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The Impact of Immigration Policy on the Education-Occupation Mismatch in Austria

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INTRODUCTION

This paper addresses the potential education mismatch in occupational attainment for immigrants, in the context of a restrictive change in immigration policy. This particular issue is captured by the more general question: *Do stronger selective immigration criteria reduce the risk of educational mismatch for immigrant workers?* Undereducation and overeducation have consequences on earnings and so numerous studies are dedicated to analyzing this possible immigrant integration problem (in the UK: Battu and Sloane 2002, 2004; in Australia: Green, Kler and Leeves, 2007 and Kler, 2007; in Denmark: Nielsen, 2007; in Canada: Wald and Fang, 2008; in the US: Chiswick and Miller, 2007; in Austria Anastasova, 2010a, b). However, little research is carried on the determinants of under- and overeducation and its variation with years of residence in the host country. Moreover, the role of immigration policy in shaping the distribution of educational levels in given occupations is less known and of particular interest if from a policymaking stance one has in mind the centrality of occupation match quality in immigrant integration logic.

Austria's 2003 policy intervention that further restricted residence and tied labor market access for immigrants to employers' needs provides me with the unique opportunity of assessing the impact one such mechanism might have on an immigrant's education-occupation mismatch through time. To my knowledge, no similar effort has been made in either the academic or policy literature. I account for the 1996-2010 period. By applying the existing perspectives in the literature on under- and overeducation I provide an assessment of the extent of education mismatch in occupational attainment not only among third country immigrants, but also native-born nationals.

SUMMARY OF RELEVANT LITERATURE

Theoretical Framework

Duncan and Hoffman (1981) are the first ones to distinguish between an individual's level of education and the level needed in an occupation, laying the foundation for work analyzing the incidence and consequences of under- and overeducation.

There are a number of theoretical explanations of why an educational "mismatch" by

occupation of individuals might occur, based on human capital, information asymmetry or a mixture of both. They all predict that immigrants, relative to natives, are more likely to be overeducated and that overeducation declines with years of residence. As for undereducation, though some theories admit that native - immigrant differences might exist, none assert it being time variant.

Human Capital Theory (HCT) acknowledges several distinct forms of human capital namely formal schooling, formal on-the-job training, and job experience (Becker, 1964). Overeducation manifests when new entrants into the labor market take jobs below their level of education in order to compensate for certain individual-level "deficiencies" such as labor market experience (Sicherman, 1991). The qualitative aspect of the process is that what appears to be overeducation is in fact a way of compensating for a lower quality of immigrants' formal education obtained in their home country, as empirically pointed out by Mattoo (2005). It is a transitory situation as education erodes over time with the accumulation of labor market experience. By contrast, undereducation manifests when employees substitute their insufficient training with job experience. It can be a permanent situation which increases with tenure. In the case of immigrants, schooling can substitute labor market experience (which not as "portable"), but the reverse is unlikely to occur (Friedberg, 2000). Undereducation can only occur if immigrants with lower levels of schooling are drawn disproportionately from the more able and highly motivated. Conclusively, human capital theory predicts that overeducation should be more prevalent among immigrants than among natives, and should decrease with duration of residence as immigrants theoretically move up the occupational ladder.

Empirical results testing this framework are mixed. Chiswick and Miller's (2009) estimates indicate that a longer duration in the U.S. is associated with a lower probability of overeducation and a higher one of undereducation. They remark that in the case of positive self-selection immigrants will most likely be undereducated compared to natives and this higher incidence need not diminish with years of residence. Nielsen (2007) concludes that in the case of Denmark general assimilation accumulated by mere residence must be backed by a substantial presence on the labor market. Work on the UK (Lindley, 2009) and Spain (Fernandez and Ortega, 2008) indicates that time does not erode an imperfect match.

Technological Change Theory, largely based on HCT, emphasizes the fact that school-acquired skills need brushing up in order to keep pace with technological changes (Kiker et

al., 2000). Earlier cohorts will be less savvy than newer ones, who by comparison will be considered overeducated when they enter the labor market. The discussion is relevant only if both the host and home country's level of development are considered.

A more recent variation of the HCT is *Career Mobility Theory* (Sicherman and Galor, 1990) which assumes that given the full set of options individuals purposely choose jobs for which they are overeducated in order to improve their future labor market prospects, i.e., investment opportunity. Andersson Joona et al. (2012:3) note that this type of voluntary act does not necessarily occur in the case of immigrants, i.e., different option pools, and even if it were, it would be difficult to test in practice.

Job Competition Theory (Thurow, 1975) offers a demand-side explanation of how human capital operates in the labor market, contrasting the supply-side HCT explanation. There is a job queue, i.e., workers competing for high wage) and a labor queue, i.e., companies competing for highly productive workers. Those with fewer skill endowments are lower positioned in the labor queue than those with similar formal qualifications, yet better "additional" qualifications. Overeducation thus can be viewed as the result of a lack of skills endowment. Immigrants are far more likely to be overeducated given their deficit in host country labor market skills and possible language deficiency.

Search and Matching Theory (Pissarides, 2000) states that imperfect information in the labor market drives the education-employment mismatch. Immigrant workers, irrespective of their education-productivity equilibrium, have fewer networks and less information on the country-specific labor market logic than natives, facts which hinder the job search and the achievement of a good occupational match. Mismatch is a temporary phenomenon, assuming that as experience accumulates overeducated workers climb up the occupational ladder to suitable jobs. The temporary variation of this adjustment period is a function of the institutional distance between the host and home country.

An alternative explanation in the context of the search process is forwarded by Hartog (2000). Mismatch might occur because workers exhibit a wealth maximizing behavior hence they only go for jobs requiring higher levels of schooling. The incidence of undereducation could rise with age or experience, for both immigrants and natives.

The Screening Hypothesis, directly related to the *Signaling Model*, asserts that workers can signal their unobserved abilities via their schooling. Native-born should face little to no

mismatch when they exit the educational system. The market, however, is a competitive and fast-changing environment, hence both over and undereducation increase with time. Since schooling acquired abroad might send an unclear signal, immigrants run the risk of being overeducated for the job they perform. Duration of residence is expected to have a negative impact on overeducation (Chiswick and Miller, 2009; Dell'Aringa and Pagani, 2010). Given that undereducation in the context of signaling implies one´s ability to over signal its abilities, it cannot be as easily accounted for, if at all.

