

# Education Policies and Migration across European Countries

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## Abstract

We explore whether and how education policies shape migration patterns across European countries. We focus on two policies: (i) increasing the length of compulsory education and (ii) introducing foreign languages into compulsory school curricula. Increasing the length of compulsory education shifts educational attainment for a significant fraction of the population from low towards medium levels. Using cohort data on migration flows across European countries, we find that additional years of compulsory education decrease the propensity to migrate. This is in line with higher emigration rates of low educated individuals compared to medium educated in the majority of European countries, and with a model in which transferring education across countries is costly. On the other hand, we find that introducing a foreign language into compulsory school curricula increases the likelihood to migrate to the country where the language is spoken. Depending on the specific content of an education policy, “more education” can thus have very different implications for an individual’s propensity to migrate.

*JEL classification:* J61, I20, F22

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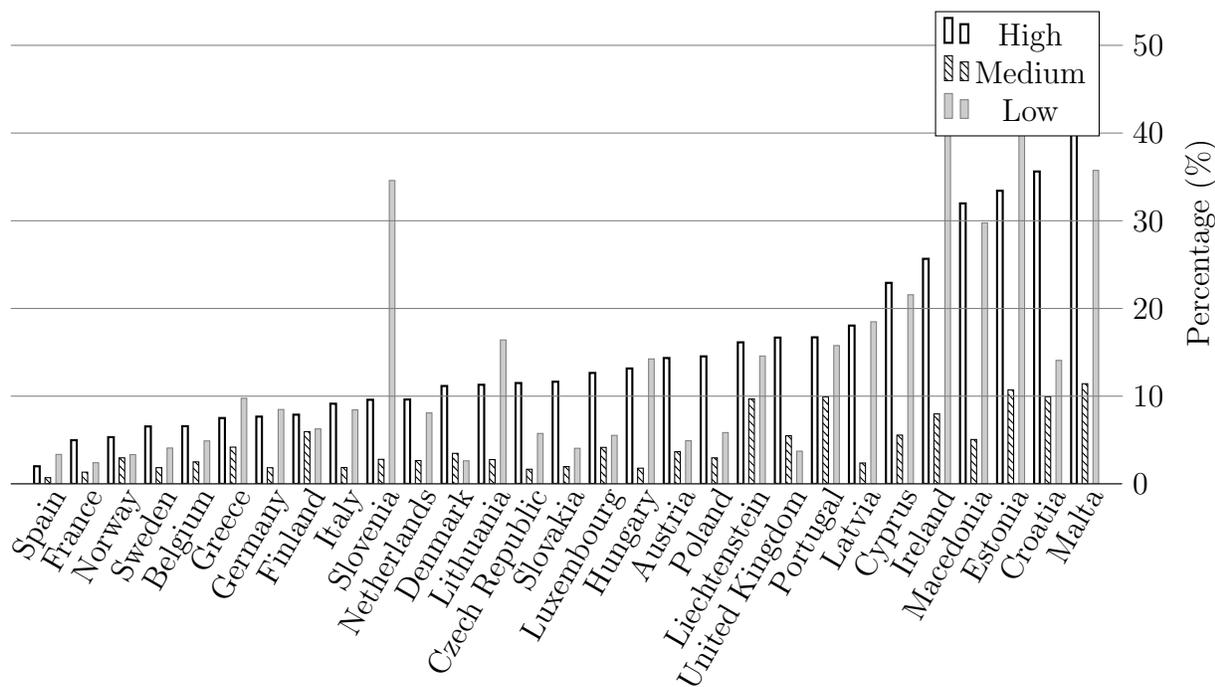
# 1 Introduction

One of the top priorities of the European Union (EU)'s 2020 agenda is to improve educational outcomes. Education policies that lead to a more educated and better prepared workforce are seen as essential for future growth and job creation. Foreign language proficiency, key for human capital transferability across countries, is ranked a chief concern. How will education policies that increase educational attainment and foreign language proficiency affect migration across European countries? In order to assess this question, we carry out the following analysis. In a first step, we focus on increases in the length of compulsory education to study the effect of increased educational attainment on EU migration. In a second step, we focus on foreign language proficiency and, as in Aparicio Fenoll and Kuehn [2014], test for the effect of compulsory foreign language courses on EU migration.

In most European countries, the relationship between education and migration displays a u-shaped pattern. Individuals with medium-level educational attainment are less likely to migrate than those with low and high levels. Figure 1.1 displays emigration rates by educational attainment for 29 European countries estimated by Brücker, Capuano, and Marfouk [2013]. With the exception of Denmark and the United Kingdom (UK), individuals with medium level educational attainment display lower emigration rates compared to low or high educated. However, educational attainment beyond compulsory education is an individual decision that could in part be influenced by the individual's desire to migrate. Hence, simple correlations between measures of education and migration rates are misleading when studying the causal effect of education on migration. Considering changes in laws that regulate the length of compulsory education is useful to overcome this challenge. Such laws cause an exogenous variation in the level of education acquired by the population. In particular, additional years of compulsory education shift the educational attainment for a significant fraction of the population from low towards medium levels. If the propensity to migrate differs along educational attainments, increasing the length of compulsory education can potentially have sizeable effects on the propensity to migrate.

On the other hand, the degree to which human capital is transferable across countries depends on foreign language proficiency. According to the Eurobarometer [2012], 68% of Europeans acquired their language skills at school. Education policies determine the importance of foreign language learning in school curricula. For students in most EU countries - with the exception of Ireland - learning a foreign language is not an individual decision, but part of compulsory education. During lower and upper secondary education (ISECD 2 and ISECD 3) students in EU countries study on average 1.5 foreign languages.

