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Immigrant Over- and Under-education: The Role of Home Country Labour Market Experience

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Immigrant Over- and Under-education: The Role of Home Country Labour Market Experience[*]

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(Revised version)

Abstract

Literature on the immigrant labour market mismatch has not explored the signal provided by the quality of home country work experience, particularly that of education-occupation mismatch prior to migration. We show that type of work experience in the home country plays a significant role in explaining immigrant mismatch in the destination country's labour market. We use the Longitudinal Survey of Immigrants to Australia and find that having been over-educated in the last job held in the home country increases the likelihood of being over-educated in Australia by about 45 percent. Whereas having been under-educated in the home country has an even stronger impact, as it increases the probability to be similarly mismatched in Australia by 61 percent.

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1. Introduction

Most of the existing literature in labour economics has argued that education is the key signal employers' use in determining the level of ability/productivity about those they are likely to employ. However, there is an argument that as the number of working years increases the strength of the education signal diminishes. For instance, Belman and Heywood (1997) has shown that "the returns to education signals will attenuate with workforce experience" as the skills used and/or developed in previous jobs become more important in determining the real productivity level of potential employees. Skills gained through professional experience might be from jobs that do not match the individual's education level and, thus, might affect future job prospects in a diverging way. For example, having accumulated experience and skills below the education level may result in a lower probability of getting job offers that match the formal educational qualifications. Conversely, having advanced in a previous job to a position involving more knowledge and skills than the ones matching formal education may result in getting subsequent offers for jobs that require a relatively higher education level as well.

Recent research on immigrants' over/under-education has typically focused only on the formal education qualifications of migrants and has compared the possible labour market mismatch of immigrants or ethnic minorities (i.e., second/third generation migrants) with natives. There is an almost universal consensus in the literature that immigrants are more often over-educated than their native counterparts and the authors forward different, and very plausible, arguments for this disparity. These range from imperfect international transferability of human capital to discrimination in the labour market to, perhaps, a combination of language and country of origin effect (Chiswick and Miller 2009; Green *et al*. 2007).

However, the extant literature on the labour market mismatch of immigrants does not appear to have explored the possible impact of home country work experience signal, particularly the existence of education-occupation mismatch prior to migration. We attempt to fill this gap by including the role of home country over-/under-education as an additional determinant of immigrants' over-/under-education in the host country's labour market. In other words, we want to explore the possible role of the home country's labour market signal on the incidence of mismatch in the host country. Our main hypothesis is that the imperfect transferability of human capital or discrimination in the host country does not exhaust the possible explanations for an immigrant's mismatch: we explicitly test for the possibility that the last job held prior to migration is a strong signal of a migrants' ability for a host country's

employer. This analysis, therefore, will provide some evidence towards the role of the *level* of skills accumulated in previous jobs in the home country (i.e., below or above the education level) in explaining the incidence of subsequent mismatch in the host country, instead of, or in addition to those typically inferred to in the existing literature.

In order to conduct the analysis, we exploit the Longitudinal Survey of Immigrants to Australia (LSIA), which contains detailed information about immigrants' education level, their occupation in Australia since arrival as well as their occupation in the home country in the 12 months prior to migration. Australia has a selective immigration policy, favouring immigrants who are young, highly educated and with prior work experience that is likely to be immediately transferable to the Australian labour market. Still, several studies have shown that immigrants are often employed below their education level and argued that immigrants' skills are not fully utilised in the Australian labour market (see for example Green *et al.* 2007). Our paper complements these studies in a specific way. Unlike the existing literature, our focus is not the comparison of immigrants' and natives' incidence of over-education, but the role of the signal from work experience in the home labour market in determining the labour mismatch in the host country.

Our results show that immigrants' education-occupation mismatch in the host country is, to a large extent, explained by their mismatch at home. The inclusion of dummies for the education-occupation mismatch in the home country along with covariates typically used in previous studies almost doubles the explanatory power of a probit model for over-education and almost quadruples that for under-education. Furthermore, after correcting for the sample selection bias into employment, we find that having been over-educated in the last job held in the home country increases the probability of being over-educated at five months after immigration by 45 percent. Similarly, having been under-educated in the home country increases the likelihood of under-education in Australia by about 61 percent.

The rest of the paper is organised as follows. Section 2 discusses previous literature and outlines theoretical motivations while Section 3 presents the data. The empirical model used in the paper is presented in Section 4 and the discussion of results appears in Section 5. Section 6 concludes the paper.

2. Previous Literature and Theoretical Motivations

We carry out our analysis within the framework of the existing over- and under-education literature.[2] This literature typically proposes that there is a reference level of education that is required for a particular job, and when a worker is hired with an education level which diverges from the required level, a mismatch occurs.[3] This could be a level higher than needed for the job, in which case the worker is over-educated, or lower than the required level, in which case the worker is under-educated.[4]

These models have been extended to consider the mismatch of immigrants compared to those of natives. All studies show that immigrants are much more likely to be mismatched (generally over-educated) than their native counterparts. There are several arguments put forward for that. For instance, Chiswick and Miller (2008, 2009), for analyses of Australia and the US, argue that the main reason for immigrant education mismatch is the less than perfect human capital transferability across borders, especially for those who migrate from less developed countries and/or those who have low host country language skills. Similarly, Green *et al* (2007) use the LSIA to show that immigrants in Australia are much more likely to be over-educated than the natives and the difference is more pronounced for those coming from non-English speaking backgrounds. One other explanation put forward by Battu and Sloane (2004) is the possible discrimination against non-whites in the UK labour market, where they compare mismatch for ethnic minorities with those for white natives.[5] They argue that ethnic minorities possibly find it difficult to acquire jobs and therefore are likely to work in an occupation that is not fully commensurate with their qualification. Hence, on average more non-whites end up being over-educated. In other words, one can argue that to be able to send a stronger signal of ability, immigrants acquire more education, compared to natives, for the same job. Finally, some unobservable factors like motivation and innate abilities might be the reasons behind the results obtained in all studies analysing the labour market mismatch for immigrants (see Chiswick and Miller 2009).

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[2] See for instance, Chevalier and Lindley (2009), McGuinness (2006), Voon and Miller (2005), Battu and Sloane (2004), Gottschalk and Hansen (2003), Bauer (2002), Dolton and Vignoles (2000), Hartog (2000) and McGoldrick and Robst (1996).

