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Education Policies and Migration across European Countries

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ABSTRACT

Education Policies and Migration across European Countries*

This paper tests whether and how two education policies: (i) increasing the length of compulsory education and (ii) introducing foreign languages into compulsory school curricula, affect subsequent migration across European countries. We construct a novel data base that includes information on education reforms for thirty-one countries spanning four decades. Combining this data with information on recent migration flows by cohorts, we find that an additional year of compulsory education reduces the number of emigrants by almost 10%. Increasing the length of compulsory education shifts educational attainment for a significant fraction of the population from low towards medium levels. Our findings are thus in line with the fact that in the majority of European countries medium educated individuals display lower emigration rates than low educated individuals. Introducing a foreign language into compulsory school curricula on the other hand, almost doubles the number of emigrants to the country where the language is spoken and increases the total number of emigrants by 20%. Depending on the specific content of an education policy, "more education" can thus have opposite effects on migration.

JEL Classification: J61, I20, F22

Keywords: migration, compulsory schooling, foreign language proficiency, education

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1 Introduction

More than fifty years after the signing of the first European treaty on labor mobility (Treaty of Rome: 1957), large differences in national unemployment rates across Europe persist. In 2014, in Spain and Greece unemployment was 24-26%, while in contrast Germany with 5% had one of the lowest unemployment rates (see Figure 1.1). According to the OECD, annual migration rates across European Union (EU) countries were around 0.3% in 2010 while US state-to-state migration rates were 2.4%.[1] As a response to the latest economic crisis, migration across European countries and in particular from Portugal, Italy, and Spain to Germany has increased somewhat, see Jauer et al [2014].[2] However, overall labor mobility remains limited, unlikely to significantly reduce the observed differences in unemployment rates of 20 percentage points.

Language barriers seem to be an obvious explanation for the relatively low European labor mobility. The European Union consists of 28 countries and has 24 official working languages. Furthermore, these languages differ quite a bit. Linguists identify at least seven different language families among them: celtic, italic, germanic, baltic-slavik, greek, uralic, semitic; see Gray and Atkinson [2003] and Harding and Sokal [1988]. In the US on the other hand, English is the only official language. Results in Bartz and Fuchs-Schündeln [2012] show that in Europe language barriers more than country borders hinder migration. Machin, Salvanes and Pelkonen [2012] bring forward an additional explanation. The authors suggest that lower educational attainment in Europe compared to the US leads to lower mobility.[3]

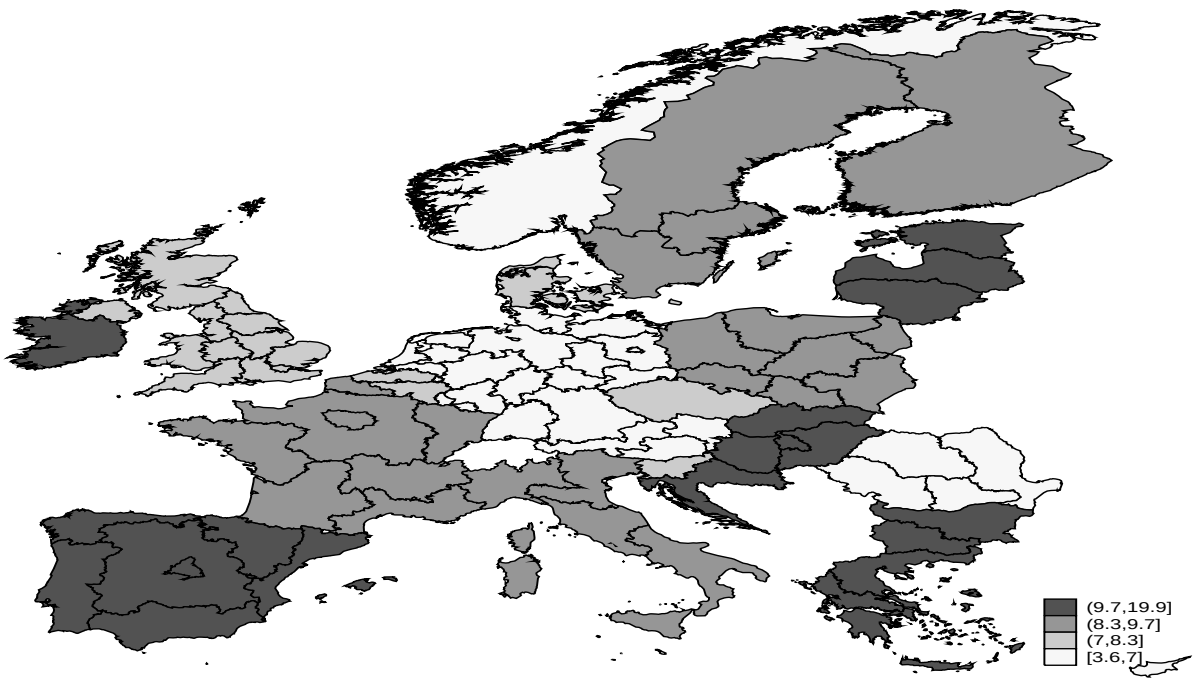
Education policies which increase schooling and improve foreign language proficiency affect educational attainment and language barriers, respectively. This suggests that education reforms – in particular of compulsory education which concerns all students – have the potential to affect migration. The current paper tests how across-country-and-time differences in such education policies affect recent European migration. In particular, we

[1] Differences in US unemployment rates by state are much smaller. In 2014, they ranged from 2.8% in North Dakota to 7.8% in Washington D.C, Mississippi, and Nevada (Bureau of Labor Statistics). US migration rates are about twice as large as within-country migration rates in most European countries with the exception of Scandinavian countries and Great Britain, see Gáková and Dijkstra [1995] and Molloy, Smith and Wozniak [2011].

[2] EU law guarantees free labor mobility but countries can impose temporary restrictions for nationals of new member states. Prior to 2014, some EU member states required that Bulgarian and Romanian nationals obtained residence and work permits (see European Commission).

[3] Alternative explanations for the low European mobility focus on relatively high unemployment benefits (Antolin and Bover [1997]) and stronger employment protection (Belot [2007]) in European countries compared to the US.

Figure 1.1: Unemployment rates across Europe, 2014

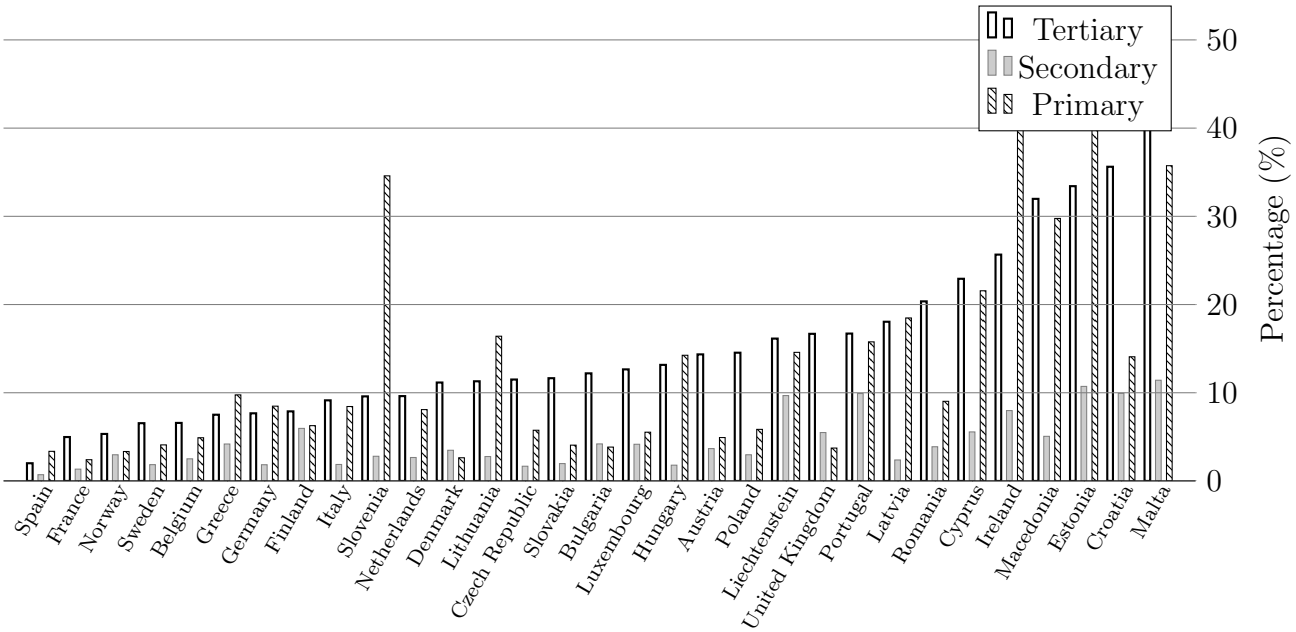


Data: Eurostat

consider the following two policies that have been put into practice repeatedly by many countries worldwide: (i) increasing the length of compulsory education and (ii) introducing foreign languages into compulsory school curricula. Our findings show that additional years of compulsory education which shift the educational attainment for a significant fraction of the population from low towards medium levels decrease migration. While this result stands in contrast to most findings in literature on internal migration, it is in line with lower cross-country emigration rates of medium educated individuals compared to low educated individuals in the majority of European countries. On the other hand, we find that introducing a foreign language into compulsory school curricula increases migration to the country where the language is spoken.