Figure 1.1: Emigration rates by educational attainment



Source: Brücker, Capuano, and Marfouk [2013]; low: lower secondary, primary and no schooling; medium: high-school leaving certificate or equivalent; high: higher than high-school leaving certificate or equivalent

English is taught during compulsory education in 14 of the 27 EU countries. More than 80% of students in EU countries study English as a foreign language, with the exception of Portugal (see Figure A-1 of the Appendix). Regarding the study of a second foreign language, in most countries learning French, German, or Spanish is compulsory. German is more common in Central and Eastern Europe, while French tends to be taught in Southern European countries.<sup>1</sup> In Germany, Spain, UK, Ireland, and Norway studying a second foreign language is not compulsory.<sup>2</sup>

A variety of recent studies have used changes in education laws and related policies to instrument for education choices when estimating the effect of education on migration. Machin, Salvanes and Pelkonen [2012] use a change in compulsory schooling laws in Norway and establish that more education leads to higher mobility. The paper by Malamud

<sup>1</sup>In many countries, Spanish is the third or fourth most widely taught second foreign language. The same holds true for Italian, but in fewer countries.

<sup>2</sup>In Germany, learning a second foreign language is only compulsory for students who attend the type of upper secondary education that provides access to universities (“gymnasiale Oberstufe”).

and Wozniak [2010] finds heterogeneous results for US migration. Using the risk of being drafted for the Vietnam War as an instrument for college-level education, the authors estimate a positive causal effect of education on internal US migration. However, when instrumenting education by quarter of birth, they do not find any significant effect. This might be due to the fact that the effect of additional years of schooling on migration differs along baseline educational attainment, being positive only for higher levels of education. The analysis by McHenry [2012] regarding migration across US states supports this interpretation. The author uses differences in changes in the minimum school leaving age across US states and shows that for low levels of education, additional attainment has a negative impact on migration. On the other hand, regarding migration across countries and foreign language proficiency, the existing literature has mainly focused on two important aspects: its determinants and its consequences for migrants (see e.g. Bleakley and Chin [2010], Chiswick and Miller [2010], and Dustmann and Fabbri [2003]). We propose a different perspective that has received relatively little attention so far: how ex-ante language skills influence individuals' decisions to migrate. Among the few related works are Chiswick and Miller [2001] and Adsera and Pytlikova [2012]. The former show that immigrants from former US, French, or British colonies tend to be more proficient in English or French compared to other immigrants. Adsera and Pytlikova [2012] try to explain migration flows to different OECD countries using linguistic distance to measure the ease of learning a host country's language.

For our analysis we use Eurostat data on migration across EU countries by cohorts. We complement our data with information on changes in the length of compulsory schooling which occurred during the 20th century and thus affected our cohorts. Our database also includes information on the introduction of foreign languages into compulsory school curricula. Our empirical strategy compares migration decisions of individuals: (i) of different cohorts from the same country who were exposed to different educational policies due to policy changes, (ii) from different countries but the same cohort who were exposed to different educational policies because of differences in legislation in the two countries. Controlling for economic variables in countries of origin and destination and the presence of other co-nationals, we find that increasing compulsory schooling by one year decreases the propensity to migrate by 37%. Introducing a foreign language into the compulsory school curricula, on the other hand, increases the likelihood to migrate to the country where the language is spoken almost fivefold. Our findings show that depending on the specific content of an education policy, "more education" can have very different implications for an individual's propensity to migrate.

Literature has used changes in education laws to estimate the causal effect of education on within-country migration. To the best of our knowledge, our paper is the first one to

study the impact of education policies on international migration. Given basically unrestricted mobility within the EU on the one hand, and a large variety of different languages spoken across Europe on the other hand, we can use the EU setting to isolate the role of education policies from migration restrictions in a context where language proficiency is relevant for migration.<sup>3</sup> The current paper also, to the best of our knowledge, provides the first analysis to use multiple dimensions of education policies when testing their effects on migration. The remainder of the paper is organized as follows. The next section presents a model of migration decisions. Section 3 describes our data. In Section 4 we present our estimation strategy. Section 5 presents and discusses our results, and Section 6 concludes.

## 2 Model

According to the traditional framework of the Roy model [1951], individuals decide to migrate by comparing their expected incomes in origin and destination countries. Differences in returns to education across countries determine whether the propensity to migrate is higher for low or highly educated individuals. Most early studies find a positive association between education and within-country migration for the USA (Greenwood [1997]), Canada (Courchene [1970]) and Colombia (Schultz [1971]). In the context of international migration, Borjas [1987] on the other hand finds immigrants to the USA to be negatively selected, i.e. those with lower skills (educational attainment) seem to migrate more. However, the traditional framework of the Roy model [1951] is unable to generate the observed u-shaped relationship between education and migration displayed in Figure 1.1. A model that allows for heterogeneous effects of education on migration and that has the potential to generate the observed pattern is the one suggested by Stark [1991]. We adapt his original model and illustrate how increases in educational attainment and improvements in foreign language proficiency driven by education reforms might affect migration.

Consider two countries; one richer  $R$  and one poorer country  $P$ . Expected wages in each country depend on the individuals' level of education  $\theta$ . We assume the following functional form for expected wages:

$$W_R(\theta) = r_0 + r_1\theta$$

$$W_P(\theta) = p_0 + p_1\theta,$$

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<sup>3</sup>Prior to 2014, migration and residence was restricted for Bulgarian and Romanian nationals in some EU countries. This is why we do not consider data for these two countries.

where  $r_0 > p_0$  and  $r_1 > p_1$ .<sup>4</sup> Because of lower language proficiency, differences in cultural norms, a lack of networks, etc. migrants have lower expected wages than natives with comparable educational attainments. We apply a discount factor ( $k < 1$ ) to expected wages of migrant workers to account for this. Medium to high values of  $k$  imply that for individuals of any educational level, expected wages in country  $R$  are still higher than those in country  $P$ , i.e.

$$kW_R(\theta) > W_P(\theta).$$

However, educational attainments obtained in one country are not automatically recognized elsewhere. In order to obtain a degree recognition valid in a foreign country, individuals have to pay a time and money cost  $C$ . A prerequisite for degree recognition is to hold a degree that can potentially be recognized in other countries: high school diploma, college degree, apprenticeship, etc. Hence, individuals with very low educational levels cannot opt for degree recognition. Secondly, degree recognition requires official translations and bureaucratic paper work requested by government agencies, associations, and/or guilds. Individuals' net income in the foreign country after going through the process of degree recognition is thus given by  $kW_R(\theta) - C$ . Individuals can also migrate without a recognized degree. In this case they are only able to make minimum wage,  $k\bar{W}_R$ .

