

# The selection of migrants and returnees in Romania

## *Evidence and long-run implications*<sup>1</sup>

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### **Abstract**

This paper uses census and survey data to identify the wage earning ability and the selection of recent Romanian migrants and returnees on observable characteristics. We construct measures of selection across skill groups and estimate the average and the skill-specific premium for migration and return for three typical destinations of Romanian migrants after 1990. Once we account for migration costs, we find evidence that the selection and sorting of migrants are driven by different returns to skills in countries of destination. Our identification strategy for the effects of work experience abroad permits a cautious causal interpretation of the premium to return migration. This premium increases with migrants' skills and drives the positive selection of returnees relative to non-migrants. Based on the compatibility of the results with rationality in the migration decisions, we simulate a rational-agent model of education, migration and return. Our results suggest that for a source

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country like Romania relatively high rates of temporary migration might have positive long-run effects on average skills and wages.

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## 1. Introduction

The emigration of highly skilled and highly productive workers, attracted by higher wages abroad, has traditionally been regarded as harmful for industrializing countries (Bhagwati, 1976; Bhagwati and Hamada, 1974; Bhagwati and Rodriguez, 1975; Grubel and Scott, 1966). However, from the perspective of the migrants themselves, migration is an opportunity to improve, sometimes dramatically, their standard of living. There is evidence that migrants for instance from Latin America (Clemens *et al.*, 2008), from India (De Coulon and Wadsworth, 2010) or from Eastern Europe (Budnik, 2009) earn on average two to four times more at destination than they would at home. Moreover, the migration of highly skilled workers may induce virtuous educational incentives in the native population. In the long run, this might increase the overall human capital of the sending country. This possibility of a 'brain gain' has been identified theoretically in the past<sup>2</sup> and tested empirically in recent research. Beine *et al.* (2001, 2008) use a cross-country approach to show that emigration rates are positively correlated with average schooling levels. Using individual data, Batista *et al.* (2010) and Chand and Clemens (2008) find a positive incentive effect of skilled emigration on the education of friends and relatives in the country of origin. In addition to this, a large body of work has shown that migration is often temporary rather than permanent, and return migrants often become successful entrepreneurs or bring back highly productive skills with positive consequences for their countries. The positive impacts of return migration for the countries of origin have been analyzed theoretically by Dustmann (1995), Santos and Postel-Vinay (2003), Mayr and Peri (2009), Dustmann *et al.* (2011) and Dustmann and Glitz (2011). There is also evidence that return migrants receive income premia for their work experience abroad (Barrett and Goggin, 2010; Reinhold and Thom, 2009). Several recent studies have also emphasized the importance of returnees as a source of entrepreneurship (Constant and Massey, 2003; McCormick and Wahba, 2001).<sup>3</sup>

These aspects of migration and return are particularly relevant for the case of Central and Eastern European Countries (CEEC). After the opening of the borders

<sup>2</sup> For instance in the papers by Mountford (1997), Stark *et al.* (1997, 1998) and Beine *et al.* (2001, 2008).

<sup>3</sup> Returnees have been sources of start-ups in high-tech sectors in countries such as India (Commander *et al.*, 2008) and in the Hsinchu Science Park in Taipei (Luo and Wang, 2002). Zucker and Darby (2007) find that in the period 1981–2004 there was a strong tendency for 'star scientists' in several fields in the US to return to their country of origin and promote the start-up of high-tech firms (especially in China, Taiwan and Brazil).

in 1990 and subsequently in the context of EU enlargement, a number of Eastern European professionals as well as unskilled workers moved to Western Europe and to North America (see among others Kahanec and Zimmerman, 2010 for a recent overview). Over the last two decades, return migrants also became an important and fast-growing group in the labour markets in all CEEC (for a recent overview see for instance Martin and Radu, 2011). Precise and comparable figures of the stock of Eastern European migrants who already returned to their countries of origin are still missing. However, some recent research suggests that these migrants acquire productive skills while abroad and receive significant income premia upon return (see e.g. Co *et al.*, 2000 for female return migrants in Hungary; De Coulon and Piracha, 2005 for Albanian returnees; Hazans, 2008 for Latvian returnees and Martin and Radu, 2011 for cross-country comparisons). There is also evidence that returnees in CEEC are more likely to undertake entrepreneurial activities or to be self-employed than non-migrants (Kilic *et al.*, 2009; Piracha and Vadean, 2010).

The consequences of migration and return on the sending countries depend crucially on two aspects: the size and the selection of these flows. The larger the number of migrants and returnees the larger are the potentials for gains and losses. Moreover, for the countries of origin, a positive selection of migrants and returnees, in terms of their skills, may represent both a challenge (risk of brain drain) and an opportunity (incentives for learning and improvement of skills). Did the increased mobility of Eastern Europeans in the 1990s harm their countries of origin? How did migration and return contribute to the productivity and income of workers? What will be the consequences of further reducing the cost of migration? This paper will provide some answers to these questions. We quantify the size and selection of migration and return for the case of Romania, and we analyze the consequences of international mobility on its levels of wages and productive skills. Being the second most populous country in Eastern Europe (after Poland) and having migrants in several destination countries, Romania is an interesting case also because of the significant rate of return migration.

Using a unique combination of census and large survey data, we are able to identify Romanian migrants in three main destination countries (Appendix Table A1 provides an overview of the collated individual-level data). We match this information with microdata on non-migrants and returnees in Romania. The three destination countries are Spain, Austria and the US. We choose these countries because, as explained in Section 2, they span very well the different ranges of institutions and labour market types across the favoured destinations of migrants from Romania and other CEECs. For these countries, we use census data (2000–2001) as well as data from the EU-Survey on Income and Living Conditions (EU-SILC) for Austria and Spain, and from the National Demographic Survey (NDS) of Romania (2003). Our dataset provides a picture of the relative size and relative characteristics (including earned wages) of the cross section (*c.* 2002) of individuals born in Romania in three different groups: those who have always resided in Romania (non-

migrants), those who migrated and returned (returnees) and those who live abroad (migrants) specifically in the US, Austria or Spain.

Our results suggest that migration choices are responsive to economic incentives: workers in specific skill cells (defined by education, age and gender) migrate in larger shares to countries which pay higher wage premia for those skill cells. We observe that Romanian migrants to the US are positively selected because the wage premium of migrating to the US is much higher for the high-skill cells (in terms of wage earning ability). In contrast, Romanian migrants to Spain are more likely to come from low-skill cells, as the wage premium of migrating to Spain is larger for low-skill than for high-skill cells. Austria exhibits a migration premium neutral to skill level. This rationality of migration is consistent with other findings for CEEC migrants (e.g. Budnik, 2009). Romanian returnees are positively selected on observables, and this also supports the other finding of a higher return premium for highly skilled. As we have a richer set of variables for returnees, we also provide evidence that selection of returnees on unobserved characteristics seems to be negative. Hence, our estimate of the return premium can be viewed as a lower bound of the actual return premium.

As our estimation results are consistent with rational choice, we then use a model of schooling, migration and return, developed previously by Mayr and Peri (2009), to evaluate the aggregate (skill and wage) effects of migration for Romania. In order to quantify these effects, we use the estimated return premium and the observed scale of return migration. We adapt the parameters to the case of Romania to obtain the long-run impact of increased mobility, accounting both for return migration and for the indirect effects from incentives on schooling.

The rest of the paper is organized as follows. Section 2 presents some stylized facts of migration and return for Romania and other CEECs during the early 2000s. Section 3 describes our individual-level data and the measures of average selection and average premium we construct. Section 4 presents our estimates for selection and return premia. Section 5 shows empirical evidence of the relationship between migration frequency and premia across skill groups. Section 6 uses some of our estimates and the empirical moments in a model to simulate the long-run effects of further relaxing migration constraints for Romania on average skills and wages. Section 7 concludes the paper. Further details on the collated data and the simulation of long-run effects are provided in the Appendix.

## 2. Stylized facts of temporary migration from Romania

Two types of data can be used to obtain some first intuition on the magnitude of migration and return for the case of Eastern Europe. First, population censuses permit the estimation of aggregate stocks of migrants and returnees. Second, survey data which allow the identification of return migrants can be used to assess the significance of return migration for the countries of origin.

Using census data, Docquier and Marfouk (2006) constructed a widely used dataset which covers our countries and period of interest. Based on this, we estimate for each of the CEECs the stock of emigrants to all OECD countries as a share of the population in the countries of origin. We combine these figures with UN (2009) yearly data on gross inflows to impute the stock of return migrants as a share of the gross flows. Appendix B describes the method used and summarizes the results in Appendix Tables B1–B3.

Although these data are fraught with various methodological problems, three features are worthy of notice. First, for all countries of origin the imputed return migration is a substantial share of total gross migration flows (Appendix Table B2). Second, all destination countries display considerable rates of return migration to Eastern Europe (Appendix Table B3). These figures are consistent with other findings on the retention rates of migrants in OECD destinations (OECD, 2008, part III). Third, Romania is rather average in its return migration. The median return rate for the considered countries is 1.12 returnees for every two migrants, while for Romania it is slightly below one returnee per two migrants. We can conclude that a share between 30 and 60 percent of the total emigrants from Eastern Europe in the decade 1990–2000 returned to their home country within that same decade.

To complement these aggregate figures, we use data for the same period from the European Social Survey (ESS). We are able to identify return migrants in the CEECs using information on the respondents' country of birth and on spells of work abroad longer than 6 months during the previous 10 years. Table 1 shows the estimated ratio of return migrants in the working age population for selected CEECs.

**Table 1. Rate of return migration in the active population (aged 24–65)**

	Returnees as ratio of population overall	Ratio of returnees among women	Ratio of returnees among men
Bulgaria	0.086	0.067	0.106
Czech Republic	0.064	0.047	0.080
Estonia	0.133	0.067	0.214
Hungary	0.075	0.048	0.104
Latvia	0.092	0.063	0.132
Poland	0.121	0.077	0.163
Romania	0.072	0.053	0.091
Slovakia	0.107	0.066	0.167
Slovenia	0.030	0.015	0.045

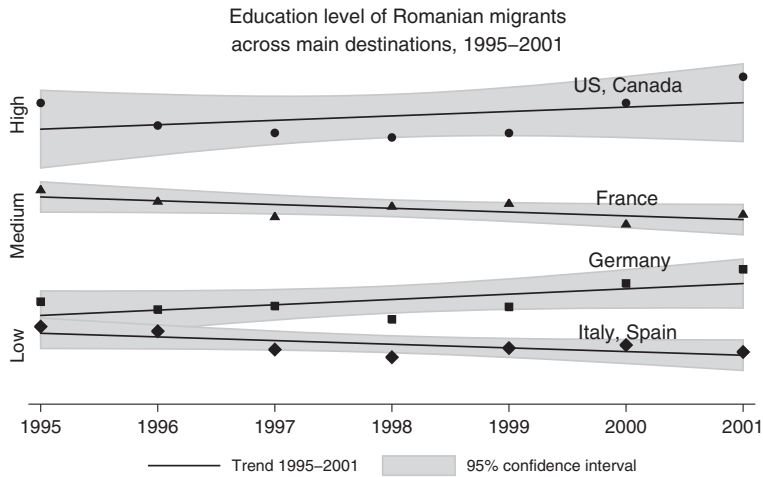
*Note:* Returnees were identified as those persons born in the country, who spent at least 6 months working abroad over the last 10 years and subsequently returned. Authors' estimations based on data from the European Social Survey (ESS) second and third rounds: 2002/04.