Figure 1.2 displays emigration rates for 2010 by educational attainment for individuals age 25 and older in thirty-one European countries. With the exception of Denmark, Bulgaria, and the United Kingdom (UK), those with secondary educational attainment display lower emigration rates compared to primary and tertiary educated. Hence, in most European countries, the relationship between education and migration displays a u-shaped pattern. Moreover, in most European countries more than 40% of individuals in the age groups most likely to migrate for job-related reasons (age 25-44) only completed

Figure 1.2: Emigration rates of individuals > 25 by educational attainment, 2010



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

their secondary education. In the US, on the other hand this is only the case for 32% of individuals, see Figure A-1 of the Appendix. Hence, the low propensity to migrate of secondary educated individuals who make up an important fraction of the active population might explain the relatively low aggregate mobility in Europe.

But why would secondary educated individuals be less likely to migrate than primary and tertiary educated individuals? In the next section we present a model that is able to rationalize such a u-shaped relationship between education and migration. If transferring education across countries is costly, wages are increasing in education, returns to education are higher in the destination country than in the country of origin, and there exists a minimum wage paid independently of one's education in the destination country, then only low and high, but not medium educated, decide to migrate. We then introduce foreign language proficiency into the model. Foreign languages are necessary for transferring human capital across countries, and better language skills reduce the wage penalty for immigrants. We use this model to predict the impact of education policies on migration. In particular, we foresee that when migration rates are u-shaped, an increase in years of compulsory education reduces migration. On the other hand, introducing foreign

languages into compulsory school curricula and thus improving language skills, leads to more migration.

In our empirical analysis we exploit that education laws change over time, and hence in each country some cohorts face different lengths of compulsory schooling than other cohorts as well as distinct policies regarding compulsory foreign language classes. In particular, our empirical strategy compares migration decisions of: (i) different cohorts from the same country who were exposed to different educational polices due to policy changes, (ii) identical cohorts from different countries who were exposed to different educational policies because of differences in legislation in the two countries. In the case of foreign language classes we add an additional dimension, and we also compare different destination countries; i.e. (iii) that the same cohort in the same country was exposed to languages of some destination countries but not others.

For our analysis we use Eurostat data on recent migration flows across European countries. To the best of our knowledge this is the only source that provides migration flows disaggregated by cohorts. Using mostly documentation from the European Commission's Education, Audiovisual and Culture Executive Agency, we create a novel data base on the introduction of foreign language classes into compulsory school curricula in 31 European countries in recent decades. We rely on a number of other sources such as Brunello, Fort and Weber [2009], Garrouste [2010], Hörner et al [2007], and Murtin and Viarengo [2011] to complete our data base with information on changes to the length of compulsory schooling in each country in recent decades.

Controlling for economic variables (unemployment rates by cohort) in countries of origin and destination, the presence of other co-nationals, and total population by age group, we find that increasing compulsory schooling by one year reduces the number of emigrants from a country by almost 10%. Introducing a foreign language into compulsory school curricula, on the other hand, almost doubles the number of emigrants to the country where the language is spoken and increase the total number of emigrants by 20%. Our results are robust to a variety of alternative specifications that include historical variables (years lived under communist rule), exclude certain potentially determinant countries, or control for cohorts' years of compulsory schooling in the country of destination.

A number of recent studies use changes in education laws and related policies to instrument for education choices when estimating the causal effect of education on within-

country migration.[4] The before-mentioned paper by Machin, Salvanes and Pelkonen [2012] uses a change in compulsory schooling laws in Norway and finds education to increase internal mobility. State autonomy and geographical distance makes migration across US states more similar to our analysis of migration across European countries. Results for the effect of education on state-to-state migration in the US are mixed. Malamud and Wozniak [2010a] use the risk of being drafted for the Vietnam War as an instrument for college-level education and estimate a positive causal effect of education on migration. Results in their working paper version (Malamud and Wozniak [2010b]) show that when instrumenting education by quarter of birth, the estimates turn negative but not significant. As the authors suggest, if the impact of additional educational attainment on migration differs for individuals with different baseline educational attainments, such contrasting results might arise. Similar to our analysis and findings, McHenry [2013] uses differences in changes to the minimum school leaving age across US states and shows that for low levels of education, additional educational attainment has a negative impact on state-to-state migration.

In the context of international migration, most studies use observed educational attainment, and many focus on the case of Mexican-US migration. Results from these studies range from negative self-selection of immigrants with individuals from the bottom of the skill distribution being more likely to migrate (Fernández-Huertas Moraga [2011]), to positive self-selection (Chiquiar and Hanson [2005]), to a u-shaped relationship (Caponi [2010]). McKenzie and Rapoport [2010] find the effect of education on Mexican-US migration to depend on the size of networks, with larger (smaller) networks attracting disproportionately more uneducated (educated) individuals.

Regarding international migration and foreign language proficiency, the existing literature mainly focuses on two important aspects: its determinants and its consequences for migrants. With respect to the latter, findings by Chiswick and Miller [2010], Dustmann and Fabbri [2003], and Gonzalez [2005] show that immigrants' accomplishments in a host country's labor market depend positively and to a great extent on language skills. Bleakley and Chin [2010] find negative effects of language proficiency on fertility and marriage. Similar to the current paper, Lleras-Muney and Shertzer [2015] consider changes in education policies, among others compulsory schooling laws and the imposition of English as language of instruction. The authors find no effect of theses policies on immigrant assimilation in the US between 1910-1930. Regarding determinants of language proficiency,

[4]Using data on educational attainment entails problems of reverse causality if individual decisions on education are influenced by the desire to migrate. For instance, McKenzie and Rapoport [2011] find that Mexican boys from a household with international migration experience are more likely to drop out of school.

Chiswick [2008] points out that three aspects: (i) exposure (not being married before migration, not living in an enclave), (ii) efficiency (young age, higher education), and (iii) economic incentives (length of expected stay) positively influence the likelihood that an immigrant acquires proficiency in the host country's language. 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 Adsera and Pytlikova [2015] who try to explain migration flows to different OECD countries using linguistic distances to measure the ease of learning a host country's language. The analysis on foreign language proficiency and migration in the current paper is similar to the one we carried out in Aparicio Fenoll and Kuehn [2014], but includes more countries, additional years, and a broader set of controls.

In contrast to most literature that uses changes in education policies as a means to investigate the effect of educational attainment on migration, the current paper directly tries to address the question: "How do changes in education policies affect migration?" While effects of education policies most likely operate through changes in individuals' educational attainment, our question is different and does not require the use of IV estimation. Our strategy allows for education policies to have general equilibrium effects that go beyond their impact on the aggregate level of education. For instance, increasing the length of compulsory schooling requires additional resources which may reduce public expenditure in other categories while improving labor market opportunities for teachers. Both aspects in turn could affect migration. In order to make sure that changes to the length of compulsory schooling affect aggregate education levels as expected, we check that these policies effectively translated into changes in educational attainment. To this end, we regress the length of compulsory schooling during the time a particular cohort was in school on measures of the cohort's average years of schooling, and as expected we find a robust positive relationship. Unfortunately, lack of cohort data on foreign language proficiency across countries prevents us from carrying out a similar test for the effect of foreign language classes during compulsory schooling on language proficiency. However, the fact that 68% of Europeans obtained their foreign language skills at school (Eurobarometer [2012]) provides us with confidence that also these policies were effective at achieving their means. While focusing on the impact of education policies on migration, the current paper thus also sheds light on the more general question of the effect of educational attainment on migration.