The upper graph of Figure 2.2 displays a possible relationship between expected wages in country of origin and destination country. Given certain parameter values, a u-shaped relationship between educational attainment and migration arises. Those with low education - with  $\theta < \theta_2$  - migrate without having invested in degree recognition and they make minimum wage  $k\bar{W}_R$ . Individuals with a medium level of education - between  $\theta_2$  and  $\theta_1$  - do not migrate and they make  $W_p(\theta)$ . Finally, those with higher educational attainments ( $\theta > \theta_1$ ) invest in degree recognition, migrate, and earn  $kW_R(\theta) - C$ .

An increase in the length of compulsory education shifts a mass of individuals from low educational attainment towards medium education. A shift in the distribution of educational attainment towards a different distribution with a higher mean and smaller variance as displayed in the lower graph of Figure 2.2 could be expected. Everything else equal, this leads to an increase in the share of individuals who decide not to migrate. The difference between the light and dark gray area indicates the additional mass of individuals who decide to stay in their home country.

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<sup>4</sup>Note that these parameters also incorporate aspects that affect differences in the probability of finding a job, e.g differences in unemployment rates.

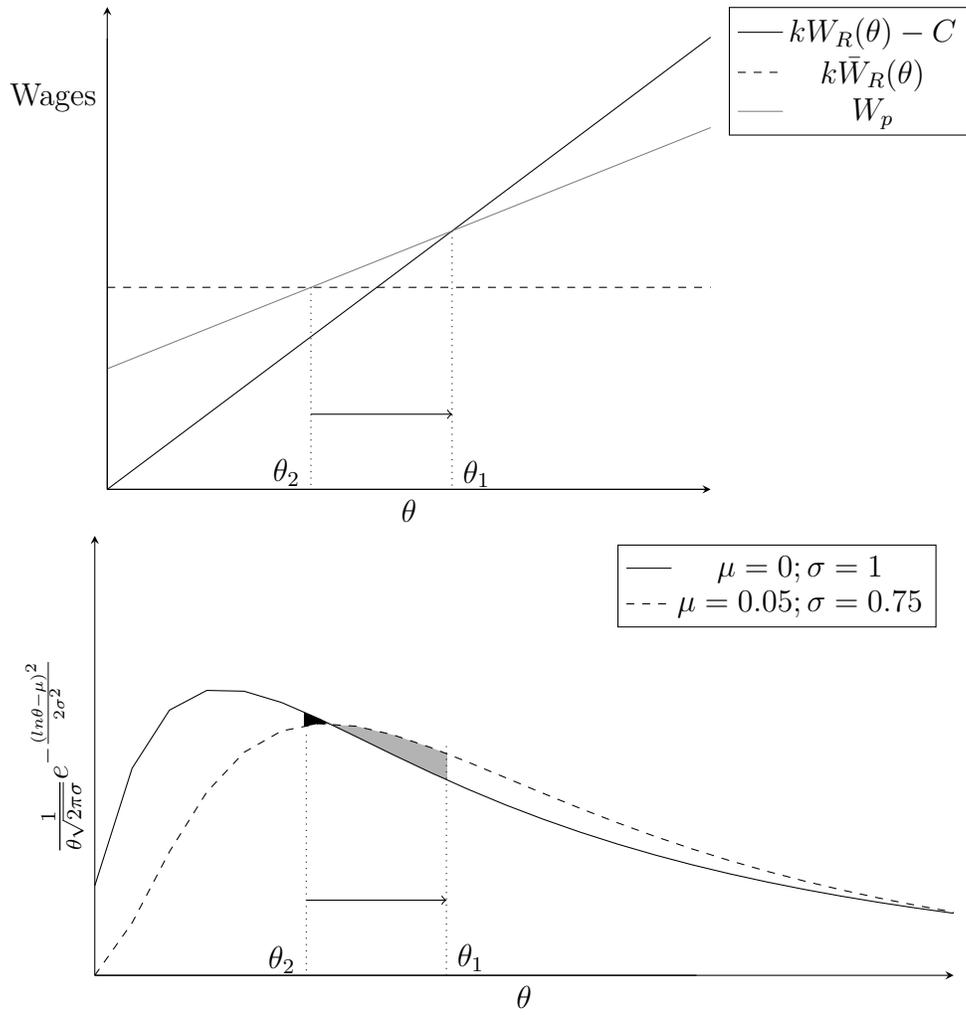


Figure 2.2

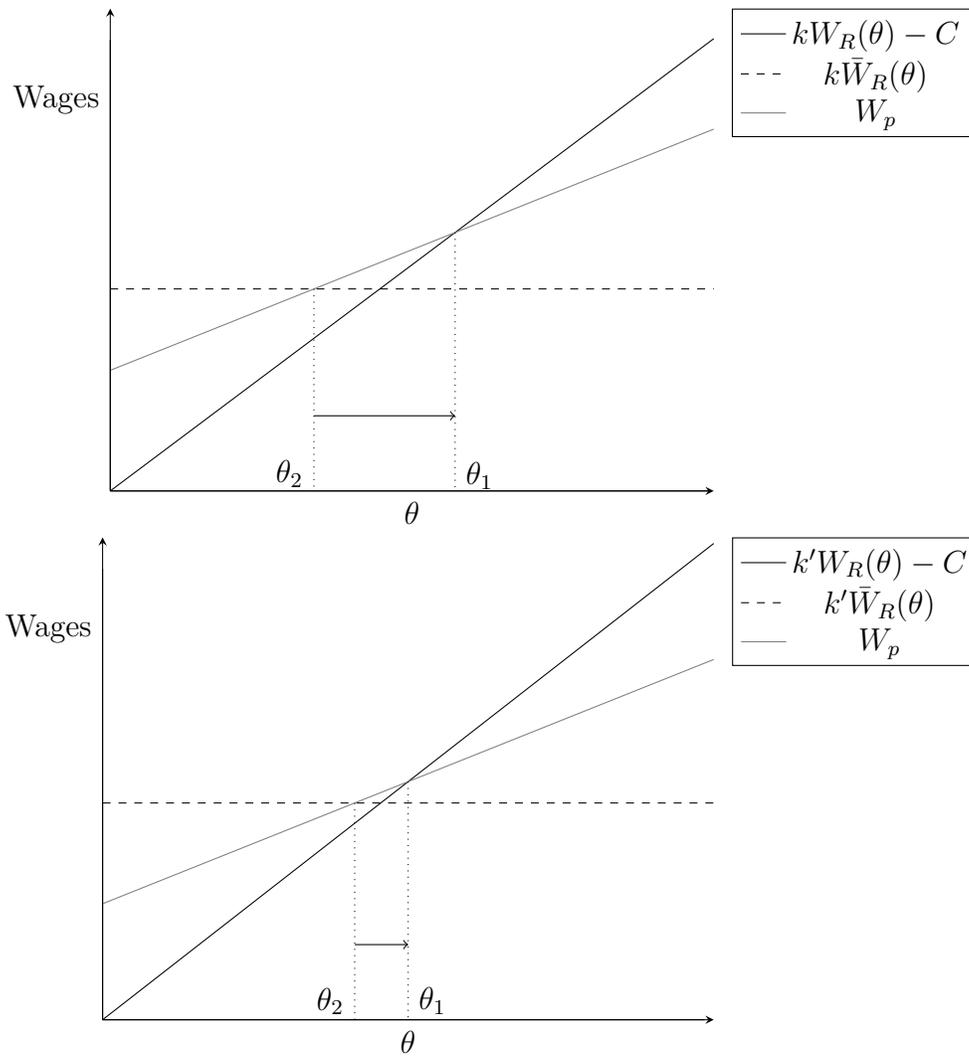


Figure 2.3

Within the model, an increase in language proficiency can be interpreted as an increase from  $k$  to  $k'$ . Migrants with better language skills are able to obtain wages more similar to those of natives. Figure 2.3 shows what would happen in such a case. An increase in  $k$  implies higher expected wages in the foreign country, both for those who migrate without degree recognition as well as for those who invest in degree recognition. However, in line with findings in literature we assume the increase in expected wages to be stronger for high educated individuals in skilled professions (see McManus, Gould, and Welch [1983], McManus [1985], Mora and Davila [1998] and Carliner [1996]). The minimum wage increases to  $k'\bar{W}_R$  and the slope of the expected wage function for those with recognized degrees  $k'W_R(\theta) - C$  increase as well. As a result fewer individuals decide to stay in the home country. An increasing number of highly educated migrate with a recognized degree but also more low educated who do not invest in degree recognition and who expect to earn a higher minimum wage migrate. The model thus predicts that given certain differences in wages across countries, an increase in the length of compulsory education reduces migration while the introduction of foreign languages in compulsory school curricula increases migration.

Ideally one would want to first analyze differences in expected wages for individuals of different educational attainment and across countries prior to testing the model's predictions. However, differences in expected wages while typically included in estimations of internal migration decisions - see Kennan and Walker [2011] for the United States - are usually not available for estimating international migration. One exception is Bertoli, Fernández-Huertas Moraga, and Ortega [2013] who consider migration from one origin country: Ecuador to two destination countries: Spain and the United States. Our analysis extends to migration across all EU countries which leaves us with more than twenty origin and destination countries. In this context, comparable micro data on wages is not available.