The Assignment Theory focuses on how heterogeneous workers are assigned to heterogeneous jobs. Job assignment is said to no longer be a lottery as income maximization guides workers in their job choices (Sattinger, 1993). Overeducation in this context is a form of allocative inefficiency whereby skills are underutilized, i.e., not all similarly educated workers are equally productive in all jobs (Linsey, 2005: 124). In this theoretical setting there are no arguments by which the extent of mismatch varies by immigrant status.

Empirical Evidence on Austria

The existing empirical literature on educational mismatch by immigrant status referring to Austria is scarce and descriptive in nature. Anastassova's (2010a, b) primary interest is on the impact educational mismatch has on wages in Austria. She finds support for the idea of a larger share of educationally mismatched individuals among immigrants. In her analysis using Luxembourg Income Study (LIS) information and employing a mode-based measure, Anastassova (2010a) indentifies 73% correctly matched native-born workers vs. 62% immigrants. In regards to imperfect matches, she finds 5% overeducated natives vs. 11% immigrants. 22% of the native-born are undereducated compared to 28% of the immigrants. In a similar work based on the Luxembourg Employment Study (LES), Anastassova (2010b) finds more or less similar figures. 79% of the native born are correctly matched vs. 62% of the immigrant workers. Overeducated are 6% of the natives vs. 17% of the immigrants, while 16% vs. 21% are undereducated. In their 2010 report, Huber et al provide results for 2004-2007, using pooled yearly information from the Austrian Labor Force Survey and employing the OECD (2007) measurement suggestion based on educational threshold inside each occupational category. They find the percentage of over-qualified workers to be almost double among the foreign-born (15.8% vs. 8.7%), yet that of under-qualified workers to be higher among the

native-born- 35.6% compared to 27.8% (Huber at al., 2010: 105-106). These results are different from those provided by the OECD (2007) report. In it, using the 2003-2004 EU-LFS data for the 15-64 population, the descriptive statistics indicate a similar trend, yet a different magnitude. 21.1% of the foreign-born vs. 10.3% of the native-born are over-qualified. When referencing Census and Population Registers for a population older than 15 years, circa 2000, the figures indicate 20% of the foreign-born vs. 9.9% among native-born (OECD, 2007: 137). The report also indicates a drop in the over-qualification rate among the foreign-born with duration of stay. Past the 10 years limit no substantial changes are noted (OECD, 2007: 140). No analysis of possible determinants follows any of these estimates.

The existing literature offers a number of explanations for both why under- and overeducation exists and why one would expect time to play a role in the process. In the following, I will introduce the specificities of the Austria immigration policy prior to laying down the general and case specific hypotheses and methodological take. I will then present the results (with their due limitations) of my analysis into the phenomena.

AUSTRIAN IMMIGRATION POLICY

I chose to focus exclusively on employed immigrants coming from non-EU 15 countries who do not hold EU-15 citizenship, in order to ensure that they have been subject to the same immigration policy restrictions throughout the time span of interest. In particular, accounting for the time it took to fully implement the 1990s changes, I consider those individuals who entered Austria post 1996. As the most significant policy changes ever since 1996 were implemented in 2003, the switch point for the policy impact analysis is 2003. This approach is line with that of Huber et al (2010) who also considered 2003 a turning point. In the following I briefly present the policy's evolution towards a restrictive matching system.

Austria has never officially defined itself as a country of immigration though 10% of its residents do not have an Austrian passport (UWT, 2007: 3). Its migration policy is twofold. There is a "guest worker regime" on the principle of recruitment and rotation (Kofmann et.al. 2000: 48), with a linkage between labor contract and residence permit, adjusted to the demands of the national labor market. The principle of jus sanguinis applies to citizenship requirements.

With the beginning of the 1990s access by immigrants to both the Austrian labor market and territory has become increasingly restrictive. The reforms generated a substantial shift in migration regime-from a system of flexible reaction towards the demands of the labor market to a strictly regulated and limited system of immigration (König and Stadler, 2004).

In 1990, the Foreign Worker Law introduces a quota for the employment of foreigners, defining the maximum share of foreign workers[1] in the total workforce at 10%. It was amended twice in 1993: first to 9% and later to 8% (Huber et al, 2010:6). In 1993 the Alien Act and the Residence Act come into force. The Residence Act establishes contingents for different categories of migrants, e.g., seasonal workers, as well as qualitative requirements for applicants, e.g., sufficient financial means at their disposal, a certain level of education, adequate accommodation (UWT, 2007:6). A new quota for family reunification, which is still in place, specifies that residence quotas are established on an annual basis by region. Initial residence permits are to be applied for from abroad. Status switching is not permitted. Austria joins the EEA in 1994 and the EU in 1995. The Austrian authorities impose the seven years transitional period before granting EU level access to those from new member states[2].

1996 represents a key moment for the 1990s period. It is then when the more restrictive 1993 regulation of residence status fully came into force, with separate quotes for family reunion, employment and private persons, by region (Huber et al, 2010:78). Residence permits for humanitarian reasons are introduced in 1997 (1998 in effect). A 1997 amendment to the Aliens Act differentiates between migrant rights to temporary stay and settlement. Table 1 summarizes the progression of these changes.

[Table 1 here]

Since 2002 (into force January 2003) until late 2010 when the social partners started discussing the introduction of a criteria-based scheme (i.e., the "Red-White-Red Card" system), labor migration of third country nationals was confined to "key" and temporary workers. The intention of the new restrictions was to better link employers' needs and immigrant workforce supply by matching third-country nationals to occupations on regional need basis. The permanent regional labor migration quota and the matching procedure also

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[1] Individuals not born in Austria, who do not hold Austria citizenship
[2] http://www.demokratiezentrum.org/en/knowledge/stations-a-z/austria-land-of-immigration.html

applies to those who entered Austria via family reunification with someone of third country origin and to those private persons who resided without labor access. However, those eligible for family reunification have the additional opportunity of accessing work on the basis of labor market testing (Biffl, 2011:15). Third country nationals can still enter the country outside the quota system, but only for education, special cases of employment, if they are private persons with no intention to work, on humanitarian grounds or if they are married with an Austrian or EEA citizen. In 2005 (January 1st 2006 in effect) some minor additional amendments were made. These changes hampered family reunion by imposing an income requirement. Moreover, new residence permits outside the quota system are restricted to family members and new settlers with no or very limited labor market access (Huber and Bock-Schappelwein, 2011: 9). The inflow of immigrants with low earning capacities decreased (Biffl, 2011: 15). All in all, it is extremely difficult for new settlers of third country origin who do not go through the employment quota system to both reside and work in Austria (IOM, 2008). Below I discuss all possible employment scenarios for those who entered Austria 2003-2010.