To the best of our knowledge the current paper is the first to analyze how education policies affect international migration in a multi-country setting. This is important because findings regarding the relationship between education policies and internal mobility cannot simply be extrapolated to the context of international migration. Within a coun-

try, educational attainment is easily transferable, but education obtained in one country might not be fully recognized in another country (see Chiswick [2008] or Greenwood and McDormell [1991]). To the best of our knowledge we are also the first to study the impact of acquired language proficiency during compulsory education on migration. The European setting is ideal for our analysis. Basically unrestricted mobility allows us to isolate the role of education policies from migration restrictions. Outside of Europe, many countries tend to place stricter limits on the entry of low educated individuals compared to highly educated individuals, making it difficult to disentangle the effect of education policies from migration restrictions. Moreover, speaking a foreign language determines the degree to which human capital is transferable across countries, and the large variety of different languages in Europe provide a context where language proficiency is important for migration. The remainder of this paper is organized as follows: Section 2 presents the model, 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] applied to the context of migration (see Borjas [1987]), individuals decide to migrate upon comparing their expected incomes in origin and destination countries. Differences in returns to education across countries determine whether relatively more low or more highly educated individuals migrate. However, a simple Roy model [1951] with wages that increase monotonously in education and migration costs which are independent of an individual's education cannot generate the observed u-shaped relationship between education and migration displayed in Figure 1.2. 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].[5] We adapt his model and illustrate how education reforms which increase educational attainment or improve foreign language proficiency can affect migration.

Consider two countries, one rich R and one poorer country P. Expected wages in each country depend on the individuals' level of education (θ) in the following way

$$W_R(\theta) = r_0 + r_1\theta$$
$$W_P(\theta) = p_0 + p_1\theta,$$

[5] Caponi [2010] proposes a model where transferability of human capital is limited across countries but parents migrate for a better education of their children. His model also generates a u-shaped relationship between education and migration.

with $r_0 > p_0$ indicating that wages are higher in the rich country.[6] Parameters r_1 and p_1 represent returns to education in the rich and poorer country respectively. Language proficiency $k \in [0, 1)$ determines how migrants' expected wages compare to those of natives with the same level of education. For high enough values of k, individuals of any education level θ have higher expected wages in country R than in country P,

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

However, an education obtained in one country is not automatically recognized elsewhere. In order to have an educational degree officially recognized in a foreign country, individuals have to incur in cost C that includes official translations and administrative paperwork requested by government agencies, associations, or guilds. Similar costs might also arise due to license requirements for certain professions. Such requirements do not only differ across countries but also across US states (see e.g. Federman, Harrington and Krynski [2006]). According to Kleiner and Krueger [2010] occupational licenses are more prevalent among workers with high school education (22%) and college degrees (44%) than high school dropouts (12%). Net income in the foreign country is hence given by $kW_R(\theta) - C$. If individuals migrate without a recognized degree they are able to earn a minimum wage that does not depend on one's education, $k\bar{W}_R$.[7]

Given certain parameter values, a u-shaped relationship between educational attainment and migration arises. The upper graph of Figure 2.3 displays the situation in which returns to education are higher in the destination country and the minimum wage is higher than the wage of low educated individuals in the country of origin. However, the minimum wage lies below the wage that medium educated individuals can earn in the country of origin. This gives rise to a u-shaped pattern. Individuals with low educational attainment – with $\theta < \theta_1$ – migrate without having invested in degree recognition and they earn minimum wage $k\bar{W}_R$. Individuals with a medium level of education – between θ_1 and θ_2 – do not migrate and they earn $W_p(\theta)$. Finally, those with higher educational attainments ($\theta > \theta_2$) pay the costs to have their degree recognized and migrate. They earn $kW_R(\theta) - C$.

An increase in the length of compulsory schooling shifts a mass of individuals from low educational attainment towards medium educational attainment. This leads to a new distribution of education with a higher mean and smaller variance as displayed in the lower

[6] Note that these parameters can also incorporate aspects that affect differences in the probability of finding a job, e.g differences in unemployment rates.

[7] This simple static model abstains from improvements in language proficiency once the individual has migrated, nor does it allow for return-migration. Reinhold and Thom [2013] propose a model of return migration where individuals' migration decisions also take into account the potential increase in income back home, something that could in part be due to language acquisition.

graph of Figure 2.3. Given our parameter values, this implies an increase in the share of individuals who do not migrate. The difference between the light and dark gray area indicates the additional mass of individuals who decide to stay as a consequence of the increase in the length of compulsory schooling. Everything else equal, our model predicts that an increase in the length of compulsory schooling reduces the number of individuals who migrate.

As language proficiency increases from k to k' – for instance as a consequence of the introduction of foreign languages into compulsory school curricula – migrants are able to obtain wages that are more similar to those of natives. Figure 2.4 displays what happens as language proficiency increases.[8] Expected wages are higher, 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 the functional form for the relationship between wages and education is such that the increase in expected wages and hence the gains from language proficiency are larger for highly educated individuals (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 intercept and slope of the expected wage function for recognized degrees $(k'W_R(\theta) - C)$ increase as well. As a result fewer individuals decide to stay. An increasing number of high and low educated migrate. The model thus predicts that an increase in the length of compulsory schooling reduces migration, while the introduction of foreign languages into compulsory school curricula leads to more migration.

In order to fully test the model, we would need to check our assumptions about wage profiles in the destination and origin countries. However, differences in wage profiles while typically included in estimations of internal migration decisions - see Kennan and Walker [2011] for the United States - are usually not available for analyses of 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 extents to migration across 31 European countries for which comparable estimates for migrants' wages profiles are not available. We can thus only test the model's predictions for migration decisions under different educational policies regarding length of compulsory schooling and foreign languages in compulsory school curricula.

[8] Without loss of generality, parameter values for Figures 2.3 and 2.4 are chosen such that $C = kr_0$.

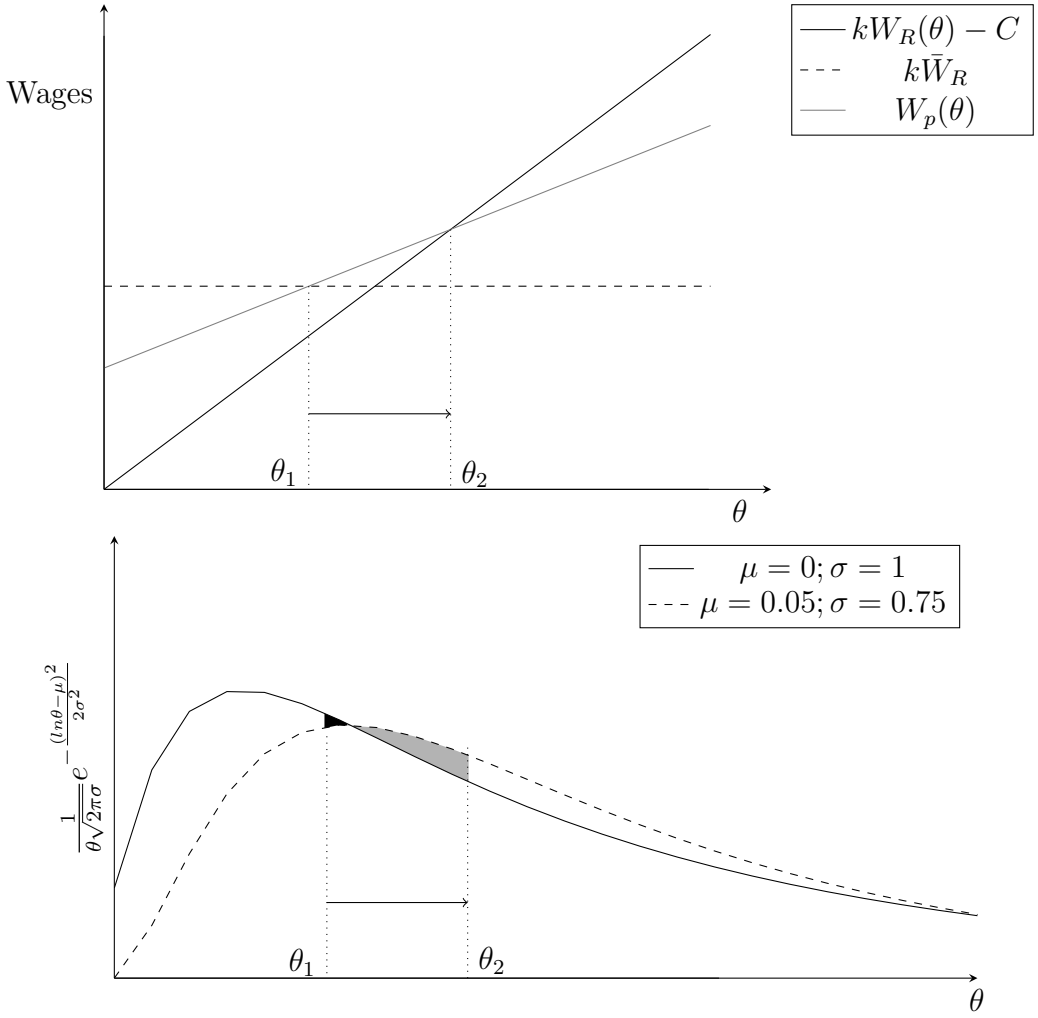


Figure 2.3: Effect of increase in length of compulsory education on migration.