### 3 Data

We use Eurostat's database on migration among EU countries. In particular we consider the flow in  $t$  and stock of immigrants in  $t - 1$  by 5-year age groups in destination countries in 2008, 2009, and 2010. Destination countries that provide this data are the following 24 countries: Austria, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Netherlands, Norway, Poland, Slovakia, Slovenia, Spain, and Sweden. For Germany and Austria, data for 2009 and 2010 is missing and we complement it with data

from the Statistisches Bundesamt [2013] and Statistik Austria [2013], respectively. Data for the UK come from the International Passenger Survey provided by the UK Office for National Statistics, ONS [2013]. Note that data for migration flows to France, Greece, Malta, and Portugal is not available. Hence, we have information on 25 destination countries and 29 countries of origin - all destination countries plus France, Greece, Malta, and Portugal. Eurostat also provides information on unemployment rates by age groups. For our analysis we only consider individuals between 25 and 44. To avoid picking up temporary migration related to studying abroad, we restrict our sample to individuals of working age ( $> 25$  years). In many countries, for individuals older than 44, i.e. those born before 1964, it is unclear that language learning (or even compulsory schooling) was enforced. We combine data on the length of compulsory schooling reforms from four sources: United Nations (UN) Data, Eurybase (the Eurydice database on education systems in Europe), Brunello, Fort and Weber [2009] and Murtin and Viarengo [2011]. We then construct a database with information on the required years of compulsory education for each cohort in each country. Educational reforms that changed the length of compulsory education during the 20th century altered the minimum educational attainment of individuals from different cohorts. Such changes generate within- and across-country variation in the minimum educational attainment.

Our data on exposure to foreign languages in compulsory education come from the European Commission's Education, Audiovisual and Culture Executive Agency (EACEA). In addition, we use data from the European's Commission's Directorate-General for Education and Culture to construct a database including information on the starting age for studying foreign languages during compulsory education. Educational reforms that have occurred during the last decades imply that individuals of different cohorts may have been exposed or not to foreign languages during compulsory education. There are also differences in the choice of foreign languages studied over time. For instance, in Spain French used to be the first foreign language studied during secondary education. Three decades ago however, students began studying English as the first foreign language. In former communist countries of Central and Eastern Europe, Russian has been replaced by English as the first foreign language. These changes generate within- and across-country variation in the exposure to foreign languages. Our data set contains this information by age group and country of origin.