[3] Recent work suggests that more than 50 percent of a country's employed are not correctly matched (see Leuven and Oosterbeek, 2011).

[4] It has become a stylised fact now that over-educated employees earn less than those with the required education level. This conclusion of course rests on the assumption that the returns to human capital are mostly affected by formal education rather than training and learning on the job (e.g., Ben-Porah, 1967; Heckman, 1976 and Mincer, 1997) or career interruptions or switches (e.g., Mincer and Ofek, 1982).

[5] Possible discrimination against immigrants in the US is also suggested by Chiswick and Miller (2010).

Education-occupation mismatch is a dynamic process that is theorised to be affected by the individual's experience in the labour market. For example, the search-and-match theory hypothesises that mismatch originates from imperfect information about the labour market. Workers, thus, might take up jobs for which they are over-educated when they enter the labour market. However, they would continue to search for higher job levels and eventually move up the occupational ladder to positions that match or even exceed their formal qualifications (see Groot and Maassen van den Brink 2000; Hartog 2000). As argued by Chiswick and Miller (2009), this search and adjustment process can be particularly relevant for immigrants, especially for those from countries with labour markets that differ appreciably from those of the destination country. With residence length and the accumulation of information about the host country labour market, the incidence of over-education is expected to fall while the incidence of under-education could rise.

The human capital theory suggests that experience and skills acquired through on-the-job training could be often substitutes to formal schooling (see Sicherman 1991). Therefore, individuals may, at the start of their career, accept jobs below their education level with the intention of accumulating experience and skills for the benefit of an expected upward job mobility. Similar to the search and matching, the human capital theory predicts that with job experience over-education decreases, while under-education increases.

One of the few studies that considered the role of job experience accumulated in the home country in explaining the immigrants' education mismatch in the host country labour market is Chiswick and Miller (2009). They found that a greater amount of home country experience is associated with poorer job matches in the US and argued the imperfect international transferability of human capital as the main driving force for that outcome. The authors, however, implicitly assume no education mismatch in the immigrants' country of origin labour market. In other words, they suppose that the professional experience gained prior to immigration was in jobs requiring exactly the education level obtained from formal schooling.

We, however, diverge from the existing literature and argue that it is not only the education signal or some other observed characteristic, like race, that determines the incidence of mismatch, but the actual signal of "real" productivity from the previous "mismatched" work experience. We expect the *level* of professional experience at origin (i.e., below or above the education level) to significantly determine the immigrants' education mismatch incidence in the host country. For example, immigrants who have gained professional experience in the home country in jobs below their education level might be

assessed by host country employers as having lower abilities and skills than those expected from their formal education, since the education signal attenuates with work experience. That might lead to employment below the education level in the host country as well. Therefore, if someone with tertiary education worked in the home country in a job that required only secondary education and is facing the same outcome in the host country, then it is less likely that the mismatch is due to imperfect transferability of skills and more likely due the lower on the jobs skills accumulated and/or some other unobservable factors (e.g., ability, motivation, ambition, and/or energy). If, however, the individual was properly matched in the home labour market but is over-educated in the host country, then perhaps the existing explanations of imperfect skill transferability and/or discrimination could be put forward for such an outcome.

Three broad approaches have been used in the literature to measure the incidence of under-/over-education. One approach, which is typically based on survey data, uses the workers' self assessment about the minimum education level needed for the job they perform or their understanding of the average education level for a particular job and whether they possess that or not (e.g., see Sicherman 1991; Dolton and Vignoles 2000). A second approach, developed by Verdugo and Verdugo (1989), uses the mean education level required across a range of occupations. Under this approach an individual is considered over- or under-educated if his education level is, respectively, one standard deviation above or below the mean education level required for that particular job. A third way to analyse the level of over-/under-education is the "objective" measure based on methods used by different countries/labour organizations to assess the average required education for a particular job (e.g., Rumberger 1987 and Green *et al.* 2007). We adopt the last approach in this paper.

We use the Australian Standard Classification of Occupation (ASCO) codes to divide the employed immigrants in eight occupational groups: Managers and Administrators; Professionals; Para-Professionals; Tradespersons; Clerks; Salespersons and Personal Service Workers; Plant and Machine Operators and Drivers; and Labourers and Related Workers. For each occupation group Australia's Department of Immigration and Citizenship (DIAC) associates a corresponding required level of education.[6] Those who have surplus education to that required by DIAC are considered over-educated, while those who have less are considered under-educated. The related education levels for each categories and further explanation is provided in section 3 below.

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[6] See http://www.immi.gov.au/employers/_pdf/ansco-anzsco-differences.pdf.

3. Data

The Longitudinal Survey of Immigrants to Australia (LSIA) is a panel survey of three cohorts of immigrants to Australia: LSIA 1 covers migrants who arrived in Australia between September 1993 and August 1995 and contains three waves, with interviews conducted at 5, 17 and 41 months after arrival; LSIA 2 consists of two waves with interviews conducted at 5 and 17 months after arrival of immigrants who arrived between September 1999 and August 2000; while LSIA 3 has only one wave and samples immigrants who arrived in Australia (or were granted their visa onshore) between December 2004 and March 2005. The substantially smaller number of questions in LSIA 3 relative to LSIA 1 and 2 makes it difficult to carry out the analysis over the three cohorts. Therefore, this paper uses only data from LSIA 1 and LSIA 2.[7]

The LSIA was commissioned in the early 1990s to fulfil the need to have better information on the settlement of new migrants than those available through censuses. It is based on a representative sample of 5 percent of migrants/refugees from successive cohorts of migrants. LSIA 1 and LSIA 2 contain more than 300 questions about the settlement process and conditions experienced pre-emigration in the home country and after relocating to Australia. The LSIA is carried out separately on primary applicants and migrating-unit spouses.[8] There are 5,192 primary applicants and 1,838 spouses in Cohort 1, while 3,124 primary applicants and 1,094 spouses were interviewed as part of Cohort 2.

Australian immigration policy became more restrictive for all migrants who entered after 1995 (i.e., Cohort 2 in our paper), except for those in the humanitarian stream.[9] The policy restrictions, intended to favour migrants with skills immediately usable in the labour market, included higher language proficiency requirements as well as higher weight attached to other employability factors namely occupational skills, education and age. As a result, migrants in Cohort 2 have a higher average level of education, higher participation rates (see Cobb-Clark 2003; Chiswick and Miller 2006), and lower durations to access their first job (Thapa and Goergens 2006) than those in Cohort 1, though they appear to have lower quality initial jobs (Junankar and Mahuteau 2005).

