflects unobserved differences in personal characteristics such as ability or motivation.

Regarding state dependence in overeducation, their calculations suggest that almost 18 percent of the overeducation risk is due to individual state-dependence.

Our overview of the existing research on persistence and state-dependence in overeducation indicates that there is evidence of a fairly high degree of persistence. None of the above mentioned studies have however focused on heterogeneous effects across different groups of workers, like natives and immigrants. This paper adds to the literature in analyzing whether state-dependence is a more severe problem for non-Western immigrants than for natives. All regressions are also estimated separately by gender allowing us to investigate gender differences.

3. Data and Method

3.1. Definition of overeducation

In the overeducation literature different methods have been used to determine the educational norm within occupations – the required education. Each individual's educational attainment is then compared to the norm of the occupation. Individuals with higher educational attainment than the norm are defined as overeducated, while individuals with lower educational attainment than the norm are defined as undereducated. Individuals whose education is the same as the norm in the occupation are defined as correctly matched, or as having the required level of education.

One method to determine the educational norm within occupations is the so-called realized matches approach with the norm defined as the number of years of schooling within a one standard deviation range around the mean; individuals are defined as being undereducated, overeducated or having the required education in relation to this norm (Verdugo & Verdugo, 1989). A second method is to use the most frequently occurring

number of years of schooling, i.e. the modal value, within occupations to define the norm instead of the mean.

A third method is to define the norm by using job analysis. Professional job analysts determine the educational requirements for a job and the individual's educational attainment is compared to this. A fourth method is worker self-assessment where workers are asked in surveys about the educational requirements of their job.

There have also been other attempts at defining overeducation. Using survey data on UK graduates, Chevalier (2003) assumes that there are three types of jobs: graduate jobs, non-graduate jobs with intermediate skill level (upgraded jobs), and non-graduate jobs with low skill level. There are also two types of graduates: clever and underachievers. *Apparently overeducated* are under-achievers who have an upgraded job. *Genuinely overeducated* both consist of clever graduates in upgraded jobs and under-achievers in non-graduate jobs. Chevalier argues that genuinely overeducated who belong to the higher end of the skill distribution may move to a more qualified job over time while the other groups are less likely to do so.

Mavromaras & McGuinness (2012) measure overskilling, defined as a situation when wage-earners report that their skills are not fully utilized in their job, instead of overeducation. It has been argued that overskilling is a more robust measure of skills under-utilization than overeducation. However, information on overskilling is only available from surveys.

All methods have their weaknesses and strengths (see Hartog 2000 for a discussion) but in many cases the choice of method is driven by data availability. In our case, we do not have access to survey data so we cannot use self-assessed educational requirements for an individual's job as a way of measuring overeducation. Results from ORU earnings equations have been found to be robust to whether the reference level of education is measured according to realized matches or the worker self-assessment (Chiswick & Miller 2009).

3.2. Data and sample restrictions

We use Swedish register data for the period 2001–2008. The population is restricted to those who were employed in November each year, aged 25–57 years, and for whom we have information on both occupation and education. Occupations are classified using the SSYK-code in the Swedish registers. We define occupations at the three-digit level which leaves us with 113 occupational categories. Occupations with fewer than 100 workers are excluded and so are military personnel. Following previous literature we also exclude the self-employed.

When defining the norm we include workers who are between 25 and 57 years of age, who have not been enrolled in education during the year and who have been in Sweden for three years or more. The most recently arrived immigrants are excluded when we calculate the norm since we do not want them to influence our measure. However, they are included in the analysis of overeducation.

In section five we analyze the wage-effects of over, under and required education. Information on wages exists in the Swedish registers for all employees in the public sector and for a sample of employees in the private sector. About 45 percent of workers in the private sector are included in the wage regressions.

Although our main sample consists of all employed workers 25–57 years of age on whom we have information on both education and occupation, different parts of the analysis are based on slightly different samples. The probability of being overeducated is analyzed on the whole sample while the ORU-regressions estimated to analyze wage effects of overeducation are estimated on the sample of workers for which information on monthly wages exists. The analysis of state dependence in overeducation is based on a balanced panel for the period 2001–2008.

As mentioned before, to be included in the sample, there must be information on both occupation and education. Information on education is missing for a relatively large number

of immigrants, especially newly arrived immigrants. Information is missing on education for less than 0.1 percent of all natives and around 3 percent of all non-Western immigrants. Information on education is collected in different ways for different segments of the population. For those growing up in Sweden, either natives or foreign-born, information stems mainly from regular reports from the educational institutions to Statistics Sweden. This information is generally of high quality. For those with education dating back a few years, the 1990 census (the latest census in Sweden) has been used.[2]

Potential measurement error in education exists for those who have been educated in Sweden, if they also have studied abroad. For example, a person with a BA from a university in Sweden and a PhD from a university in the US will have a BA recorded as their highest degree according to the statistics, i.e., the Swedish degree is always counted as the highest one. There could be a difference between the foreign-born growing up in Sweden and native Swedes regarding how often they receive their highest degree from a country other than Sweden.

This problem will be more pronounced for the foreign-born who have immigrated after completing their education in their home country or in another country than Sweden. Those registered as new immigrants in Sweden are asked by Statistics Sweden to fill out a questionnaire with questions regarding their education, but many who receive the questionnaire do not answer it, which means that information is lacking for many newly arrived immigrants. However, the information received through this channel has been gradually complemented by other data sources; from the Public Employment Service for those who have been searching for work through an employment office, from the National Health Board for those who apply for a permit to work as medical doctors, dentists, nurses

[2] Employees at Statistics Sweden with good knowledge of the 1990 census indicate, however, that many may have reported an education level higher than their acquired one.

etc. Still, individuals for whom we have complete information on education may differ from those where information on education is lacking, meaning a potential selection problem. In part this selection problem is mitigated by omitting newly arrived immigrants when constructing the educational norms.