The results confirm that return migration is not a marginal phenomenon for Eastern European countries. The share of migrants in the working age population is between 6 and 13 percent. To grasp the likely impact of this on the home economy it is important to understand the selection of migrants and returnees. We do this for the case of Romania by characterizing the skills of migrants and returnees to determine if their behaviour is consistent with economic rationality in pursuing better labour market opportunities through migration.

In the period immediately after the regime change and the opening of the borders in 1989, migration from Romania was first characterized by mass emigration of ethnic minorities (German and Hungarian). However, by the mid-1990s a new pattern of labour migration to various European and overseas destinations emerged. Labour outflows increased steadily against the background of a slow pace of economic restructuring which resulted in a large decline in GDP, high inflation, mass layoffs, decreasing real wages and rising unemployment (Earle and Pauna, 1996, 1998). De-industrialization led to a decrease in industrial employment by almost 3 million jobs and particularly affected younger and older workers, who were less likely to find new employment opportunities (Voicu, 2005).

Based on evidence gathered from previous studies (e.g., Diminescu and Lăzăroiu, 2002; Baldwin-Edwards, 2007) we argue that the destination countries can be grouped in three main categories with respect to the type of selection of Romanian migrants. First, a strictly positive selection seems to characterize migration flows to traditional immigration countries (US, Canada, and Australia). These flows were rather small but persistent and included a significant share of young people who migrated for educational purposes (Diminescu, 2003). In the early 2000s, the US was among the main countries from where migrants returned and settled back in Romania (OECD, 2008). A second group of destination countries were characterized by a neutral average selection of migration from Romania. These were the continental European countries which received most of the Eastern European migrants over the 1990s: Germany, Austria and France (Diminescu, 2003; Sandu *et al.*, 2006). Third, particularly towards the end of the 1990s and the early 2000s, large flows of Romanian migrants arrived in Mediterranean countries, mainly in Spain and Italy, but also, to a lesser extent, in Portugal and Greece (Diminescu and Lăzăroiu, 2002; Sandu *et al.*, 2006). These flows were characterized by a negative selection: most migrants were less skilled, already had a longer migration history often involving informal or illegal employment spells and made use of network ties established in their communities of origin (Elrick and Ciobanu, 2009; Șerban and Voicu, 2010).

One drawback of these previous studies is that they only use aggregate data or qualitative evidence. In contrast, to substantiate our hypothesized typology of destination countries, we exploit (besides the census and survey data described in Section 3) also administrative data on Romanian migrants who registered a change in residence abroad. These data cover records for more than 95,000 migrants who

**Figure 1. Sorting across destinations**

*Source:* Authors' own estimation based on administrative emigration registers.

left Romania in the period 1995–2001,<sup>4</sup> including information on their individual characteristics and their choice of destination. Using these data, Figure 1 shows the sorting of Romanian migrants by education across the main countries of destination. The vertical axis measures the ratio between the fraction of tertiary educated among migrants towards specific destinations to the same fraction among non-migrants in Romania. The results confirm the described selection pattern in terms of the typology of destination countries for Romanian migrants.

For the period 2002–2003, we also construct a measure of the stock of Romanian migrants in OECD countries and a measure of returnees, both as shares of the total population in Romania. Moreover, we characterize the distribution of migrants residing in OECD countries (using data from Docquier and Marfouk, 2006) and of returnees (using microdata from the NDS 2003) by education. These data are summarized in Table 2.

The results indicate that both migrants and returnees are positively selected over the education variable, relative to the total population. The share of returnees is smallest in the group of people with no degree (and for migrants among those with primary education) while it is largest among those with tertiary education (similarly for migrants). The selection of migrants seems even more skewed towards the highly educated relative to returnees. However, these aggregate data hide the

<sup>4</sup> Due to the data collection process, the records are reliable and representative only for this period. We were, therefore, not able to include other years in our cross-tabulations. We thank Mr. Dorel Gheorghiu (National Institute of Statistics, Bucharest) for providing access and valuable insights on these data.

**Table 2. Romania: Migrants and returnees, by education  
(from aggregate and NDS data)**

Sample	Romania NDS, 2003	OECD Country Census 2001
	Returnee as ratio of population	Living abroad (OECD) as ratio of population
All	0.049	0.032
<i>Education groups</i>		
Tertiary	0.058	0.126
Secondary	0.056	0.126
Primary completed	0.034	0.016
No degree completed	0.015	0.039

*Note:* Authors' calculations on NDS 2003 data and Docquier and Marfouk (2006) data.

already mentioned considerable variation in the selection patterns across destination countries. Neither the administrative data, nor the evidence collated in previous studies can be used to identify the underlying factors that explain this variation.

The main goal of our paper is therefore to analyze the rationality of decisions to migrate and return with regard to the observed selection patterns and the sorting across destinations. Using various sources of data, we are able to identify Romanian migrants in three of the main destination countries covered in Figure 1: the US, Spain and Austria. These countries span very well the types of destination countries for Romanian migrants, each of them corresponding to one of the three selection patterns described above. Our analysis based on individual data will characterize in more detail the features of selection for both migrants and returnees. It will relate these to skill-specific premia in order to test if economic rationality is consistent with the observed selection and sorting of Romanian migrants across destinations.

### 3. Data and methodology

Following the literature on selection of migrants (e.g., Chiquiar and Gordon, 2005; Fernandez-Huertas Moraga, 2011), we first characterize the distribution of non-migrants, migrants and returnees based on their combination of observable characteristics. We group individuals into cells to estimate their wage-earning ability and their probability of employment (in Romania). We call the wage-earning ability the skill of that group of workers. For each cell, we count non-migrants, returnees and migrants to the US, Austria and Spain to determine how these groups compare to each other in their distribution across skills. We define the selection of migrants (positive or negative) as the difference in average skills between migrants and non-



migrants. We assess then if the likelihood of selecting oneself into a group (non-migrants, migrants or returnees) is systematically related to skills.

Our data include wages by each skill cell, both for Romanian migrants (in the US, Austria and Spain) and for non-migrants and returnees (in Romania). We can therefore calculate the average and the skill-specific premium to migrate and to return. Using a simple regression analysis (by skill), we can relate the probability (frequency) of migration/return to the corresponding skill-specific premium. Accounting for the fact that the costs of migration may vary by skill, this allows us to investigate the economic rationality of migration and return. This is a simple modification of the Roy (1951) model to measure selection in many skill groups and to estimate the migration premia with different selection rules, for returnees and permanent migrants.

We describe the individual data and the skill structure in Section 3.1. Section 3.2. discusses in detail the measures of average selection on observables. In Section 3.3., we provide some empirical evidence regarding the potential selection of returnees on unobservables. The construction of the average and skill-specific migration and return premium is described in Section 3.4. Section 3.5. then presents the model that we use in our econometric analysis of the determinants of selection.

### ***3.1 Individual data and wage decomposition***

We match information from census data (for employment) and population surveys (for wages) to analyze the characteristics of three groups of Romanian workers around the year 2003: non-migrants, migrants and returnees.

The data for Romania are from the National Demographic Survey (NDS, 2003), as well as from the Census 2002. The NDS data were collected by the Center for Regional and Urban Sociology (CURS) and were designed to be representative both at the national and regional level. Our restricted sample has more than 35,000 observations, including 1,400 returnees (defined as those who had spells of at least 6 months of employment abroad), and covers all relevant individual characteristics besides information on migration choices.<sup>5</sup> We use census and income surveys for the three destination countries. For the US, we construct employment, population and average monthly wage data on Romanian migrants by observable characteristics using the 2000 Census. For Spain, we use the 2002 Census for employment and population data on Romanian immigrants and the EU-SILC (2004) for average monthly wage data. For Austria, we use the 2001 Census for employment and population data on Romanian immigrants and the EU-SILC (2004) for the average monthly wage data. We convert all wages into 2003 US\$ and we consider that database as a cross section of Romanian individuals *c.* 2003, either resident in Romania (non-movers or returnees) or resident in the US, Austria or Spain. We restrict our sample to individuals between 15 and 65 years of age.

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<sup>5</sup> The constructed dataset and the sources used are listed in Appendix Table A1.

In the constructed dataset, we observe for each individual  $i$  a vector of characteristics  $X_i$  and his migration status, namely non-migrant in Romania ( $NM$ ), migrant residing in a destination country  $c$  ( $Mc$ ) or returnee ( $R$ ) in Romania after an employment spell abroad. Following Chiquiar and Hanson (2005), the vector  $X$  includes four relevant characteristics defined by the following categorical variables: education ( $Edu$ ), with the categories No Degree, Primary, Secondary and Tertiary; age ( $Age$ ), taking ten values from 15 to 65 in 5-year intervals; gender ( $Gen$ ), with the two categories  $M$  and  $F$ ; and family-size ( $Fam$ ), with four categories: Single with no children, Married with no children, Single with Children and Married with Children. These characteristics identify the observable features of an individual in our dataset. We use the notation  $x_i = (Edu_i, Age_i, Gen_i, Fam_i) \in X$  to denote the vector of characteristics of individual  $i$ . We allow for the fully saturated model in observable characteristics, so individuals can be put in one of 320 cells spanned by  $x_i$  (= 4 education by 10 age by 2 gender by 4 family groups). Each individual also has a 'migration status'  $k_i$  attached to herself as she can be a non-migrant in Romania, a migrant residing in country  $c$  (US, Spain or Austria) or a returnee, hence  $k_i \in \{NM, M_{US}, M_{AUT}, M_{SPA}, R\}$ . Our dataset also allows us to actually observe (for Romania and the US) or to impute (for Spain and Austria) based on their occupation and industry, the wage of each individual  $w_i$ .<sup>6</sup>

We decompose the log wage of individual  $i$  working in country  $j$  into four components as follows:

$$\ln(w_{ij}) = \ln w(x_i) + \ln p_j(x_i) + I(k_i = R) * \ln r_j(x_i) + \varepsilon_{ij}. \quad (1)$$

The term  $\ln w(x_i)$  is the mapping from individual observable characteristics  $x_i$  into log wages in Romania (2003). Assuming that the observable characteristics  $x_i$  are the main determinants of wage-earning abilities of individuals, the function  $\ln w(x_i)$  translates the characteristics into a wage earning potential in Romania. The term  $\ln p_j(x_i)$  is the migration premium (or 'location' premium as defined by Clemens *et al.*, 2008). It represents the extra wage (in log points) obtained by individual  $i$  from working in country  $j$  as a migrant. The base country, Romania, will be identified as  $j = 0$  and we set, by definition,  $\ln p_0(x_i) = 0$ . We allow this premium to vary with individual characteristics across skill groups. The term  $\ln r_j(x_i)$  is the 'return' premium. It is the premium (positive or negative) from being a returnee ( $k_i = R$ ) relative to being a non-migrant  $NM$ . Finally,  $\varepsilon_{ij}$  are the idiosyncratic effects on the earning abilities of individual  $i$  in country  $j$ , which we first assume to have zero-mean in each cell  $x_i$  of the set  $X$  and to be uncorrelated with  $x_i$ ,  $E(\varepsilon_{ij}|x_i) = 0$ .