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[7] Migrants interviewed in LSIA 1 will be referred to as Cohort 1 and those in LSIA 2 will be referred to as Cohort 2 in the rest of the paper.

[8] Migrating unit is this context includes all members of the family migrating to Australia under the same visa application. The term spouse is used for husband/wife, civil partners, fiancé(e)s and de facto partners.

[9] There are five visa categories used to enter Australia: Independent skills, Business/ Employer Nominated , Preferential Family, Concessional Family and Refugee. See Green *et al.* (2007) for a discussion.

Among the several questions asked in both LSIA 1 and LSIA 2, we capture the education-occupation mismatch by comparing the level of education acquired by the migrant with the level of education required to perform the migrant's job as defined by DIAC. This definition assigns the (formal) educational requirement for managers, administrators and professionals − who are classified in the ASCO occupational categories 1-3 as "bachelor or higher". For associate professionals, tradespersons, clerks, salespersons and personal service workers, and plant and machine operators and drivers (ASCO 4-7) the educational requirement is a "diploma or vocational degree". For labourers and related workers (ASCO 8-9) it is "secondary or less" education.

We consider as over-educated all those respondents who have a level of education that is above what is required by DIAC to perform the tasks of the occupation held. This includes individuals who have a tertiary education but have an occupation that requires only secondary or vocational education, and individuals who have vocational education but have an occupation that requires secondary education. Conversely, the under-educated include individuals who have an education level lower than the one required for their job.

Due to limited number of observations in certain categories (e.g., immigrants that were over-educated in the home country but are under-educated in Australia), we need to pool Cohort 1 and 2 in our empirical analysis discussed in section 5. This then limits us to use only the first two waves of Cohort 1 as Cohort 2 does not have a third wave. Furthermore, our focus on males reflects the limited number of female immigrants that appear as participating in the labour market in the LSIA.

From Table 1, it can be seen that male immigrants are typically in their mid-30's, have a small family, with one or two dependent children. Immigrants typically carry with them funds equivalent to over one year of Australia's average wage. The majority is highly educated, with approximately two thirds holding a diploma/certificate or higher educational qualification. The main countries of former residence are English speaking OECD countries (i.e., Canada, Ireland, the United Kingdom, and the United States; above 20 percent for both cohorts) and South, East, South East Asia and Oceania (between 36 and 41 percent).

Table 2 presents the education mismatch transitions between the occupational status in the job held in the home country during the last 12 months before migration and the occupational status at five months after arrival in Australia. Perhaps unsurprisingly, many of those who had a job in the home country prior to migration were unemployed in the first months after migrating to Australia. On average 31 percent of immigrants were unemployed at five months after arrival, with the highest incidence of unemployment among those who

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were unemployed or not in the labour force at home (about 47 percent). The overall incidence of unemployment drops at 17 months after arrival to about 20 percent, and is even less for those who held a job matched with their formal educational qualifications at home (about 15 percent; see Table 3). There is also substantial persistence in the educational mismatch between home and host countries among those who were employed both prior and after migration: 41 percent of the over-educated at home were over-educated in their job in Australia at five months after arrival; the rate increases to about 51 percent at 17 months after arrival, as part of those who were initially unemployed enter into employment. This path dependency can be observed with respect to under-education as well: of those who were under-educated at home, about 46 percent were under-educated at five months and 47 percent at 17 months after immigration to Australia.

Table 4 illustrates that the educational mismatch persistence remains during the period analysed (17 months after arrival). Over 61 percent of those over-educated in the initial jobs at arrival continued to work in positions that required a lower level of formal education even after 17 months of residence, and about 79 percent of those who were initially under-educated remained in jobs that required a higher level of formal education.

4. Empirical Methodology

The primary concern of this paper is to model the determinants of a mismatch between the actual education and the one formally required for the occupation (i.e., over-education and under-education respectively) among immigrants in the Australian labour market. Given the fact that the mismatch is observed only for the employed individuals, an exclusive focus on those immigrants who have an occupation may overlook the fact that they might constitute a non-randomly selected sub-sample (see, for instance, Dolton and Vignoles 2000). Bauer (2002) and Cutillo and DePietro (2006) argue that the presence of possible heterogeneity of ability in the population could have a significant impact on the labour market outcome and consequently the extent of over- and under-education in the employed subsample. Given Australia's different visa regimes which range from high skilled immigrants to refugees and those who entered on family visa, the immigrant sample is likely to be quite heterogeneous in ability and home country experiences.

Only about 68.6 percent of male immigrants in the potential labour force had employment at five months after immigration and 80.5 percent one year later. Taking into consideration the fact that the two possible types of mismatch (i.e., over-education and under-education) are observed only if the individual is employed, we apply a binomial probit model

in order to correct for eventual sample selection bias. This approach follows Green *et. al.* (2007), who use the same database and identification variables.

The occurrence of the mismatch j – which stands for either over- or under-education – may be illustrated by the following two linear latent dependent variable equations:

$$y_{1ij}^* = x_i^{'}\beta + u_i \qquad (1)$$

where $y_{1ij} = 1$ if the individual has attained the respective mismatch ($y_{1ij}^* > 0$) and

$y_{1ij} = 0$ if not ($y_{1ij}^* \leq 0$)

$$y_{2i}^* = z_i^{'}\gamma + v_i \qquad (2)$$

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

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

The dichotomous variable y_{1ij} is only observed if $y_{2i} = 1$. The model was first presented by Van De Ven and Van Praag (1981) to examine deductibles in private health insurance in the Netherlands. Variants of the model have then been used, for example, by Boyes *et al.* (1989) for analysing the default on loans while taking into account whether an application for a loan was accepted or not and Lichtfield and Reilly (2009) to investigate whether an individual has attempted to migrate conditional on having considered migrating.

Equation (2) is fully observed and can be estimated separately. However, separate estimation of mismatch attainment (Eqn. 1) may be subject to selection bias given the potential for correlation between the two error terms u_i and v_i. The model can be estimated stepwise (i.e., the inverse Mill's ratio of the selection equation is introduced as a covariate in the outcome probit equation) or by maximum likelihood. Relative to the maximum likelihood approach, the two-step method is often perceived to give inconsistent results, in particular in the case when there is strong multicollinearity between covariates in the outcome and the selection equations (e.g., when using a joint set of covariates; see Lahiri and Song 2000).