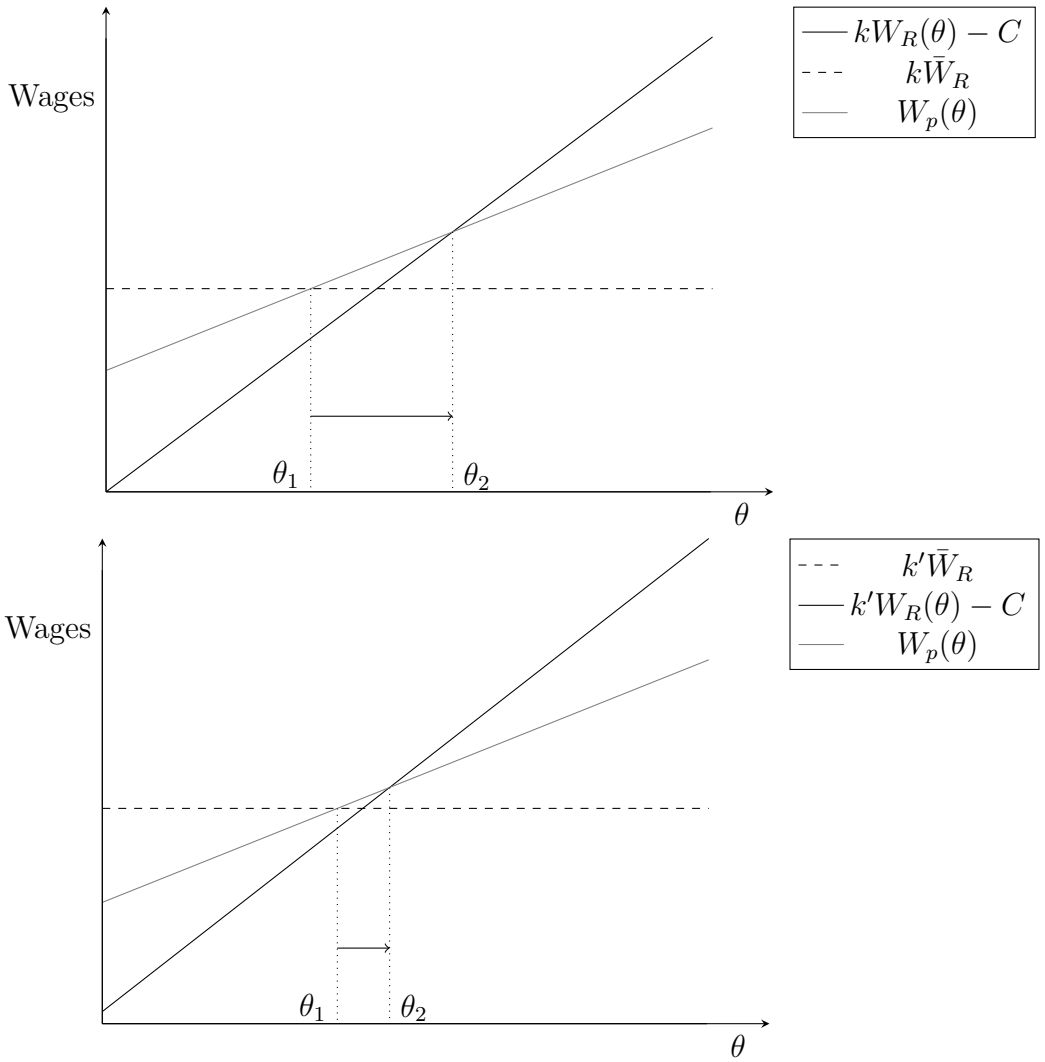


Figure 2.4: Effect of improvement in language proficiency from k to k' on migration.

3 Data

For our analysis we use data from Eurostat on migration across European countries. In particular, we consider the flow in t and stock of immigrants in $t-1$ by 5-year age groups for all combinations of origin and destination countries in 2008-2012. The following 26 destination countries provide this data: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, and Sweden. For Germany and Austria, missing data for 2009-2012 and 2010 respectively is complemented with data from the Statistische Bundesamt and Statistik Austria. Data for the UK come from the International Passenger Survey of the Office for National Statistics (ONS). We thus have information on 27 destination countries and 31 countries of origin - all destination countries plus France, Greece, Malta, Latvia, and Portugal. We also rely on Eurostat data for national unemployment rates by 5-year age groups.

For our analysis we consider young individuals between 25 and 44 who are most likely to migrate for work-related reasons. To avoid picking up short-term temporary migration related to studying abroad, we restrict our sample to individuals age 25 and older. Furthermore, in many countries for individuals older than 44 (born before 1964) it is unclear that language learning (or even compulsory schooling) was enforced. We construct a database with information on the required years of compulsory schooling for each cohort in each country based on four main sources: Brunello, Fort and Weber [2009], Garrouste [2010], Hörner et al [2007], Murtin and Viarengo [2011]. Educational reforms that changed the length of compulsory schooling during the 20th century for different cohorts generate within- and across-country variation. Table A.1 of the Appendix displays these changes and variations for our cohorts.

We create a novel database on foreign language classes in compulsory education using mainly information from the European Commission's Education, Audiovisual and Culture Executive Agency (EACEA) and the European's Commission's Directorate-General for Education and Culture. For each cohort and country, this database includes information on the starting age for studying foreign languages during compulsory education as well as on the type of languages studied. Educational reforms that have occurred during the last decades imply that some cohorts have been exposed to foreign languages during compulsory education while others have not. There are also differences in the type of foreign languages included in school curricula. In most former communist countries of Central and Eastern Europe after 1990, Russian was replaced by English as the first

foreign language. Nowadays, the vast majority of students in European countries studies English as their first foreign language. In many countries, studying a second foreign language is compulsory during lower secondary education. Traditionally, only German and French were offered as second foreign languages, but recently individuals in most countries can also choose Spanish and in fewer countries Italian. At present, German is more common in Central and Eastern Europe, while French tends to be taught in Southern European countries. Spanish is the third or fourth most widely taught second foreign language. These differences and changes over time generate variations within- and across-countries of origin and destination in the exposure to foreign languages. For countries, where students can choose among various foreign languages we consider all options to avoid picking up individual choices which can be endogenous to migration decisions. 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. Our data set contains this information by cohort and country of origin. We summarize this information in Table A.2 of the Appendix.

Table 3.1 provides summary statistics - mean, standard deviation and minimum and maximum values - for our variables. We have observations for 11,205 cells defined by the combination of origin, destination, age, and year.[11] On average, 221 individuals in each age group from each country of origin migrate each year to one of the destination countries. However, we observe a lot of variation in these migration flows. There was no migration from Cyprus to Estonia in 2010, while in 2008, 29,250 individuals age 25-29 migrated from Romania to Italy.

Average years of compulsory schooling are 9.1, ranging from 6 (for older cohorts in most countries) to 13 for younger cohorts in Germany. Around 11.3% of our observations - cells defined by the combination of origin, destination, age, and year - were exposed to compulsory foreign language classes in the language of destination countries. Observations are distributed homogeneously across age groups. We have slightly more observations for 2008 than for 2009-2012. Regarding differences in unemployment rates, measured one year before migration, we observe a maximum difference of 33 percentage points between unemployment rates in Norway and Greece for individuals age 25-29 in 2012. Also measured one year before, the average number of immigrants of a certain age group from a certain country of origin is around 1,797, i.e. more than eight times the average annual inflow.