3.3. Econometric Analysis

In the empirical part of the paper, we first present the incidence of overeducation among natives and immigrants in Sweden. Second, we analyze wage-effects of over, under and required education by estimating the ORU-model first developed by Duncan & Hoffman (1981).

$$lnw_{it} = \beta_0 + \beta_1 UE_{it} + \beta_2 RE_{it} + \beta_3 OE_{it} + \delta X_{it} + u_{it} \qquad (1)$$

Undereducation is measured as years of deficit education in relation to the "norm" in the occupation which we either derive using the mean plus/minus one standard deviation or the modal years of schooling. Overeducation is in turn measured as the number of excess years of schooling an individual has. Years of undereducation is set to zero for all except for those who are defined as undereducated and years of overeducation is set to zero for all except for those who are overeducated. Required education corresponds to the number of years that is the norm within the occupation.

Since we use panel data and estimate both pooled cross sectional OLS regressions, the incidence of over and undereducation, as well as number of years of over and undereducation varies over both occupation and year. Hence, we allow the norm within the same occupation to change over time to account for compositional changes within occupations.

Many researchers have estimated the ORU-model. The results are remarkably consistent both over time and space (see Hartog 2000): (1) The returns to actual years of schooling are lower than the returns to required years of schooling; (2) The returns to overeducation are

positive, but smaller than the returns to required education, i.e. $\beta_3>0$ but $\beta_3<\beta_2$.This means that overeducated workers earn more than correctly matched workers in the same types of jobs but earn less than correctly matched workers with the same years of schooling; (3) The returns to undereducation are negative, but the estimate is smaller than the estimate for the returns to required education, i.e. $\beta_1<0$ but $|\beta_1|<\beta_2$.

One concern that has been raised is if unobserved heterogeneity can influence the results in previous studies (e.g. Chevalier 2003, Bauer 2002, Korpi & Tåhlin 2009, Nielsen 2011).[3] Bauer (2002) argues that controlling for unobserved heterogeneity might be important if individuals with lower ability need more education to acquire a job for which they are formally overeducated. He further argues that if there is a negative correlation between the probability of being overeducated and ability, then one would expect that we underestimate the returns to overeducation and overestimate the returns to undereducation when not controlling for unobserved heterogeneity.

In the case of immigrants, it can also be argued that some employers might require a stronger signal i.e., more formal education for the same job from an immigrant applicant than from a native. In the hiring process, a high level of education is an indication of high ability and conscientiousness, but this may be offset by a general skepticism towards people with a foreign background. Thus, it is not a priori clear how the results are expected to change by controlling for unobserved heterogeneity, in particular for immigrants, given that many studies point to a tendency of immigrants being discriminated against in the hiring process in the Swedish labor market (Carlsson & Rooth 2007, Bursell 2007, Arai, Bursell & Nekby 2010).

Arai, Bursell & Nekby (2010) use correspondence testing, which usually means that similar CVs with different types of names, i.e. native-sounding and foreign-sounding, are sent

[3] See Leuven & Oosterbeek (2011) for an extensive survey of previous results and a discussion about the problems with estimating causal wage-effects of over and undereducation.

as job applications to the same employer and for the same job opening. In their study they enhance the CVs of those with a foreign-sounding (Arabic) name by on average two years more of relevant work experience. For males, the increase of relevant work experience does not eliminate the lower call back rate for applicants with foreign-sounding names, but for women the gap in call back rates between applications with native and foreign-sounding names disappears.

Leuven & Oosterbeek (2011) are critical of the attempts that have been made to control for unobserved heterogeneity, both using fixed-effect models and instrumental variables. As a result, they argue that it is very difficult to get a credible estimate of the causal wage-effect of being over or undereducated.

The discussion above has mostly been about selection into over and undereducation and how it may be correlated with ability, given employment. Another type of selection stems from the fact that we observe the occupation only for those who are employed. In Sweden, one of the main issues in the debate about integration of immigrants is that their employment rate is substantially lower than that of natives. Previous research has also found evidence of employer discrimination in the hiring process (Carlsson & Rooth 2007, Bursell 2007, Arai, Bursell & Nekby 2010). Among highly educated individuals overeducation may be positively correlated with the probability of being employed.

To illustrate how different types of selection might affect our sample we present employment levels by gender, birth region, and educational level for all people in Sweden aged 25 to 57 years in 2008 in Table 1. The general tendency is that employment increases with educational attainment. Among native men included in our sample, almost 90 percent were employed in November 2008, which means that there is not much selection into the sample in this group; almost all are employed. Among native women, employment is slightly lower except for those with higher education of three years or more and those with post-

graduate education. For those two groups, the employment rates for women and men are about the same among natives.

Native men have about 25 percentage point higher employment rate than immigrant men. The difference is about the same between native and immigrant women. A number of factors affect the probability of immigrants getting a job given their education; where you live (Zenou, Åslund & Östh 2010), which type of job that you apply for[4] (Carlsson & Rooth 2007), and the period of arrival to Sweden (Åslund & Rooth 2007).

In Table 1 we also see that of all employed male immigrants about 13 percent are self-employed. Self-employment is often seen as an alternative for people that cannot find a job to create one for themselves (Moore 1983). Self-employment rates are, however, almost as high for natives as for immigrants.