Temporary workers may be granted a one year residence permit if the Austrian Employment Service has determined that the job cannot be occupied by another suitable unemployed person resident in Austria. By means of decree, without the possibility for a more permanent stay, they can be granted a less than six month visa (UWT, 2007: 8-9).

Settlement permits are issued to *key workers*, including the self-employed, and this residence title is subject to an annual quota for each group, in each region. On top of it, the quota system for issuing work permits also applies to key persons. They need to have special training or skills which are in particular demand in the labor market. Their monthly gross salary has to amount to at least 60% of the ceiling on insurable earnings[3] (UWT, 2007: 8-9). They receive their license as a consequence of an employer applying in their behalf, in a certain region, prior to them entering the country. The approval is for 18 months, but in 12 months' time they can apply for full access to the Austrian labor market as long as they have found a new employer (Beratungszentrum für Migranten und Migrantinnen, 2009:4). They are also required to fulfill an "integration agreement" consisting of a linguistic and a cultural module (Federal Act concerning settlement and residence in Austria, 2005/06).

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[3] About 2,500 euros in 2011/12

HYPOTHESES

H1: Upon arrival, while the risk is higher for an immigrant compared to a native to be overeducated for the current occupation relative to being correctly matched[4], the risk is lower to be undereducated, irrespective of arrival cohort.

All the theoretical frames I previously introduced in the literature review section assert the fact that overeducation is far more common among immigrants and that it declines with times passage. The first step is testing these assumptions at time 0 after arrival.

In the framework of the HCT, the incidence upon arrival of undereducation should be lower for immigrants. Though ability/motivation in some cases is important, in the Austria setting employers have a constantly large pool of better educated migrants (credentials are a scare commodity).

H2: Upon arrival, overeducation is less common among immigrants subject to the 2003 increased regulations on residence and labor market access than among immigrants who were subject to the more relaxed regime, relative to similarly endowed native nationals.

As stated when detailing the post 2003 immigration policy characteristics, a key worker's entry on the country's territory and labor market is dependent on both the state and the employer's idea of the required qualification necessary for fulfilling the tasks of a high status occupation in demand. Similarly tight matching criteria apply to those who need be labor tasted. The extent of overeducation in such cases should be slender (e.g., surgeon turned general practitioner) - closer to the native level, that is. When one does not enter the country with a solid offer nor is subjected to labor market testing, despite being screened for higher education the probability of ending up overeducated for the job performed is higher.

H3: For an immigrant worker, the risk of being overeducated relative to being correctly matched to the educational level required to carry out the current job declines with years of residence.

H4: The risk of being undereducated rises with years of residence.

The pattern described by these two hypotheses is consistent with the job search process after arrival being aimed at securing employment in jobs with higher required levels of education (Chiswick and Miller 2009: 168).

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[4] The highest level of educational attainted is the same as the one required to perform the job in which one is employed

H5: The Austrian 2003 type of policy change increases the impact years of residence have on an immigrant's risk of being mismatched.

The post-2003 policy setting poses a number of barriers to the prospect of exiting a mismatch situation. There are financial requirements one needs to meet in order to remain in the country, there is a residence dependency on the initial employer(s) and the process of attaining the most relaxed form of settlement is more difficult. The HCT prediction of undereducation resulting from one remaining alongside the same employer for a long period of time is thus catalyzed by contextual factors. Important to note, however, is that Austria's Employment Protection Legislation Index (EPL) is 2.4 with similar scoring for regular and temporary employment (2.2, respectively 2.3), meaning that temporary job traps and labor market dualism have little impact on the quality of a match. The post-2003 workers having to go through a matching process/labor testing and once in Austria having completed the integration module are better equipped to exit a situation of overeducation faster than the previous policy cohort individuals.

DATA

The Dataset

The data comes from the European Union Labour Force Survey (EU-LFS) 1998-2010 as provided by Eurostat, 2010 release. The data collection process is fundamental in understanding how the final sample was created.

In March 1995 Statistik Austria started carrying out The Austrian Labour Force Survey (AT-LFS) according to the EU-LFS questionnaire as an annual supplementary program of the quarterly Mikrozensus survey. The Mikrozensus' is a random sample of dwellings stratified by federal states. Its rotation scheme is of eight waves with one eight of the sample replaced each quarter (Eurostat, 2012: 36). Each dwelling exits the AT-LFS after two rounds. One must pool yearly information every two years in order to avoid duplicate cases (Quatember, 2002: 96).

In 2004 the AT-LFS was redesigned as a continuous survey, covering all weeks of the year. The rotating system got restructured to five waves (Eurostat, 2012: 36). The data is provided in both quarterly and yearly averages format. All changes applied starting spring quarter 2005 and had consequences on handling the cross-sectional information. In order to merge it without duplicate observations one has the option between pooling the first wave

across all quarters/years or the same quarter across all years while dropping the fifth wave (the UK-LFS has a similar structure hence see Rafferty and Wathan, 2011:56-57). I opted for the former as it generates a larger immigrant sample. I use the yearly averages format of the data as certain variables (marriage status, years of residence, working status the year prior to the survey, size of the firm one's working for) are only available in it.

Sample Selection

The final sample refers to workers aged 15-69. I exclude those who are part of the armed forces (ISCO code 0) as it is difficult to make a link between their skill level and occupation. In respect to country of birth and nationality I only keep those born in Austria who have Austrian citizenship, and those born in a country subject to restrictive access, i.e., non EU-15, who entered Austria after 1996 and do not have EU-15 citizenship. This decision is immigration policy motivated. Although data is available starting in 1996, the analysis starts with the 1998 survey round for identification reasons[i].

The data only covers foreigners registered at municipal registry offices hence I do not account for illegal immigrants (see Biffl, 2011: 94-96 for a discussion on illegal residence and work). As only starting 2002 the country of birth and nationality variables allows me to differentiate between non- EU-15 immigrants I do not analyze such differences.

I carry out the first part of the analysis on the sample resulting from pooling the 1998-2010 waves of the EU-LFS for Austria and imposing the above criteria. For the second part I divide this sample between those individuals who entered the country prior to the change in the immigration policy (1996-2002) and those who entered the country post the event (2003-2010).