[11] In total we should have 14,500 observations. Unfortunately, we were not able to complement the following missing data: destination countries France, Greece, Malta, and Latvia, data for Belgium 2008-09, Bulgaria 2009-11, Croatia 2009-10, Cyprus 2009-12, Macedonia 2009-10, Poland 2009-12, Portugal 2009-12, Slovakia 2012. The remaining missing data refer to single observations, for instance for half of all destination countries migration from Liechtenstein is missing.

Table 3.1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.
Imm flow origin-destination by age	221.199	1,015.603	0	29,250
Years of compulsory education	9.096	1.184	6	13
Exposed to foreign language	0.113	0.311	0	1
Age group 25-29	0.252	0.434	0	1
Age group 20-34	0.252	0.434	0	1
Age group 35-39	0.249	0.432	0	1
Year: 2008	0.224	0.417	0	1
Year: 2009	0.183	0.387	0	1
Year: 2010	0.193	0.395	0	1
Year: 2011	0.195	0.396	0	1
Diff unemp origin-destination by age	0.474	5.949	-27.2	33.1
Stock imm origin-destination by age	1,796.978	10,279.171	0	324,571
Stock population in origin by age	1,182,331.963	1,603,305.056	2,224	7,176,550
Years under communist rule	4.845	7.474	0	23.5

N=11,205; Differences in unemployment rates and the stock of immigrants refer to years $t-1$, i.e 2007, 2008, 2009, 2010, 2011. Sources: Eurostat, Statistisches Bundesamt, Statistik Austria, ONS, UN Data, Eurybase, European Commission's Education, Audiovisual and Culture Executive Agency (EACEA), European's Commission's Directorate-General for Education and Culture, Brunello, Fort and Weber [2009], Garrouste [2010], Hörner et al [2007], Murtin and Viarengo [2011], etc.; own calculations

However, while in 2010 there were no individuals from Bulgaria residing in Liechtenstein, there were 324,571 immigrants from Poland aged 40-44 living in Germany in 2011. On average, there are a little over 1 million inhabitants per age group in each country of origin, ranging from only 2,224 individuals of age 25-29 in Luxembourg and Liechtenstein, to more than 7 million British and Germans of age 40-44. Finally, we calculate the average number of years lived under communist rule by a cohort as the difference between 1990 and the cohort's birth year.

4 Estimation Strategy

Our identification strategy makes use of all three dimensions of variation in the data, comparing individuals across age, countries of origin, and time. We could have estimated the effects of education policies on migration by only comparing individuals across age, considering different cohorts from the same country who were affected by different compulsory

schooling laws. However, such an estimation is affected by differences in the propensities to migrate by age. Another alternative would have been to compare individuals of the same cohort from different countries of origin. However, nationals of different countries have different propensities to migrate, independently of education policies. A third approach would have consisted in observing individuals of a certain age and country of origin at different points in time, using the fact that they were affected by different compulsory schooling laws. However, we only have data on migration flows for five years, and even if we disposed of additional data, migration patterns change over time. We improve upon these approaches by combining them all. Using fixed effects, 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 compulsory foreign language classes we introduce a fourth dimension, using the fact that our explanatory variable varies by destination country. We hence compare the propensity to migrate to different destination countries, and we attribute the difference in migration flows between the destination country where the taught language is spoken and other countries to the impact of foreign language classes. 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.

To assess the impact of education policies on migration we estimate two separate models. Regarding our first model, we estimate the effect of years of compulsory education on the number of migrants in a cohort. We assume the following linear form for the relationship between the two variables:

$$\begin{aligned} M_{a,o,d,t} &= \alpha_0 + \alpha_1 CS_{a,o,t} + \alpha_2 D_a + \alpha_3 D_o + \alpha_4 D_d + \alpha_5 D_t + \alpha_6 D_{a,o} + \alpha_7 D_{a,d} + \\ &\quad + \alpha_8 D_{a,t} + \alpha_9 D_{o,d} + \alpha_{10} D_{o,t} + \alpha_{11} D_{d,t} + \alpha_{12} X_{t-1} + \epsilon_{a,o,d,t} \end{aligned} \tag{4.1}$$

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 schooling faced by individuals of age a in year t, and D_s with $s = a, o, d, t$ are dummies for age, country of origin, country of destination, and year. Our basic model includes all four dummy variables and two interaction terms for age and year and country of origin and destination.

We then expand the model and include all simple interactions as well as certain double interactions of dummy variables. For instance, we add the interaction term $D_{d,o,t}$ between country of origin, country of destination, and year. This term accounts for pull and push factors between country pairs that change over time and that affect individuals regardless of their age. 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]). In our context, including these terms in the estimation is important for two reasons: (i) In 2009 and 2011, work restrictions in some countries for nationals of Central European countries that joined the EU in 2004 and 2007 respectively, were finally lifted. (ii) Four countries in our sample (Croatia, Liechtenstein, Macedonia, Norway) did not belong to the EU during 2008-2012. Norway and Liechtenstein belong to the Schengen area which guarantees free mobility since 2001 and 2011 respectively. Croatia joined the EU in 2014, and Macedonia is an EU candidate country, and since 2009 its residents can travel visa-free to the Schengen area. Note that when in place, these restrictions applied to individuals of all ages. 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 lagged control variables by age group (X_{t-1}) total population in country of origin, stock of immigrants settled in the destination country, and differences in the unemployment rates between the destination country and the country of origin.

For countries where the length of compulsory schooling did not change during the time our cohorts were in school, the variable $CS_{a,o,t}$ is a constant. As a result, the corresponding dummy variable $D_{a,o}$ will not be identified. However, as long as identifying this dummy variable is not the focus of our analysis, this will not pose a problem for our estimation. Following Bertrand, Duflo and Mullainathan [2004], we cluster standard errors at the destination-origin-age level to allow for serial correlation in migration flows over time.

Our second model estimates the number of migrants as a function of exposure to compulsory foreign language classes in the language of the destination country.[12] We assume the following linear form for the relationship between the two variables:

$$\begin{aligned} M_{a,o,d,t} &= \beta_0 + \beta_1 L_{a,o,d,t} + \beta_2 D_a + \beta_3 D_o + \beta_4 D_d + \beta_5 D_t + \beta_6 D_{a,o} + \beta_7 D_{a,d} + \\ &\quad + \beta_8 D_{a,t} + \beta_9 D_{o,d} + \beta_{10} D_{o,t} + \beta_{11} D_{d,t} + \beta_{12} X_{t-1} + \epsilon_{a,o,d,t} \end{aligned} \tag{4.2}$$

where L is a dummy variable that denotes exposure to compulsory language classes in at least one of the official languages of country d. All other variables are as defined before.

Only some foreign languages are studied during compulsory education in European schools,

[12] Limited reliability of data on years of exposure to foreign language classes is the main reason why we do not consider such a refinement of our dependent variable. Furthermore, comparability across countries would require adjustments for hours taught per week as well for linguistic distance between language of destination and origin countries.

and hence the set of foreign languages considered includes English, German, French, Spanish, and Italian.[13] For destination countries where neither English, German, French, Spanish, or Italian are official languages, we set $L_{a,o,d,t} = 0$ for all $t, a, o.$. As a result, in our model specification that includes triple interactions, dummy variables $D_{d,o,t}$ or $D_{d,a,t}$ are not going to be identified. As mentioned before, as long as identifying these dummy variables is not our main interest, this will not pose a problem. Again, we cluster standard errors at the destination-origin-age level to allow for serial correlation in migration flows over time.

4.1 Endogeneity Concern

There might exist some concern that education reforms could be endogenous to migration. Endogeneity could arise for two reasons: (i) reverse causality: if somehow cohort-specific migration patterns in 2008-2012 determined education reforms implemented in the past when those cohorts were in school. (ii) omitted variables: if determinants of cohort-specific migration patterns (e.g differences in cohort-specific labor market conditions between origin and destination countries) persisted over time, and if they influenced reforms that were implemented when our cohorts were in school.