<sup>6</sup> As we do not observe individual wages in the Spanish and Austrian census (and the EU-SILC is too small to have representative wages for Romanian migrants in Austria and Spain), we attribute the average wage based on occupation-industry (from the respective population surveys). The basic idea is that observable characteristics affect the type of occupation-industry in which a person works and the wage is determined by those attributes. In the rest of the paper, we will call individual wages the wages constructed following this procedure for residents in Austria and Spain. For residents of Romania and the US, we have the actual individual wages.

Unobservable wage-earning characteristics of individuals within an observable skill cell  $x$  are thus assumed to be independent and identically distributed with zero average. However, we will discuss later the possibility of non-random unobservable characteristics and their implication for selection issues.

### 3.2 Measures of selection

Our goal is to define two sets of concepts that are crucial to characterizing the process of migration and return and, in an economic theory of migration, should be related to each other. The first set of concepts are the selection of migrants (relative to non-migrants) and the selection of returnees (relative to non-migrants) along the wage-earning ability (skill) dimension. Are migrants (and returnees) selected, on average, from among individuals with higher earning abilities (positive selection) or lower earning abilities (negative selection) than the average non-migrants? We will primarily characterize the selection of migrants on observable wage-earning abilities, following the argument in Hartog and Winkelmann (2003) against correcting for selectivity when the sample of migrants is small relative to the sample of non-migrants. We will however discuss, in the light of the existing literature, what may be the selection of migrants on unobservable skills and how it may affect our findings. For returnees, as we have a richer set of data, we will use some identifying assumptions to distinguish selection on unobservables from the return premium.

The second set of concepts to be measured are the 'premia' from making a migration decision; in particular the premium for being a 'migrant' and that for being a 'returnee'. For given observable characteristics (hence accounting for wage-earning ability selection) migrants should earn more than non-migrants. This would be necessary to justify the paying of migration costs in any economically motivated theory of migration. However, how does this premium vary with skills and country of destination? It would be even more interesting to know if, for given observable skills, returnees earn more or less than non-migrants. If there is a premium for returnees, then temporary migration has a permanent positive effect on earning abilities. Hence, migration and return can be part of a strategy to increase the living standards and returnees are not, on average, those who failed abroad. As for the migration premium, it is also very relevant to understand whether the return premium depends (and how) on skills.

Let us define, in turn, the formulas to obtain each of these terms: the average selection of migrants and returnees on observables and the average premium for migrants and returnees, as well as their dependence on observable skill.

#### 3.2.1 Average selection

The average (logarithmic) wage-earning ability of a non-migrant (NM) with observable characteristics  $x$ , call it  $\ln \hat{w}(x)$ , is summarized by the average individual wage of all non-migrant individuals in observable cell  $x$ . Hence  $\ln \hat{w}(x) = (1/NM_x) \sum_{i \in x} \ln w_{i,NM}$  where  $NM_x$  is the observed total employment in cell  $x$ . The variable

In  $\widehat{w}(x)$  can be called the (wage-earning) skill of group  $x$ . The average observed skill of the non-migrants in Romania ('country 0'), corresponds therefore to their average log wage based on observables:

$$\ln w_{NM,0} = \sum_{x \in X} \ln \widehat{w}(x) f_{NM}(x). \quad (2)$$

The term  $f_{NM}(x) = NM_x / \sum_{z \in X} NM_z$  is the observed relative frequency of non-migrant workers,  $NM$  in cell  $x$ . If, conditional on  $x$ , the idiosyncratic wage residuals in 1 converge in probability to 0,  $(1/NM_x) \sum_{i \in x} \varepsilon_{io} \xrightarrow{p} 0$ , then with a large enough sample, such as the census, the value  $\ln \widehat{w}(x)$  calculated from the sample would converge to  $\ln w(x_i)$ . In order to identify how migrants compare to non-migrants in their observable skills (wage-earning abilities) we construct the counterfactual wage distribution based on the observable characteristics of migrants and the corresponding observed wage of non-migrants for each cell  $x$ . In particular, we define the average skills of migrants to country  $c$ , based on observables, as:

$$\ln w_{Mc,0} = \sum_{x \in X} \ln \widehat{w}(x) f_{Mc}(x). \quad (3)$$

The term  $f_{Mc}(x) = Mc_x / \sum_{z \in X} Mc_z$  is the relative frequency of migrants to country  $c$ ,  $Mc$ , observed from the census of country  $c$ . This method accounts in a fully non-parametric way for the fact that migrants are non-randomly selected from the original population and uses the relative frequencies of migrants to non-migrants in each skill cell to correct for this. Moreover, the differences in wage-earning abilities (skills) between migrants and non-migrants are evaluated at home wages, assigning thus to each skill its domestic price (in Romania).

Similarly, to identify how returnees to Romania compare to non-migrants we construct the average wage-earning ability of returnees, based on the observable characteristics of returnees and the log wage of non-migrants  $\ln \widehat{w}(x)$ :

$$\ln w_{R,0} = \sum_{x \in X} \ln \widehat{w}(x) f_R(x). \quad (4)$$

Analogous to (3) the term  $f_R(x) = R_x / \sum_{z \in X} R_z$  is the relative frequency of returnees in skill cell  $x$ . Given the definitions provided above, we define the average 'selection' ( $S$ ) based on observables ( $O$ ) of migrants to country  $c$ , relative to non-migrants, as:

$$OS_{Mc,NM} = \ln w_{Mc,0} - \ln w_{NM,0}. \quad (5)$$

If expression (5) is positive, migrants to country  $c$  are selected on average with wage-earning observable characteristics above the average for non-migrants. This is exactly the definition of positive selection. Vice versa, if it is negative, migrants to country  $c$  are selected, on average, below the average wage-earning ability of non-migrants. Moreover, quantitatively, as the expression is in log differences, it approximates the difference in wage-earning abilities as a percentage of the average non-migrant wage. Similarly, we define the selection of returnees (on observables) relative to non-migrants as:

$$OS_{R,NM} = \ln w_{R,0} - \ln w_{NM,0}. \quad (6)$$

As above, a value of  $OS_{R,NM} > 0$  implies a positive selection of returnees relative to people who did not migrate.

There are two issues that may bias the selection of migrants and returnees according to observable characteristics, produced by (5)–(6). Those biases may produce the appearance of positive or negative selection when there is none or vice versa. The first issue is that for given observable characteristics participation rates into employment in Romania may be systematically different from participation in the labour market of country  $c$ . The second is that there may be unobserved characteristics correlated with  $x$  (hence not random and not zero-mean within group  $x$ ) and those may differ between migrants and non-migrants. We will discuss them in turn.

### 3.2.2 Participation in employment and observable characteristics

The rate of participation in employment for a group with characteristics  $x$  can be different at home and abroad. It is easy to think that, if a skill group  $x$  is paid a higher wage in a country, this may attract workers of that skill and push a larger fraction of them to work. This may affect the calculated skill selection if we base our evaluation of formulas (5) to (6) on employment data. For instance, if migrants to country  $c$  have characteristics that are identical to non-migrants but, once in the labour market of country  $c$ , their participation in employment is relatively larger in the high wage-potential groups compared to their participation in Romania, the method above will produce the appearance of positive selection, when there is in fact no selection. Had those migrants stayed in Romania, they would have earned, on average, as much as non-migrants.<sup>7</sup> To avoid this problem, we should correct the relative frequency of migrants in constructing their average wage earning ability  $\ln w_{Mc,0}$ . In particular, rather than the frequency of characteristic  $x$  in employment we should use its frequency in the *population* of migrants and correct those population frequencies by the participation rates of each group  $x$  in Romania. Such correction allows us to compare the average wage-earning ability of migrants, had they stayed in Romania,

<sup>7</sup> We assume that a potential bias in migration premia resulting from differences in work intensities (conditional on being employed) between migrants and non-migrants is negligible.

with that of non-movers. Formally, we can define the ‘participation-corrected’ average wage-earning ability of migrants to country  $c$  as follows:

$$\ln w_{Mc,0}^{PART_0} = \sum_{x \in X} \ln \widehat{w}(x) f_{Mc}^{PART_0}(x), \quad (7)$$

where  $f_{Mc}^{PART_0}(x) = \theta_x^0 Mc_x^{POP} / \sum_{z \in X} \theta_z^0 Mc_z^{POP}$  and  $Mc_x^{POP}$  is the total population (rather than workers only) with characteristic  $x$  who migrated to country  $c$ , while  $\theta_x^0$  is the employment–population ratio for workers of characteristic  $x$  in Romania ( $\theta_x^0 = NM_x / NM_x^{POP}$ ). We will use the empirical participation rate of non-migrants in each cell from the Romanian Census 2002 as a non-parametric estimate of  $\theta_x^0$ , and the data on the population  $Mc_x^{POP}$  of migrants in group  $x$  in country  $c$  from the Census of country  $c$ . The ‘double selection’ into migration and into employment that is considered in many recent papers (e.g., Chiquiar and Gordon, 2005; Fernandez-Huerta, Moraga, 2008; Piracha and Vadean, 2010) is addressed here in a completely non-parametric way. Assuming that we have identified the relevant observable characteristics that determine the probability of migrating and of participating in the labour force, we use a fully non-parametric relationship between those and the migration probability, and between those and participation at home, to identify the selection on wage-earning abilities. In particular, the variable:

$$OS_{Mc,NM}^{PART_0} = \ln w_{Mc,0}^{PART_0} - \ln w_{NM,0} \quad (8)$$

identifies the difference in wage-earning ability of migrants had they remained at home relative to the wage-earning abilities of non-migrants. This is the cleanest comparison possible to identify the type of migrant selection on observable wage-earning abilities. Similarly, we can correct the skill selection of returnees by imputing to them the employment–population ratio of non-migrants.