Crucial to testing my hypotheses is the measure of years of residence. The two immigrant sub-samples are based on a computed year of arrival in Austria variable. I retain in the 1996-2002 sample all those who entered Austria during that period and were still in country after 2003. However, individuals with a value for years of residence larger than 10 are excluded given how the variable is provided and the identification problems this situation creates[ii].

The sample on which I perform my analysis comprises of 167,518 individuals, out of whom 164,976 are native-born nationals and 2,542 of third country origin and non-EU-15 nationality: 1,372 arrived during 1996-2002 and 1,170 arrive between 2003 and 2010.

MEASUREMENT

Dependent Variable: Measuring Under- and Overeducation

There are a number of subjective and objective ways one could measure the match between the main occupation an individual and the level of qualification he/she has attained (see Groot and Maasen van den Brink, 2000). None come without a set of disadvantages. For future comparative purposes and validity reasons, I choose to use the 2007 OECD suggested method which relies on educational thresholds inside each of ISCO 88 occupational groups (SOPEMI, 2007: 156). Table 2 summarizes the suggestion. For a detail account of how I recorded the European Labour Force Survey (EU-LFS) highest level of education completed variable check Table A1 .

[Table 2 here]

As the EU-LFS does not provide self-reported information in regards to one's ease in performing the tasks required by the occupation or the number of years of education attained, I am unable to provide comparative estimates using other measurement option, i.e., worker's self-assessment (Duncan and Hoffman, 1981) or realized matches (Verdugo and Verdugo, 1989; Kiker et al., 1997).

Independent Variable and Controls – Measurement Discussion

My main independent variable is years of residence in the host country. It takes values between 1 and 10 for the foreign born population and zero for the native one. In the 2003-2010 immigrant sample the maximum value is seven.

The final list of all other covariates includes: sex, age, marital status, type of contract, contract duration, size of the firm where one's working, position on the labor market the previous year, region in which the job place in located. Due to EU-LFS microdata anonymisation criteria age is provided in 5- year age band format, i.e., 0 - born in the country or arrived at age less than 1, 1-4, 5-9, etc.(Eurostat, 2011c: 1). I treat the variable as continuous, i.e., a one unit increase equals five years. In regards to marital status I distinguish between being single, married or no longer with a partner. Both variables regarding contract characteristics are dichotomous – working full time versus working part time, having a permanent contract versus not having one. Also a dichotomous variable is the professional

status one had the previous year – working or not working. The variable regarding the size of the firm one's working for is unaltered, i.e. 0-10, 11-19, 20-49, more than 50 employees. Due to sample constraints I reduce from nine to three the account of regions where one's work place is located: Eastern (*Ostösterreich),* Southern (*Südösterreich*) and Western Austria (*Westösterreich*). This control is a proxy for foreign workers density. When estimating models Eastern Austria- because of Vienna (Figure 28 in Biffl, 2011:77) represents the baseline group.

For the part of analysis in which I focus on immigrant cohorts I replace the control for last year's professional status with a variable I newly create to reflect recent labor market mobility. Given the way this variable is constructed it cannot be used for the native-born population. The variable indicates three possible statuses: not working last year, working last year but for a different employer than the current one, working last year for the same employer. In order to obtain the latter two I generate a tenure measure by subtracting from the year of the survey the year one started working for the current employer. If the individual started working for said employer prior to arriving in Austria his or her tenure is equal to the number of years of residence, i.e., I am only interested in tenure in the framework of Austrian legislation. In the category "working for the same employer" I place all those who have tenure equal to their years of residence and were active last year. Since the count for years of residence starts with the value one, I ensure the same start value for tenure. In the category "working for a different employer than the current one" fall all those for whom tenure does not equal years of residence and were active last year. For a detailed overview of the sample's characteristics see Table A2.

I cannot use one's level of education as a predictor as it would induce a spurious link between the explanatory variables and the outcome (see Chiswick and Miller 2009).

METHODS

I use of a multinomial logit model, which assumes that the log-odds for each response follow a linear model:

$$h_{ij} = \log \frac{p_{ij}}{p_{iJ}} = \alpha_j + \boldsymbol{x}_i \beta_j \quad \textit{i=1,...n; and j=1,2, J-1;}$$

where α_j is a constant and β_j is a vector including the independent variable and controls, for j categories and i individuals. The J-1 equations contrast each of the categories 1, 2, J-1 with category J. My categories are: being under-educated, over-educated and correctly matched. I contrast the first two with the latter.

My analysis is twofold. In order to assess immigrants status differences in estimated coefficients I run a multinomial model on data pooled across the native nationals and the post 1996 immigrants. As suggested by Friedberg (2000) by including a dummy for being foreign born and a variable for years spent in the host country I am able to measures the initial gap of immigrants upon arrival relative to comparable natives. The second part of the analysis deals with difference between immigrants by period of entry in Austria. I run separate multinomial models by time of access into in the country. My main interest is the coefficients for years of residence. After estimating the models I perform a Chow Test for structural change. The Chow Test (Chow, 1960) allows me to assess whether the coefficients for the years of residence variable on the two sub-samples are equal. As the number of observation in both sub-samples is similar, homoscedasticity is assured and the test is applicable (Ghilagaber, 2004). The Chow Test also requires similar variance in all groups. To guarantee that I use the dummy variable approach with White's Robust Standard Errors.

RESULTS

Overall Trends in the Level of Education- Occupation Mismatch

Table A2 reports the distribution of under- and overeducation among immigrants and non-immigrants. In both groups the percentage of those who exhibit an adequate match between their level of education and that required by their occupation is more or less similar (56.8% among the native nationals and 54.9% among the third-country nationals, non EU-15 born). Undereducation is more prevalent among native nationals (34.8% vs. 22%), while overeducation is almost three times more common among immigrants (8.4% vs. 23.1%). These estimates indicate similar trends to those highlighted by Huber et al. (2010: 105-6) in their work employing the same method of constructing the dependent variable.

By looking at the immigrant sample only, I note the percentage of those "correctly matched" to be around 54% across all entry years (55.1% in the case of those who entered the country 1996-2002, 54.6% in that of those who entered post 2003). Undereducation is marginally more dominant among those who entered the country before the latest policy changes (24.3% vs. 19.2%). In contrast, overeducation is marginally more prevalent among those who more recently moved to Austria (20.6% vs. 26.2%). The chi-square test results indicate all above noted educational mismatch differences between groups as significant at the 1% level.