Regarding the first concern: (i) Education reforms are predetermined with respect to migration patterns in 2008-2012. Still, migration patterns could be highly persistent over time. However, education reforms could at most be driven by aggregate migration flows. It is highly unlikely that they are determined by differences in the number of migrants by cohort. Hence, origin-year fixed effects and origin-destination-year fixed effects pick up any effect of migration persistence in our estimations on the effect of number of years of compulsory schooling and foreign language classes, respectively. (ii) From a political economy point of view, migration flows are unlikely to influence education policies. Governments design their education policies focusing on the median voter who stays, instead of targeting those who migrate. Moreover, the time that passes from the moment education reforms are implemented to the time that students finish their compulsory education and enter the labor market - be it at home or abroad - is likely to exceed governments' mandates. Hence, as governments might not be able to reap the potential fruits in terms of more or less migration, migration flows or brain drain concerns are very unlikely determinants of policies affecting compulsory education.[14]

[13] Even though Russian is the most widely taught second foreign language in Latvia, Estonia, and Lithuania, we ignore this option given that we do not have data on migration flows to Russia.

[14] The only example known to us of a government explicitly providing training such that its citizens

Regarding the second concern: To proxy labor market conditions, in our estimations we control for differences in cohort-specific unemployment rates in the year before migration, and our estimated coefficients remain unchanged. This suggests that differences in labor market conditions between origin and destination countries are not driving education reforms implemented in the past. One could think that unemployment rates at the time of the reforms could be a relevant omitted variable, however those are unlikely to affect migration patterns in 2008-2012, in particular once controlling for contemporaneous unemployment. In general, in order to address both concerns, one would like to know more about the determinants of education reforms. To the best of our knowledge there does not exist any established theory on the political economy of education reforms, but increasing the length of compulsory education or introducing foreign language classes into compulsory school curricula requires additional resources: teachers, facilities, etc. The actual implementation of those reforms hence depends on the availability of resources. In our regressions, fixed effects pick up business cycle phases which determine the availability of resources to a large extent (e.g. tax revenues, social expenditures).

Furthermore, there is a long tradition in the literature of using compulsory schooling laws as exogenous shifters of educational attainment. Since the seminal paper by Angrist and Krueger [1991], such laws have been used in studies of the causal relationship between education and many different outcomes, such as earnings (Harmon and Walker [1995], health (Brunello, Fabbri and Fort [2013]), and citizenship (Milligan, Moretti and Oreopoulos [2004]). More relevant to us and as discussed before, changes in the length of compulsory education have also been used in analyses of the impact of education on internal migration in Norway (Machin, Salvanes and Pelkonen [2012]) and the US (Malamud and Wozniak [2010b] and McHenry [2013]).

5 Results

We first test whether changes to the length of compulsory education have any impact on the actual number of years of schooling. Only if those changes are actually enforced and individuals are not already staying in school beyond the minimum years required by law, can we expect an effect of compulsory schooling on indirectly related outcomes like migration. We hence regress average years of schooling as measured by Barro and

become better migrant workers is the training of nurses in the Philippines, see Lorenzo et al [2007]. The effect of such specialized training of adult workers on migration is much more immediate than the one resulting from education reforms regarding compulsory schooling.

Lee [2010] for different age groups for 2010 on our measure of years of compulsory schooling as determined by each country's education policy. Unfortunately, we cannot exploit changes over time because Barro and Lee [2010] only provide data every five years.[15] We also include dummy variables for age group, country of origin, and destination and their simple interactions in this regression. Table A.3 of the Appendix shows the results from this regression. The estimated coefficients indicate that policies that increased the length of compulsory schooling were effective in increasing average years of education for the affected cohorts.

We then turn to our empirical analysis regarding the impact of additional years of compulsory schooling on the propensity to migrate. Results from our first model as defined in Equation 4.1 are displayed in Table 5.1. The first column corresponds to the basic regression that includes dummy variables for year, age group, and countries of origin and destination, two interaction terms for age and year and country of origin and destination, as well as our lagged control variables for unemployment, stock of immigrants and population by age group. In column 2 we add all simple interactions. In column 3 we include 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 group, and year. Our coefficient of interest is negative, significant, and very stable across specifications. An additional year of compulsory schooling decreases the number of immigrants from the affected cohort who migrate in a given year to one specific destination country by 21 individuals. This implies a reduction of 9.7% with respect to the overall mean, and 14.6% with respect to a mean considering only countries providing identification, i.e. those that carried out education reforms that affected the cohorts in our sample.

Table 5.2 – similarly structured as Table 5.1 – contains the estimation results of our model that considers the effect of compulsory foreign language classes on migration. 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 as compared to the odds of migrating to any other European country. For younger individuals in countries like Bulgaria, Finland, France, and Netherlands we also consider if having been exposed to Spanish increases the odds of migrating to Spain. Finally, for individuals in countries like Malta, Slovenia, and Austria we also consider if having been exposed to Italian increases the odds of migrating to Italy. Our results show that this is the case. The coefficient of interest remains stable even after controlling for simple interactions of country of destination, country of origin, age group, and year effects

[15] Barro and Lee [2010] provide data for all countries included in the main estimations, except Liechtenstein.

Table 5.1: Migration and years of compulsory schooling

	(1)	(2)	(3)	(4)
Years of compulsory schooling	-24.618	-31.383	-32.706	-31.295
	(15.301)	(15.238)**	(14.346)**	(14.497)**
Obs.	11,205	11,205	11,205	11,205
R^2	0.683	0.713	0.928	0.93

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 age-specific unemployment rate between origin and destination countries, the stock of co-nationals from each age group in the destination country in the previous period, and the size of the age group in the origin country. Errors are clustered by origin-destination-age.

and some second order interactions. We find that exposure to foreign language classes during compulsory education almost doubles migration to the country where the language is spoken. The number of individuals of a cohort that migrate to this country increases by 392 individuals per year, 177% higher than the mean. Our estimated coefficient could in principle be driven by two aspects: (i) increased migration and (ii) redirected migration towards countries where taught languages are spoken ("substitution effect").[16] In order to compare this estimate to the previous one for compulsory education, one may wonder how much it represents in terms of overall migration. Given that we cannot disentangle the two driving forces, we can only calculate an upper bound for the overall effect that corresponds to a situation when substitution effects are absent. Considering that only 11.3% of our observations were exposed to compulsory foreign language classes in the language of destination countries, the total number of emigrants increases by 20%.

5.1 Robustness Checks

If different countries simultaneously increased the length of compulsory schooling, less migration could be driven by more education in the origin country as well as more education in the destination country. The latter might result from increased competition and lower wages for high-skilled jobs. Hence, we also test for such effects by including years of

[16] A model as the one in Bertoli, Fernández-Huertas Moraga, and Ortega [2013] where individuals first decide to migrate and then specify their destination country could produce such substitution effects

Table 5.2: Migration and compulsory foreign language classes

	(1)	(2)	(3)	(4)
Foreign Language Classes	575.208	459.246	425.323	421.887
	(152.695)***	(166.262)***	(166.684)**	(170.595)**
Obs.	11,205	11,205	11,205	11,205
R^2	0.688	0.727	0.93	0.932

The dependent variable is the number of immigrants, the variable foreign language classes 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 age-specific unemployment rate between origin and destination countries, the stock of co-nationals from each cohort in the destination country in the previous period, and the size of the age group. Errors are clustered by origin-destination-age.

compulsory schooling in the destination country into our regressions. The coefficient for this variable is only significant in our first most simple specification, and the coefficient for "years of compulsory schooling" in the origin country remains unaltered; see Table A.4 of the Appendix.

As mentioned before, young individuals in most European countries study English as their first foreign language during compulsory education. Hence, migration to the UK could be of particular importance for our estimations. Data for the UK, different from our other data (Eurostat, Statistisches Bundesamt, Statistik Austria) are not based on registers but are estimated based on international passenger flows. Hence, there might be some concern regarding the fact that results could be exclusively driven by these data. However, when running our regressions excluding observations for the destination country UK, the coefficient for "foreign language classes" remains unaltered; see Table A.5 of the Appendix.

In Central and Eastern Europe – with the exception of Croatia, Macedonia, Romania, and Slovenia where Russian was not the first compulsory foreign language – the change from Russian to English as the first foreign language was driven by the end of communism, which in itself had important implications for migration flows. Given that we consider migration in years 2008-2012, most of the initial emigration boom is likely to have ebbed out. Even if that were not the case, in our estimations 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 2008-2012, then - controlling for differences in age - we should not observe any differences in migration decisions between the two groups. For instance, among two cohorts from the same ex-communist country, one born in 1980 and another one born in 1975, the former was exposed to English as a foreign language while the latter was not. If individuals from both cohorts migrated to the UK or Ireland, origin-destination-fixed effects would capture their decision, and it would not add to our estimated effect of language proficiency on migration. Only in case individuals from the younger cohort, but not from the older cohort migrated to the UK or Ireland would we attribute their migration decisions to the newly acquired English skills. In order to address any remaining concerns, we include a control variable for the number of years a cohort lived under communist rule into our estimations. Our results remain unchanged - see Tables A.6 and A.7 of the Appendix.