Our age restriction implies that individuals in all countries - with the exception of Belgium and some Central and Eastern European countries (Croatia, Czech Republic, Estonia, Hungary, Latvia, Macedonia, Slovakia, and Slovenia) - were exposed to English as a first foreign language. In Central and Eastern Europe the change from Russian to English as the first foreign language was clearly driven by the end of communism, which in itself had

important implications for migration flows. Given that we consider migration in years 2008-2010, most of the initial emigration boom is likely to have ebbed out. Even if that were not the case, in our estimation we compare migration decisions of individuals who were and those who were not exposed to English as a foreign language. If the end of communism were still the main driving force for migration in 2008-2010, then - controlling for differences in age - we should not observe any marked differences in migration decisions between the two groups. For instance, comparing two individuals from the same ex-communist country, one born in 1980 and another one born in 1977, the former was exposed to English as a foreign language while the latter was not. If both individuals migrated to the UK or Ireland origin-destination-fixed effects would capture their decision, and it would not contribute to our estimated effect of language proficiency on migration. Only in case the younger, but not the older, individual migrated to the UK or Ireland would we attribute his migration decision to the newly acquired English skills. As mentioned before, exposure to compulsory second foreign language differs across countries. The most widely taught second foreign languages in Europe are French, German, and Spanish. Italian is taught in fewer countries. We also take into account that there are countries where studying a second foreign language is not part of compulsory education, and that students in Finland learn Swedish as a foreign language.

Table 3.1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.
imm flow origin-destination by age group	148.098	591.050	0	19000
years of compulsory education	9.452	1.158	6	13
exposed to foreign language	0.086	0.278	0	1
age group 25-29	0.252	0.434	0	1
age group 30-34	0.252	0.434	0	1
age group 35-39	0.248	0.432	0	1
age group 40-44	0.248	0.432	0	1
year: 2008	0.382	0.486	0	1
year: 2009	0.317	0.465	0	1
year: 2010	0.301	0.459	0	1
diff. unemploy. origin -destination by age,	1.112	5.742	-38.7	29.8
stock imm origin-destination by age,	508.466	2447.845	0	41744

N=6784; Differences in unemployment rates and the stock of immigrants refer to years  $t - 1$ , i.e 2007, 2008, 2009. Sources: Eurostat, Statistisches Bundesamt [2013], Statistik Austria [2013], ONS [2013], UN Data, Eurybase, European Commission’s Education, Audiovisual and Culture Executive Agency (EACEA), European’s Commission’s Directorate-General for Education and Culture; own calculations

Table 3.1 provides summary statistics - mean, standard deviation and minimum and

maximum values - for our variables. We have observations for 6,784 combinations of origin\*destination\*age\*year.<sup>5</sup> Around 148 individuals in each age group from each country of origin migrate each year to one of the destination countries. However, there is large variation. Individuals from some age groups and countries of origin do not migrate to certain countries. On the other hand, the inflow of individuals from some age groups and countries of origin is 100 times more common compared to the mean. In particular, 19,000 Polish immigrants of age 25-29 entered the UK in 2010. The average number of years of compulsory education is 9.5. Years of compulsory education range from 6 (for older cohorts in most countries) to 13. Around 8-9% of our observations - cells defined by the combination of origin, destination, age, and year - are exposed to the language of the destination country during compulsory education. We have four age groups and observations are distributed homogeneously across them, such that there are 25% of observations in each group. We have slightly more observations for 2008 than for 2009 or 2010. Regarding differences in unemployment rates by age groups we observe the maximum difference of almost 40 percentage points between unemployment rates in the Netherlands and Macedonia for individuals aged 25-29 in 2008. Measured one year before migration, the average number of immigrants of a certain age group and from a certain country of origin is around 500, i.e. more than three times the average annual inflow. In some countries there are no immigrants of a specific age group from a certain EU country, while there are 41,744 immigrants from France aged 40-44 in Spain.

## 4 Estimation Strategy

To assess the impact of education policies on migration we estimate two separate models. Our first model considers the number of migrants as a function of the number of years of compulsory education. The second model estimates the number of migrants explained by exposure to foreign language courses in the language of the destination country. Regarding our first model, we first need to test whether changes in the length of compulsory schooling have any impact on the actual number of years of schooling. In a first step, we thus regress years of compulsory schooling as determined by each country's education policy on actual average years of schooling. To this end, we estimate the following equation:

$$\begin{aligned}
 S_{a,o} = & \alpha_0 + \alpha_1 C S_{a,o} + \alpha_2 D_a + \alpha_3 D_o + \alpha_4 D_d + \alpha_6 D_{a,o} + \alpha_7 D_{a,d} + \\
 & + \alpha_9 D_{o,d} + \alpha_{12} X_{t-1} + \epsilon_{a,o}
 \end{aligned}
 \tag{4.1}$$

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<sup>5</sup>In total we should have 8,700 observations. Unfortunately, we were not able to complement the following missing data for destination countries: for 2009 and 2010 for Croatia, Cyprus, Macedonia, Poland; for 2008 and 2010 for Belgium; for 2010 for the Netherlands. The remaining missing data refers to single observations; for instance for half of all countries migration from Liechtenstein is missing.

where  $S_{a,o}$  denotes average years of schooling of age group  $a$  in country  $o$ .  $CS$  denotes the number of years of compulsory education faced by individuals in cohort of age  $a$ , and  $D_s$  with  $s = a, o, d$  are dummies for age, country of origin, and destination country. We take average years of schooling as measured by Barro and Lee [2010] for different age groups for 2010.

In a second step we estimate the effect of compulsory education on the number of migrants assuming the following linear form for the relationship between the two variables:

$$M_{a,o,d,t} = \alpha_0 + \alpha_1 CS_{a,o,t} + \alpha_2 D_a + \alpha_3 D_o + \alpha_4 D_d + \alpha_5 D_t + \alpha_6 D_{a,o} + \alpha_7 D_{a,d} + \alpha_8 D_{a,t} + \alpha_9 D_{o,d} + \alpha_{10} D_{o,t} + \alpha_{11} D_{d,t} + \alpha_{12} X_{t-1} + \epsilon_{a,o,d,t} \quad (4.2)$$

where  $M$  is the number of immigrants of age  $a$  from country  $o$  going to country  $d$  in year  $t$ .  $CS$  denotes the number of years of compulsory education faced by individuals in cohort of age  $a$  in year  $t$ , and  $D_s$  with  $s = a, o, d, t$  are dummies for age, country of origin, destination country, and year. Our basic model includes all four dummy variables and their simple interactions.

