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The Impact of Migration Policy on Migrants'  
Education Structure: Evidence from an Austrian  
Policy Reform

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## **Abstract**

Huber P., Bock-Schappelwein J. (2013). **The Impact of Migration Policy on Migrants' Education Structure: Evidence from an Austrian Policy Reform**

We ask how a reform of migration law intended to increase the selectivity of migration (the so-called integration agreement regulation in 2003) impacted on the education structure of migrants to Austria. To identify the effects of this reform, we use the fact it affected only migrants from third countries but not from EEA-countries. We find no compelling evidence that this regulation improved the education structure of migrants to Austria. Our interpretation of this is that the implicit positive impact of the reforms on the education structure of migrants was countervailed by an increased restrictiveness of the migration regime in total.

## **Key words**

Migration Policy, Self-Selection, European Economic Area

**JEL:** F22, J61, I20, O15

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## Introduction

In the last two decades, the share of foreign born residing in Austria more than tripled. In 1990, a mere 5% of the total resident population in Austria was born outside the country. In 2008, this applied to over 16%.<sup>1</sup> One of the consequences of this increase was an intensive debate on appropriate migration and integration policies, which resulted in repeated and intensive policy changes. In particular, three reforms mark the history of migration policy in Austria in this time period. These were the introduction of a foreigner and a residence law in 1993 (“Fremdengesetz”, “Aufenthaltsgesetz”) regulating the entry, stay and residence of foreigners in Austria (see Biffl, 2007), the accession to the European Economic Area (EEA) in 1994, which liberalized immigration and labor market access from all member states of the EEA and has been analyzed in Huber and Bock-Schappelwein (2012), and the so-called integration agreement regulation (“Fremdengesetznovelle 2002”), which entered into force on the 1<sup>st</sup> of January, 2003, and aimed at increasing the share of highly educated foreign workers from third countries to Austria.

Of these reforms, the integration agreement regulation in 2003 may be of wider policy interest in the light of the challenges to the Austrian migration regime and trends in international migration policy. A number of EU-countries have recently put in place policies that are intended to increase the share of highly educated migrants (see OECD, 2008) and migration experts (e.g. Chiswick, 2005) have long argued that developed countries should aim to attract more highly educated migrants. Therefore the so-called integration agreement regulation, which aimed at attracting more highly educated migrants, while at the same time making immigration law in general more restrictive, may be an interesting case study to analyze the impact of migration policy on the education structure of migrants.

This may be even more so, given that evidence on the effects of migration policy on the education structure of migrants is rather rare. Most of the literature (e.g. Mayda 2009 and Clark, Hatton and Williamson 2007) focuses on the impact of migration policy on overall migration and the few contributions considering the skill structure of migrants (e.g. Chiswick, 2000, Djajic 1989, Bianchi 2006, Egger and Radulescu 2009, Greenwood and McDowell 2011) often come to contradictory conclusions. In particular, in two recent papers that are close to ours, Chen (2005) finds evidence that masters degree students interested in migrating to the US were negatively selected in a less restrictive migration regime and positively in a more restrictive one, while Kato and Sparber (2010)

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<sup>1</sup>Austria is, however, by no means the only EU country where the share of foreign born increased substantially in the last decades: other cases include Ireland (see: Barrett, 2009) and Spain (see Bentolila et al. (2008)).

find that the tightening of H-1b (student visas) in the US in October 2003 disproportionately discouraged high-ability international students from attending US schools.

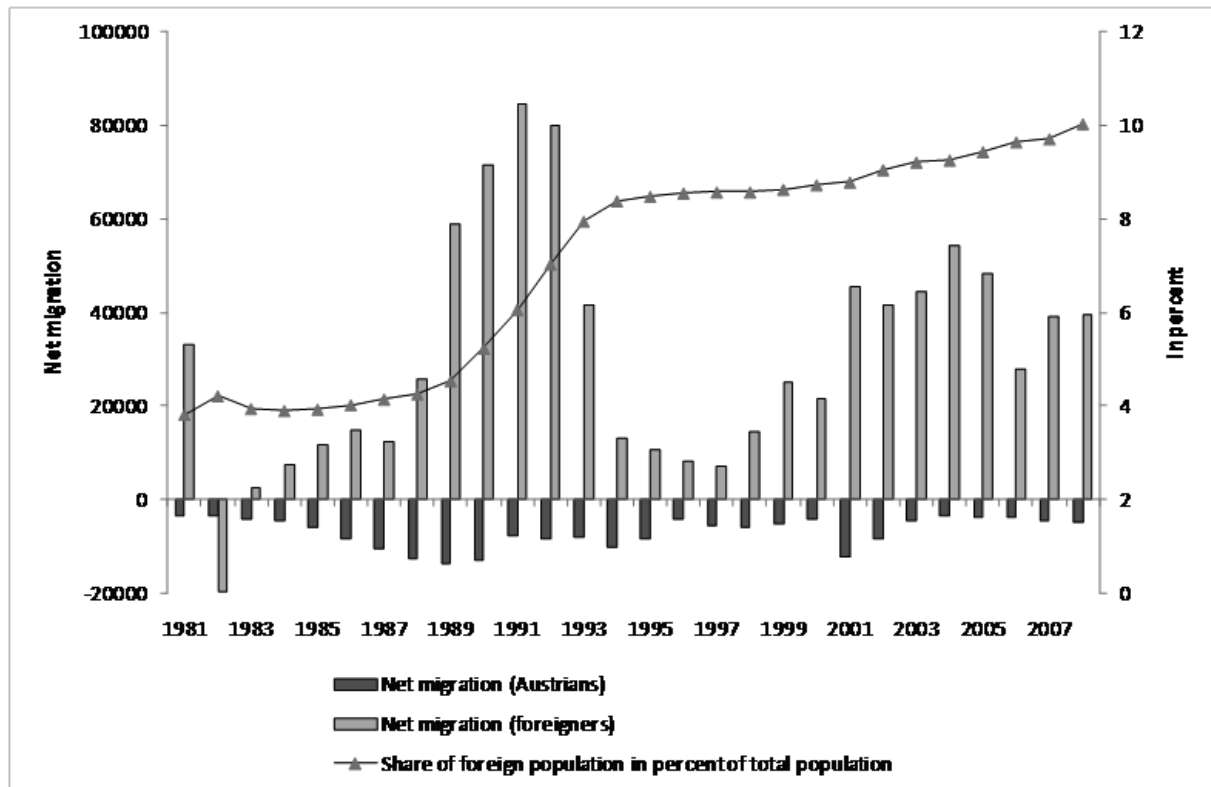
This paper augments this evidence by presenting an assessment of the effects of a move to a more selective migration policy. In line with Bianchi (2006) and Djajic (1989) we show that, from a theoretical perspective, such selective migration policies may lead to negative effects on the education structure of migrants either when migrants are positively selected at the outset or when the more selective regulation also makes the overall regime more restrictive and migrants are negatively selected. Furthermore, to empirically test the impact of the policy change, we use the fact that the change in policy in 2003 (i.e. the introduction of the integration agreement legislation) applied only to third country migrants to Austria and not to migrants from the EEA-countries. This allows us to use difference-in-difference estimation (see: Angrist and Pischke 2008 for an overview and Card 1990 and DeSilva et al. 2010 for applications in the migration literature) to evaluate the impact of migration policy changes on the education structure of migration.