### 3.2.3 Unobservable characteristics

The unobservable individual characteristics denoted as  $\varepsilon_{ij}$  in expression (1) have been assumed to be uncorrelated with  $x$  so that  $E(\varepsilon_{ij}|x) = 0$ . However, it is possible that some unobservable characteristics are correlated with  $x$  so that  $E(\varepsilon_{ij}|x) = g(x)$ . For instance, if unobserved wage-earning abilities are larger, on average, for groups with larger observable wage-earning ability, then  $g(x)$  can be systematically positively correlated with  $\ln w(x)$ . Under these circumstances, the term  $(1/N_x) \sum_{i \in x} \varepsilon_{i0}$

does not converge in probability to 0 and hence cannot be approximated to 0 using the Census sample. In fact, if different selection processes operate on the unobservable characteristics, it may even be possible that  $E(\varepsilon_{i0}^{Mc}|x) = g^{Mc}(x) \neq E(\varepsilon_{i0}^{NM}|x) = g^{NM}(x)$ , which means the conditional average of unobservable wage earning ability for a group  $x$  is different between migrants and non-migrants.

This departure from the original assumptions implies that the total average skill selection indicator  $S_{Mc,NM}$  will equal:

$$\begin{aligned} S_{Mc,NM} &= OS_{Mc,NM} + US_{Mc,NM} \\ &= \ln w_{Mc,0} - \ln w_{NM,0} + \sum_{x \in X} g^{NM}(x) f_{NM}(x) - \sum_{x \in X} g^{Mc}(x) f_{Mc}(x) \end{aligned} \quad (9)$$

where the term  $OS_{Mc,NM}$  is constructed as in expression (5) and is the selection based on the observables, while the term  $US_{Mc,NM} = \sum_{x \in X} g^{NM}(x) f_{NM}(x) - \sum_{x \in X} g^{Mc}(x) f_{Mc}(x)$  is capturing the selection of migrants over the unobserved wage-earning abilities. The term  $US_{Mc,NM}$  cannot be constructed with our data. To do this one would need information on the wage paid to migrants in Romania before they migrated. Some recent studies on Mexican data (Kaestner and Malamud, 2010; Fernandez-Huertas Moraga, 2011) have used data on pre-migration wages and have evaluated such a term for Mexican migrants. Clemens *et al.* (2008) also evaluate this for the Philippines, South Africa and Mexico. These are countries not too far from the income level of Romania, hence we can look at the average selection of migrants on unobservable skills there, especially relative to selection on observables, to gather an idea of how large that phenomenon could be. While it is hard to have a clear theoretical expectation on the sign and magnitude of the selection on unobservables, one consideration may help. A country that rewards wage-earning skills would attract more skilled workers along the observable and unobservable dimension. In accordance with this intuition, most of the existing estimates of observable and unobservable selection either find no relevant selection on unobservables (Kaestner and Malamud, 2010) or find selection on unobservables of the same sign and smaller scale than selection on observables (Budnik, 2009, Fernandez-Huertas Moraga, 2011 and the relevant cases in Clemens *et al.*, 2008). It is likely, therefore, that selection on unobservables is in the same direction and smaller than selection on observables.

### 3.3 Selection bias and return migration

The selection problem is somewhat different for the case of return migrants. Our main concern is that a considerable part of the observed returns to work experience abroad might result from the fact that return migrants are not randomly selected with regard to their unobservable characteristics. Unlike the evidence on the selection of migrants, for returnees the literature provides no clear relationship between the types of selection generated in observed and unobserved characteristics (Borjas, 1987; Borjas and Bratsberg, 1996): positive selection in observables might well coincide with negative selection in unobserved characteristics, or vice versa.

If being a return migrant is endogenous in the wage function, that is if the return migrant status is correlated with the wage residuals in expression (1), the selection bias might completely mask the effect of work experience abroad. However, here

the richer data on non-migrants and returnees from the NDS allow us to characterize the selection bias under some identifying assumptions.

Our identification strategy uses the variation in migration choices across different religious groups as well as due to the availability of data on migrant network ties. Network ties are defined by the presence of family members or friends abroad while religious groups are constructed using the self-reported religious affiliation. The assumption behind this is that having connections to family members or friends abroad significantly increases the propensity to migrate temporarily (relative to no migration) without affecting individual wages (our measure of earnings excludes remittances from family members abroad). The same holds true for being affiliated to a minority religious group. Sociological research (e.g., Sandu, 2005) has documented the fact that members of protestant communities (Baptists, Pentecostals, Adventists) have a much higher propensity to migrate than the Orthodox majority. Cross-border community networks established around these churches (an estimated 20 percent of Romanian migrants in the US and Spain are neo-protestants, compared to just about 5 percent among non-migrants reported both in the 2002 census and in our data) play an important role in facilitating temporary migration for work abroad. Members of the other main minority religious groups (Catholic and Protestant) also have a higher propensity to migrate and return compared to non-migrants. Overall, in our sample, just under 10 percent of non-migrants belong to a minority religious group, compared to more than 21 percent among returnees.<sup>8</sup>

Using this strategy, we estimate various models to make sure that we obtain the right direction of the selection on unobservable characteristics for return migrants compared to stayers.

Table 3 reports the estimates of the return to work experience abroad. Columns (1) and (2) provide intuition for the raw (uncontrolled) differences in mean wages between non-migrants and returnees. The OLS estimates in Column (3) add controls for age, gender, education and family characteristics. In order to account for the endogeneity of return migration we estimate first a full maximum likelihood model (Maddala, 1983) in which we add some structure by explicitly considering the binary nature of the return migrant status in a first-stage probit model. We use the two variables indicating the availability of migrant network ties and the religious affiliation as instruments in the first stage. The estimated corrected return premium shown in Column (4) is significantly higher than the OLS estimate indicating that returnees are negatively selected in terms of unobserved characteristics. This negative selection is confirmed by the IV 2SLS regression reported in Column (5) which uses the same two variables to instrument for the endogeneity of return migration. Under all specifications of the IV model, the first-stage F-statistics are high (above 20) and

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<sup>8</sup> While those variables may also affect selection of permanent migrants relative to non-migrants, we do not have them available for Romanians who live abroad. Hence, we cannot do the same exercise for the selection of migrants.



**Table 3. Selection of returnees to Romania, 2003**

	(1) Average log wages	(2) Log wage difference returnees–non migrants	(3) OLS regression estimates	(4) ML estimates (correcting for endogeneity of return)	(5) IV regression estimates	(6) Matching estimates (ATT)
All	1.167	0.163 (0.023)	0.084 (0.021)	0.161 (0.056)	0.275 (0.129)	0.089 (0.026)
Women	1.055	0.085 (0.051)	0.094 (0.046)	0.252 (0.076)	0.171 (0.440)	0.079 (0.056)
Men	1.284	0.092 (0.026)	0.086 (0.024)	0.169 (0.064)	0.202 (0.113)	0.085 (0.029)

*Notes:* The table reports the effects of return migration on (log) wages using the NDS 2003 data. In Column (2), the raw means for returnee vs. non-migrant are 1.14 vs. 1.05 for women and 1.36 vs. 1.27 for men. The covariates used in Columns (2)–(5) are age, education, gender and family characteristics. In Column (4), the full ML estimates (Maddala, 1983) correct for the endogeneity of return migration using migrant network ties (kin abroad) and minority religion (catholic, neo-protestant or muslim) as exclusion restrictions. These are also used to instrument for the endogeneity of return migration in the IV 2SLS regression in Column (5) (first stage F-statistic: 28.82, Sargan test: 4.83) The matching estimates in Column (6) are based on common support by age, gender, education and lagged regional migration rates obtained from census data. Standard errors in parentheses. Full data for 6,249 women; 5,743 men, 634 returnees (506 men, 128 women).

both network ties and religious affiliation are strong predictors of migration and return. Column (6) shows the matching estimates based on common support by the same variables as the covariates in the other models.

The conclusion from these models is that, if at all, return migrants are likely to be negatively selected on unobserved characteristics. This is also in line with findings of other studies on return migration in Eastern Europe (e.g., Co *et al.*, 2000; De Coulon and Piracha, 2005; Hazans, 2008) which mostly find returnees to be negatively selected on unobserved characteristics. Hence, we assume that our uncorrected estimates represent a lower bound for the return premium.

### 3.4 Income premia and selectivity patterns of migration

A non-parametric method similar to the one used for the selection of (return) migrants can be used to identify, under some assumptions, the average premia, both for migrants and for returnees. Consider the counterfactual wage (4) that returnees would earn if they were paid as non-migrants, with the same characteristic  $x$ , and the difference between this and their actual average wage. This difference represents exactly the average premium to returnees (call it ' $PR_{R,0}$ ') plus a term representing the selection of migrants on unobservables:

$$\begin{aligned} \sum_{x \in X} \ln w_R(x) f_R(x) - \sum_{x \in X} \ln w_{NM}(x) f_R(x) &= \sum_{x \in X} \ln r(x) f_R(x) + US_{R,NM} \\ &= PR_{R,0} + US_{R,NM}, \end{aligned} \quad (10)$$

The term  $\ln r(x)$  (from the decomposition of individual wages in expression (1)) is the 'return' premium for being a returnee and may depend on  $x$ . In addition, if returnees differed systematically from non-migrants on unobservables, then there would be an extra term  $US_{R,NM}$  capturing the selection on unobservables. If this term is negative, as indicated by our results in the previous section, then the difference in average log wages represents a lower bound of the true return premium.

Finally, we can compute the wage premium that the average migrant to country  $c$  will receive relative to what she would have earned at home. This is the 'migration' or 'location' premium, in other words the fact that the receiving country pays more for given observable characteristics than the home country, Romania. The average premium to migrate to country  $c$  (plus the selection on unobserved characteristics) is calculated using the observable characteristics of migrants to that country as:

$$\begin{aligned} \sum_{x \in X} \ln w_{cM}(x) f_{Mc}(x) - \sum_{x \in X} \ln w_{NM,0}(x) f_{Mc}(x) &= \sum_{x \in X} [\ln p_c(x)] f_{Mc}(x) + US_{Mc,NM} \\ &= PR_{M,c} + US_{Mc,NM}, \end{aligned} \quad (11)$$

Notice that the term  $\ln w_{cM}(x)$  is the wage earned in country  $c$  by Romanian immigrants of skill  $x$ . Using the individual wage definition in expression (1), the difference in the wage of an individual with characteristic  $x$  earned at home 0 or abroad  $c$  is the sum of the individual location (migration) premium  $\ln p_c(x)$  weighted by the frequency of Romanian migrants to country  $c$  plus the unobserved selection of migrants to country  $c$ ,  $US_{Mc,NM}$ . Given the lack of information on  $US_{Mc,NM}$ , we will consider it as relatively small, vis-a-vis  $PR_{M,c}$  so that we can neglect it and expression (11) will be considered as identifying the average migration premium.