The slightly higher share of self-employment, missing information on education for many and low employment rates result in that many of the immigrants who have succeeded in getting a job are highly educated. They have passed several thresholds before getting a job. But nevertheless, it is a question of interest how the human capital of these workers is utilized in the Swedish labor market.

[TABLE 1 ABOUT HERE]

3.4. Estimating state-dependence in overeducation

In the introduction it was argued that state-dependence in overeducation might be a more severe problem than just the incidence of overeducation. If it exists and is a more severe problem among immigrants than natives, this indicates that a higher incidence of overeducation among newly arrived immigrants is not only an initial problem but can have long-lasting negative effects on their labor market integration. Therefore, it is important to

[4] Carlsson & Rooth (2007) show that the degree of employer discrimination in the hiring process varies with the characteristics of the job and the workplace.

estimate the effect of earlier overeducation on future overeducation. To do this we estimate dynamic random effects probit models where lagged overeducation is the variable of interest,

$$OE_{it} = X'_{it}\beta + \gamma OE_{it-1} + \varepsilon_i + u_{it} \quad (2)$$

where ε_i is the unobserved heterogeneity which together with u_{it}, which is assumed to be *iid*, are components of the error term. To be able to establish if there is a direct effect of lagged overeducation on present overeducation net of all factors that affect the probability of being overeducated in the first place, we need to address two problems. The first is the so called initial conditions problem and occurs since the lagged dependent variable is likely to be correlated with the individual effect, ε_i. Unobservables that are correlated with the outcome in question will in almost all cases be correlated with the lagged dependent variable. Three different methods have been used to correct for this developed by Heckman (1981), Wooldridge (2005) and Orme (2001). A comparison of these three estimators has shown that none of them outperforms the other two, and all three estimators display in most cases satisfactory results. However, the Heckman estimator for which Stewart (2006) has developed a STATA code, is more time consuming than the other two (Arulampalam and Stewart 2009). We have therefore chosen to follow Wooldridge (2005), where the relationship between the individual effect and the lagged dependent variable is modeled conditional on the initial value of overeducation and exogenous explanatory variables.

The second problem arises because of the assumption of independence between the covariates and the error term. This is resolved by applying the Mundlak correction which in practice means that we include individual means of each of the time varying variables that are assumed to be correlated with the unobserved heterogeneity (Mundlak 1978). In our case individual means over age, number of children, years of schooling, and years in Sweden (for immigrants). The model to be estimated then becomes:

$$OE_{it} = X'_{it}\beta + \gamma OE_{it-1} + \delta OE_{i1} + \overline{X'_i}\alpha + \varepsilon_i + u_{it} \qquad (3)$$

4. The incidence of overeducation in Sweden

In this section we describe the incidence of overeducation in Sweden among natives and immigrants. In Table 2 we present the incidence of under and overeducation by gender and birth region for the entire Swedish population independent of educational level. We present the shares calculated using the realized matches method both using the mode and a one standard deviation range around the mean as the norm and the shares we obtain from job analysis. In performing job analysis, we follow Dahlstedt (2011) and define four educational groups and four occupational categories depending on the level of education. Dahlsted (2011) divide occupations into four mutually exclusive groups according to the level educational requirements for the job.

First of all we find that the incidence of overeducation differs depending on the method used for defining the norm for an occupation. Using the modal value as the norm generally gives us a much higher estimate of overeducation compared to the other methods, while the mean method and job analysis give similar results.[5] However, all methods show that the incidence of overeducation is higher among immigrants than among natives. Using the modal method, the incidence of overeducation among males is about 33 percent among natives and between 42 and 50 percent among non-Western immigrants, depending on birth region. Overeducation levels are only slightly lower for female natives and immigrants. These numbers are in line with what has been found for Denmark (Nielsen 2011), the US (Chiswick & Miller 2008) and Germany (Bauer 2002). Dahlstedt (2011) reports a similar incidence of overeducation using job analysis and Swedish register data for 2003.

[5] This has also been found in previous studies where both the mean and mode are used (see for example Bauer 2002 and Nielsen 2011).

To see how different variables jointly affect the probability of being overeducated we estimate pooled probit regressions over the years 2001–2008. In column 1 (men) and 3 (women) in Table 3 the dependent variable is overeducation defined using the mean method and in columns 2 and 4 overeducation is defined using the mode. All marginal effects are slightly larger using the modal value but the sign of the estimates are not affected by the way overeducation is defined. Most variables affect overeducation among men and women in a similar way. All groups of immigrants are more likely than natives to be overeducated although the difference increases with the birth regions' distance to Sweden. A more stable family situation as indicated by being married and larger family responsibilities measured by the number of children is associated with a lower probability of being overeducated for men. The number of children appears on the other hand to be associated with a higher probability of overeducation among women. Overeducation decreases with age in a non-linear way. Years of schooling is strongly correlated with overeducation, which is not surprising since overeducation hardly exists among those with lower education.

In Table 4 educational attainment and the ORU-variables are described in more detail. Native women have most schooling in terms of years (12.9) and the highest share with a long university education (30.0 percent). Native women hold jobs with the highest required education and they have the lowest number of years of overeducation. Immigrant men have the highest number of years of overeducation *and* the highest number of years of undereducation.

[TABLE 2, 3 & 4 ABOUT HERE]

5. The return to overeducation

With the descriptive evidence as background, in this section we analyze the returns to over and undereducation for natives and immigrants separately. Overall, the pattern for

women is very similar to that of men so we will only comment on some of the most apparent differences.