We then expand the model to include certain triple interactions of dummy variables. For instance, we add the interaction term  $D_{d,o,t}$  between destination country, country of origin, and year. This term accounts for pull and push factors between countries that change over time and that are common to all cohorts of immigrants from the same country of origin. Including these dummy variables is equivalent to including control variables from typical gravity models like differences in the share of young individuals in the labor force, female labor force participation rates, or average wage differentials (see e.g. Ortega and Peri [2009] or Lewer and Van den Berg [2008]). We also include the interaction term  $D_{d,a,t}$  between destination country, age group, and year to take into account any age-specific changes in the labor demand of the destination country. Moreover, to control for network effects and economic factors we include as control variables ( $X_{t-1}$ ) the stock of immigrants by country of origin and differences in the unemployment rates between the destination country and the country of origin, both in  $t-1$  and by age group.

Note that for countries that do not change the length of compulsory schooling during the sample period,  $CS_{a,o,t}$  is a constant. As a result,  $D_{a,o}$  will not be identified. However, as long as identifying these dummy variables is not the focus of our analysis this will not pose a mayor problem for our estimation. Following Bertrand et al [2004], we cluster standard errors at the destination-origin-age level to allow for serial correlation in migration flows over time.

In our second model, we assume that the number of migrants depends on exposure to foreign language as follows:

$$\begin{aligned}
M_{a,o,d,t} = & \beta_0 + \beta_1 L_{a,o,d,t} + \beta_2 D_a + \beta_3 D_o + \beta_4 D_d + \beta_5 D_t + \beta_6 D_{a,o} + \beta_7 D_{a,d} + \\
& + \beta_8 D_{a,t} + \beta_9 D_{o,d} + \beta_{10} D_{o,t} + \beta_{11} D_{d,t} + \beta_{12} X_{t-1} + \epsilon_{a,o,d,t}
\end{aligned} \tag{4.3}$$

where  $L$  is a dummy that denotes exposure to compulsory language courses in the official language of country  $d$  and all the other variables are as defined above.

Given that only some languages are studied as foreign languages during compulsory education in European schools, the maximum set of foreign languages considered is composed of English, German, French, Spanish, and Italian.<sup>6</sup> While for most countries, second foreign languages are either German or French, for individuals in Portugal, Greece, France, and Italy we also include Spanish and for individuals in Malta, Italian. For each country we specifically include all possible choices of languages. This guarantees that individual choices which are potentially correlated with migration intentions and differences in labor market conditions of origin and destination countries do not alter the estimated effect. For destination countries where neither English, German, French, Spanish, or Italian are official languages, we set  $L_{a,o,d,t} = 0$  for all  $t, a, o$ . For migration between countries that share the same national language, as Germany and Austria, UK and Ireland, France and Belgium, or the Netherlands and Belgium we set  $L_{a,o,d,t} = 1$  for all  $t, a$ . As a result, in our model specification that includes triple interactions some variables  $D_{d,o,t}$  and  $D_{d,a,t}$  are not going to be identified. As before, identifying these dummy variables is not our main interest and hence this will not pose a problem.

The validity of our identification strategy relies on exploiting all dimensions of variation of the data. We could have estimated the effects of education on migration by comparing individuals of different ages from the same country and exploiting that those individuals would be affected by different compulsory schooling laws. However, such an estimation would be affected by differences in the propensities to migrate along age groups. Another alternative would have been to compare individuals of the same age from different countries. However, nationals of different countries have different propensities to migrate to any other country, independently of education policies. A third potential approach would consist in comparing individuals of the same age and country of origin but observed in different points in time. This way, individuals of a particular age at time  $t$  are subject to a different education policy than those of the same age observed at time  $t + 1$ . However, migration patterns differ across time even if education policy stays the same. We improve

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<sup>6</sup>Even though Russian is the most widely taught second foreign language in Latvia, Estonia, and Lithuania we ignore this option given that migration to Russia is restricted, different from migration within the EU.

on these alternative approaches by combining them and comparing individuals across age, countries of origin, and time. This strategy allows us to control for confounding factors that vary with age, time, and country of origin, and their pairwise combinations (age and time, age and country, time and country). Moreover, in our estimation of the impact of foreign language courses we make use of the fact that our explanatory variable varies also by destination country, and introduce destination country as an additional dimension. As a result, our estimated coefficients result from refined comparisons of cohorts and they are robust to the potential influence of a long list of unobserved factors.

## 5 Results

We first analyze our empirical results regarding the impact of additional years of compulsory schooling on the propensity to migrate. Table 5.2 shows the results of our first step, i.e. estimating Equation 4.1. The first column corresponds to the basic regression that includes no interactions. In column 2 we add the interaction of origin and destination country dummies. Column 4 presents results for the most complete specification which also includes the interaction of destination and age. The estimated coefficients indicate that the analyzed policies were effective in increasing the actual years of schooling for the affected cohorts.

Table 5.2: Average years of education and length of compulsory education

	(1)	(2)	(3)
Years of CS	0.13 (0.017)***	0.13 (0.017)***	0.13 (0.017)***
Origing by destination		X	X
Destination by age			X
Number of observations	9024	9024	9024
$R^2$	0.741	0.742	0.742

The dependent variable is the average number of years of education by cohort. The variable years of compulsory schooling refers to the average number of years of compulsory schooling faced by the corresponding cohort. The coefficients are marked with \* if the level of significance is between 5% and 10%, \*\* if the level of significance is between 1% and 5% and \*\*\* if the level of significance is less than 1%. All regressions contain year-fixed effects, age indicators, binary variables for each pair of origin and destination countries, dummies for each combination of age and year, a variable for differences in lagged unemployment rate between origin and destination countries and the stock of co-nationals from each cohort in the destination country in the previous period. Errors are clustered by origin-destination-age.