### 3.5 Skill premium and skill selection

Above we defined some aggregate statistics to characterize the selection and the premium for migrants and returnees. Being based on the partition of the population into cells  $x \in X$ , this method also defines the selection and the premium for each value  $x$ . Even more conveniently, as the function  $\ln \hat{w}(x)$  transforms the multidimensional set of characteristics  $X$  into a unidimensional skill,  $\ln w$ , we can invert the mapping ( $x^{-1}(\ln w)$ ) and define selection and premia for each level of the skill variable  $\ln w$ . In particular, using the notation introduced in Section 3.4, the selection of migrants relative to non-migrants is measured as a function of the wage level by the

relative density:  $(f_{Mc}(x^{-1}(\ln w))/f_{NM}(x^{-1}(\ln w)))$ . For instance, a value of this relative frequency for a cell equal to 1.3 implies that in this cell people are 30 percent more likely to migrate relative to staying, than in the average cell. A value of 1 implies that in the cell people have the average probability of migrating to  $c$ . Similarly, the selection of returnees relative to non-migrants over the skill spectrum  $\ln w$  is given by:  $(f_R(x^{-1}(\ln w))/f_{NM}(x^{-1}(\ln w)))$ . The logarithmic premium for migrants at each level of skill can be written as:  $PR_{Mc}(x^{-1}(\ln w)) = \ln w_{cM} - \ln w_{NM}$  and, similarly,  $PR_{R0}(x^{-1}(\ln w)) = \ln w_R - \ln w_{NM}$  where the wage differences are taken for workers of the same skill  $x$ .

The representation of selection (relative frequency) as a function of skills is helpful to illustrate the whole profile (estimated kernel density) of each group (non-migrants, migrants and returnees). Similarly, the characterization of the premia as a function of skills  $\ln w$  allows us to analyze more systematically how they are related.

In a very simple theory of migration, however, it is also useful to consider each skill cell  $x \in X$  as an observation on a group of workers (whose number is equal to population in the cell) who have specific characteristics. Assuming each group as having a random distribution of migration costs to each country and a common return from migration to country  $c$  which is given by the common linear premium  $LPR_{Mc}(x) = w_{cM}(x) - w_{NM}(x)$ , under general assumptions on the distribution of costs, the odds of migrating to that country relative to not migrating are an increasing function of the linear premium. Allowing for a measurement error  $u(x)$  in the relative frequencies, this can be approximated by the following linear relationship:

$$f_{Mc}(x)/f_{NM}(x) = a(x) + b * LPR_{Mc}(x) + u(x) \text{ for } x \in X. \quad (12)$$

The relative selection in group  $x$  indicates by how much the migrants are over ( $> 1$ ) or under ( $< 1$ ) represented in that skill group relative to non-migrants. Two qualifications are needed. First, under the assumption of idiosyncratic costs distributed as an extreme value Gumbull distribution, the standard utility maximization in the Logit model implies that there is a linear relationship between log odds and wage differentials (see for instance Ortega and Peri, 2009). Expression (12) is simply a linear approximation of that exact equation. Second, the coefficient  $b$  captures whether the selection, consistent with utility maximization, would be increasing in the linear returns to migration. The term  $a(x)$  introduces the possibility that the selection is also affected by migration costs that are systematically different by skill group. Regression (12) will be estimated for each country of destination to see if the implication that  $b > 0$ , derived from a model of rational migration, is supported in the data. In testing the equation for each country of destination, we are assuming independence from irrelevant alternatives. Similarly, as we have an independent measure of the return premium  $LPR_R(x) = w_R(x) - w_{NM}(x)$  for each skill group, we can test whether the data support a theory of return motivated by economic benefits. We will run the regression:

$$f_R(x)/f_{NM}(x) = \alpha(x) + \beta * LPR_R(x) + v(x) \text{ for } x \in X \quad (13)$$

and test for  $\beta > 0$ . People need not return to a wage equal to that of similar non-migrants. In this case migration and return can be the optimal choice, even with no uncertainty (or unexpected shocks) for some people, as we will see in Section 6.

## 4. Evidence on selection and premia

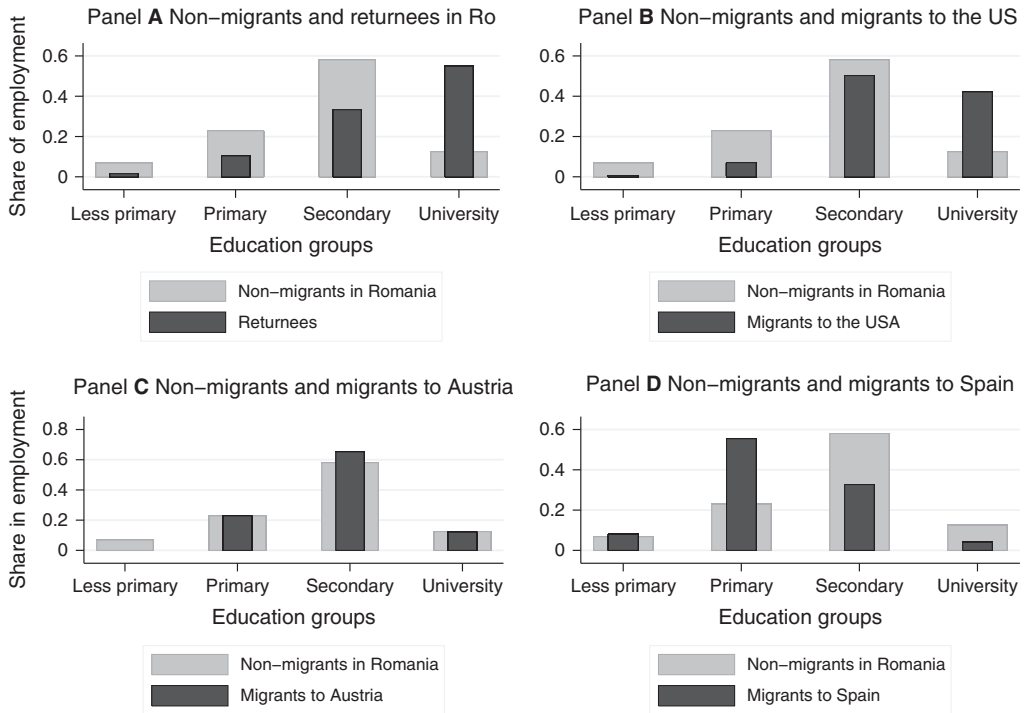
To analyze the evidence on selection and premia for Romanian individuals in the year 2003, we first show some simple graphs of selection for migrants and returnees over education and age. We will then present the values of the average skill selection on observables as well as the whole distribution of skills for migrants and returnees relative to non-migrants. Finally, we will show the average migration and return premium and their distribution by skill for migrants and returnees.

### 4.1 Simple selection on education and age

Figures 1–3 present, in a very simple form, some evidence on the selection of returnees and migrants to each of the three destination countries over education and age groups. Figure 1 shows the trend in education levels of Romanian migrants to main destinations over 1995–2001. It shows that the US, Austria and Spain are examples of destination countries for migrants of high, medium and low education levels respectively over the whole period.

In Figure 2, each panel shows the distribution of non-migrants and one other group (in turn returnees and migrants) in the form of histograms over four education groups (no degree, primary, secondary and tertiary). The wider bars represent the distribution of non-migrants, always the comparison group, and the thinner ones the distribution of the other group. Figure 3 does the same for the distribution across age groups. In both Figures 2 and 3, Panel 1 reports the comparison with returnees, Panel 2 with migrants to the US, Panel 3 with migrants to Austria and Panel 4 with migrants to Spain. In each panel, the distribution, which is relative to working individuals (male and female), has been constructed using census data. Some tendencies are clear from these figures and anticipate some of the regularities that we will unveil later. First, returnees are clearly positively selected among education groups vis-a-vis non-migrants. Their relative distribution is much more skewed towards workers with tertiary education at the expense of workers in any other education group.

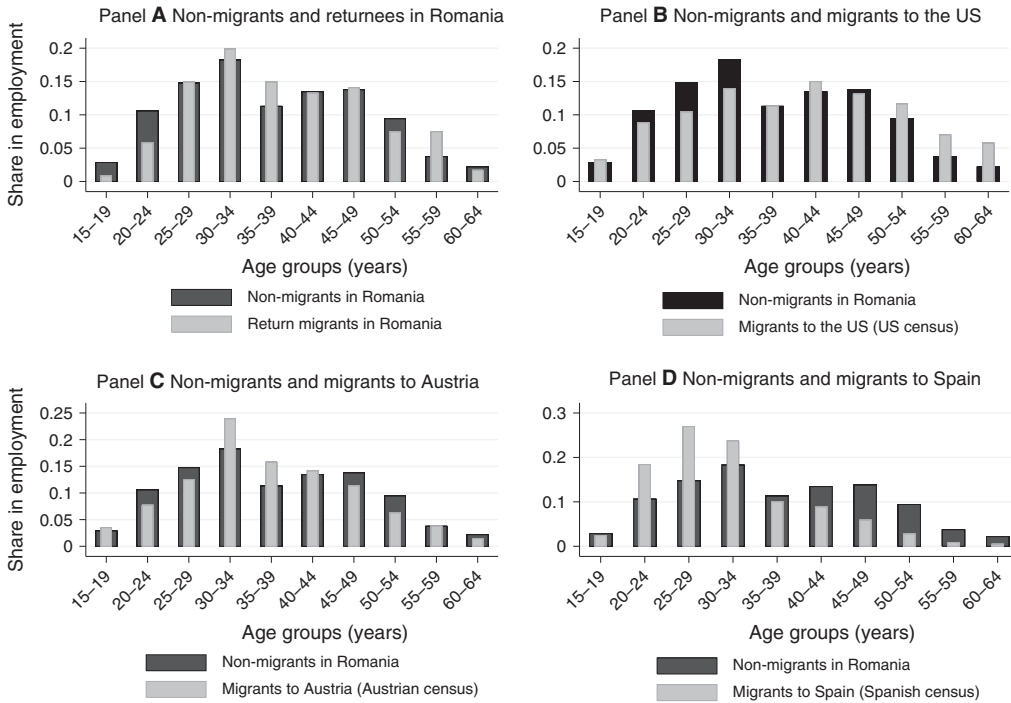
In terms of age, returnees are much less differentiated from non-migrants, however they tend to be slightly over-represented among groups with intermediate and old age rather than among young workers (below 25 years of age). Migrants to the US tend to be better educated as well as older relative to non-movers. Both features may add to their earning abilities. The largest share of migrants to the US is among

**Figure 2. Selection over education**

workers with secondary schooling and above, and they are significantly over-represented among workers older than 50 years. Migrants to Austria seem to be the group with the more 'average' selection relative to non-movers. Their education distribution is not very different from that of non-movers (except for a slightly larger share of secondary educated and a smaller share of those with no degree). The age distribution is only slightly more concentrated in the group 30 to 50 years of age relative to non-migrants. Finally, migrants to Spain show a clear negative selection, being much more concentrated than non-migrants among workers with only a primary degree (across education groups). Also, they are over-represented in the groups of less than 30 years of age (among age groups).