In the first and second columns in Table 5 the results for the return to actual schooling is presented separately for natives and non-Western immigrants. In line with previous research we find that the returns to actual schooling are lower for non-Western immigrants than for natives and lower for women than for men.

The estimates of the return to actual schooling may be affected by the degree of mismatches in the labor market as well as by the returns to under- and overeducation. For the US, Chiswick & Miller (2008) find that the payoff to schooling is lower for immigrants than for natives and a decomposition reveals that this is primarily a result of lower payoff to schooling among low-educated workers (upper secondary education for two years and below). The returns to over, under and required education in Sweden have previously been analyzed by Böhlmark (2003) and Korpi & Tåhlin (2009), but they do not compare natives and immigrants. A recent paper by Katz & Österberg (2011) analyze under and overeducation among second generation immigrants in Sweden. This paper is however more descriptive and do not focus on the returns to overeducation or state-dependence.

The return to required schooling can be interpreted as the return to schooling for correctly matched workers. When required schooling is entered linearly into the regression there is in practice no difference between natives and immigrants. This means that given that workers are correctly matched, the return to education is about the same. This result is consistent with findings presented in Chiswick & Miller (2008).

The return to undereducation is about the same for natives and immigrants; for each year of undereducation, wages drop by about 3 percent. There is however a large difference in the return to overeducation. It is substantially smaller for immigrants than for natives; for each year of overeducation wages increases by 6.0 percent for natives but only by 1.7 percent for

immigrants. Similar result has been found for Denmark (Nielsen 2011) and Canada (Wald & Fang 2008).

One of the regularities is that the estimate for required education is larger than the estimate for overeducation but both are positive. This means that overeducated workers earn more than correctly matched workers in the same kind of jobs but less than correctly matched workers with the same education. However, our estimations reveal that the difference in the estimates is much larger for immigrants than for natives and our interpretation is that overeducated immigrants earn only slightly more than correctly matched workers in the same kind of jobs (compressed wage distribution, no individual wage bargaining) but much less than correctly matched workers with the same education (large wage differences between the jobs that correctly matched and mismatched immigrants have, given the same amount of education).

To control for unobserved heterogeneity we estimate panel data models with individual fixed effects. Doing this we basically find the same patterns: the return to actual schooling is lower among immigrants, the return to undereducation and required education is about the same while the return to overeducation is substantially lower for immigrants (see Table 6).

Bauer (2002) argued that if there is a negative correlation between ability and overeducation, i.e. workers with lower ability would be more likely of being overeducated, the we would expect that the estimates in the pooled OLS model underestimate the return to overeducation. This is not consistent with our findings since the estimates of the return to overeducation, both for natives and immigrants, is lower in the specification where we control for unobserved heterogeneity. It is however interesting to note that the estimate for immigrants is much less affected by the inclusion of individual fixed effects then are the corresponding estimate for natives.

A conclusion to draw from these results is that immigrants appear to be gaining more from being correctly matched on the Swedish labor market than natives do. Or put differently, immigrants lose more from being overeducated in terms of lower wages. This is in contrast to the results for the US where immigrants gain more from being undereducated compared to natives (Chiswick & Miller 2008).

To summarize, we find that non-Western immigrants face a higher risk of being overeducated once they enter the labor market and lose more from being incorrectly matched. But is this a short run or long run phenomenon? We turn to this question in the next section.

[TABLE 5 ABOUT HERE]

6. State-dependence in overeducation

Mavromaras et al (2012) make a distinction between simple persistence and self-persistence, or state-dependence, where the former can be interpreted as the duration of time an individual stays overeducated while the latter refers to the fact that previous overeducation has a direct causal effect on future overeducation. That is, state-dependence is present if we find an effect of lagged overeducation on future overeducation once we have controlled for background factors that caused overeducation in the first place. They also argue that state-dependence is a more severe problem than persistence.

In this section we first describe (simple) persistence in overeducation by presenting the share that is still overeducated in 2002–2008 among those who were overeducated in 2001 in Table 7. The modal method has been used to define the educational norm. For native men, 50 percent are still overeducated in 2008, i.e. seven years after observed overeducation. For all groups of immigrants, the persistence is even stronger. Around 70 percent of those overeducated in 2001 are still overeducated in 2008. For all groups of women, outflow from overeducation is higher, compared to their male counterparts.

Chevalier (2003) argues that overeducation persistence would be lower for clever graduates in upgraded jobs, i.e. those who for some reason were mismatched during a year. It is difficult to apply this reasoning to a comparison between natives and immigrants, since there are factors other than ability that will affect the quality of the match for immigrants.

Next we turn to the results from the dynamic random effects probit models. For comparison we present the results from a random effects probit model without correcting for the initial conditions problem and without the Mundlak correction in Table 8, column 1 and 2 for men and in the corresponding columns in Table 9 for women. The results from the random effects probit model with both corrections for the initial conditions problem by inclusion of overeducation in period t=0, in our case year 2001, and the individual means over age, number of children, years of schooling, and years since migration for immigrants are presented in Colum 3 and 4 in Table 7 and 8.

In all models and for both natives and immigrants we find indications of a very high degree of state-dependence in overeducation. In the model with controls for initial overeducation the estimates are 2.4 for natives and 2.7 for non-Western immigrants. Using a similar method and Australian survey data over six waves, the highest estimate of lagged overeducation that is reported by Mavromaras & McGuinness (2012) is 1.13, i.e. substantially below the estimates we find. Although there are many factors to consider when making cross-country comparisons, it has been argued that overeducation might be more self-persistent in countries with more labor marked rigidities (Verhaest & Van der Velden, 2012).