The remainder of this paper is organized as follows: the next section provides some institutional background on the development of migration policy in Austria since the early 1990s, while section 3 discusses the theoretical background. Section 4 then describes the data used and section 5 the method. Section 6 presents results and section 7 discusses robustness issues. Finally, section 8 summarizes our findings and discusses their relevance for migration policy.

## **1 Institutional Background: Migration law in Austria**

When the Iron Curtain came down in 1989, this marked the end of traditional Austrian migration policy, which was based on a temporary foreign guest worker model. New groups of migrant workers came to Austria – from Central and Eastern Europe and from other parts of the world. Additionally, as a result of the civil war in former Yugoslavia, a large number of refugees moved to Austria. The inflow of foreigners to Austria increased notably. In only a few years, the share of the foreign population in Austria grew from 4.5% (1989) to 7% (1992). In consequence, migration rules were tightened in the early 1990s – beginning with an amended Foreign Worker Law in 1990. According to this amendment, the share of foreign labor in the Austrian labor market was limited to 10% and reduced twice in 1993, first to 9% and later to 8%. Additionally, the number of foreign workers in agriculture and tourism was limited by quota in 1994.

Figure 1 Migration in Austria (1981-2008)



Source: Statistics Austria, own calculations. Right axis: share of foreign population in percent of total population, left axis: net migration per year.

In addition to the amendment to the Foreign Worker Law in 1993, the Alien Law (“Fremdengesetz”) and Residence Law (“Aufenthaltsgesetz”) also came into force. The latter regulated the first entry, stay and residence of foreigners and restricted the number of people permitted to settle in Austria by quota. According to these laws, from 1993 onwards, governors of the federal states of Austria together with the ministries of the interior and labor fixed the region specific residence quota (which henceforth coexisted with the labor market access quota) on an annual basis. Differences by residence status in each region came into force in 1996, with the quota differentiated by family reunion, employment and private persons. Also, special rules excluded some migrant groups (such as some family members or some groups of migrant workers)<sup>2</sup> or asylum seekers from quota regulation.

<sup>2</sup>The composition of migrants without quota regulation changed in 1997, when special rules, for instance for commuters, students, artists, intercompany transferees and persons working for foreign media, were introduced.

Table 1 Annual quota by residence status and number of first settlement permits by quota type

	1998	1999	2000	2001	2002	2003	2004	2005
	Quota							
Total	8,540	9,565	7,860	8,338	8,280	8,070	8,050	7,500
Of which:								
Family reunion	4,550	5,210	5,000	5,490	5,490	5,490	5,490	5,460
Employment	950	1,120	1,000	815	495			
Key employment	1,860	1,130	1,010	1,613	1,905	2,405	2,200	1600
Private persons	630	660	490	420	390	175	360	440
						Permits granted		
First settlement permits by quota						8,027	5,138	6,258
First settlement permits outside quota						26,537	26,697	25,908

Source: Federal Ministry of the Interior ("Niederlassungsverordnung").

Table 2 Chronology of migration law in Austria

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

Source: Currle (2004), own research.

In 1994, Austria joined the EEA. Since that time, only non-EEA-citizens are restricted by the residence quota when coming to Austria and need work permits for labor market access – with the continuing exceptions for some groups of foreigners and foreign workers from non-EEA-countries. In August 1997, new legislation regulating the residence and settlement of persons of third country origin was passed and came into effect in 1998. The new legislation – the Alien Law ("Fremdengesetz 1997") – regulated short stays and long-term residence of persons from third countries. It was intended to facilitate the integration of family members who had arrived before 1992 into the labor market, with the quota remaining largely unaffected.

A further comprehensive revision of the Alien and Residence Law (the so-called integration agreement regulation) entered into force on January 1, 2003. According to this amendment, the settlement of new low skilled workers of third country origin without family members in Austria was no longer possible. The permanent labor migration quota was restricted to the highly educated employed, family reunion and to private persons without labor market access. Thus, in effect this regulation made immigration to Austria more difficult, while at the same time easing conditions for the highly skilled. However, as before, a number of persons of third country origin could still settle in Austria outside the quota system. These were, in particular, the partners and family members of

Austrians and EEA-citizens, who were third country citizens, persons working for foreign media, artists and settlers on humanitarian grounds<sup>3</sup>. The total quota amounted to 8,070 persons in 2003, of which 8,027 were actually used. Of these, 934 were taken by high skilled employed and 6,517 by family reunion. By contrast, the total number of first settlement permits for foreigners of third country origin outside the quota system amounted to 26,537.

Table 3 Annual quota for contingent work permits and agricultural worker permits

	Contingent work permits	"Erntehelfer"-permits
2003	8,000	7,000
2004	8,000	7,000
2005	8,000	7,000
2006	7,500	7,000
2007	7,500	7,000
2008	7,500	7,000
2009	8,000	7,500
2010	7,500	7,500
2011	7,500	7,500

Source: "Niederlassungsverordnung".

At the same time, short-time, contingent work by foreign workers was restricted by a maximum number of initial work permits. Contingent work permits are valid for six months and can be extended for another six months at most. After one year of employment, contingent foreign workers have to leave Austria for two months. The number of initial work permits for contingent foreign workers of third country origin amounted to 8,000 in 2003. This temporary residence status does not allow permanent residence and family reunion. In addition, the number of initial work permits for agricultural workers, who were allowed to work in the agricultural sector for a maximum of six weeks, amounted to 7,000.