For each type of mismatch, the log-likelihood function to be evaluated is:

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

$$+ \left(1 - y_{1ij}\right) y_{2i} \ln \Phi_2\left(-x_i^{'}\beta, z_i^{'}\gamma; -\rho\right)$$

$$+ \left(1 - y_{2i}\right) \ln\left(1 - \Phi\left(z_i^{'}\gamma\right)\right) \} \qquad (3)$$

where ρ denotes the correlation coefficient between the error terms u_i and v_i; $\Phi_2(\cdot)$ denotes the bivariate standard normal cumulative distribution function; and $\Phi(\cdot)$ the univariate

standard normal cumulative distribution function. The parameters of Eqns. (1) and (2) are estimated jointly by maximizing the log-likelihood function (3) with respect to the coefficient vectors β and γ and the correlation coefficient ρ. The estimate of ρ provides a test for selectivity bias. If ρ is significantly different from zero, the coefficients of Eqn. (1) would have been biased if estimated separately by binomial probit.

The identification of such selectivity models is of crucial importance. Identification is achieved by the inclusion of variables in Eqn. (2) that are excluded from Eqn. (1). Poor identification restrictions can lead to erroneous conclusions regarding the presence of selectivity effects. In the context of our application it would be of some interest to establish if, having controlled for a set of observable characteristics, the employed respondents possessed unobservable characteristics (e.g., motivation, cognitive abilities, etc.) that were in some way different from the whole sample. A statistically significant ρ value may provide an insight into this particular issue. However, confidence in the reliability of such a result depends crucially on appropriate identification. There is a set of variables that appear in z_i' but not in x_i' as well as a set that is common to both vectors. In addition, there are variables that appear in x_i' but not in z_i', though these are not crucial for identification.

Following the empirical study of Green *et al.* (2007) the covariates chosen to identify the model (i.e., variables appear in z_i' but not x_i') are: English proficiency, a control for whether the immigrant visited Australia prior to immigration, the household structure, a variable indicating whether the immigrant had own funds at the time of arrival, and a control for car ownership.

There are both theoretical and empirical reasons for these identifying restrictions. As shown in previous studies, the high proficiency level of the host county language often has a positive effect on the probability of employment (see Green *et al.* 2007). Similarly, those who have visited Australia prior to immigration are likely to have better knowledge of the Australian labour market or have previous contacts with Australian employers.

The family structure may affect the probability of employment as well. For instance, the presence of other adults in the household might ease the pressure of taking up employment. On the other side, immigrants with dependent children (i.e., at or below school age) present might be under greater pressure of taking up employment. Hence, we control for both the effect of the number of adults and the number dependent children in the household on the probability of being in employment. Immigrants who face liquidity constraints might

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also be more likely to be under pressure to take up employment. So, variables indicating if the immigrant had funds on arrival and the log of the amount of funds are used for the model identification as well. Finally, owning a motor vehicle might increase the area where the individual can take up a job and, thus, the employment opportunities.[10]

Our primary covariates of interest are a set of dummy variables included only in the outcome equation and control for the type of mismatch between the educational level and the occupational attainment in the last job held in the former home country in the 12 months prior to immigration (i.e., over-educated, correct match, under-educated). Having not worked during the last 12 months prior to immigration is the reference group for the dummy set. Moreover, immigrants enter Australia with qualifications from a large variety of educational systems. In order to capture differences in the quality of education received, we include in a second specification of our empirical model controls for the country where the highest formal qualification was received as well.

5. Empirical results

We start the analysis by assessing the importance of our variables of interest in improving the explanatory power of the empirical model. In this first step – making abstraction of the eventual sample selection bias – we compare the adjusted R-squared from a binomial probit estimation of Eqn. (1), with and without including the set of dummies for the type of mismatch between the education level and the occupational attainment in the last job held in the home country twelve months prior to immigration.

The results show that the education-occupation mismatch incidence in the home country adds significantly to the explanation of the variation in the immigrants' mismatch in Australia (see Figure 1). Compared to a model that has as covariates only socio-economic controls used in pervious studies (i.e., age, age squared, a dummy for having the qualification assessed in Australia, dummies for the former region of residence, dummies for the entry visa type, a dummy for school age children present, a dummy for having financial funds at time of entry, and regional dummies), the inclusion of covariates controlling for the mismatch in the home country almost doubles the explanatory power of the probit estimation for over-education at five months after arrival in Australia (i.e., adjusted R-square increases from 0.14 to 0.26) and almost quadruples the explanatory power of probit estimation for under-

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[10] Employment prospects for ethnic minorities in the UK appear to be closely related to access to transport (Battu and Sloane 2002 and 2004).

education at five months after arrival (i.e., adjusted R-squared increase from 0.14 to 0.51 percent).

The estimation results of the probit models with sample selection, for over- and under-education at five and 17 months after arrival, respectively, are presented in Tables 5 and 6. Both the selection into employment and the education mismatch equations include controls for heterogeneity in the labour market and economic conditions in different Australian states.[11]

Similar to findings in previous studies, the selection into employment is found to be positively related to host country language proficiency, knowledge of the Australian labour market over previous country visits, having obtained the entry visa after screening for labour market and/or business skills, having a car, and having dependent children in the household (see Green *et.al.* 2007). Moreover, the probability of being employed is negatively affected by having entered Australia on a humanitarian visa, which could be evidence of having relatively lower skill level, and the presence of other adults in the household that might contribute to the household income. Moreover, at five months after arrival, immigrants in Cohort 2 are about 14 percent more likely to be in employment compared to immigrants in Cohort 1, probably due to the stricter access to unemployment benefits introduced in 1996.

The error term of the selection equation is positively correlated with the error term of the over-education equation, indicating that there are unobservable factors that affect similarly the likelihood of both employment and over-education. One explanation could be that relatively "low-level" jobs are accepted to avoid the stigma of being unemployed, or perhaps there are other financial/family pressures to accept "any" job at the start of the immigration process, with the aim to improve in terms of occupational mobility, as opportunities improve with time spent in Australia.