The results of estimating our first model, i.e. estimating the effect of years of compulsory education on migration as defined by Equation 4.2 are displayed in Table 5.3. The first column corresponds to the basic regression that includes only two interactions (destination with age and year). In column 2 we add the interactions of origin with year and age. In column 3 we insert a triple interaction (destination by origin by year). Column 4 presents results for the most complete specification which also includes the triple interaction of destination, age and year. The coefficients are negative, significant, and very stable across specifications. An additional year of compulsory schooling decreases the number of immigrants from the affected cohort that migrate by almost 55 individuals, i.e. 37% with respect to the mean.

Table 5.3: Migration and length of compulsory schooling

	(1)	(2)	(3)	(4)
Years of CS	-57.705 (20.431)***	-56.571 (17.285)***	-54.954 (19.218)***	-54.806 (19.158)***
Destination by age		X	X	X
Destination by year		X	X	X
Origin by year		X	X	X
Origin by age		X	X	X
Destination by origin by year			X	X
Destination by age by year				X
Number of observations	6784	6784	6784	6784
$R^2$	0.779	0.819	0.849	0.853

The dependent variable is the number of immigrants. The variable years of compulsory schooling refers to the average number of years of compulsory schooling faced by the corresponding cohort. The coefficients are marked with \* if the level of significance is between 5% and 10%, \*\* if the level of significance is between 1% and 5% and \*\*\* if the level of significance is less than 1%. All regressions contain year-fixed effects, age indicators, binary variables for each pair of origin and destination countries, dummies for each combination of age and year, a variable for differences in lagged unemployment rate between origin and destination countries and the stock of co-nationals from each cohort in the destination country in the previous period. Errors are clustered by origin-destination-age.

Table 5.4 - similarly structured as Table 5.3- contains the estimation results of our model that considers exposure to a foreign language during compulsory education as a source of exogenous variation in language proficiency. In particular, we consider how having been exposed to English, French, and German during compulsory education raises the odds of migrating to the UK, Ireland, Belgium, Germany, or Austria. For individuals in Portugal, Greece, France, and Italy we also consider if having been exposed to Spanish increases the odds of migrating to Spain. Finally, for individuals in Malta we consider if having

been exposed to Italian increases the odds of migrating to Italy. Our results show that this is clearly the case. The coefficient of interest remains stable even after controlling for destination country, country of origin, age group, and year effects as well as all their first order interactions and some second order interactions. We find that speaking the language of a host country increases migration to that country almost fivefold. Exposure to language learning during compulsory education increases the number of individuals of a cohort that migrate to the country where the language is spoken by 544 per year, a magnitude similar to the standard deviation of the number of immigrants in the sample.

Table 5.4: Migration and foreign language in compulsory school

	(1)	(2)	(3)	(4)
Foreign language courses	813.91 (339.438)**	521.079 (236.434)**	523.899 (260.825)**	544.316 (273.013)**
Destination by age		X	X	X
Destination by year		X	X	X
Origin by year		X	X	X
Origin by age		X	X	X
Destination by origin by year			X	X
Destination by age by year				X
Obs.	6784	6784	6784	6784
$R^2$	0.762	0.843	0.868	0.872

The dependent variable is the number of immigrants, the variable foreign language courses identifies the cohorts from the country of origin who were exposed to learning the language of the country of destination during compulsory schooling. The coefficients are marked with \* if the level of significance is between 5% and 10%, \*\* if the level of significance is between 1% and 5% and \*\*\* if the level of significance is less than 1%. All regressions contain year-fixed effects, age indicators, binary variables for each pair of origin and destination countries, dummies for each combination of age and year, a variable for differences in lagged unemployment rate between origin and destination countries and the stock of co-nationals from each cohort in the destination country in the previous period. Errors are clustered by origin-destination-age.

However, educational reforms might be endogenous to migration if differences in unemployment rates between origin and destination countries jointly determine reforms and migration patterns. If governments consider it their duty to improve their citizens' prospects as migrants, they might decide to increase the years of compulsory schooling in response to large migration outflows. In contrast, governments may also increase the length of compulsory education to improve the local situation (hiring teachers, etc.) and hence, to discourage outmigration. Regarding foreign language courses, governments might decide to start teaching foreign languages in compulsory education to encourage migration to certain countries with lower unemployment rates. For instance, given the current eco-

conomic situation in their countries of origin, migration by Portuguese, Spanish, and Greek citizens to Germany has increased over the last years (see Figure A-2 of the Appendix A). If this increase in migration led governments to strengthen teaching of German at compulsory levels, we would observe a further increase in migration that would ultimately be caused by the differences in unemployment rates rather than by the improved language skills.

However, educational reforms take at least 5-15 years to show any effect, while most governments' mandates are restricted to 4 years. Hence, effects of educational reforms are rather independent of political cycles, making it rather unlikely that governments pursue such a strategy. Moreover, many scholarship programs that explicitly include return clauses, and different returnee programs seem to indicate that in general, governments are not interested in permanent migration of their (educated) citizens. Decision making within the education system is, to an large degree, a political process, involving a number of key players. Hence, the strength and timing of reforms depends on the delicate equilibrium of forces between the different levels of administration; for instance see National Research Council [2001]. In addition, we argue that increasing the length of compulsory education and introducing or strengthening teaching of foreign languages requires increased government spending. Hence, such policies are much more likely to happen in times of budget surpluses than in situations of economic crisis and fiscal austerity. Similar to a luxury good, spending on foreign language teaching is likely to increase with sound public finances rather than with migration outflows.