Finally, in 2005, the legislation regarding foreigners was once more fundamentally revised, affecting the regulation of residence and settlement ("Niederlassungs- und Aufenthaltsgesetz"), Alien Police Law ("Fremdenpolizeigesetz") and asylum seekers ("Asylgesetz") and came into force on January 1, 2006. The legislation was aligned with existing EU guidelines (Biffi 2007). Hence, the annual quota for long-term immigration, which contained the quota for family reunion, highly skilled employed, highly skilled self-employed and private persons, were augmented by the quota for permanent residents of third country origin in another EU-country (employed, self-employed, private persons) and for transferred permits ("Zweckänderungen"). Highly skilled migrants were still committed to fulfill the various requirements. Additionally, family reunion was hampered by income requirements. New

<sup>3</sup>In addition, the amended Foreign Worker Law ("Ausländerbeschäftigungsgesetz") granted executives, researchers, scientists of third country origin, as well as certain groups of private persons without labor market access, quota-free residence permits.



residence permits outside the quota system were restricted to family members and new settlers of third country origin with no or limited labor market access.

## 2 Theoretical Considerations

In summary, from the early 1990s to the mid-2000s, Austrian migration policy was marked by three developments. First, migration law, which had been based on the presumption of (temporary) guest worker migration until the late 1980s, increasingly moved in the direction of a more settlement based model of regulation. Second, changes in migration law also reflected attempts to reduce inflows of migrants by making the migration regime more restrictive. Finally, increasing the education content of migration by making migration law increasingly selective was a third recurring theme of migration law reforms. Our interest in this paper is with the last of these objectives.

To analyze this, we start from a simple model of migrant selectivity in which we consider two countries (indexed by  $j \in \{f, h\}$ , with  $h$  denoting the sending and  $f$  the receiving country). We assume that individuals (indexed by  $i$ ) differ with respect to education ( $s^i$ ) and derive utility from (expected lifetime) income ( $w_j^i$ ) which depends on education according to the function:

$$\ln(w_j^i) = \omega_j + \theta_j \ln(s^i) \quad (1)$$

where that  $\ln(s^i)$  is normally distributed with mean  $\mu_s$  and standard deviation  $\sigma_s$  and  $\theta_j$  measures country specific returns to migration. Furthermore, we assume that the (financial, administrative and psychological) costs of migration ( $K$ ) are given by fixed financial and administrative costs of migration ( $k_0$ ) that have to be paid by everyone, an education dependent cost component ( $k_1$ ), so that costs of migration are given as:

$$K = k_0 - k_1 \ln(s^i) \quad (2)$$

where, in accordance with empirical results by Hunt (2004), who finds that the highly educated often have access to low-cost migration channels, for example as posted workers, we assume that the highly educated face ceteris paribus lower costs of migration.

Given these assumptions, individuals with  $(\theta_f - \theta_h + k_1)\ln(s^i) > \omega_h - \omega_f + k_0$  will migrate and all others will stay. Thus in the case that  $\theta_f - \theta_h + k_1 > 0$  all persons with an education level satisfying  $\ln(s^i) > \frac{\omega_h - \omega_f + k_0}{\theta_f - \theta_h + k_1}$  will migrate, while if  $\theta_f - \theta_h + k_1 < 0$  persons with  $\ln(s^i) < \frac{\omega_h - \omega_f + k_0}{\theta_f - \theta_h + k_1}$  migrate.

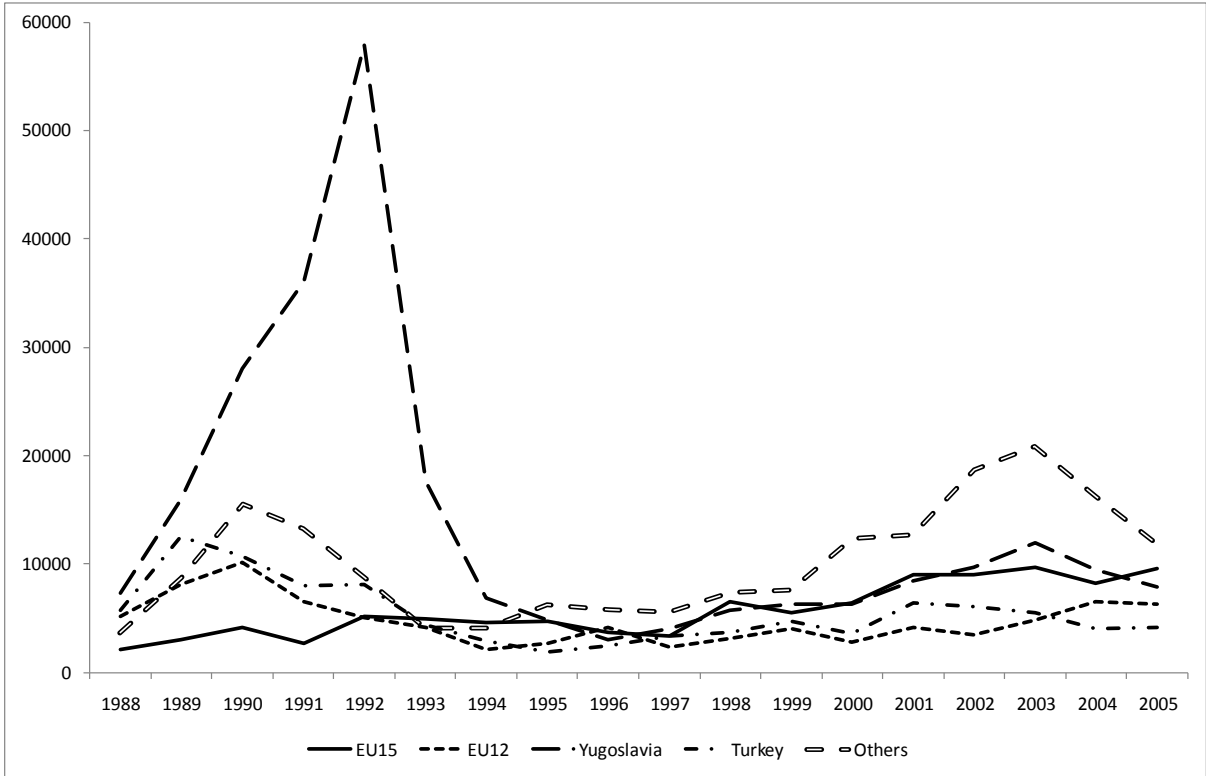
As amply demonstrated in the literature on migrant selectivity (e.g. Borjas 1999 and Chiswick 2000), migrants will therefore be more highly educated than stayers (positively self-selected) if the returns from education (net of education dependent migration costs) in the receiving country are higher than in the sending country (i.e.  $\theta_f + k_1 > \theta_h$ ) and negatively self-selected if the opposite applies (i.e.  $\theta_f + k_1 < \theta_h$ ). In addition, assuming that policy can influence education dependent costs of migration ( $k_1$ ) it is easy to see that an increase in  $k_1$  (i.e. a move to a more selective migration policy) will decrease the education level of migrants in countries where positive self-selection prevails and increase education levels in countries where negative self-selection prevails. In this respect, previous research (Belot and Hatton, 2008, and Huber et al 2010) suggests that migrants in Austria are negatively self-selected. In particular, Belot and Hatton (2008) show that the share of highly educated migrants is 0.3 percentage points lower than could be predicted from the education structure of the sending countries alone. This suggests that the introduction of the integration agreement regulation should have improved the education structure of migrants to Austria.