Australian employers seem to take into consideration signals about the immigrants' labour market abilities from the education mismatch incidence in the last job in the home country. At five months after immigration and conditional on being employed, immigrants who have been over-educated in the job held in the home country 12 months prior to immigration have about 45 percent higher likelihood to be over-educated in Australia. Similarly, having been under-educated in the last job in the home country increases the

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[11] Due to the very small sub-samples of immigrants in the Australian Capital Territory (ACT), Tasmania and Northern Australia, we merged these with New South Wales, South Australia and Western Australia respectively. The pairing was made on the basis of geographical proximity as well as labour market similarities in terms of average unemployment rates and average weekly earnings of employees. Hence, our five regional dummies are: 'New South Wales & ACT', 'Victoria', 'Queensland', 'South Australia & Tasmania', and 'Northern & Western Australia'.

probability to be under-educated at five months after arrival by about 61 percent. The difference between the sizes of the two effects could be explained by the fact that the immigrant population is likely to be non-randomly selected from the home countries' populations. Assuming that immigrants are positively selected with respect to unobserved abilities and motivation, they would be expected to put more effort in climbing up the occupational ladder (see Chiswick 1978). Therefore, the best from the under-educated group in the home country are likely to have a higher probability to be under-educated in Australia and the best of the over-educated in the home market are likely to have a lower probability to be over-educated in Australia. The effect of that would be lower observed coefficients between over-education at origin and over-education in Australia and greater observed coefficients between under-education at origin and in Australia compared to the ones that would be obtained in the absence of selection bias. Nevertheless, we cannot correct for this due to the lack of information about the socio-economic characteristics of the home countries' populations.

Australian employers seem to put the least value on professional experience from South, East, South East Asia and Oceania as well as from countries in Eastern Europe and Central Asia, Middle East and North Africa, and Latin America and the Caribbean. Compared to having lived and worked in Canada, Ireland, the UK or the US, immigrants from Asia (South, East and South East) and Oceania had about 7 percent higher probability of being over-educated at five months after arrival, whereas having migrated from Eastern Europe and Central Asia, Middle East and North Africa, or Central and South America increased the over-education probability by about 6 percent.

As found also by Green *et al.* (2007), having entered Australia with a visa that required the proof of business or professional skills significantly decreases the likelihood of over-education: compared to a Preferential Family Visa, our reference category, having immigrated with a Business Skills Visa or through the Employer Nomination Scheme decreases the probability of being over-educated by about 16 percent, while having entered with an Independent Skilled Visa decreases it by about 5 percent. Conversely, having entered Australia with a Humanitarian Visa decreases the likelihood of under-education by about 6 percent.

Having an overseas qualification assessed in Australia does not seem to improve the education-occupation match, at least not in the first three years after arrival. Even after 17 months of arrival, the assessment of a foreign qualification is more common among those immigrants that fail to find a job in which they can fully use their qualifications: having the

qualification assessed is positively related to working below the formal education level and negatively related to working above it.

The comparison of home country mismatch effect at 5 and 17 months after arrival (Tables 5 and 6 respectively) shows that it becomes weaker with the length of residence in Australia. The relation of over-education in Australia to over-education in the home country decreases from about 45 percent at five months to about 35 percent at 17 months after immigration, while the effect of under-education in the home country on under-education in Australia decreases from 61 to 50 percent. This is consistent with the argument that a more recent signal about the real productivity/ability, after working in Australia, has a much stronger effect on over-education incidence (at 17 months after arrival; marginal effect of 0.59) compared to the signal from over-education in the home country (marginal effect of 0.35). Similarly, the probability of being under-educated at 17 months after immigration is about 79 percent higher if the immigrant was under-educated at five months after landing, but only 50 percent higher if it was under-educated in the home country.

At 17 months after arrival, the probability of being employed of Cohort 2 vs. Cohort 1 immigrants drops from 14 percent to between 2 and 4 percent, depending on the type of mismatch. However, Cohort 2 immigrants become approximately 8 percent more likely to be under-educated, providing evidence of an eventual better selection with regard to unobservable skills after the 1996 reform in Australia's immigration policy.

6. Conclusions

The main objective of the paper was to investigate the role of a possible mismatch of an immigrant in the home country on his subsequent mismatch in the host country. Many immigrants appear to have work experience before migration in jobs below (or above) their education level, which might generate a negative (or positive) effect on their average skill level. Therefore, taking into account the level of professional experience achieved before migration, along with the formal education qualifications, provides a more accurate estimate of the immigrants' real productivity, especially since the education signal attenuates with work experience.

We used the Longitudinal Survey of Immigrants to Australia for two cohorts of immigrants who entered the country in 1993-1995 and 1999/2000 respectively and showed that the inclusion of covariates capturing the mismatch already experienced in the home country almost doubles the explanatory power of probit models estimating the over-education

of immigrants and almost quadruples the explanatory power of the models assessing the under-education of immigrants.

After controlling for selection into employment and the effect of various socio-economic characteristics, over- and under-education in the home country continue to have the strongest effect among all covariates: having been over-educated in the last job held in the home country increases the likelihood of over-education at five months after arrival in Australia by about 45 percent, while having been under-educated at home increases the probability of under-education in Australia by about 61 percent. The importance of "ability signals" in path dependency in over-/under-education is also confirmed by the fact that the education-occupation mismatch after 17 months of residence is significantly dependent on the education-occupation mismatch experiences immediately after arrival in Australia.

The more stringent rules on access to social security payments faced by the second immigrant cohort increased their employment probability relative to the first cohort. However in contradiction to Green *et al.* (2007), we found no evidence that the constraint of finding a job sooner has resulted in a poorer matching incidence for the second cohort; this being probably the effect of the tighter selection criteria with respect to skills under the points-based system.

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Table 1: Descriptive Statistics – male immigrants aged 25 to 64