Even if it is difficult to compare estimates across groups we can say something about the state-dependence among natives as compared to immigrants. First, we note that the standard errors of the estimates are small which makes the 95 percent confidence interval rather narrow. As a result, the confidence intervals of the same estimate for the two groups are not overlapping making the estimates of the lagged dependent variable for natives and immigrants

being significantly different from each other. It might thus seem reasonable to conclude that state-dependence is a more severe problem among immigrants than among natives but that it is exists and is fairly large also for natives.

Comparing men and women, both simple persistence and state-dependence is slightly lower among women and men, which might be explained by the sample of women being more select than the male sample or that women have an outside option.

One caveat when interpreting these results is that the variation in overeducation across years is small due to the way overeducation is defined. In the present regression, a person is defined as overeducated if years of schooling exceed the modal value of years of schooling in the occupation. To leave the overeducation state it is required that the worker moves to an occupation in which the modal value of years of schooling is equal to or exceeds the workers' education. If there is too little variation caused by too few year to year job transitions in the sample this might be a reason for the very high estimates. To allow for a longer transition period between jobs we have estimated similar models including a second lag in the regression. Overeducation in the previous year is still very large and significant. The second lag is much smaller although statistically significant and the difference in coefficient estimates between natives and immigrants is about the same as before.

7. Discussion

This paper studies educational mismatch among non-Western immigrants in Sweden. We first analyze differences in the incidence of overeducation and find that the incidence of overeducation is higher among all groups of immigrants than natives but the difference is larger for regions from which Sweden traditionally receives many refugees and tied movers. Turning next to the wage effects of educational mismatch, we find that on average the return to required schooling is about the same for natives and immigrants. However, the return to

overeducation is substantially smaller for immigrants than for natives; immigrants lose much more from not being correctly matched than natives do. This is in contrast to the results for the US where immigrants gain more from being undereducated compared to natives. In the Swedish case the lower payoff to schooling for immigrants is due to a greater penalty to being overeducated for immigrants in Sweden and not due to a higher return to undereducation as in the US. Thus, in both settings there is an issue of ineffective use of overeducation at high levels, but in the Swedish case, the mechanism behind the lower payoff to schooling for immigrants relative to natives seems to be a failure for individuals with less than high-school education to find a job commensurate with their qualifications.

However, there are some caveats to our analysis. The estimates of the returns to actual, required, under and overeducation presented in this paper should be interpreted with some care. There are several sources of selection that might influence our results. First, employment among immigrants is low and hence those who have a job are not a random sample of the immigrant population. Second, selection into over or undereducation is not random. It is difficult to determine in which direction the selection goes. Some have argued that there is negative correlation between ability and the probability of being overeducated since less able workers might require a higher education to perform a job for which the formal requirements actually are lower. But in the paper we argue that this might not be true for immigrant workers. Employers may see overeducation as a signal of ability and conscientiousness and prefer to hire immigrant workers with a higher education than what is actually needed to perform the job instead of hiring an immigrant worker with the required educational qualifications.

The third part of the paper consists of analyzing state-dependence in overeducation, in particular if this appears to be a more severe problem among immigrants than among natives. We find that there is a very high degree of state-dependence in overeducation among natives

as well as among immigrants, but it is stronger for immigrants than for natives. One hypothesis that might explain this result is that job mobility is lower for immigrants compared to natives in Sweden, and hence will result in a greater degree of state-dependence in a spell of overeducation. Looking at job switches between consecutive years in our data, 13.9 percent of native women compared to 14.8 percent among immigrant women have changed workplace from one year to the next. For men the corresponding figures are 13.7 percent and 13.9 percent. [6] Estimating the probability of changing workplace in a regression framework and controlling for years of schooling, age, being married, having young children, sector, and municipality, we find that native women and men have a slightly higher probability of changing workplace compared to non-western immigrant women. This is also what we find for native men. Hence, in our sample it does not appear to exist large differences in job mobility between natives and immigrants. It could still be the case that natives gain more from switching jobs in terms of better matches and wage growth than what immigrants do. Whether this is due to a higher arrival rate of job offers commensurate with their qualifications or higher search effort on the part of natives to find such jobs is an issue left for future research.

Another possible explanation for more severe state-dependence among immigrants is that natives to a higher extent choose a job for which they are overqualified for as part of their career plan while immigrants to a larger extent involuntarily are forced into jobs which they are overqualified for and also to a larger extent are trapped into mismatches on the labor market.

[6] These figures are for the same sample as we use to estimate state-dependence in overeducation, i.e. it includes individuals with and without information on wages that are in the sample for eight consecutive years.

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Tables and Figures

Table 1 Employment among 25-57 year olds in November 2008, percent

	Men		Women	
	Natives	Non-Western immigrants	Natives	Non-Western immigrants
All	88.5	61.5	85.6	53.8
Employment by educational level				
Primary school less than 9 years	71.0	47.9	54.8	36.7
Primary school 9(10) years	79.5	57.3	67.0	45.1
Upper secondary 2 years or less	88.5	67.7	83.8	61.6
Upper secondary more than 2 years	90.8	72.6	87.4	63.7
Higher education less than 3 years	90.0	62.3	86.0	55.3
Higher education 3 years or more	92.7	65.9	92.5	64.6
Post graduate education	94.8	69.8	93.8	68.3
Employment for those with missing information on education	*23.1*	*31.3*	*11.1*	*12.8*
Number of observations	1,653,515	268,476	1,575,726	283,422
Employed as wage-earners, given employment	88.3	87.0	94.9	93.5
Per cent with missing information on education, given employment as wage-earner	0.09	4.14	0.03	1.50
Number of observations	1,291,129	143,741	1,280,799	142,538