To summarize, the observable features of returnees look similar to those of migrants to the US, who show the strongest educational distribution. Migrants to Austria, on the other hand, are the most similar to non-movers and show a concentration in intermediate education and age groups. Finally, migrants to Spain appear to be the group with the lowest earning potential, as they are concentrated among low education and young age groups. We will test more formally in the next section whether these stylized facts match the more structural measures of average selection.

Figure 3. Selection over age



### 4.2 Selection on observable wage-earning skills

Table 4 shows the values of the average skill selection of returnees and migrants to the US, Austria and Spain relative to non-migrants. The entries in Column (1) of Table 4 are (respectively from the first to the last row) the statistics  $OS_{R,NM}$ ,  $OS_{MUS,NM}$ ,  $OS_{MAut,NM}$  and  $OS_{MSpa,NM}$ , defined as in Section 2. In Column (1) we construct the frequencies for the group of non-migrants  $f_{NM}(x)$  using the Census 2002 data. In Column (2) we evaluate the same statistics when the frequencies  $f_{NM}(x)$  are measured using the NDS 2003. Column (3) shows the average selection statistics obtained when we correct for participation in the destination country using the observed participation in Romania. Column (4) shows the statistics obtained using only employment and wages of male workers. Column (5) removes from the Romanian sample the ethnic minorities (Roma, Hungarian) who may be significantly different in their wage-earning ability from the ethnic Romanian. The values can be interpreted as percentage differences in the average wage-earning skill of the group and the average wage-earning skills of non-migrants.

**Table 4. Average selection on observable skills, relative to non-migrants Romania, 2003**

	(1) Average selection on observable skills Census 2002	(2) Average selection on skills NDS 2003	(3) Average selection correcting for participation Census 2002	(4) Average selection of men Census 2002	(5) Average selection on observables wage-earning abilities (excluding ethnic minorities)
Returnees	+0.14	+0.12	+0.13	+0.13	+0.14
Migrants to US	+0.16	+0.13	+0.20	+0.14	+0.15
Migrants to Austria	0.03	0.01	+0.04	+0.03	0.02
Migrants to Spain	-0.11	-0.13	-0.07	-0.13	-0.10

*Note:* The calculation of average selection on observable skills follows the expressions in Section 3.2 of the text. Column (1) uses the employment data by skill cell from the Romanian Census 2002, Column (2) uses the employment data from the National Demographic Survey (NDS) (2003), Column (3) corrects for participation in Romania; Column (4) includes only male individuals. Specification (5) excludes the Roma ethnic group among non-migrants.

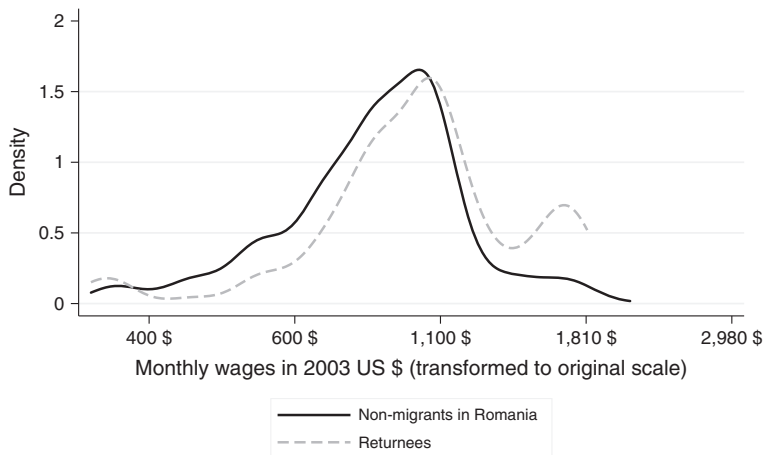
The statistics obtained using different methods and samples show only rather small variation. This reinforces the idea that the features of selection that we found are quite robust and stable. First, the group of returnees exhibits a positive average selection between 12 and 14 percent. This means that when compared to non-movers, returnees have observable skills that allow them to earn domestic (monthly) wages higher by 12–14 percent. This is a significant positive selection. To give a point of comparison, the Mincerian returns to schooling that we estimated on the Romanian NDS data give a return of around 0.06–0.07 per year of schooling. Hence, the average difference in skills between non-migrants and returnees is equivalent to 2 years of schooling. This value is not very sensitive to the corrections. Importantly, the number obtained when using the NDS employment data and the number obtained when using employment data from the Census are very similar, implying that as far as the selection of returnees is concerned, the two datasets produce compatible results.

Moving to the average selection of migrants to the US, we also find a large and economically significant positive selection ranging between 0.13 and 0.20. The only correction that makes some difference is the one for participation which actually increases the selection, implying that the selection of individuals who migrate to the US is even more positive than the selection of working individuals. This may be due

to a lower participation of more educated women to employment in the US, if they move, for example with their highly educated working husband. Again, the pure skill selection among these migrants makes them equivalent to workers with 2–3 more years of schooling than the average non-migrant. Confirming the first impression from the education and age data, the selection of migrants to Austria is essentially zero. The statistic is small implying at most a 2–3 percent positive selection. Migrants to Austria are selected in a way that is not highly correlated with their wage-earning skills. Correcting for participation in Romania and using the NDS rather than the Census data to construct employment frequencies does not make much difference. Finally, the migrants to Spain exhibit a significant negative selection. Confirming the evidence from the education and age data, their average skill selection ranges from  $-0.07$  to  $-0.13$ . Using participation rates in Romania (column (3)) slightly reduces the negative selection, which implies that Romanian migrants to Spain also have lower employment participation in higher skill groups. Migrants to Spain have skills equivalent to 1 to 2 fewer years of schooling relative to Romanian non-migrants.

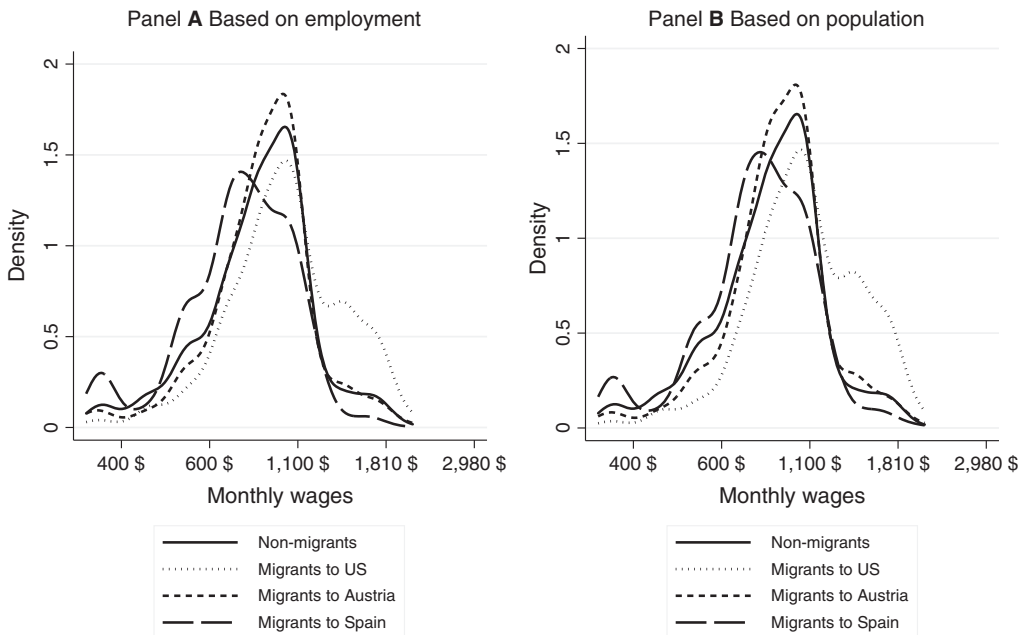
The average values of the selection variable conceal a whole distribution of skills for each group relative to non-migrants. Figures 4 and 5 show the comparison for the whole density distribution of non-migrants and other groups. Figure 4 shows the comparison between non-migrants and returnees. We show the distribution of the two groups by skill (logarithmic monthly wages). Two differences are clear even to a cursory visual inspection. First, the density of returnees is consistently lower in

**Figure 4. Kernel density of non-migrants and returnees over skill, Census 2002**



*Note:* The function represents the density of each population over the wage-earning skill,  $\ln(\text{wage})$ , distribution estimated using a Gaussian kernel. Bandwidth is chosen optimally, for each distribution, following Fernandez-Huertas (2008).



**Figure 5. Kernel density of migrants and non-migrants over skill, Census 2002**

*Note:* The function represents the density of each population over the wage-earning skill,  $\ln(\text{wage})$ , distribution estimated using a Gaussian kernel. Bandwidth is chosen optimally for each distribution, following Fernandez-Huertas (2008).

the skill range corresponding to US\$ 400 to US\$ 1,000 (monthly). On the other hand, the density of returnees is larger for wages above US\$ 1,000 and has an increase in density around US\$ 1,600. These workers are likely to be the college educated in some intermediate age groups. Overall, we can reject the hypothesis that the two distributions are equal by doing a Kolmogorov–Smirnov test, which rejects equality at 0.1 percent significance.