	Cohort 1		Cohort 2	
	Wave 1	**Wave 2**	**Wave 1**	**Wave 2**
Age	34.98	35.69	35.93	36.81
No. of adults in household	2.75	2.40	2.56	2.37
No. of children in household	1.53	1.47	1.54	1.47
Education: Postgraduate	0.229	0.235	0.285	0.226
Education: Bachelor	0.235	0.226	0.247	0.205
Education: Diploma/Certificate	0.205	0.216	0.204	0.217
Education: Completed secondary or trade	0.220	0.217	0.206	0.257
Education: Some secondary or less	0.110	0.106	0.057	0.095
FHC: English Speaking OECD	0.205	0.191	0.233	0.215
FHC: Non-English Speaking OECD	0.119	0.118	0.093	0.062
FHC: South, East, South East Asia & Oceania	0.373	0.358	0.368	0.408
FHC: Sub-Saharan Africa	0.081	0.077	0.094	0.087
FHC: Other	0.222	0.256	0.212	0.228
Qualification assessed	0.344	0.403	0.305	0.280
Self-employment	0.117	0.132	0.148	0.211
Interview in English	0.751	0.797	0.839	0.814
Visited Australia before immigration	0.484	0.463	0.652	0.541
Visa type: Preferential Family/Family Stream	0.236	0.233	0.310	0.371
Visa type: Concessional Family/Skilled-Austr. Link	0.216	0.221	0.150	0.178
Visa type: Business Skills & Empl. Nom. Scheme	0.174	0.176	0.218	0.133
Visa type: Independent	0.247	0.241	0.240	0.161
Visa type: Humanitarian	0.127	0.129	0.082	0.157
HH owns car	0.710	0.849	0.673	0.797
Funds at time of immigration	0.737	0.726	0.792	0.729
Value of funds at immigration (thousands AU$)	40.36	43.32	61.20	69.49
Occup in AU: Managers & Administrators	0.137	0.128	0.151	0.144
Occup in AU: Professionals	0.329	0.286	0.364	0.239
Occup in AU: Para-Professionals	0.030	0.041	0.097	0.162
Occup in AU: Tradespersons	0.194	0.211	0.172	0.154
Occup in AU: Clerks	0.022	0.018	0.015	0.015
Occup in AU: Salespersons & Pers. Serv. Workers	0.068	0.069	0.097	0.121
Occup in AU: Plant & Machine Operators & Drivers	0.062	0.084	0.063	0.103
Occup in AU: Labourers & Related Workers	0.157	0.162	0.043	0.062
Educ. mismatch AU: Unemployed	0.360	0.195	0.209	0.195
Educ. mismatch AU: Over-educated	0.121	0.165	0.136	0.182
Educ. mismatch AU: Correctly matched	0.397	0.501	0.505	0.414
Educ. mismatch AU: Under-educated	0.123	0.139	0.151	0.209
Educ. mismatch FHC: Not working	0.104	0.099	0.092	0.130
Educ. mismatch FHC: Over-educated	0.083	0.079	0.100	0.091
Educ. mismatch FHC: Correctly matched	0.577	0.582	0.599	0.518
Educ. mismatch FHC: Under-educated	0.236	0.241	0.210	0.261
Region of residence: New South Wales	0.414	0.430	0.396	0.402
Region of residence: Victoria	0.256	0.246	0.234	0.224
Region of residence: Queensland	0.111	0.113	0.094	0.099
Region of residence: South Australia	0.048	0.049	0.049	0.052
Region of residence: Western Australia	0.123	0.120	0.142	0.139
Region of residence: Tasmania	0.012	0.010	0.024	0.021
Region of residence: Northern Territory	0.009	0.007	0.013	0.010
Region of residence: A.C.T.	0.027	0.024	0.049	0.054
No. of observations	1955	1900	860	482

Note: FHC stands for "Formal Home Country".

Table 2: Transition matrix of education mismatch between home country and 5 months after arrival in Australia (Cohort 1&2)

Education mismatch in home country	Education mismatch in Australia – 5 months after arrival				
	Unemployed	Over-educated	Correctly matched	Under-educated	Total
Not working	46.81	12.77	28.37	12.06	100
Over-educated	39.11	41.13	19.35	0.40	100
Correctly matched	26.50	11.98	59.21	2.31	100
Under-educated	33.96	2.80	16.98	46.26	100
Total	31.35	12.53	42.99	13.13	100

Note: The "Not working" subgroup in the case of "education-occupation mismatch in the home country" includes besides unemployed also individuals that were not in the labour force, since some of them are employed or are looking for a job once in Australia.

Table 3: Transition matrix of education mismatch between home country and 17 months after arrival in Australia (Cohort 1&2)

Education mismatch in home country	Education mismatch in Australia – 17 months after arrival				
	Unemployed	Over-educated	Correctly matched	Under-educated	Total
Not working	37.45	14.74	31.87	15.94	100
Over-educated	20.62	50.52	28.35	0.52	100
Correctly matched	14.83	18.15	63.47	3.54	100
Under-educated	22.30	3.60	26.76	47.34	100
Total	19.51	16.87	48.30	15.32	100

Note: The "Not working" subgroup in the case of "education-occupation mismatch in the home country" includes besides unemployed also individuals that were not in the labour force, since some of them are employed or are looking for a job once in Australia.

Table 4: Transition matrix of education mismatch between 5 and 17 months after arrival in Australia (Cohort 1&2)

Education mismatch in Australia – 5 months after arrival	Education mismatch in Australia – 17 months after arrival				
	Unemployed	Over-educated	Correctly matched	Under-educated	Total
Not working	39.33	17.52	30.57	12.57	100
Over-educated	6.11	61.45	30.15	2.29	100
Correctly matched	3.02	6.52	86.11	4.35	100
Under-educated	4.53	1.23	15.64	78.60	100
Total	19.51	16.87	48.30	15.32	100

Note: The "Not working" subgroup in the case of "education-occupation mismatch in Australia at 5 months after arrival" includes besides unemployed also individuals that are were initially not in the labour force, since some of them are employed or are looking for a job one year later.

Table 5: Probit with sample selection estimates of over- and under-education (marginal effects) – Cohort 1&2, Wave 1 (5 months after arrival)