However, as noted above, the integration agreement regulation, aside from increasing education selectivity, also made overall migration conditions more restrictive and thus also influenced the parameter  $k_0$ . For this parameter, it can be shown that, if migrants are positively self-selected, an increase in these fixed migration costs will increase the expected education levels of migrants, while in the case of negative self-selection of migrants, an increase in migration costs will reduce the expected education level of migrants to a country. Policy reforms changing the administrative costs of migration (captured by the parameter  $k_0$  in our model) therefore have an oppositely signed impact on the education structure of migrants than increases in selectivity (captured by the parameter  $k_1$  in our model) and the impact of a migration policy reform making the migration regime more selective in a country where migrants are negatively selected inter alia depends on whether the positive effects of a more selective migration regime outweigh the negative effects of making the migration regime more restrictive in general.

### 3 Data and stylized facts

To empirically analyze the impact of the integration agreement legislation on the education structure of migrants, we therefore use data from a pooled sample of the Austrian Labor Force Survey (ALFS) from the years 2004 to 2007. In this representative quarterly survey, around 40,000 Austrian residents are asked for a number of personal characteristics (such as age, gender, educational attainment level and employment status) as well as for their country of birth and their year of immigration to Austria. Thus from this data it is possible to calculate the number of persons that migrated to (and still reside in) Austria from a particular country in a particular year. In addition, the data also provides ample information on the personal characteristics of this group. One limitation, however, is that we can only focus on migrants that were still residing in Austria in the time period from 2004 to 2007 and thus on permanent (or at least long-term) migration.<sup>4</sup> This, however, is arguably also the most relevant group, since the policy changes in 2003 were explicitly directed at persons with permanent settlement intentions and because among all migrant groups permanent migrants are most likely to have a lasting impact on the human capital endowment of their host country.

Figure 2 Foreign-born residents in Austria by year of migration and region of birth



<sup>4</sup> The reason for this is that the question on the country of birth and year of migration were asked for the first time in 2004.

Source: Austrian Labor Force Survey (pooled values 2004-2007). Note: Figure displays the average annual number of foreigners residing in Austria in the period 2004 to 2007 by year of migration to Austria, horizontal axis = year of migration to Austria.

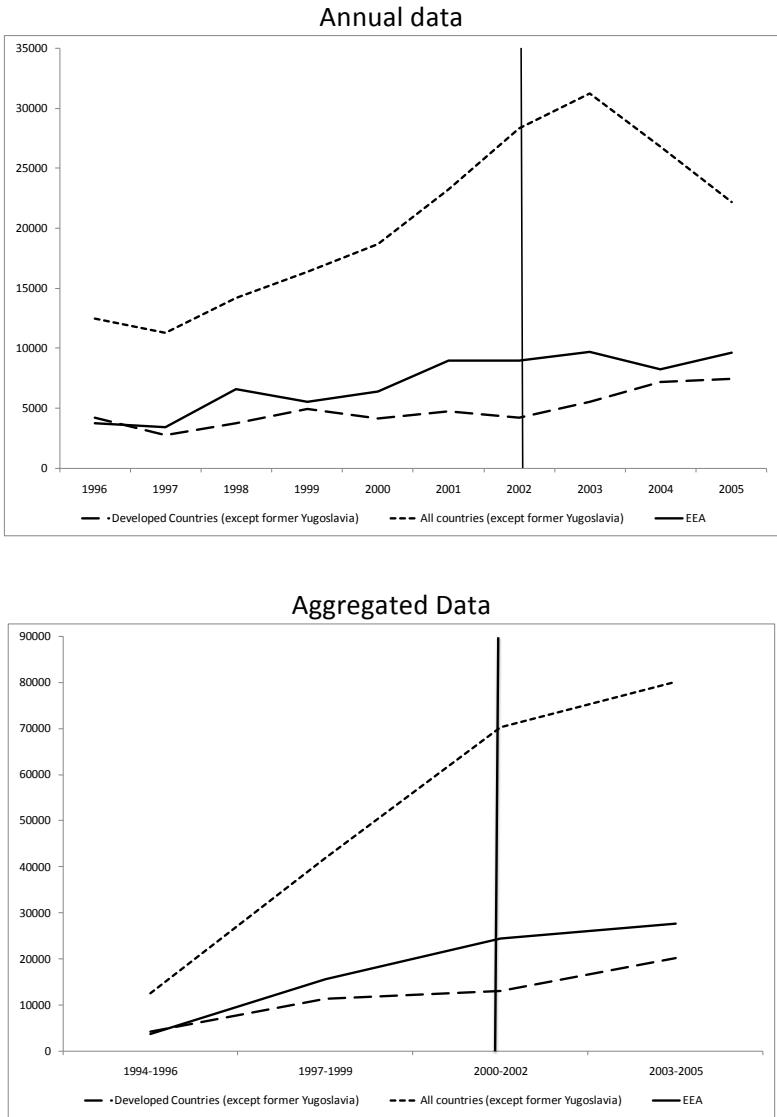
A second limitation stems from the fact that the 1990s, aside from being a period of substantial institutional change in migration policy, were also particularly turbulent in terms of migration to Austria. During these years, the civil war in former Yugoslavia led to a massive increase in the number of Yugoslav refugees to Austria (see Figure 2). In addition, political developments in the home country may lead to distortions with respect to the education structure of migrants from developing and less developed countries. Thus for our benchmark results, we focus on migrants that settled in Austria in the years between 1997 and 2005 and compare migration to Austria from the EEA and other developed countries (excluding former Yugoslavia), which we define as those countries with an average human development index exceeding 0.8 in the years 1995 to 2005 (see Appendix 1). To check for the robustness of our results we, however, also perform a parallel analysis in which we compare EEA migrants to migrants from all other countries (including less developed countries but excluding Yugoslavia) and a further analysis in which we compare EEA-migrants to all other countries including Yugoslavia.