Multivariate Results by Immigrant Status

Table A3 contains the estimates related to the first two hypotheses.

The first model (Model 1: immigrant status dummies, years of residence and years of residence square) clearly indicates that the initial risk for a newly arrived immigrant (irrespective of policy cohort) compared to native nationals is higher for being overeducated relative to being educationally fit for the current occupation. The estimates resulting from Model 2 which additionally controls for socio-demographic characteristics and Model 3 which accounts also for occupation-related aspects concur to this fact. A similar consistency throughout the models can be observed in the case of the initial risk referring the undereducation-matched relation. Precisely, the expected risk of being undereducated is way lower for immigrants (the relative risk ratio is around 0.35-0.40 values).

The full model (Model 3) provides the strongest test for the first two hypotheses. Upon arrival a 1996-2002 immigrant has a 2.86 times higher risk of being overeducated and not educationally matched to his job relative to a native. It has, however, a 0.32 times lower risk of being undereducated ($p<0.01$). A 2003-2010 immigrant runs an even higher risk of being overeducated- 3.09 times higher to be precise (($p<0.01$), yet a similarly low risk of being undereducated – around 0.3 times lower. Both hypotheses are confirmed. The years of residence estimates capture the rate at which the risk ratio switch narrows down as immigrants integrate into the labor market. For Model 1-3 the returns to years of residence are constrained to be the same for both immigrants' cohorts. This is, however, something I am testing in the following. Nevertheless, I note that the passage of time seems to have a detrimental effect on both under and overeducation relative to a perfect education-occupation fit.

Multivariate Results by Immigrant Cohort

Table 3 reports the risk ratios of being undereducated or overeducated for the current occupation compared to being educationally matched, as estimated via a multinomial logit model for the two cohorts of interest: non EU-15 born non EU-15 nationals who started residing in Austria either in 1996-2002 or in 2003-2010.

[Table 3 here]

For those who came to Austria between 1996 and 2002 each additional year in the country is equivalent to a 1.06 times higher risk of being undereducated for the current occupation relative to being educationally matched, holding all other variables in the model constant. When it comes to overeducation the relative risk is expected to be 0.92 times lower. A similarly 1% significant trend can be noted for those who moved to Austria after the immigration policy changes occurred (2003-2010). More specifically, I note that each unit increase in years of residence refers a 1.17 times increased relative risk of being undereducated. A 0.89 times lower risk of being overeducated compared to being educationally compatible with the requirements of the present occupation is noted, all other covariates held constant. Worthy of mentioning is that testing for a non-linear relation by including a square term yielded no significant estimates in either cohort.

For both groups age seems to have an equal and significant effect on the relative risk of an educational mismatch. Ageing by five years translated into a 0.95 times lower relative risk of being undereducated and a 1.02 times higher risk of being overeducated relative to meeting the educational level implied by one's occupation, all other covariates held constant. Due to the nature of the variable, I am unable to test for the non-linearity of the relationship.

When referring the 1996-2002 cohort, the relative risk ratio switch from an inactive status last year to continuous employment is 0.5 for being undereducated vs. educationally matched. In other words, the expected risk of being undereducated is half of that estimated for those who stayed with their initial employer. A similarly low expected risk can be found when addressing the risk switch ratio in regards to overeducation. As for the 2003-2010 entrants, a substantially lower and significant risk is yet again encountered when discussing overeducation. The estimate for undereducation indicates an opposite trend to the 1996-2002 one, yet not significant and with a large standard error. I can, however, put forth the common sense idea by which continuing working for the initial employer relative to being inactive the previous year reduces the risk of a mismatch between one's educational level and that required by his/her current occupation.

[Graph 1 here]

A powerful extension to the standard interpretation of these results consists in computing their marginal effects. For a general picture, I start by calculating the average marginal effect of one year of residence on the probability of each outcome. This is done by computing a marginal

effect for each case, and then averaging all computed effects. In the case of those who came into the country 1996-2002 on average an additional year of residing in Austria translates into a 1.4% higher probability of undereducation and 1.5% lower one of overeducation. For those who started residing 2003-2010, however, estimates indicate a 2.8% higher probability of undereducation and of 2.7% lower of over-education. All estimates are significant at the 1% level. Time seems to have on average a null, non-significant effect on the probability of being educationally matched to the current occupation, for either cohort.

To give a more precise evaluation, I also construct marginal effects at representative values of years of residence. This implies setting years of residence to a particular value, leaving the other variables unchanged, finding the predicted probability for each outcome, and then averaging them. In doing so I created a situation which highlights the effect of years of residence at crucial points in the migration experience timeline. Graph 1 shows the average predicted probabilities at each value of the years of residence variable. Particular discrete changes occur at the values 2 (i.e., one can apply for a labor permit allowing full country mobility after one year, meaning he might have it by year two), 5 (i.e., by this point one is expected to exhibit some labor market mobility) and 7 (i.e., maximum value for the 2003-2010 cohort). I note that if all individuals had 2 years of residence, then those who came into the country 1996-2002 would have on average 19% chance of being undereducated vs. 15.3% for those who entered 2003-2010. As for overeducation, the estimates indicated a 27.6% chance vs. a 30.22% one. As time passes by, the the scenario reverses. Precisely, if all individuals had 7 years of residence, the average predicted probability of being overeducated is of 25.2% vs. 30.1%, while that of being undereducated is of 19.6% vs. 17.2%.

I argue that years of residence directly impact the risk of a mismatch differently for each policy cohort. However, I am aware that this causal interpretation requires a number of assumptions to be made. One assumption is that both before and after the policy change, in terms of observed and unobserved characteristics my immigrant population is the same. This assumption is threatened by access to information on those who try to migrate to Austria. Firstly, there are those who have never tried and do not plan to try migrating to Austria. We have no information on them unless collected in the home country. Secondly, there are those who intended to migrate to Austria and did not get selected. The responsible Austria authorities might have information on them. Thirdly, there are those who successfully managed to migrate to

Austria. It is to the characteristics of these individuals that we have access to. The second assumption is that on the labor market the only difference between the two immigrant cohorts has to do with the quality of the education-occupation matching process. A possible way to ensure that both assumptions are met would have been to have additional information on the immigrant's country of origin. In this manner I would have been able to assess differences in cohort quality and to a looser extent account for outmigration, i.e., using the GDP of country of origin as an exclusion restriction.