	(1)	(2)	(3)	(4)
	Over-education		Under-education	
Age	-0.003	-0.003	-0.002	-0.003
	[0.009]	[0.009]	[0.007]	[0.007]
Age squared x 100	0.001	0.001	0.002	0.003
	[0.012]	[0.012]	[0.009]	[0.009]
Qualification assessed	0.026	0.024	-0.071	-0.071
	[0.019]	[0.020]	[0.016]***	[0.015]***
Self-Employed	-0.088	-0.092	0.104	0.107
	[0.033]***	[0.034]***	[0.020]***	[0.020]***
FHC: Non-English Speaking OECD		-0.011		-0.018
		[0.028]		[0.019]
FHC: South, East, South East Asia and Oceania		0.072		-0.047
		[0.024]***		[0.016]***
FHC: Sub-Saharan Africa		0.034		0.004
		[0.039]		[0.025]
FHC: Other		0.062		-0.035
		[0.031]**		[0.018]*
Visa type: Concessional Family/Skilled-Austr. Link	0.012	0.002	-0.005	-0.002
	[0.023]	[0.023]	[0.021]	[0.021]
Visa type: Business Skills & Empl. Nomination Scheme	-0.162	-0.161	0.004	-0.001
	[0.017]***	[0.018]***	[0.019]	[0.018]
Visa type: Independent	-0.048	-0.055	-0.037	-0.035
	[0.019]**	[0.020]***	[0.018]**	[0.018]**
Visa type: Humanitarian	-0.02	-0.023	-0.059	-0.059
	[0.044]	[0.047]	[0.020]***	[0.018]***
Funds at time of immigration	-0.021	-0.009	-0.002	-0.009
	[0.024]	[0.024]	[0.020]	[0.020]
Educ. mismatch FHC: not working	0.001	-0.006	0.302	0.314
	[0.027]	[0.026]	[0.050]***	[0.051]***
Educ. mismatch FHC: over-educated	0.446	0.451	-0.071	-0.067
	[0.051]***	[0.052]***	[0.021]***	[0.020]***
Educ. mismatch FHC: under-educated	-0.125	-0.128	0.613	0.612
	[0.017]***	[0.018]***	[0.032]***	[0.032]***
Cohort 2	-0.021	-0.024	0.014	0.017
	[0.016]	[0.017]	[0.015]	[0.015]
Regional fixed effects	Yes	Yes	Yes	Yes
Selection equation (Probability of being employed)				
Age	-0.007	-0.007	-0.005	-0.005
	[0.010]	[0.010]	[0.010]	[0.010]
Age squared x 100	-0.005	-0.005	-0.008	-0.008
	[0.013]	[0.013]	[0.013]	[0.013]
Interview in English	0.054	0.052	0.061	0.061
	[0.026]**	[0.026]**	[0.026]**	[0.026]**
Visited Australia before immigration	0.08	0.077	0.074	0.074
	[0.022]***	[0.022]***	[0.022]***	[0.022]***
Visa type: Concessional Family/Skilled-Austr. Link	0.07	0.07	0.07	0.07
	[0.024]***	[0.024]***	[0.024]***	[0.024]***
Visa type: Business Skills & Empl. Nomination Scheme	0.33	0.33	0.331	0.331
	[0.015]***	[0.015]***	[0.015]***	[0.015]***
Visa type: Independent	0.078	0.079	0.076	0.076
	[0.024]***	[0.024]***	[0.024]***	[0.024]***
Visa type: Humanitarian	-0.274	-0.276	-0.28	-0.28
	[0.045]***	[0.045]***	[0.046]***	[0.046]***
Number of adults in household	-0.026	-0.026	-0.027	-0.027
	[0.006]***	[0.006]***	[0.007]***	[0.007]***
Children present	0.05	0.05	0.06	0.06
	[0.021]**	[0.021]**	[0.021]***	[0.021]***
HH owns car	0.156	0.156	0.148	0.148
	[0.024]***	[0.024]***	[0.024]***	[0.024]***
Funds at time of immigration	-0.05	-0.045	-0.05	-0.05
	[0.064]	[0.065]	[0.065]	[0.065]
Log of value of funds at immigration	0.01	0.01	0.01	0.01
	[0.008]	[0.008]	[0.008]	[0.008]
Cohort 2	0.138	0.138	0.136	0.136

	[0.019]***	[0.019]***	[0.019]***	[0.019]***
Regional fixed effects	Yes	Yes	Yes	Yes
Observations	2815	2815	2815	2815
Censored obs	883	883	883	883
Wald chi2	257.97	260.21	600.17	597.3
Log likelihood	-1967.72	-1960.15	-1748.47	-1743.2
ρ	0.692	0.667	-0.072	-0.015
	[0.190]***	[0.243]**	[0.168]	[0.171]

Standard errors in brackets
 * significant at 10%; ** significant at 5%; *** significant at 1%

Note: The base group for "Formal Home Country" (FHC) is "English speaking OECD"; for "Visa type" the base group is "Preferential Family/ Family Stream"; and for "Education mismatch FHC" the base group is "Correctly matched".

Table 6: Probit with sample selection estimates of over- and under-education (marginal effects) – Cohort 1&2, Wave 2 (17 months after arrival)

	(1) Over-education	(2)	(3) Under-education	(4)
Age	-0.013	-0.005	0.009	0.006
	[0.008]	[0.008]	[0.007]	[0.008]
Age squared x 100	0.016	0.000	-0.012	0.000
	[0.011]	[0.000]	[0.009]	[0.000]
Qualification assessed	0.034	0.032	-0.088	-0.113
	[0.020]*	[0.019]*	[0.016]***	[0.018]***
Self-Employed	-0.070	-0.078	0.082	0.080
	[0.031]**	[0.031]**	[0.020]***	[0.022]***
FHC: Non-English Speaking OECD	0.004	0.006	0.001	0.028
	[0.032]	[0.032]	[0.024]	[0.032]
FHC: South, East, South East Asia and Oceania	0.061	0.005	-0.063	-0.027
	[0.025]**	[0.024]	[0.017]***	[0.022]
FHC: Sub-Saharan Africa	-0.025	-0.042	0.005	0.084
	[0.036]	[0.032]	[0.027]	[0.043]**
FHC: Other	0.075	0.012	-0.043	-0.027
	[0.030]**	[0.027]	[0.018]**	[0.024]
Visa type: Concessional Family/Skilled-Austr. Link	0.001	0.022	0.025	-0.009
	[0.024]	[0.025]	[0.024]	[0.024]
Visa type: Business Skills & Empl. Nomination Scheme	-0.147	-0.085	0.013	0.010
	[0.018]***	[0.025]***	[0.022]	[0.026]
Visa type: Independent	-0.089	-0.048	-0.034	-0.063
	[0.019]***	[0.022]**	[0.020]*	[0.021]***
Visa type: Humanitarian	-0.029	-0.038	-0.033	-0.014
	[0.028]	[0.026]	[0.022]	[0.029]
Funds at time of immigration	-0.018	0.018	0.005	0.004
	[0.022]	[0.020]	[0.020]	[0.022]
Educ. mismatch FHC: not working	-0.038		0.306	
	[0.023]		[0.050]***	
Educ. mismatch FHC: over-educated	0.345		-0.083	
	[0.049]***		[0.017]***	
Educ. mismatch FHC: under-educated	-0.172		0.503	
	[0.015]***		[0.032]***	
Educ. mismatch Wave 1: not working		0.194		0.161
		[0.024]***		[0.024]***
Educ. mismatch Wave 1: over-educated		0.585		-0.024
		[0.044]***		[0.032]
Educ. mismatch Wave 1: under-educated		-0.116		0.778
		[0.024]***		[0.030]***
Cohort 2	0.001	-0.001	0.074	0.079
	[0.020]	[0.019]	[0.022]***	[0.023]***
Regional fixed effects	Yes	Yes	Yes	Yes
Selection equation (Probability of being employed)				
Age	0.013	0.013	0.016	0.017
	[0.008]*	[0.007]*	[0.008]**	[0.008]**
Age squared x 100	-0.024	0.000	-0.027	0.000
	[0.009]**	[0.000]***	[0.010]***	[0.000]***
Interview in English	0.051	0.053	0.078	0.085
	[0.021]**	[0.020]***	[0.023]***	[0.023]***
Visited Australia before immigration	0.083	0.076	0.079	0.080
	[0.018]***	[0.018]***	[0.019]***	[0.019]***
Visa type: Concessional Family/Skilled-Austr. Link	0.033	0.030	0.024	0.024
	[0.020]*	[0.020]	[0.021]	[0.021]
Visa type: Business Skills & Empl. Nomination Scheme	0.156	0.156	0.152	0.151
	[0.014]***	[0.014]***	[0.015]***	[0.015]***
Visa type: Independent	0.055	0.055	0.050	0.050
	[0.020]***	[0.020]***	[0.020]**	[0.020]**
Visa type: Humanitarian	-0.165	-0.169	-0.158	-0.155
	[0.036]***	[0.036]***	[0.036]***	[0.036]***
Number of adults in household	-0.009	-0.007	-0.011	-0.013
	[0.006]	[0.006]	[0.006]*	[0.006]**
Children present	0.052	0.051	0.065	0.066
	[0.016]***	[0.016]***	[0.017]***	[0.017]***
HH owns car	0.138	0.132	0.147	0.146