Finally, the data are also subject to sampling errors. This is important in our context, since the number of migrants from some countries is too small to allow for reliable estimates of the structure of migration. To minimize this problem, aside from focusing on pooled data from 2004 to 2007, for descriptive purposes we consider both data on an annual frequency from 1997 to 2005 as well as data on three-year averages (i.e. 1997-1999, 2000-2002 and 2003-2005, respectively), which are likely to be less prone to such error. Furthermore, we gauge the potential impact of measurement errors on our econometric analysis by also estimating models in which we exclude migrants from all sending countries for which we have less than 200 observations in our data, when considering the robustness of results.

Figure 3 displays the average number of migrants by year of settlement and region of origin (EEA-countries, other developed countries except former Yugoslavia and all other countries except former Yugoslavia) for the entry years 1997 to 2005. As can be seen, migration from all countries increased substantially at the beginning of the period and reached a peak of about 33,000 migrants in 2003 or, respectively, the time period from 2003 to 2005. This is associated with the beginning of the economic upswing in 2002-2003. The low values in 1997, by contrast, are associated with slow economic growth in combination with an increasingly restrictive migration policy. Migration from the EEA-countries to Austria, by contrast, was much more stable, with a slight upward trend in the time period considered starting at around 3,000 persons in 1997 and amounting to 7,500 persons by 2005.

Thus the rather different development of permanent migration from all over the world and the EEA-countries suggests that comparing the EEA to the rest of the world may not provide the best comparison group. Permanent migration flows from other developed countries were much more in line with that of migration from the EEA in the time period considered. Here, migration figures were slightly below those from the EEA countries and almost moved in parallel to those of the EEA throughout the period.

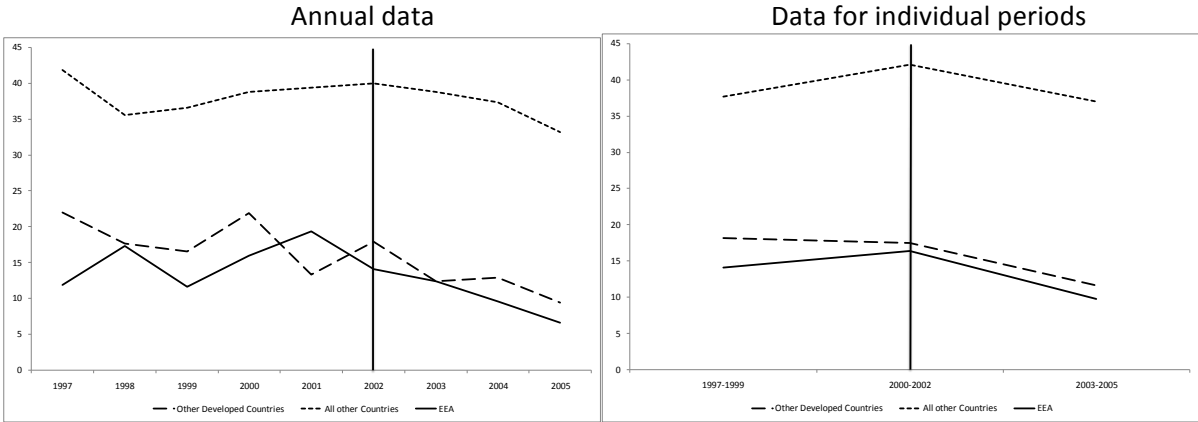
Figure 3 Foreign-born residents in Austria (excluding former Yugoslavia) by year of settlement and country of birth (years of immigration 1988-2005)



Source: Austrian Labor Force Survey (pooled values 2004-2007). Note: Figure displays the average annual number of foreigners residing in Austria in the period 2004 to 2007 by year of migration to Austria, horizontal axis= year of migration to Austria. Vertical lines indicate the last period before reforms

Figure 4 thus compares the education structure of permanent migrants from the EEA-countries to Austria to that from other developed countries as well as the rest of the world in the years from 1997 to 2005, by displaying the development of the share of permanent migrants with low (ISCED 2 or lower) educational attainment<sup>5</sup> from the EEA and the other developed countries, as well as all other countries both for annual data and for data aggregated over three-year periods. According to data aggregated for sub-periods, the gap in the share of permanent migrants with low educational attainment levels among other developed countries and the EEA-countries narrowed slightly after 2003. Relative to permanent migrants from all other countries, by contrast, the share of less educated permanent migrants from the EEA moved in parallel. This therefore suggests a rather mild impact of the reforms of residence law in 2003 on the education structure of permanent migration to Austria. This conclusion is reconfirmed when considering annual data (see: left-hand side of Figure 4): the share of the less educated permanent migrants from the EEA and other developed countries as well as all other countries oscillated substantially both over the period before and after 2003. Here the share of low educated foreign born from the EEA was lower than from other developed countries for most of the pre- and post-reform period.

Figure 4 Share of low educated migrants by country of birth in Austria (1997-2005 in %)



Source: Austrian Labor Force Survey (pooled values 2004-2007), excluding migrants from former Yugoslavia, developed countries = countries with an average HDI in excess of 0.8 for the years 1985-2005 (see Appendix for details). Figure displays the average share of less educated (ISCED 2 or lower) foreigners residing in Austria in the period 2004 to 2007 by year of migration to Austria, horizontal axis= year of migration to Austria. Vertical line marks last period before reforms.