Table 2 Incidence of over and undereducation by birth region and gender among those aged 25-57 years in 2008

Region	Mean			Mode			Job analysis		
Men	Correctly matched (%)	Over-educated (%)	Under-educated	Correctly matched (%)	Over-educated (%)	Under-educated	Correctly matched (%)	Over-educated (%)	Under-educated
Sweden	71.9	11.9	16.3	36.0	33.2	30.8	56.0	16.2	27.8
Other Nordic countries	64.5	11.2	24.3	36.5	25.3	38.2	52.6	15.3	32.1
EU15	56.7	26.6	16.7	23.9	43.7	32.4	53.1	26.9	20.0
Rest of Europe	65.9	20.4	13.7	22.7	47.7	29.6	57.5	27.4	15.1
Africa	55.1	26.2	18.6	18.3	48.6	33.1	48.2	35.7	16.1
North America	54.9	32.6	12.5	22.0	50.0	28.1	50.0	34.4	15.5
South America	62.9	20.2	16.9	24.9	44.3	30.8	50.5	29.9	19.5
Asia	53.6	23.9	22.5	20.9	42.2	36.9	49.1	29.5	21.5
Women									
Sweden	76.4	12.4	11.2	39.3	31.1	29.6	60.9	22.0	17.1
Other Nordic countries	70.6	12.8	16.6	35.1	27.7	37.2	58.5	21.7	19.9
EU15	62.1	23.6	14.3	29.9	40.5	29.5	56.0	28.6	15.3
Rest of Europe	62.4	23.6	14.0	25.4	48.6	26.1	53.2	35.5	11.3
Africa	60.1	17.9	22.0	23.1	39.9	37.0	55.9	26.7	17.4
North America	59.2	30.3	10.6	27.9	48.1	24.0	53.2	35.1	11.7
South America	64.3	21.6	14.1	27.5	44.5	27.9	53.6	32.8	13.6
Asia	55.8	22.2	22.0	24.4	41.3	34.3	52.0	32.1	15.9

Note: Overeducation among immigrants from Oceania and Soviet Union is not shown due to small sample sizes.
To present the incidence of over- and undereducation using job analysis we rely on the division into four occupational categories and four educational groups done in Dahlstedt (2011)

Table 3 Probit estimates (marginal effects) for the probability of being overeducated in 2001–2008

	Men		**Women**	
	Overeducation (mean)	Overeducation (mode)	Overeducation (mean)	Overeducation (mode)
Region of birth				
Sweden	Ref.	Ref.	Ref.	Ref.
Other Nordic countries	0.011***	0.003***	0.012***	0.020***
	(0.000)	(0.001)	(0.000)	(0.001)
EU15	0.014***	0.030***	0.004***	0.015***
	(0.001)	(0.002)	(0.001)	(0.002)
Rest of Europe	0.066***	0.188***	0.066***	0.178***
	(0.001)	(0.001)	(0.001)	(0.001)
Africa	0.115***	0.214***	0.093***	0.138***
	(0.002)	(0.002)	(0.002)	(0.002)
North America	0.055***	0.086***	0.032***	0.063***
	(0.002)	(0.003)	(0.002)	(0.003)
South America	0.076***	0.148***	0.076***	0.136***
	(0.001)	(0.002)	(0.001)	(0.002)
Asia	0.068***	0.125***	0.069***	0.119***
	(0.001)	(0.001)	(0.001)	(0.001)
Oceania	0.060***	0.090***	0.026***	0.028***
	(0.004)	(0.008)	(0.004)	(0.009)
Soviet Union	0.018***	0.009	0.051***	0.116***
	(0.004)	(0.009)	(0.003)	(0.006)
Age	-0.005***	-0.078***	-0.005***	-0.045***
	(0.000)	(0.000)	(0.000)	(0.000)
Age squared	0.046***	0.862***	0.052***	0.427***
	(0.001)	(0.002)	(0.001)	(0.002)
Number of children	-0.002***	-0.003***	-0.002***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Married	-0.010***	-0.017***	-0.009***	-0.022***
	(0.000)	(0.000)	(0.000)	(0.000)
Years of schooling	0.044***	0.118***	0.041***	0.092***
	(0.000)	(0.000)	(0.000)	(0.000)
Firm size	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of observations	9,529,410		9,526,181	

Note: The models also include controls for sector (five categories), industry (11 categories), county (21) and year dummies. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4 Sample means for natives and immigrants in 2008

	Men		Women	
	Natives	Non-Western immigrants	Natives	Non-Western immigrants
Years of schooling	12.3	12.2	12.9	12.4
(std.dev)	(2.3)	(2.8)	(2.2)	(2.9)
Level of education				
Primary school less than 9 years	0.8	7.1	0.3	9.1
Primary school 9(10) years	10.9	9.4	6.1	7.2
Upper secondary 2 years or less	30.2	24.5	25.1	21.4
Upper secondary more than 2 years	22.0	21.6	21.4	20.0
Higher education less than 3 years	15.0	14.3	16.2	13.2
Higher education 3 years or more	19.8	20.8	30.0	27.5
Post graduate education	1.4	2.2	0.8	1.5
Years of (using the mean +/- 1 st.dev):				
Undereducation	0.14	0.24	0.10	0.26
Required education	12.46	12.02	12.79	12.16
Overeducation	0.13	0.38	0.13	0.35
Years of (using the mode):				
Undereducation	0.69	0.76	0.55	0.69
Required education	12.41	11.56	12.82	11.96
Overeducation	0.62	1.08	0.59	1.08
Number of observations	1,265,344	125,621	1,165,324	133,242