Figure 5 shows the kernel density estimator for non-migrants and migrants in each of the three destinations using both employment distribution by skill (Panel A) and population distribution (Panel B). The solid line represents non-migrants, the short dashed line is for migrants to Austria, the long dashed line for migrants to Spain and the dotted line for migrants to the US. As expected, relative to the non-migrants the distribution of migrants to Spain shows a significant density mass below the average skill level of non-migrants (about US\$ 882) with a peak near US\$ 700. On the other hand the distribution of migrants to the US shows a significant mass of density above the average of non-migrants reaching high and very high wages (up to US\$ 1800). The density of migrants to Austria is not too different from

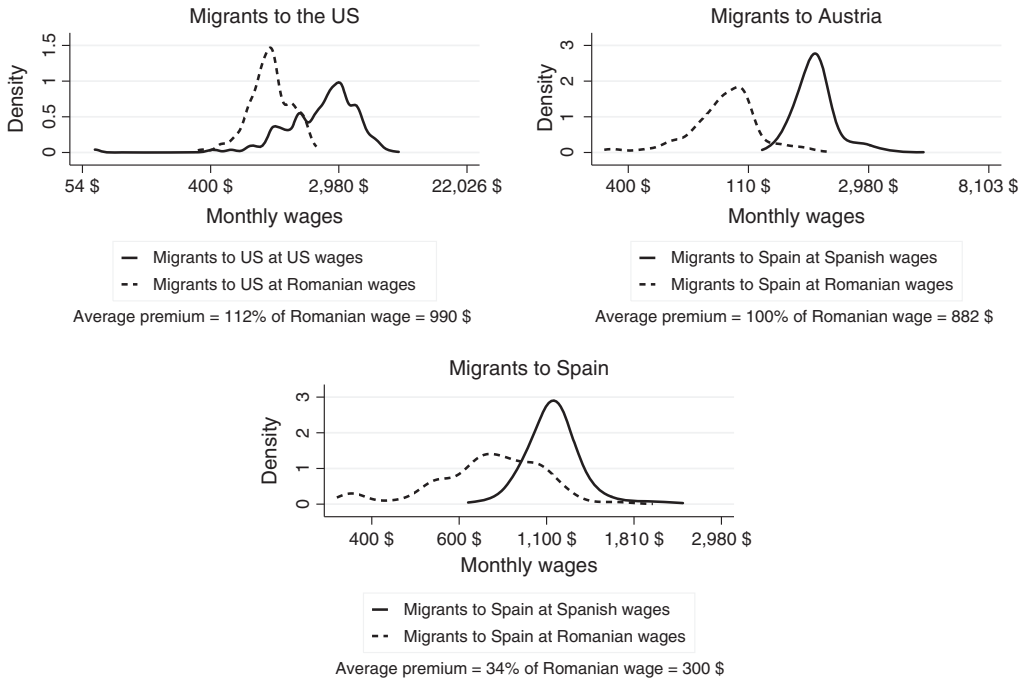
that of non-migrants. A Kolmogorov–Smirnov test of distributional equality between non-movers and migrants to Austria cannot reject the null at 5 percent confidence.

Overall, the average skill selection on observables ranges from –13 percent for migrants to Spain to +20 percent for migrants to the US averaging around 0 for migrants to Austria. There could also be selection on unobservables. Our results on returnees indicate that they may be negatively selected on unobservables. Any estimate of a return premium based on observables would, therefore, represent a lower bound of the true return premium. Regarding migrants, Fernandez-Huertas Moraga (2011) estimates negative selection for migrants from Mexico to the US and reports that selection on unobservables is also negative and about 30 percent of the one on observables. Kaestner and Malamud (2010) do not find any significant selection either on observables or on unobservables for the same Mexican migrants to the US. Clemens *et al.* (2008) report a selection on unobservables for migrants from the Philippines equal to 8 percent and for South Africa they report an even more positive selection on unobservables (around 20 percent). The few other estimates available are for much poorer countries. In general, previous studies have either found an average selection on unobservables of the same sign as the selection of observables but much smaller or no selection at all. With this caveat in mind, we interpret the average observed selection as a correct measure of the skill selection of migrants and a possibly upward biased measure of the skill selection of returnees and proceed to identify the migration and return premium.

### 4.3 Migration and return premium

The largest economic benefit of international migration is in the form of a ‘migration premium’ for migrants. Individuals with given skill characteristics increase their wage and income substantially by moving to countries where their skills are paid much more. The average wage premium for migrants varies across countries of destination, but so does the skill-profile of migrants, which depends on how the labour market at destination prices their skills. In general, for a given average wage differential, the influential Roy (1951) model (applied for instance in Borjas, 1987 and Borjas and Bratsberg, 1996) implies that countries with large skill compensation (namely larger than in the country of origin) attract more skilled workers. Those countries typically exhibit larger wage inequality driven by skill differences. On the contrary, given average wage differentials, countries with low skill compensation (lower than in the country of origin) would instead attract less skilled workers. Such differential behaviour essentially depends on the fact that in the first case the migration premium is increasing, while in the second case it is decreasing with skills.

A simple way of characterizing such migration premia across skills is to report the distribution of the log wages earned by migrants abroad and those they would receive at home (imputed based on their observable characteristics). Averaging those two distributions using the density of skills of migrants and taking their

**Figure 6. Wages in the destination country and counterfactual wages in Romania**

difference would generate the average migration premium, as described in Section 3.4. The distributions of wages in the country of emigration together with the wages those individuals would earn in Romania is shown in Figure 6. The difference in the average skills between the two distributions represents the average migration premium and is reported in 2003 US\$ below each panel.

Panel 1 reports the wage distribution for migrants in the US and their counterfactual distribution had they worked in Romania. Panel 2 shows the same comparison for migrants to Austria and Panel 3 for migrants to Spain. Two regularities are apparent. First, relative to their wage distribution in Romania, migrants have a wider wage dispersion in the US, an intermediate one in Austria and the smallest one in Spain (smaller than in Romania). This is an indication that returns to skills are highest in the US and lowest in Spain. Second, while significant in each case, the average migration premium is much more substantial for migrants to the US (US\$ 990 per month) than for migrants to Spain (US\$ 300 per month). This is consistent with the large migration flows to the US, and it partly compensates for the large costs of migration. More interestingly, however, is the fact that for migrants to Spain the figure suggests that the largest benefits would accrue to those who are likely to be in the long left tail of the counterfactual Romanian wage distribution (hence the

low skilled). To the contrary, for the migrants to the US, the more likely to gain are those from the right tail of the wage distribution. A more systematic analysis of premium and skills is needed here, although the simple wage distribution already indicates the main driver of migration incentives between these countries.

## 5. Migration and return driven by skill-specific premia

In this section, we analyze whether differential migration rates to specific countries (or return rates) across skill cells are consistent with a rational response to wage premia. Table 5 shows the estimates of coefficients  $b$  and  $\beta$  from Equations (12) and (13) in its first three rows. A positive value of the estimated coefficient implies that migrants and returnees respond to a larger premium by migrating (returning) in larger shares proving the rationality of their behaviour.

Each cell in Table 5 corresponds to the estimates of the parameter  $\beta$  (Column (1)) or  $b$  (Columns (2), (3) and (4)) from a different regression. In the first row, we measure migration and return rates including total population in the cells, in the second

**Table 5. Migration- and return-frequencies and wage premium**

Dependent variable explanatory		(1) Relative frequency of return	(2) Relative frequency of migration to US	(3) Relative frequency of migration to Austria	(4) Relative frequency of migration to Spain
Monthly wage premium	In population cells	0.38 (0.05)	0.24 (0.01)	0.30 (0.02)	0.63 (0.04)
Monthly wage premium	In employment cells	0.21 (0.02)	0.27 (0.03)	0.18 (0.03)	0.27 (0.05)
Monthly wage premium	Controlling for age and family effects	0.11 (0.02)	0.33 (0.02)	0.15 (0.03)	0.01 (0.02)
Does it support the selection by premium theory?		Yes	Yes	Yes	Yes in part

*Note:* Column (1) shows the estimate of  $\beta$  in regression (13). Columns (2)–(4) show the estimates of  $b$  in regression (12). The units of observation in each regression are education-age-gender-family status cells. There are 320 of them. The explanatory variable is the difference between the wage of a returnee (migrant) and that of a non-mover in the same skill cell expressed in thousands of 2003 \$. Method of estimates is weighted LS, with weights equal to the non-migrant population in the cell.

row including only workers in each cell. In the third row, we include in regressions (12) and (13) dummies to control for age groups and for family type (married or not and with children or not) meant to capture differential migration and return costs for individuals of different age groups and different family structure. Young, unmarried individuals with no children are the most mobile, hence one can expect that in these groups we observe the most migrants and returnees beyond the effects of a wage premium. This would be due to a systematic difference in costs rather than in the return to migration. The estimated  $b$  and  $\beta$  coefficients are positive and significant in 11 cases out of 12. Their values range between 0.1 and 0.6 with most estimates between 0.2 and 0.4. Taking 0.25 as the median estimate, this coefficient implies that an increase in the migration premium for a skill group by US\$ 1,000 per month would increase the frequency of migrants relative to non-migrants in that skill group by 25 percent. The stability of the coefficient across countries and even between migrants and returnees implies that we can think of a common explanation for the skill selection of migrants and returnees, namely their response to the wage premium, in other words, to economic incentives. The different skill composition of migration to different countries and the skills of returnees can, therefore, be explained simply by the common tendency to migrate to where, and to return when, the premium is larger. This common response to incentives is consistent with a positive skill-selection for returnees and migrants to the US (where premia are higher for highly skilled), with a negative selection for migrants to Spain (where premia are higher for less skilled), but also with the random selection of migrants to Austria. These migrants too respond to wage premia, only those premia do not have a clear correlation with skills.

## 6. Long-run simulated effects on wages and schooling

The empirical analysis found two interesting results. First, returnees to Romania are positively selected relative to non-migrants on observables. As their positive selection is similar to the selection of migrants to the US, which are among the most skilled of migrants, returnees are likely to be positively selected also among migrants overall. Second, returnees earn wages significantly higher than non-migrants, and this difference increases with their skills. Interpreting the wage premium as a productivity difference due to skills accumulated abroad, there are two potentially important effects of migration and return for the sending country. First, this process may increase the expected overall returns to skills, possibly inducing the positive brain gain incentives emphasized by Docquier and Rapoport (2008). Second, it may increase the productivity of returnees (who have learned new skills and enhanced their human capital) with positive effects for the domestic economy.

The evidence is consistent with rational behaviour, driven by migration and return premia. Hence, we use the model developed in Mayr and Peri (2009) to analyze the long-run implications of emigration and return on average years of

schooling and wages in Romania, and simulate the effects of relaxing migration constraints.

The solution of this model<sup>9</sup> identifies the selection of migrants and returnees, in terms of their schooling (and an underlying skill parameter). A simple (log linear) structure of wages, utility and costs implies that the model produces some 'threshold' skill levels for emigration and return. The key parameters are the relative size of the return premium, and returns to education at home and abroad.