The results of Chow Test for the variable years of residence provide evidence on the effects of time passage. When the outcome of interest is undereducation the 0.35 chi square statistic with one degree of freedom is not significant. This means that the number of years one has been residing in Austria does not have a different effect on the relative risk of being undereducated depending on policy period. Specifically, one could argue that the policy changes involving matching and a tighter link to the initial employer and region of work did not hamper labor mobility. Hence the risk of one staying with the same employer for long enough as for skills to devalue remained constant. The 2.55 chi square statistic in the case of overeducation is significant at the 10% level. It could be stated that time spent in Austria does indeed have a different impact on the relative risk ratio of being overeducated depending on the immigration policy in place at time of entry in Austria. Precisely, those who entered the country after 2003 exhibit a slightly faster pace at which the risk of overeducation reduces. It might just be that the policy changes resulted in a more successful match for individuals on the labor market over time.

SUMMARY AND CONCLUSIONS

This paper is concerned with the extent of educational attainment mismatch in the current occupation of employment (measured according to the 2007 OECD suggestion) in Austria, and the impact immigration policy and duration of residence have on shaping it. Precisely, I look at the 1996-2010 period and assess the role of the 2003 policy intervention which further restricted residence and labor market access for immigrants. I use EU-LFS 1998-2010 data.

The results displayed in the Table A3, clearly show that the incidence of educational mismatch varies by immigrants status in the Austrian labor market in a way that is consistent with the limited estimates provided by previous studies, such as the most recent one by Huber et

al (2010). In particular, I notice that overeducation is more common among immigrants, that undereducation is more common among native nationals and that a bit more than half on the individuals in each group are correctly matched. From a purely economic standpoint it is important to note that from one immigrant cohort to another, any gains resulting from a lower incidence of undereducation are overturned or balanced out by the increase in overeducation.

Upon arrival in Austria, immigrants face a higher risk of being overeducated than native nationals and a lower one of being undereducated, once socio-demographic characteristics and job related aspects are accounted for. These results are in line with all theoretical explanations of an immigrant's initial labor market performance. Furthermore, I note that overeducation is more prevalent among post 2003 immigrants. The simplest explanation would be that on top of the international transferability of human capital skill being imperfect, allowing employers on a key market discretionary power in the matching process triggers an initial allocative inefficiency.

After arriving in Austria, though, one would expect that as time goes by the risk of educational mismatch to change. Not only do uncertainties over the value of skills tend to clear out, but also destination specific skills enable immigrants to improve their job performance. Shortly put, immigrant adjustment should take place. Table 3 estimates ascertain a decrease in the risk of overeducation with each additional year spent in the country. Moreover, the 2003 policy intervention has a say in reducing the risk of overeducation relative to that of match status. Precisely, those immigrants who entered the country between 2003 and 2010 have a slightly steeper rate at which the risk of overeducation decreases by years of residence. To all appearances, this situation is the result of a more successful integration process in the Austria labor market. As far as undereducation goes, each additional year of residence has a detrimental impact on one's risk of being undereducated. Though the estimates slightly differ by immigrant cohort, the difference in coefficients is not significant. As most often undereducation comes from one staying alongside the same employer for long haul, making residence and labor access criteria harsher does not seem to hamper the existing levels of job mobility in a way by which the risk of undereducation would rise with time.

I conclude that the imposition of a matching system backed by an integration module can lead to a somewhat more efficient use of human capital in that immigrants spend less time in positions for which they are overqualified. That said, the observed policy effect is not large and further research will tell us if it is generalizable outside of the Austrian context.

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APPENDIX
-Includes main text Table and Figures-

Table 1: Chronology of Migration Law in Austria

Year	Law
1975	Foreign Worker Law ("Ausländerbeschftigungsgesetz 1975")
1988	Amendment of Foreign Worker Law
1990	Alien Police Law (Fremdenpolizeigesetz)
	Amendment of Foregin Worker Law
1993	Alien Law ("Fremdemgesetz")
	Residence Law("Aufenthaltsgesetz")
	Amendment of Foreign Worker Law
1994	EEA-accession
1995	EU-accession
1996	Amendment of Residence Law
1998	Alien Law 1997 ("Fremdemgesetz 1997")
2003	Alien Law 2002 (Amendment of Alien Law 1997)
2006	Alien Police Law ("Fremdempolitzeigesetz 2005")
	Residence and Settlement Law ("Niederlassungs- und Aufenthaltsgesetz 2005")

Source*:* Huber and Bock- Schappelwein(2011), own research

Table 2: Correspondence between Highest ISCED Level of Education Completed and ISCO
Employment Level in Terms of Education Level – Occupation Match

| ISCO 88	Undereducated	Matched	Overeducated
(0: Armed Forces)			
1: Legislators, senior Officials and Managers	Low Skills(0-2) Intermediate (3-4)	High Skills (5-6)	
2: Professionals	Low Skills(0-2) Intermediate (3-4)	High Skills (5-6)	
3: Technician and Associate Professionals	Low Skills(0-2) Intermediate (3-4)	High Skills (5-6)	
4: Clerks	Low Skills(0-2)	Intermediate(3-4)	High Skills (5-6)
5: Service Workers and Shop and Market Sales Workers	Low Skills(0-2)	Intermediate(3-4)	High Skills (5-6)
6: Skilled Agricultural and Fishery Workers	Low Skills(0-2)	Intermediate(3-4)	High Skills (5-6)
7: Craft and Related Trades Workers	Low Skills(0-2)	Intermediate(3-4)	High Skills (5-6)
8: Plant and Machinery Operators and Assemblers	Low Skills(0-2)	Intermediate(3-4)	High Skills (5-6)
9: Elementary Occupations		Low Skills(0-2)	Intermediate (3-4) High Skills (5-6)

Source: Summary of Table I.A2.1-3, SOPEMI, 2007: 156

Table 3: Relative Risk of Being Undereducated or Overeducated (Baseline: Matched) by Immigrant Cohort