<sup>5</sup> We limit our analysis to a differentiation of qualified and unqualified migrants to avoid excessive measurement error, due to the small number of highly (i.e. tertiary) educated migrants in Austria.

#### 4 Method

Descriptive evidence thus suggests at best a rather mild impact of the integration agreement regulation on the education structure of migrants. More robust empirical evidence on the impact of the reforms on the education structure of permanent migrants can be obtained by using a difference-in-difference approach. Here we exploit the fact that the integration agreement regulation applied only to migrants from outside the EEA, but not to migrants from EEA-countries. Dividing the data into a subset (denoted by R) of sending countries ( $j$ ) that were affected by the reform and another subset that was unaffected, and grouping the time periods ( $t$ ) into a pre-reform and a post reform period (with  $\tau$  the period of reforms), the impact of a change in migration policy can be identified by the parameter  $\delta$  in a logit regression of the form:

$$y_{jit}^* = \alpha_t D_t + \beta_j D_j + \lambda X_i + \gamma Z_{jt} + \rho_S D_S + \delta D_{t \geq \tau} D_{j \in R} + \epsilon_{jit} \quad (3)$$

where  $\epsilon_{jit}$  is a logistically distributed random disturbance term and  $y_{jit}^*$  is a latent variable measuring the probability of a migrant ( $i$ ) migrating to Austria from country ( $j$ ) in time period ( $t$ ) being low educated (i.e. having an educational attainment of ISCED 2 or lower) with the observed variable (educational attainment) taking on the value 1 if the migrant has low educational attainment and 0 otherwise.  $D_t$  is a set of dummy variables for each individual time period of migration, which measures changes in the education structure of migrants over time that are common to all sending countries,  $D_j$  is a dummy variable for each sending country considered, which measures country specific (but time invariant) influences on the education structure,  $D_S$  is a dummy variable for the survey year,  $X_i$  is a set of individual characteristics that may impact on the education structure of migrants and  $Z_{jt}$  is a set of time-varying sending country characteristics that influence the education structure of migration.  $\alpha_t$ ,  $\beta_j$ ,  $\lambda$ ,  $\rho_S$  and  $\gamma$  are a set of parameter vectors to be estimated.

The central parameter of interest in this regression is  $\delta$ . This measures the average change in  $y_{jit}^*$  on the treated relative to the untreated migrant groups since  $D_{t \geq \tau}$  is a dummy variable that takes on the value of 1 if the time period under consideration is a post-reform period (i.e.  $t \geq \tau$ ) and  $D_{j \in R}$  is a dummy variable which takes on the value one if the country under consideration is a non-EEA-country. A statistically significant positive value of this parameter implies that (relative to EEA-countries) the share of low educated migrants from non-EEA-countries increased after the reform,

while a statistically significant negative parameter implies that the share of low educated from non-EEA-countries reduced after reforms. Furthermore, as shown by Puhanyi (2012) the marginal effect on the interaction term  $D_{t \geq T} D_{j \in R}$  can be interpreted as the treatment effect.

## 5 Results

Table 4 presents the marginal effects of three logit models which differ with respect to the comparison group. In model 1 (on the left-hand side panel of table 4), we compare migrants from EEA-countries and other developed countries (excluding former Yugoslavia) in the time period 1997 to 2005. As already stated, we consider this our benchmark, because of the higher comparability of the developed countries to the EEA. In model 2 (central panel), we compare migrants from EEA-countries to all other countries (including the less-developed countries, but excluding former Yugoslavia). This comparison has the advantage of a larger number of observations than in the first case, but the disadvantage that migration from less-developed countries may be influenced by a number of factors (e.g. refugee migration), for which we cannot properly control. Finally, in model 3 (right-hand side panel) we include all countries, including former Yugoslavia, in our comparison. In addition, the table presents marginal effects for both the specification in equation (3) as well as for a specification in which we allow treatment effects to vary over the post-treatment year.

Aside from controlling for a full set of time, wave and sending country dummies (which are not reported in the tables), in all regressions, we also include (the log of) age and age squared as well as dummy variables for females, married persons and persons with children as controls for individual characteristics (i.e. our  $X_j$  variables). We do this because previous research on Austria by Bock-Schappelwein et al. (2008) as well as other countries (Chiswick and DebBurman, 2004) shows that the educational attainment of migrants is nonlinearly related to age, that migrant women in general have lower educational attainment than migrant men and because there is also some evidence (Bock-Schappelwein et al. 2008) in Austria that, due to the impact of family reunion on the education-structure of migrants, married migrants and migrants with children have lower educational attainment than others. Thus these variables control for any potential shifts in the structure of migrants with respect to gender, age, and family status before and after the integration agreement legislation.

The marginal effects of these controls are in line with expectations and previous results. The probability of a migrant having low educational attainment decreases with age but increases with age squared. This is consistent with the results of Chiswick and DebBurman (2004), who also find a



non-linear relationship between age and educational attainment of migrants. Female migrants have a significantly (around 8 percentage points) higher probability of having low educational attainment, when all countries are considered, while no significant effects can be found when considering only developed countries. This is primarily due to a particularly high share of less educated females among foreign born from Turkey in Austria (Bock Schappelwein et al, 2008). Migrants with children on average have an 8 to 10 percentage point higher probability to have low educational attainment. The only variable that remains insignificant throughout is the dummy for married migrants.

In addition, we also control for a number of time-varying sending country characteristics (the  $Z_{jt}$  variables). These are the (logs of) annual US-Dollar GDP per capita taken from the United Nations Statistical Database, the infant mortality rate taken from UNICEF ([www.childmortality.org](http://www.childmortality.org)), the share of low educated in the total population in five-year intervals (from Cohen and Soto, 2001), as well as the five-year average of the Gini-coefficient of the income distribution (taken from the UNU-WIDER - World Income Inequality Database (WIID)). We include these variables because previous research (Beine et al. 2008) finds that the structure of emigration from a country depends on its level of economic development (proxied by GDP per capita and infant mortality) and the educational structure of the native population (proxied by the share of low educated among the resident population). The Gini-coefficient is included to control for effects of the income distribution in the sending country on the structure of migration, as suggested in the literature on migrant selectivity (e.g. Brücker and Defoort 2009). The marginal effects of these variables are often statistically insignificant. This is an indication that they provide to little variance to identify their effect on the education structure of migration after controlling for time and sending country fixed effects. The only exception is GDP per capita, which, however, is only on the margin of significance for the sample of developed countries.