We also carry out a formal check addressing the exogeneity of educational reforms. For the case of a nation-wide education reform that was implemented sequentially by Norwegian municipalities, both Machin, Salvanes and Pelkonen [2012] and Black, Devereux and Salvanes [2005] provide a test for the exogeneity of this timing. They suggest running a regression of the birth year of affected cohorts on a variety of socio-economic variables (income, labor force participation, educational attainment, election outcomes, etc.) measured around the time of the reform. The authors of both papers conclude that county fixed effects turn out to be the only significant variables in these regressions. As those same fixed effects are included in their main regressions, this dependence does not pose any problem. We run a similar regression of a dummy variable for reform that varies at the year and country of origin level on a variety of potentially related variables, as well as year and country dummies. As potentially related variables we consider available data on demographics (population growth), urban development (% rural population), education (average years of schooling), economic development (value added share of manufacturing, and agriculture) and business cycle (unemployment rate, GDP per capita). Tables A.8 and A.9 of the Appendix show the results from this estimation for reforms regarding changes in length of compulsory schooling and foreign language classes respectively. Governments' educational reforms regarding foreign language classes in compulsory education or the length of compulsory schooling do not seem to relate systematically to changes in population growth, urban or economic development, education, or the business cycle. As in the two above-mentioned papers, only few fixed effects are significant. Moreover, the proportion of the variance attributable to the regressors is low.

6 Conclusion

Previous literature has used education reforms to test whether more education is associated with more or less within-country mobility. Results have been mixed. We consider an international context with basically unrestricted migration – Europe – and test for the direct effect of education policies on migration. We show that increases in the length of compulsory education reduce the propensity to migrate across European countries. One additional year of compulsory education reduces migration by almost 10%. We also show that the introduction of foreign languages into compulsory school curricula on the other hand, increases migration. In particular, we find that acquiring foreign language proficiency during compulsory education almost doubles the number of individuals who migrate to the country where the language is spoken.

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 essential for future growth and job creation. At the same time, labor mobility is one of the main EU objectives, and foreign language proficiency, key for human capital transferability across countries is ranked a chief concern in the Barcelona objective of 2002. Our results suggest that education policies aimed at increasing educational attainment and foreign language proficiency may have opposite effects on migration. Increasing educational attainment while reducing differentials in national unemployment rates across Europe thus requires coordinated education and labor market policies.[17] For lower levels of education, our results show that governments can be fairly confident that more years of compulsory schooling are unlikely to be lost to brain drain. Our results do not extent to higher levels of education, but within the context of our theoretical model we can conjecture that initiatives like the Bologna process that makes university degrees across Europe comparable can help to reduce degree recognition costs, increase returns to migration and foster mobility. Recently, the EU Commission has proclaimed the ambitious goal of enabling all EU citizens to communicate in two languages other than their mother tongue. If the EU wants to seriously promote a unified labor market, it should strengthen teaching of foreign languages in compulsory education, and in particular of those languages spoken in countries with strong labor markets (German instead of Spanish).

[17] Boldrin and Canova [2001] argue that EU policies aimed at achieving convergence in economic conditions across Europe seem to discourage migration at the same time.

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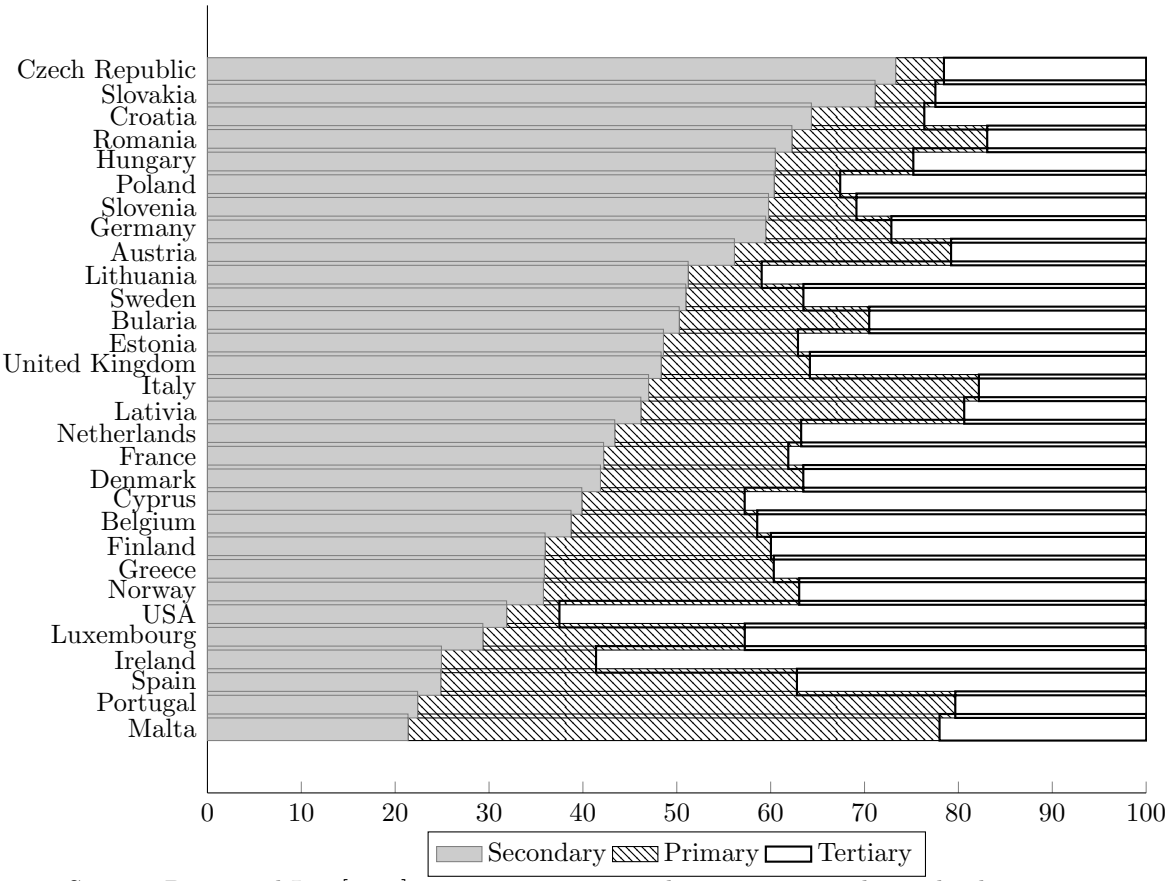
A Appendix

Figure A-1: Educational attainment of the population 25-44, 2010



Source: Barro and Lee [2010] primary: some secondary, primary and no schooling; secondary: secondary: secondary completed; tertiary: higher than secondary completed; Data for Liechtenstein not available

Table A.1: Reforms: Change in length of compulsory education

	Years		
country	before	after	first affected cohort
Belgium	8	12	1969
Bulgaria	8	9	1976
Czech Republic	9	10	1968
Czech Republic	10	9	1975
Estonia	8	11	1973
Estonia	11	9	1976
Finland	6	9	1970
Germany	9	13	1977
Latvia	8	11	1973
Latvia	11	9	1975
Lithuania	8	11	1973
Lithuania	11	9	1975
Luxembourg	9	10	1972
Malta	10	11	1983
Netherlands	10	11	1973
Netherlands	11	12	1980
Portugal	6	9	1980
Romania	10	8	1976
Slovakia	9	10	1968
Slovakia	10	9	1975
Slovakia	9	10	1984
Spain	8	10	1978

Sources: Brunello, Fort and Weber [2009], Hörner et al [2007], National Education Act Bulgaria, Eurydice [1997], Saar [2008], Archimedes Foundation [2010], Garrouste [2010], OECD [2001], OECD [2002], Reiff [2012], Murtin and Viarengo [2011]