	1996-2002		2003-2010	
	Undereducated vs. Matched	Overeducated vs. Matched	Undereducated vs. Matched	Overeducated vs. Matched
Years of Residence	1.06**(0.03)	0.92***(0.03)	1.17***(0.06)	0.89**(0.04)
Sex (ref: female)				
Male	1.06 (0.16)	0.85(0.13)	0.98(0.17)	0.78(0.12)
Age	0.95***(0.08)	1.02**(0.08)	0.96***(0.01)	1.02***(0.08)
Marital status (ref: single)				
Married	0.94(0.15)	1.27(0.24)	0.76(0.14)	1.07(0.2)
No longer with a partner	1.31(0.37)	1.29(0.39)	1.62(0.54)	1.16(0.38)
Type of contract(ref: part-time)				
Working Full-time	2.08***(0.41)	0.78(0.14)	0.85(0.18)	0.61***(0.1)
Contract duration (ref: non -permanent)				
Permanent Contract	0.54***(0.09)	1.15(0.26)	0.68**(0.13)	0.96(0.18)
Firm size (ref: 0-10 employees)				
11-19 employees	0.86(0.18)	1.04(0.24)	0.68(0.17)	0.73(0.16)
20-49 employees	1.01(0.2)	1.45*(0.31)	0.75(0.18)	1.00(0.21)
50 or more employees	0.91(0.16)	1.47***(0.27)	0.69**(0.15)	1.07(0.19)
LM status last year (ref: inactive)				
Working, but LM mobile since in AU	0.81(0.15)	1.30(0.25)	1.26(0.28)	0.97(0.18)
Working for the same employer	0.5***(0.13)	0.66*(0.17)	1.31(0.34)	0.54***(0.12)
Region- workplace (ref: Ostösterreich)				
Working in Südösterrreich	0.86(0.2)	1.15(0.27)	0.65(0.2)	1.12(0.26)
Working in Westösterreich	1.12(0.16)	1.29*(0.19)	0.91(0.15)	1.01(0.15)
_ct	1.73(0.64)	1.93***(0.08)	1.54(0.64)	0.55*(0.2)
Pseudo R-squared	0.0535		0.0482	
N	1372		1170	

Source: EU-LFS for Austria 1998-2010, unweighted data
Note: * p<.10 **p<.05 ***P<0.01/ standard errors in between brackets

Graph 1: Marginal Effects for Education-Occupation Mismatch at Different Values of Years of Residence (YR)

Source: EU-LFS for Austria 1998-2010, unweighted
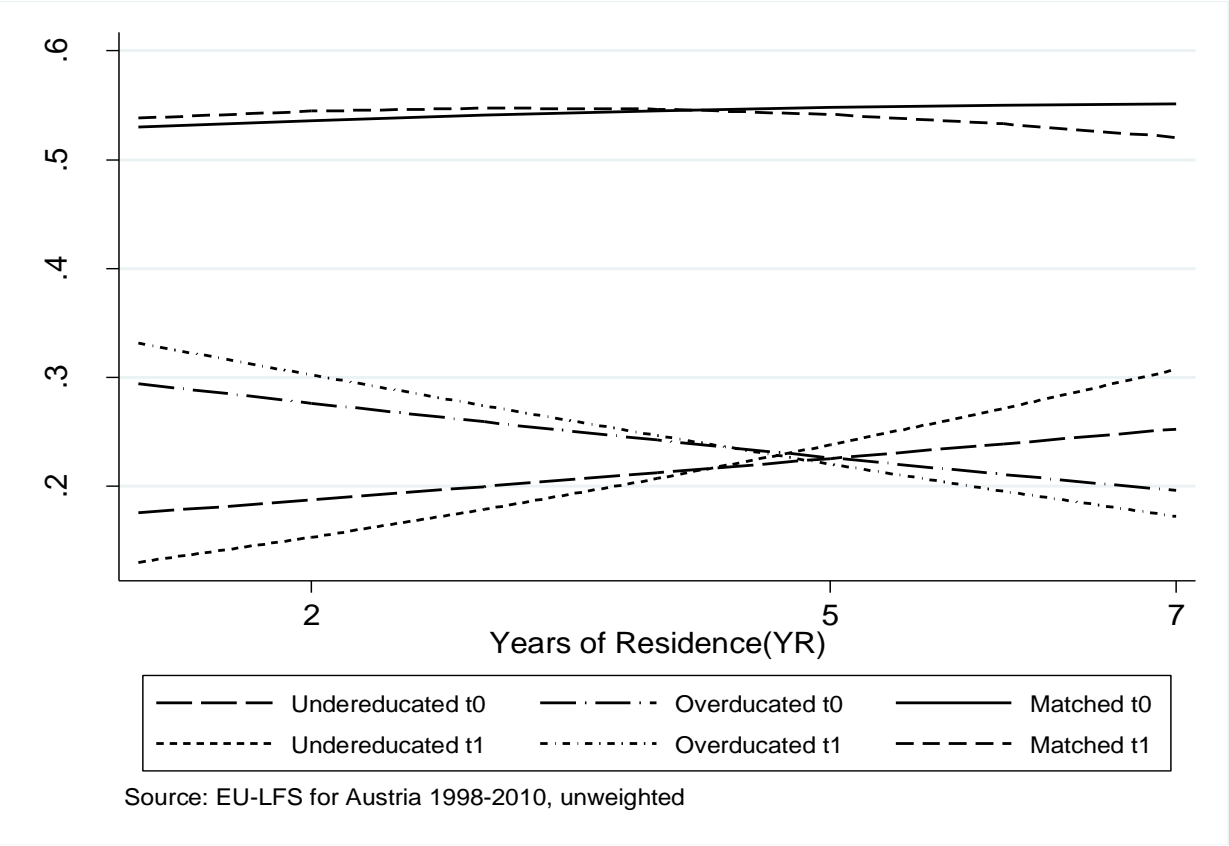
ANNEX

Table A1: Education Scale (EU-LFS) Recode

Codes from 1998			
00	No formal education or below ISCED 1	00	0
10 (2)	ISCED 0-1	00	0
11	ISCED 1	11	1
21	ISCED 2	21	2
22	ISCED 3c (shorter than 2 years)	22	2
30	ISCED 3 (without distinction a, b or c possible, 2 y+)	31	3
31	ISCED 3c (2 years and more)	32	3
32	ISCED 3 a,b	30	3
33 (2)	ISCED 3c (3 years or longer) or ISCED 4c	31/*42*	3
34 (2)	ISCED 3b or ISCED 4b	32/*41*	3
35 (2)	ISCED 3a or ISCED 4a	32/*41*	3
36 (1)	ISCED 3 or 4 (without distinction a, b or c possible)	30(2001-02)/43	3(2001-02)/4
41	ISCED 4a,b	41	4
42	ISCED 4c	42	4
43	ISCED 4 (without distinction a, b or c possible)	43	4
51	ISCED 5b	51	5
52	ISCED 5a	52	5
60	ISCED 6	60	6
99	Not applicable (child less than 15 years)	99	99
Blank	No answer	Blank	Blank