Table 4 Marginal effects of a logit regression on the probability for a migrant being low educated

	Model 1: Relative to migrants from other developed countries		Model 2: Relative to migrants from all other countries excl. former Yugoslavia		Model 3: Relative to migrants from all other countries incl. former Yugoslavia	
	(1)	(2)	(1)	(2)	(1)	(2)
2003-05 X EEA	0.014 (0.037)		0.093** (0.047)		0.107** (0.044)	
2003 X EEA		0.035 (0.031)		0.090** (0.042)		0.048* (0.027)
2004 X EEA		0.003 (0.045)		0.095 (0.050)		0.058* (0.031)
2005 X EEA		-0.019 (0.079)		0.085 (0.089)		-0.057 (0.046)
Ln(age)	-3.755*** (0.312)	-3.752*** (0.316)	-5.935*** (0.458)	-5.934*** (0.460)	-5.842*** (0.451)	-3.826*** (0.312)
Ln(age)^2	0.515*** (0.044)	0.515*** (0.045)	0.824*** (0.065)	0.824*** (0.065)	0.811*** (0.063)	0.525*** (0.044)
Female	0.023 (0.017)	0.023 (0.018)	0.088*** (0.023)	0.088*** (0.023)	0.087*** (0.022)	0.052*** 0.017
Married	-0.008 (0.025)	-0.008 (0.025)	-0.016 (0.032)	-0.016 (0.033)	-0.017 (0.031)	-0.007 (0.024)
Children	0.077** (0.031)	0.076** (0.031)	0.106*** (0.029)	0.106*** (0.029)	0.102*** (0.029)	0.076*** (0.032)
ln(gdp)	0.155* (0.088)	0.187* (0.097)	0.107 (0.090)	0.109 (0.094)	0.118 (0.091)	-0.001 (0.077)
ln(share low educated)	-0.076 (0.061)	-0.086 (0.061)	-0.075 (0.080)	-0.076 (0.079)	-0.076 (0.081)	-0.009 (0.057)
ln(gini)	0.237 (0.237)	0.230 (0.230)	-0.096 (0.342)	-0.097 (0.343)	-0.204 (0.303)	0.215 (0.243)
ln(infant mortality)	-0.348 (0.243)	-0.350 (0.242)	0.001 (0.191)	0.001 (0.195)	0.033 (0.196)	0.003 (0.142)
Number of Obs.	7735	7735	12168	12168	13486	13486
Pseudo R2	0.178	0.179	0.307	0.307	0.298	0.295
Log Likelihood	-45004914	-44983881	-80493109	-80492535	-83711076	-84143132

Source: Austrian Labor Force Survey (pooled values 2004-2007), own calculations; table reports marginal effects, values in brackets are (cluster corrected) standard errors of the estimate, \*\*\*, (\*\*) and [\*] signify significance at the 1%, (5%) and (10%) level, respectively. Country, wave and time fixed effects not reported

The central variables of interest are, however, the time-EEA interactions reported in the top rows of table 4. These indicate no improvement of the education structure of migrants from third countries (i.e. the treated group) relative to the education structure of migrants from EEA-countries (i.e. the untreated group) after the integration agreement regulation. Indeed, the estimates of the time-EEA interactions imply that, after reforms, the probability of a migrant from all countries outside the EEA being low educated (relative to that of a migrant from EEA-countries being low educated) increased significantly (by 9.3 percentage points) and when including former Yugoslavia (by 10.7 percentage

points) in the comparison group. This result is, however, not robust and loses significance when considering the comparison to developed countries.

In sum, the results are not very robust, but the majority of them point to a negative impact of the reform of residence laws in 2003 on the average educational attainment of third country migrants. In terms of our theoretical model, this can be interpreted as an indication that any potential positive impact of reduced education dependent costs of migration on the education structure of migrants was outweighed by the increase in fixed migration costs caused by the more restrictive migration regime. Alternatively, it could, however, also be argued that the number of people affected by the integration agreement regulation was too small and that thus other aspects of the migration regime (e.g. changes in the structure of family reunion migrants especially from third countries) were more important for overall changes in education structure in the time period considered. This seems to be all the more likely given that – as shown above – the reforms of 2003 affected only a relatively small segment of highly educated migrants.

### **5.1 Robustness**

These results could, however, be criticized for a number of reasons. First, as discussed above, focusing on the ALFS induces an element of measurement error to the estimates. Thus one could ask what the potential effects of measurement errors are. Second, as also shown above, most of our results indicate that controls for time-varying sending country characteristics remain insignificant. One may thus argue that these variables impact results. Similarly, one could ask what the impacts of controlling for individual characteristics are. Third, one may object to using the total foreign-born population, rather than active age groups. To address these issues, table 5 presents results for a number of alternative specifications of equation (3). First, we present results including only migrants coming from countries for which we have more than 200 observations. Second, we present marginal effects when focusing only on the population aged between 20 and 64 at the time of migration. Finally, we present results in which we excluded time-varying sending country variables (i.e. GDP per capita, share of low educated population, infant mortality and the Gini-coefficient) from the estimation, as well as a specification excluding individual variables (i.e. age, age squared, gender marital status and the dummy for children), to assess the potential impact of co-linearity of these variables with our period-EEA interaction terms.

The impact of these changes is minor and provides few additional insights. As above, the results indicate that, after the integration agreement legislation, the share of migrants with low educational attainment settling in Austria from third countries increased relative to migrants from EEA-countries. The only additional insights here are that this marginal effect increases somewhat (to a 12.8

percentage point increase) when considering only countries with more than 200 observations, as well as when focusing only on the 20 to 64 year-old migrants. In total, these results, however, slightly strengthen the conclusion of a worsening education structure of migrants after the integration agreement reforms, since both when excluding sending country variables as well as when focusing only on large migrant groups, a significant increase in the share of low educated migrants from third countries to Austria emerges.