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		[0.024]***	[0.024]***	[0.027]***	[0.026]***
Funds at time of immigration		-0.032	-0.037	-0.039	-0.041
		[0.051]	[0.050]	[0.052]	[0.052]
Log of value of funds at immigration		0.009	0.009	0.009	0.010
		[0.006]	[0.006]	[0.007]	[0.007]
Cohort 2		0.040	0.040	0.022	0.021
		[0.017]**	[0.017]**	[0.018]	[0.018]
Regional fixed effects		Yes	Yes	Yes	Yes
Observations		2382	2382	2382	2382
Censored obs		465	465	465	465
Wald chi2		262.67	371.36	491.72	491.88
Log likelihood		-1663.27	-1603.22	-1424.8	-1421.4
ρ		0.952	0.952	0.195	0.471
		[0.086]***	[0.103]**	[0.213]	[0.207]**

Standard errors in brackets
 * significant at 10%; ** significant at 5%; *** significant at 1%

Note: The base group for "Formal Home Country" (FHC) is "English speaking OECD"; for "Visa type" the base group is "Preferential Family/ Family Stream"; and for "Education mismatch FHC" the base group is "Correctly matched".

Figure 1: Pseudo R-squared values from probit estimations of over- and under-education of employed male immigrants in Australia
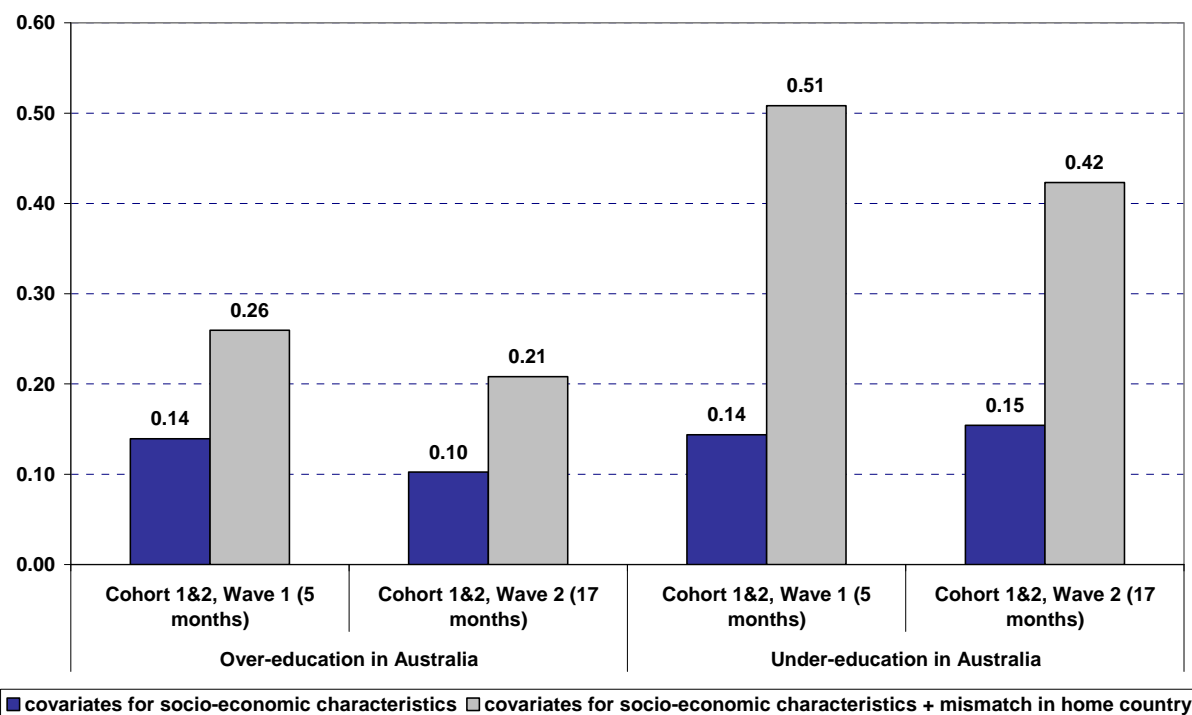
Notes: "Socio-economic characteristics" include: age, age squared, a dummy for having the qualification assessed in Australia, a dummy for being self-employed, dummies for the former country of residence, dummies for the entry visa type, a dummy for school age children present, a dummy for having financial funds at time of entry, and regional dummies. "Mismatch in home country" includes three dummy variables: "not working", "over-educated", and "under-educated", with "correctly matched" being the base group.