(1) According to 2001-2002 codification this code contains only ISCED 3 levels without distinction a, b or c possible but of various lengths; no cases for Austria
(2) Codes valid only for the series 1998-2000

Table A2: Sample Characteristics

	Non -EU15 origin, non-EU15 nationals		Native born nationals
	2006-2002 Percentage or mean (std. dev.)	2003-2010 Percentage or mean (std. dev.)	
Educational mismatch			
Undereducated	24.3	*overall: 22* 19.2	34.8
Overeducated	20.6	*overall: 23.1* 26.2	8.4
Matched	55.1	*overall: 54.9* 54.6	56.8
Sex			
Male	53.28	51.79	54.21
Female	46.72	48.21	45.79
Age	32.69*(9.03)	31.76(8.82)	38.77(11.68)
Years of Residence	6.34**(2.5)	3.4(1.77)	--
Marital Status			
Single	23.32	26.24	26.24
Married	68.08	66.84	54.66
No longer with a partner	8.60	6.92	8.51
Type of contract (schedule)			
Part-time	23.40	25.73	20.75
Full-time	76.60	74.27	79.25
Type of contract (duration)			
Permanent	83.31	78.72	78.01
Non- permanent	16.69	21.28	21.99
Firm size			
0-10 employees	32.14	37.78	37.94
11-19 employees	15.60	14.36	11.84
20-49 employees	17.57	16.58	15.32
50 or more employees	34.69	31.28	34.90
Last year status on the LM			
Not working	24.56	25.38	36.02
Working	75.44	74.62	63.98
Recent LM mobility			
Not working last year	24.56	25.38	-----
Working, but for a different employer	62.39	51.88	
Working for the same employer	13.05	22.74	
Region of work			
Ostösterreich	43.80	47.18	31.76
Südösterreich	11.01	9.66	22.08
Westösterreich	45.19	43.16	46.16
N	1372	1170	164,976

Source: EU-LFS for Austria 1998-2010,unweighted data

Note:*Age is provided in 5 years band (17, 22...69)-values around 32 stand for 30-34 years; around 38 for 36-39 years

   ** YR for this sample takes values up to 10

Table A3- Relative Risk of Being Undereducated or Overeducated (Baseline: Matched) by Immigrant Status

	Model 1		Model2		Model 3	
	Undereducated vs. Matched	Overeducated vs. Matched	Undereducated vs. Matched	Overeducated vs. Matched	Undereducated vs. Matched	Overeducated vs. Matched
Immigrant status (ref: AT national native)						
Immigrant 1996-2002	0.38***(0.09)	2.25***(0.47)	0.38***(0.09)	2.63***(0.55)	0.32***(0.07)	2.85***(0.6)
Immigrant 2003-2010	0.35***(0.07)	2.6***(0.47)	0.35***(0.07)	3.02***(0.55)	0.3***(0.06)	3.09***(0.56)
Years of Residence						
Years of residence	1.21***(0.1)	1.14*(0.09)	1.22**(0.1)	1.14(0.09)	1.28***(0.1)	1.12(0.09)
Years of residence – square term	0.99*(0.007)	0.98**(0..07)	0.99*(0.01)	0.98**(0.01)	0.98**(0.01)	0.98**(0.01)
Sex (ref: female)						
Male			1.02**(0.01)	1.11***(0.02)	0.94***(0.01)	1.39***(0.02)
Age			0.99***(0.0005)	1.01***(0.001)	0.99***(0.001)	1.01***(0.001)
Marital status (ref: single)						
Married			0.91***(0.01)	1.1***(0.03)	0.93***(0.01)	1.07***(0.03)
No longer with a partner			1.04**(0.02)	1.16***(0.04)	1.09***(0.02)	1.16***(0.04)
Type of contract(ref: part-time)						
Working Full-time					1.06***(0.02)	0.56***(0.01)
Contract duration (ref: non -permanent)						
Permanent Contract					0.38***(0.005)	0.78***(0.02)
Firm size (ref: 0-10 employees)						
11-19 employees					1.2***(0.02)	0.87***(0.03)
20-49 employees					1..12***(0.02)	0.88***(0.03)
50 or more employees					1.29****(0.02)	1.03***(0.03)
LM situation last year(ref: inactive)						
Active					0.88***(0.01)	1.44***(0.03)
Region- workplace (ref: Ostösterreich)						
Working in Südösterrreich					0.82***(0.01)	1.25***(0.03)
Working in Westösterreich					0.99***(0.01)	1.11***(0.03)
_ct	0.61***(0.003)	0.15***(0.001)	0.73***(0.01)	0.06***(0.002)	1.35***(0.04)	0.09***(0.004)
Pseudo R-squared	0.002		0.006		0.027	
N			167518			

Source: EU-LFS for Austria 1998-2010, unweighted data
Note: * p<.10 **p<.05 ***P<0.01/ standard errors in between brackets

[i] In all EU-LFS micro data sets what's being given is the period of time for which one has been residing in Austria at year level. This measure takes the value of zero only for the Austrian born, irrespective of their current nationality. It takes values starting one for all foreign-born. Note that a less than a year residence is rounded to the value of one and so on. I generate the adjutant year of arrival variable by subtracting from the year of the survey the number of years of residence. This is a slightly imprecise measure.

The direct consequence of this imprecision is the use of 1998-2010 data. In the 1996 data I am unable to precisely distinguish between those immigrants who entered the country in 1995 and those who did so in 1996 (i.e., the start year of the first policy period). If, however, I were to use data from 1997 onwards, given the rotation scheme (i.e., having to pool yearly information every two years) I would have a similar problem distinguishing in the 2003 data between those who came in 2002 and those who came in 2003 (i.e., the start year of second policy period).

[ii] Up until 2007 for those who have been in Austria for 10 years or more, the years of residence are top-coded at 11. From 2008 onwards the number of years past the values of 10 is broken down into 5 years bands categories, i.e., 11-14, 15-19, 20-24, up to 99 (Eurostat, 2011b:19). Given the situation, I am unable to distinguish between those who came in Austria in say 1996 and are still in Austria in 2008 and those who came in 1994 and are also still around. Consequently, in the final sample I only keep those individuals for which I have an exact value for their years of residence, i.e., between 1 and 10. To summarize, in the 1996-2002 sample the maximum number of years one could have is 10, whilst in the 2003-2010 one it is 7.