Since, the seminal paper by Angrist and Krueger [1991], minimum school leaving age laws have been employed as exogenous shifters of educational attainment in studies of the causal relationship between education and many different outcomes. Some of these outcomes include earnings (Harmon and Walker [1995]), fertility (Lavy and Zablotsky [2011]), health (Brunello, Fabbri and Fort [2013]) and citizenship (Milligan, Moretti and Oreopoulos [2004]). More relevant to us and as discussed before, changes in the minimum school leaving age have also been treated as exogenous changes in education in the analyses of the impact of education on internal migration in Norway (Machin, Salvanes and Pelkonen [2012]) and the USA (McHenry [2012]). Studies about motivations behind schooling reforms (Cuban [1990]) point out implementations of educational policies do not adhere to labor market, health, or migration considerations nor to long-term objectives for these or other non-education related variables. Regarding laws regulating the length of compulsory education, early studies by Chiswick [1972] and West [1967] support the view that governments are generally willing to increase the age up to which school attendance is compulsory. Hence, the actual implementation of such policies depend much more on the availability of resources than on the specific ideology of the politicians in turn.

Similarly, to the best of our knowledge, there does not exist any established theory on the political economy of reforming foreign language curricula. Analyzing various historical and current reforms, we find that governments' motivations for reforming foreign language teaching typically stem from a need to improve their citizens' overall human capital.<sup>7</sup> To guarantee the sustainability of the pension system, governments need a large and highly qualified working population. Fostering emigration by improving foreign language teaching seems rather short-sided in comparison.

## 6 Conclusion

Theoretical models of migration decisions highlight the role of education in explaining individual heterogeneity in migration choices. Changes in the length of compulsory education induce exogenous and significant shifts in the level of educational attainment. Previous literature has used such changes to test whether more education is associated with more or less internal mobility. Results have been mixed. We apply the technique to an international context and show that increases in the length of compulsory education reduce the propensity to migrate across countries. One additional year of compulsory education reduces migration by 37%. We further investigate possible interactions between compulsory education policies and migration, and show that the introduction of foreign languages in compulsory school curricula shapes migrations patterns. In particular, we find that acquiring foreign language proficiency during compulsory education increases the likelihood to migrate to the country where the learned language is spoken almost fivefold.

Policies tackled at achieving two of the EU's 2020 top priorities - improving educational outcomes and increasing foreign language proficiency - should take into account their potentially contradicting effects on migration across European countries. Because by changing the length and the curricula of compulsory schooling, governments not only determine their citizens' educational attainments and their foreign language proficiency but ultimately also influence their migration decisions.

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<sup>7</sup>For instance, in England and Wales, from September 2014 onwards, foreign language learning will become compulsory for students age 7-14.

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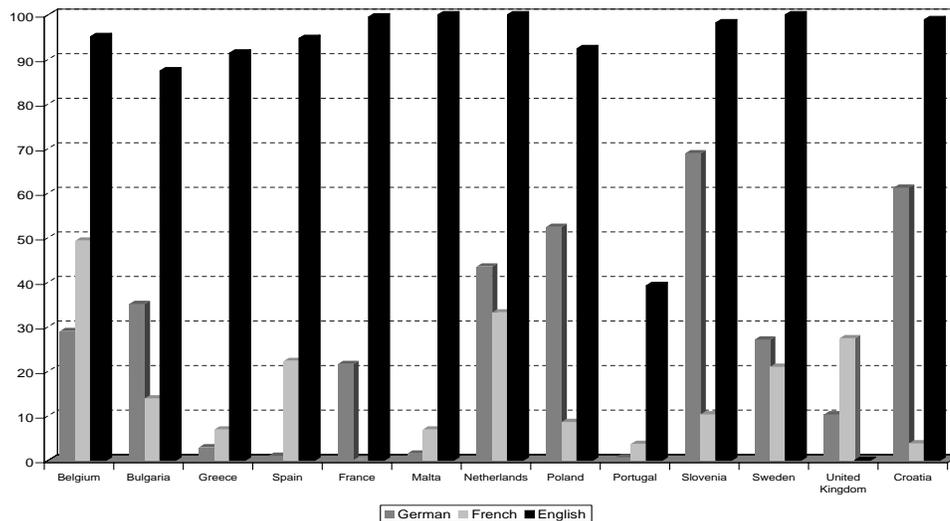
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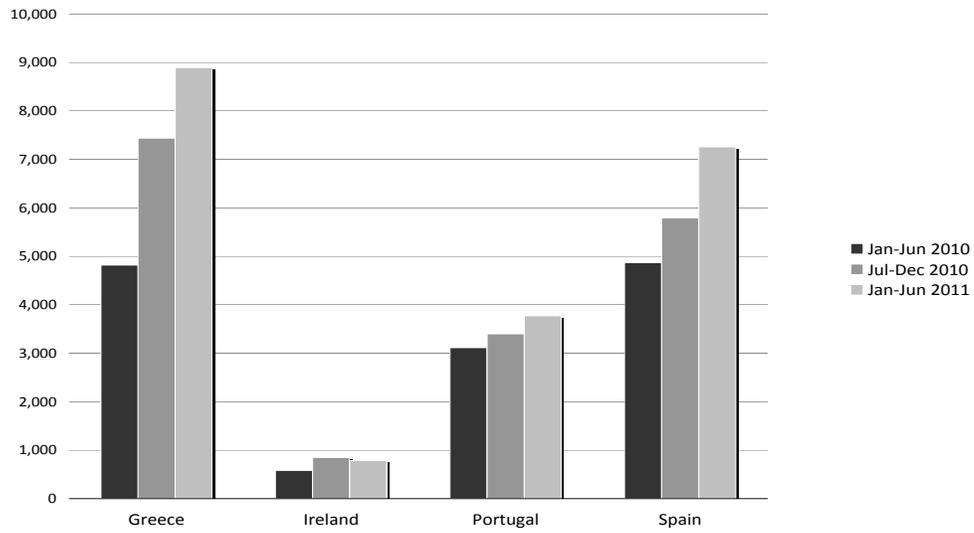
## A Appendix

Figure A-1: Percentage of Students learning foreign languages in selected EU countries



Data: Eurostat

Figure A-2: Recent migration from Greece, Ireland, Portugal and Spain to Germany



Data: OECD