Table A.2: Reforms: Foreign language classes in compulsory education

origin country	destination countries	first affected cohort
Austria	Ireland, UK	1975
Austria	Italy	1985
Belgium	Austria, Germany, Netherlands	1953
Belgium	Ireland, UK	1978
Bulgaria	Austria, Belgium, Germany, Ireland, UK	1974
Bulgaria	Italy, Spain	1982
Croatia	Austria, Germany, Ireland, UK	1948
Croatia	Italy	1971
Croatia	Belgium	1975
Cyprus	Ireland, UK	1951
Cyprus	Belgium	1960
Czech Republic	Austria, Belgium, Germany, Ireland, Spain, UK	1979
Denmark	Ireland, UK	1963
Estonia	Austria, Belgium, Germany, Ireland, UK	1983
Finland	Ireland, Sweden, UK	1961
Finland	Austria, Belgium, Germany, Italy, Spain	1985
France	Austria, Germany, Ireland, UK	1952
France	Spain, Italy	1985
Germany	Ireland, UK	1959
Greece	Belgium, Ireland, UK	1964
Greece	Austria, Germany	1979
Hungary	Austria, Germany, Ireland, UK	1979
Italy	Austria, Belgium, Germany, Ireland, Spain, UK	1952
Latvia	Austria, Belgium, Germany, Ireland, UK	1982
Liechtenstein	Austria, Belgium, Germany	1960
Liechtenstein	Ireland, UK	1988
Lithuania	Austria, Belgium, Germany, Ireland, UK	1980
Luxembourg	Austria, Germany	1962
Macedonia	Austria, Germany, Ireland, UK	1948
Macedonia	Italy	1971
Macedonia	Belgium	1975
Malta	Austria, Belgium, Germany, Italy	1993
Netherlands	Austria, Belgium, Germany, Ireland, United Kingdom	1951
Netherlands	Spain	1979
Netherlands	Italy	1987
Norway	Ireland, UK	1959
Poland	Austria, Belgium, Germany, Ireland, UK	1979
Portugal	Austria, Belgium, Germany, Ireland, UK	1976
Portugal	Spain	1987
Romania	Austria, Belgium, Germany, Ireland, UK	1957
Romania	Italy, Spain	1979
Slovakia	Austria, Belgium, Germany, Ireland, Spain, UK	1979
Slovakia	Italy	1983
Slovenia	Austria, Germany, Ireland, UK	1948
Slovenia	Italy	1971
Spain	Ireland, UK	1982
Sweden	Ireland, UK	1952
Sweden	Austria, Belgium, Germany, Spain	1981
UK	Austria, Belgium, Germany, Spain	1977

Sources: Directorate General for Education and Culture [2001], Braham [1972], Galvez et al [2000], Education, Audiovisual and Culture Executive Agency [2012], Education, Audiovisual and Culture Executive Agency [2010] Ministry of Education Macedonia [2004], State Statistical Office, Republic of Macedonia [2015], Nash and Eleftheriou [2008], Tomich [1963]

Table A.3: Average years of education and length of compulsory education

	(1)	(2)	(3)
Years of compulsory schooling	0.331	0.348	0.314
	(0.101)***	(0.101)***	(0.136)**
Obs.	108	108	108
R^2	0.201	0.225	0.747
F statistic	5.224	3.859	14.067

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.

Table A.4: Robustness check: Migration and years of compulsory schooling also in destination country

	(1)	(2)	(3)	(4)
Years of compulsory schooling	-22.832	-43.134	-32.750	-31.295
	(15.549)	(15.558)**	(14.338)**	(14.497)**
Years of compulsory schooling in destination	60.003	-3.645	-11.059	1547.559
	(19.841)***	(121.279)	(26.155)	(2535.695)
Obs.	11,205	11,205	11,205	11,205
R^2	0.684	0.725	0.928	0.93

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 age-specific unemployment rate between origin and destination countries, the stock of co-nationals from each age group in the destination country in the previous period, and the size of the age group in the origin country. Errors are clustered by origin-destination-age.

Table A.5: Robustness check: Migration and compulsory foreign language classes, excluding United Kingdom

	(1)	(2)	(3)	(4)
Foreign language classes	439.348	411.356	338.933	337.388
	(137.011)***	(163.869)**	(153.727)**	(156.849)**
Obs.	10,921	10,921	10,921	10,921
R^2	0.706	0.74	0.957	0.958

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 age-specific unemployment rate between origin and destination countries, the stock of co-nationals from each age group in the destination country in the previous period, and the size of the age group in the origin country. Errors are clustered by origin-destination-age.

Table A.6: Robustness check: Migration and years of compulsory schooling, incl. years lived under communist rule

	(1)	(2)	(3)	(4)
Years of compulsory schooling	-24.618	-31.383	-32.706	-31.295
	(15.301)	(15.238)**	(14.346)**	(14.497)**
Obs.	11,205	11,205	11,205	11,205
R^2	0.683	0.713	0.928	0.93

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 age-specific unemployment rate between origin and destination countries, the stock of co-nationals from each age group in the destination country in the previous period, the size of the age group in the origin country, and a variable for the number of years lived under a communist regime. Errors are clustered by origin-destination-age.

Table A.7: Robustness check: Migration and compulsory foreign language classes, incl. years lived under communist rule

	(1)	(2)	(3)	(4)
Foreign language classes	560.060	418.459	393.544	391.515
	(150.675)***	(161.834)***	(161.491)**	(165.454)**
Obs.	11,205	11,205	11,205	11,205
R^2	0.688	0.728	0.93	0.932

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 age-specific unemployment rate between origin and destination countries, the stock of co-nationals from each age group in the destination country in the previous period, the size of the age group in the origin country, and a variable for the number of years lived under a communist regime. Errors are clustered by origin-destination-age.

Table A.8: Robustness check: Exogeneity of changes in length of compulsory schooling

	population	geography	education	agriculture	manufacturing	economiccycle
	(1)	(2)	(3)	(4)	(5)	(6)
Population growth (annual %)	0.002	0.002	0.001	0.025	0.028	0.014
	(0.009)	(0.009)	(0.01)	(0.035)	(0.035)	(0.037)
Rural population (% total pop.)		0.00004	0.0001	0.003	0.003	0.005
		(0.002)	(0.002)	(0.005)	(0.005)	(0.005)
Average years of schooling			-.005	-.011	-.010	-.008
			(0.013)	(0.028)	(0.028)	(0.028)
Value-added agriculture (%)				-.010	-.007	-.011
				(0.014)	(0.015)	(0.016)
Value-added manufacturing (%)					0.004	0.005
					(0.008)	(0.008)
GDP per capita						4.66e-06
						(3.66e-06)
Unemployment rate						
Obs.	1,448	1,448	1,398	460	460	460
R^2	0.056	0.056	0.057	0.132	0.132	0.136
F statistic	1.047	1.033	1.009	0.953	0.941	0.953

The dependent variable is a dummy variable that takes on value one if a reform regarding the length of compulsory schooling was passed that year. 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 and country of origin fixed effects. Sources: World Bank Data for population growth, % of rural population, value-added shares manufacturing and agriculture; Barro and Lee [2010] for average years of schooling; OECD Data for GDP per capita and unemployment rates.

Table A.9: Robustness check: Exogeneity of foreign language classes during compulsory education

	population	geography	education	agriculture	manufacturing	economiccycle
	(1)	(2)	(3)	(4)	(5)	(6)
Population growth (annual %)	0.002	0.002	0.002	0.009	0.009	0.01
	(0.003)	(0.003)	(0.003)	(0.009)	(0.009)	(0.009)
Rural population (% total pop.)		0.001	0.001	-.0002	-.0001	-.0004
		(0.0004)**	(0.0005)**	(0.001)	(0.001)	(0.001)
Average years of schooling			-.001	0.004	0.003	0.003
			(0.004)	(0.007)	(0.007)	(0.007)
Value-added agriculture (%)				-.0003	-.0007	-.0002
				(0.004)	(0.004)	(0.004)
Value-added manufacturing (%)					-.0006	-.0007
					(0.002)	(0.002)
GDP per capita						-5.82e-07
						(9.05e-07)
Unemployment rate						
Obs.	1,448	1,448	1,398	460	460	460
R^2	0.048	0.051	0.052	0.133	0.133	0.134
F statistic	0.885	0.933	0.921	0.961	0.945	0.935

The dependent variable is a dummy variable that takes on value one if a new foreign language was introduced into the compulsory school curricula that year. 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 and country of origin fixed effects. Sources: World Bank Data for population growth, % of rural population, value-added shares manufacturing and agriculture; Barro and Lee [2010] for average years of schooling; OECD Data for GDP per capita and unemployment rates.