Table 5 Returns to actual, required, over and undereducation. Pooled OLS regression 2001–2008

	Actual schooling, **men**		Under-, required and overeducation, **men**		Actual schooling, **women**		Under-, required and overeducation, **women**	
	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants
Schooling	0.063**	0.043**			0.055**	0.038**		
	(0.000)	(0.000)			(0.000)	(0.000)		
UE_mode			-0.033**	-0.030**			-0.031**	-0.027**
			(0.000)	(0.000)			(0.000)	(0.000)
RE_mode			0.078**	0.075**			0.064**	0.066**
			(0.000)	(0.000)			(0.000)	(0.000)
OE_mode			0.060**	0.017**			0.047**	0.013**
			(0.000)	(0.000)			(0.000)	(0.000)
R-squared	0.433	0.410	0.464	0.503	0.436	0.405	0.462	0.506
Number of observations	5,413,151	420,554	5,413,151	420,554	6,929,785	543,752	6,929,785	543,752

Note: The models also include controls for age, age squared, marital status, having young children, years since migration (for immigrants), sector (five categories), municipality, birth region for immigrants (six categories) and year dummies. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6 Returns to actual, required, over and undereducation. Panel data models with individual fixed effects 2001–2008.

	Actual schooling, **men**		Under-, required and overeducation, **men**		Actual schooling, **women**		Under-, required and overeducation, **women**	
	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants
Schooling	0.025**	0.020**			0.017**	0.014**		
	(0.000)	(0.001)			(0.000)	(0.001)		
UE_mode			-0.024**	-0.022**			-0.018**	-0.017**
			(0.000)	(0.001)			(0.000)	(0.001)
RE_mode			0.028**	0.024**			0.020**	0.018**
			(0.000)	(0.001)			(0.000)	(0.001)
OE_mode			0.025**	0.015**			0.015**	0.007**
			(0.000)	(0.001)			(0.000)	(0.001)
R-squared	0.333	0.345	0.334	0.348	0.401	0.387	0.402	0.391
Number of observations	5,413,151	422,451	5,413,151	422,451	6,929,785	545,849	6,929,785	545,849

Table 7 Persistence in overeducation. The percentage among those who were overeducated in 2001 that was also overeducated in subsequent years.

Region	2002	2003	2004	2005	2006	2007	2008
Men							
Sweden	83.1	76.5	65.6	61.6	58.9	57.4	50.5
Other Nordic countries	85.5	79.8	70.4	66.9	65.7	64.2	58.4
EU15	90.7	84.8	75.6	73.0	70.9	69.4	63.8
Rest of Europe	86.3	77.4	69.0	67.2	65.3	64.3	61.2
Africa	91.2	79.1	74.3	72.9	71.2	68.9	66.0
North America	91.6	87.0	80.7	76.6	75.1	74.4	69.5
South America	89.9	77.4	71.7	69.4	67.1	66.3	62.8
Asia	92.3	85.9	79.2	77.7	76.0	74.5	71.1
Women							
Sweden	87.9	77.9	61.8	59.0	56.0	51.7	45.3
Other Nordic countries	90.0	79.8	68.1	66.2	64.2	59.5	54.3
EU15	91.2	82.8	73.5	70.5	67.9	65.1	60.2
Rest of Europe	92.3	77.0	67.7	66.8	64.7	62.9	59.4
Africa	92.0	78.9	74.4	73.1	71.3	68.9	65.7
North America	90.5	84.8	76.8	74.1	71.9	70.4	62.8
South America	92.5	80.0	69.7	68.9	67.6	65.1	61.6
Asia	92.0	84.0	74.5	73.0	71.1	68.4	65.3

Table 8 State-dependence in overeducation, men.

	Random effects probit, 2002-2008				Random effects probit, 2002-2008 – Wooldridge estimator with Mundlak correction			
	Natives	Non-Western immigrants	Natives	Non-Western immigrants	Natives	Non-Western immigrants	Natives	Non-Western immigrants
Overeducation t-1	3.235***	3.582***	2.701***	2.934***	2.445***	2.670***	2.566***	2.878***
	(0.002)	(0.010)	(0.004)	(0.020)	(0.005)	(0.023)	(0.005)	(0.021)
Overeducation t-2			0.627***	0.756***			0.297***	0.406***
			(0.004)	(0.020)			(0.005)	(0.023)
Overeducation t=0					1.433***	1.764***	0.776***	0.583***
					(0.009)	(0.052)	(0.008)	(0.031)
Age	-0.065***	-0.012	-0.051***	-0.004				
	(0.002)	(0.007)	(0.002)	(0.008)				
Age squared	0.705***	0.194**	0.545***	0.108				
	(0.020)	(0.088)	(0.023)	(0.101)				
Number of children	-0.003**	-0.004	-0.001	-0.004				
	(0.001)	(0.005)	(0.001)	(0.005)				
Married	-0.031***	-0.013	-0.029***	-0.016	-0.052***	-0.023	-0.035***	-0.012
	(0.003)	(0.011)	(0.003)	(0.013)	(0.004)	(0.017)	(0.003)	(0.013)
Years of schooling	0.149***	0.127***	0.143***	0.119***				
	(0.001)	(0.002)	(0.001)	(0.002)				
Years since migration		-0.011***		-0.011***				
		(0.001)		(0.001)				
Means over time								
Age					-0.117***	0.019	-0.086***	0.015
					(0.003)	(0.013)	(0.003)	(0.010)
Age squared					1.343***	-0.157	0.983***	-0.116
					(0.036)	(0.161)	(0.031)	(0.119)
Number of children					-0.000	-0.004	-0.001	-0.004
					(0.002)	(0.008)	(0.002)	(0.006)