Table 5 Marginal effects of a logit regression on the probability for a migrant being low educated

	2003-2005 X EEA	Pseudo R2	Log Likelihood
Excluding national variables	0.095 *** (0.036)	0.311	-93449110
Focusing only on sending countries with more than 200 observations	0.128 *** (0.046)	0.307	-76900089
Excluding individual variables	0.023 (0.041)	0.082	-50825903
only 20 65 year olds	0.149 (0.371)	0.093	-40083076

Source: Austrian Labor Force Survey (pooled values 2004-2007), own calculations; reference group are migrants from developed countries excluding former Yugoslavia, table reports marginal effects, values in brackets are (cluster corrected) standard errors of the estimate, \*\*\*, (\*\*) and [\*] signify significance at the 1%, (5%) and [10%] level, respectively. Country, wave and time fixed effects and other control variables are not reported.

Finally, a further issue with respect to our results is that we might have identified effects even in the absence of treatment. To address this issue, table 6 reports the results of a series of “placebo” treatments. For these, we estimated equation (3) imposing treatments in time periods where no treatment effects should be found. In particular, we used the fact that, before 1994, migration law stipulations applied to both migrants from EEA-countries as well as others and that therefore (irrespective of whether a reform in migration law occurred in that year or not) no treatment effects should be found with our method for the pre EEA-accession period.

We use data on migrants arriving in Austria from 1980 to 1993 (i.e. before EEA-accession) for these “placebo” treatments and impose a treatment in each year from 1986 to 1990, respectively.<sup>6</sup> We thus have one treatment (1990) in which a reform of migration law occurred and four in which no reforms occurred. We cannot reject the null hypothesis of no effect for any of the placebo treatments when not allowing for time varying treatment effects, while when allowing for time-varying treatment effects among 20 coefficients estimated, one is significant at the 5% level and

<sup>6</sup> Note that, in these “placebo” treatments we consider a post-treatment period of four years throughout. Thus our estimation period runs from 1980 to 1993 for the 1993 treatment, from 1980 to 1992 for the 1989 treatment and so on.

another at the 10% level. Thus our acceptance rate corresponds exactly to the predictions of statistical theory.

Table 6 Marginal effects of a logit regression of the probability for a migrant being low educated for alternative “placebo” treatment periods

	Placebo treatment period				
	$\tau=1990$	$\tau=1989$	$\tau=1988$	$\tau=1987$	$\tau=1986$
EEA *					
D( $\tau, \tau+3$ )	-0.045 (0.055)	-0.019 (0.039)	-0.017 (0.045)	0.003 (0.048)	-0.012 (0.052)
EEA * D( $\tau$ )	-0.080 (0.051)	-0.064 (0.042)	-0.010 (0.094)	0.168** (0.068)	-0.082 (0.054)
EEA * D( $\tau+1$ )	-0.057 (0.101)	-0.027 (0.051)	-0.063 (0.044)	-0.005 (0.101)	0.153* (0.079)
EEA * D( $\tau+2$ )	-0.067 (0.086)	0.061 (0.070)	-0.031 (0.049)	-0.046 (0.048)	-0.004 (0.104)
EEA * D( $\tau+3$ )	0.031 (0.099)	-0.026 (0.045)	0.057 (0.072)	-0.016 (0.050)	-0.049 (0.047)

Source: Austrian Labor Force Survey, own calculations; Note: The table reports the marginal effects of logit regressions with a placebo treatment at time  $\tau$  and a post treatment period of 4 years. (Pooled values for ALFS 2004-2007), reference group are migrants from countries excluding former Yugoslavia, values in brackets are (cluster corrected) standard errors of the estimate, \*\*\*, (\*\*) and [\*] signify significance at the 1%, (5%) and [10%] level, respectively. Country, wave and time fixed effects and other control variables are not reported

## 6 Conclusion

This paper analyzes the impact of the introduction of the integration agreement legislation in 2003 on the education structure of migrants. We find no compelling evidence that this regulation improved the education structure of migrants to Austria. Indeed, most of our econometric results, point to a (sometimes significant) negative impact of these reforms on the average education structure of permanent migrants. Our interpretation of this is that the implicit positive impact of the reforms on the education structure of migrants was countervailed by an increased restrictiveness of the migration regime in total, or that other aspects of the migration regime (in particular changes in the structure of family reunion migrants) were more important for changes in education structure in the time period considered. The results therefore present case study evidence which warns that reforms of migration law enacted to provide privileged access to highly educated permanent migrants may not yield the expected results, if other elements of the regulation system governing migration counteract these developments.

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## Appendix

Table A List of developed countries (based on an average Human development index of 0.8 or more)

Country	Average HDI (95-02)	Country	Average HDI (95-02)
Luxembourg	0.96	Antigua and Barbuda	0.86
Liechtenstein	0.95	United Arab Emirates	0.86
Norway	0.94	Bahrain	0.86
Hong Kong, China (SAR)	0.94	Slovakia	0.86
Canada	0.94	Bahamas	0.85
United States	0.94	Cuba	0.85
Netherlands	0.94	Poland	0.85
Switzerland	0.93	Estonia	0.85
Andorra	0.93	Hungary	0.85
Sweden	0.93	Croatia	0.84
Japan	0.93	Oman	0.84
Iceland	0.93	Seychelles	0.84
Australia	0.93	Lithuania	0.84
France	0.93	Libyan Arab Jamahiriya	0.84
Belgium	0.92	Chile	0.84
Denmark	0.92	Saint Kitts and Nevis	0.83
Finland	0.92	Argentina	0.83
Austria	0.92	Uruguay	0.83
Spain	0.92	Bulgaria	0.83
United Kingdom	0.92	Latvia	0.83
Germany	0.91	Montenegro	0.83
New Zealand	0.91	Costa Rica	0.82
Ireland	0.91	Saint Lucia	0.82
Italy	0.91	Mexico	0.82
Greece	0.90	Serbia	0.82
Israel	0.90	Dominica	0.81
Qatar	0.90	Trinidad and Tobago	0.81
Slovenia	0.90	Grenada	0.81
Brunei Darussalam	0.90	Romania	0.81
Barbados	0.89	Bosnia and Herzegovina	0.81
Cyprus	0.89	Venezuela (Bolivarian Republic of)	0.81
Singapore	0.89	Albania	0.81
Kuwait	0.88	Russian Federation	0.81
Czech Republic	0.88	Saudi Arabia	0.81
Portugal	0.87	Macedonia (the Former Yugoslav Republic of)	0.80
Malta	0.87	Panama	0.80
Korea (Republic of)	0.87	Lebanon	0.80

Source: UNIDO, WIFO-calculations