Years of schooling					0.218***	0.167***	0.172***	0.108***
					(0.001)	(0.004)	(0.001)	(0.003)
Years since migration						-0.016***		-0.011***
						(0.001)		(0.001)
Constant	-2.622***	-3.510***	-2.847***	-3.619***	-3.049***	-5.232***	-2.830***	-3.940***
	(0.034)	(0.153)	(0.040)	(0.179)	(0.061)	(0.277)	(0.052)	(0.204)
Number of observations	4,866,487	298,287	4,138,386	253,142	4,866,487	298,908	4,138,386	253,759
Number of individuals	710,939	43,845	706,535	43,531	710,939	43,847	706,535	43,586
sigma_u	0.0007	0.0008	0.0015	0.0018	0.7295	0.7839	0.4556	0.2339
	(0.0004)	(0.0015)	(0.0006)	(0.0022)	(0.0043)	(0.0214)	(0.0051)	(0.0300)
rho	5.01e-07	6.69e-07	2.41e-06	3.29e-06	0.3473	0.3806	0.1719	0.0519
	(5.41e-07)	(2.45e-06)	(1.79e-06)	(7.89e-06)	(0.0026)	(0.0128)	(0.0032)	(0.0125)
lnsig2u	-14.507***	-14.217***	-12.935***	-12.626***	-0.631***	-0.487***	-1.572***	-2.906***
	(1.079)	(3.659)	(0.744)	(2.401)	(0.012)	(0.054)	(0.023)	(0.254)

Note: The models also include controls for sector (five categories), county (21) and birth region for immigrants (six categories). Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9 State-dependence in overeducation, women.

	Random effects probit, 2002-2008				Random effects probit – 2002-2008 Wooldridge estimator with Mundlak correction			
	Natives	Non-western immigrants	Natives	Non-western immigrants	Natives	Non-western immigrants	Natives	Non-western immigrants
Overeducation t-1	2.961***	3.298***	2.542***	2.793***	2.478***	2.637***	2.403***	2.722***
	(0.002)	(0.009)	(0.004)	(0.018)	(0.004)	(0.020)	(0.005)	(0.020)
Overeducation t-2			0.470***	0.587***			0.236***	0.343***
			(0.004)	(0.018)			(0.005)	(0.022)
Overeducation t=0					0.815***	1.207***	0.625***	0.520***
					(0.006)	(0.038)	(0.007)	(0.030)
Age	-0.014***	-0.016**	0.009***	0.006				
	(0.002)	(0.007)	(0.002)	(0.008)				
Age squared	0.056***	0.239***	-0.186***	0.005				
	(0.020)	(0.086)	(0.022)	(0.097)				
Number of children	0.002	0.014***	-0.000	0.012**				
	(0.001)	(0.005)	(0.001)	(0.005)				
Married	-0.036***	-0.006	-0.032***	-0.001	-0.044***	-0.003	-0.034***	0.004
	(0.002)	(0.010)	(0.002)	(0.011)	(0.003)	(0.014)	(0.003)	(0.012)
Years of schooling	0.128***	0.123***	0.128***	0.115***				
	(0.001)	(0.002)	(0.001)	(0.002)				
Years since migration		-0.012***		-0.011***				
		(0.001)		(0.001)				
Means over time								
Age					-0.004	-0.002	0.003	0.006
					(0.003)	(0.012)	(0.003)	(0.010)
Age squared					-0.066**	0.083	-0.142***	-0.012
					(0.031)	(0.147)	(0.032)	(0.123)
Number of children					0.007***	0.019***	0.004**	0.013**
					(0.002)	(0.007)	(0.002)	(0.006)

Years of schooling					0.153***	0.153***	0.149***	0.113***
					(0.001)	(0.004)	(0.001)	(0.003)
Years since migration						-0.017***		-0.014***
						(0.001)		(0.001)
Constant	-3.206***	-3.253***	-3.721***	-3.665***	-4.029***	-4.275***	-4.089***	-3.706***
	(0.034)	(0.148)	(0.039)	(0.170)	(0.053)	(0.247)	(0.055)	(0.208)
Observations	4,406,600	276,453	3,776,853	236,910	4,406,600	276,838	3,776,853	237,292
Number of individuals	629880	39547	629779	39512	629880	39550	629779	39550
sigma_u	0.0011	0.0013	0.0032	0.0007	0.5290	0.6636	0.5115	0.3421
	(0.0005)	(0.0019)	(0.0014)	(0.0024)	(0.0038)	(0.0184)	(0.0049)	(0.0239)
Rho	1.23e-06	1.64e-06	0.0000	5.33e-07	0.2187	0.3057	0.2074	0.1048
	(1.16e-06)	(4.79e-06)	(8.97e-06)	(3.52e-06)	(0.0025)	(0.0118)	(0.0031)	(0.0131)
lnsig2u	-13.608***	-13.322***	-11.469***	-14.445**	-1.273***	-0.820***	-1.341***	-2.145***
	(0.945)	(2.922)	(0.859)	(6.615)	(0.015)	(0.056)	(0.019)	(0.140)

Note: The models also include controls for sector (five categories), county (21) and birth region for immigrants (six categories). Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

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