If the return to education abroad is sufficiently large compared to the return to education at home, then the returns to migrating are higher for the highly educated; hence migrants are relatively more educated. All workers with skills (schooling level) above a given threshold will opt to emigrate (and only a fraction  $P$  of them will succeed). If the return premium is sufficiently large, then the returns to returning are even higher for the highly educated, and hence the most educated of all choose to migrate and return. In particular, there will be a higher schooling threshold above which all individuals, if they migrated in the first period, would return in the second period. Those with intermediate schooling (between the two thresholds) choose to migrate and stay abroad (if they succeed in migrating), and the least educated (below the lowest threshold) stay at home. The model has an important implication. If the probability of migrating  $P$  increases under positive skill selection of migrants (as observed), more intermediate and highly skilled will migrate. However, two effects may balance this brain drain. First, as education is a choice, more individuals will choose higher education as the expected returns to schooling increase. A higher probability to migrate (and return) increases the expected returns to education and induces more individuals to get higher education.<sup>10</sup> Second, more migrants means more returnees, and each one of them will benefit from the extra-productivity (wage) effect due to the accumulated skills abroad. These two positive effects on skills and wages can offset the negative effect of a positive selection of migrants.

Our results complement other empirical findings on the effects of labour supply shocks in countries of origin in Eastern Europe. Dustmann *et al.* (2012) find a positive effect of emigration from Poland on Polish wages. For the case of Lithuania, where the rate of emigration following the EU-enlargement was similar to that from Romania (around 9 percent), Elsner (2013) finds that emigration increased the wages of young non-migrant workers by 6 percent, while it had no effect on the wages of older workers who stayed in the home country.

Appendix Table C1 provides the simulated effects of emigration and return on average years of schooling and wages in Romania, using parameters and averages calculated for Romania. The parameters for the returns to schooling at home and

<sup>9</sup> For the details of the model, see Mayr and Peri (2009).

<sup>10</sup> The response of education depends on the assumed costs of education and distribution of skills that we set to match the initial distribution of the Romanian population by the level of schooling (from the Barro and Lee, 2000 data).

abroad are estimated using a Mincerian equation for Romania (around 0.06) and for the average European country (around 0.08). The return premium is chosen to match the return premium obtained by college educated returnees in Section 3 (around 28 percent above non-migrants). The wages for no schooling are set at the level observed from our Romanian data and the average of the three migration countries. The migration and return costs are set to match the share of returnees in total (always measured to be around 0.4–0.5).<sup>11</sup> It shows that the relaxation of migration constraints increases average schooling and wages in Romania (i.e., the net effect of emigration is positive). The table also distinguishes between the net effects by education and age, and shows that the highly educated in their second period of life benefit the most.

## 7. Conclusions

Return migration is an important compensation mechanism for the potentially negative effects of the large labour outflows experienced by many Eastern European countries around the year 2000. Recently re-evaluated evidence on the magnitude of return migration during the age of mass migration (Bandiera *et al.*, 2013) reinforces the importance of return flows for the economic convergence between sending and destination countries. This sheds new light on the likely benefits that accrue to sending countries if migrants return with foreign qualifications, occupational skills, financial capital and attitudes which contribute to economic and institutional development.

However, these beneficial effects of temporary migration will depend crucially on the nature of selection into migration and return.

The novelty of our study lies in uncovering the magnitude and the selection of migration and return flows for the case of Romania. We use these estimates in a model of education and temporary migration to simulate the long-run effects of migration and return on the levels of skills and wages.

Consistent with other findings in the literature, our results confirm the significance of return migration. They suggest that, over less than a decade, about half of the people who migrate eventually return. Romanian return migrants are strongly positively selected on observables and negatively selected on unobserved characteristics, relative to non-migrants. In line with the qualitative evidence of previous sociological studies as well as with the predictions of standard economic theory, our microdata imply that the selection of migrants depends on the country of destination. It is positive for the US and negative for Spain. Moreover, Romanian returnees are selected in a similar way as migrants to the countries with the highest skill premium (which is the US) and hence are positively selected among migrants overall.

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<sup>11</sup> The other parameters of the model are kept as in Mayr and Peri (2009) to match an average Eastern European country.

Both rounds of selection (first into migration and second into return) are consistent with the idea that workers move in accordance with the wage premium they receive. Decisions to return may therefore be part of an optimal strategy to maximize lifetime income.

We contribute to the existing literature on return migration by assessing the long-run implications of these temporary migration patterns for the sending country. Using the model introduced in Mayr and Peri (2009), we simulate the effects likely to occur due to the free movement of labour in the context of EU enlargement (for the case of Romania after 2007). Our results suggest that at the end of the migration cycle the large outflows of labour will be followed by significant flows of return migration. Despite the strong positive selection into the initial migration, our results imply an increase in average wages and levels of schooling in the Romanian population through incentives to invest in education and due to the enhanced wage-productivity of return migrants. Various economic and political developments in Europe are likely to mediate the impact of migration on CEE sending countries. However, over the long-run, an increase in labour mobility is likely to have a positive contribution on economic convergence via return migration.

## References

- Baldwin-Edwards, M. (2007). 'Navigating between Scylla and Charybdis: Migration policies for a Romania within the European Union,' *Journal of South-East European and Black Sea Studies*, 7(1), pp. 5–35.
- Bandiera, O. Rasul, I. and Viarengo, M. (2013). 'The making of modern America: Migratory flows in the age of mass migration,' *Journal of Development Economics*, 102, pp. 23–47.
- Barrett, A. and Goggin, J. (2010). 'Returning to the question of a wage premium for returning migrants,' *National Institute Economic Review*, 213, pp. R43–R51.
- Barro, R. J. and Lee, J. W. (2000). 'International data on educational attainment: Updates and implications,' *CID Working Paper No. 42*, Cambridge, MA.
- Batista, C., Lacuesta, A. and Vicente, P. (2010). 'Testing the 'Brain Gain' hypothesis: Micro evidence from Cape Verde,' *Journal of Development Economics*, 97(1), pp. 32–45.
- Beine, M., Docquier, F. and Rapoport, H. (2001). 'Brain drain and economic growth: Theory and evidence,' *Journal of Development Economics*, 64(1), pp. 275–289.
- Beine, M., Docquier, F. and Rapoport, H. (2008). 'Brain drain and human capital formation in developing countries: Winners and losers,' *Economic Journal*, 118(4), pp. 631–652.
- Bhagwati, J. (1976). *The Brain-Drain and Taxation: Theory and Empirical Analysis*, New York, North Holland.
- Bhagwati, J. and Hamada, K. (1974). 'The brain drain, international integration of markets for professionals and unemployment: A theoretical analysis,' *Journal of Development Economics*, 1(1), pp. 19–42.
- Bhagwati, J. and Rodriguez, C. (1975). 'Welfare-theoretical analyses of the brain-drain,' *Journal of Development Economics*, 2(3), pp. 195–222.



- Borjas G. (1987). 'Self selection and earning of immigrants', *American Economic Review*, 77(4), pp. 531–553.
- Borjas, G. and Bratsberg, B. (1996). 'Who leaves? The outmigration of the foreign-born', *Review of Economics and Statistics*, 78(1), pp. 165–176.
- Budnik, K. B. (2009). 'Rationality of post-accession migration', *Focus on European Economic Integration*, Q1/09, pp. 57–83.
- Chand S. and Clemens, M. (2008). 'Skilled emigration and skill creation: A quasi-experiment', *CGD Working Paper No. 152*, Washington, DC: Center for Global Development.
- Chiquiar, D. and Gordon, H. (2005). 'International migration, self-selection and the distribution of wages: Evidence from Mexico and The United States', *Journal of Political Economy*, 113, pp. 239–281.
- Clemens, M., Montenegro, C. and Pritchett, L. (2008). 'The place premium: Wage differences for identical workers across the US border', *Center for Global Development Working Paper No. 148*, Washington, DC: Center for Global Development.
- Co, C. Y., Gang, I. and Yun, M. (2000). 'Returns to returning', *Journal of Population Economics*, 13, pp. 57–79.
- Commander, S., Chanda, R. Kangasniemi, M. and Winters, A. (2008). 'The consequences of globalisation: India's software industry and cross-border labour mobility', *World Economy*, 31, pp. 187–211.
- Constant, A. and Massey, D. (2003). 'Self-selection, earnings, and out-migration: A longitudinal study of immigrants to Germany', *Journal of Population Economics*, 16, pp. 631–653.
- De Coulon, A. and Piracha, M. (2005). 'Self-selection and the performance of return migrants: The source country perspective', *Journal of Population Economics*, 18, pp. 779–807.
- De Coulon, A. and Wadsworth, J. (2010). 'On the relative rewards to immigration: A comparison of the relative labour market position of Indians in the USA, the UK and India', *Review of Economics of the Household*, 8, pp. 147–169.
- Diminescu, D. (ed.) (2003). *Visibles mais peu nombreux. Les circulations migratoires roumaines*, Editions de la Maison des Sciences de l'Homme, Paris.
- Diminescu, D. and Lăzăroiu, S. (2002). Circular migration of Romanians after 1989: Migrants behavior, institutions and policies, IOM-Study, Bucharest.
- Docquier, F. and Marfouk, A. (2006). 'Measuring international migration by educational attainment, 1990-2000', in: Ozden, C. and Schiff, M.. (eds.), *International Migration, Remittances and the Brain Drain*, Chapter 5, New York: Palgrave Macmillan, pp. 151–199.
- Docquier, F. and Rapoport, H. (2008). 'Brain drain and human capital formation in developing countries: Winners and losers', *The Economic Journal*, 118, pp. 631–652.
- Dustmann, C. (1995). 'Savings behavior of migrant workers: A life cycle analysis', *Zeitschrift für Wirtschafts- und Sozialwissenschaften*, 4, pp. 511–533.
- Dustmann, C. and Glitz, A. (2011). 'Migration and education', in: Hanushek, E.A., Machin, S. and Wößmann, L. (Eds.). *Handbook of the Economics of Education*, Vol. IV, Amsterdam: Elsevier, pp. 327–439.
- Dustmann, C. and Weiss, Y. (2007). 'Return migration: Theory and empirical evidence from the UK', *British Journal of Industrial Relations*, 45(2), pp. 236–256.
- Dustmann, C., Fadlon, I. and Weiss, Y. (2011). 'Return migration, human capital accumulation and the brain drain', *Journal of Development Economics*, 95(1), pp. 58–67.
- Dustmann, C., Frattini, T. and Rosso, A. (2012). 'The effect of emigration from Poland on Polish Wages', *CREAM Discussion Paper No 29/12*, London: University College.

- Earle J. S. and Pauna, C. (1996). 'Incidence and duration of unemployment in Romania', *European Economic Review*, 40, pp. 829–837.
- Earle, J. S. and Pauna, C. (1998). 'Long-term unemployment, social assistance and labor market policies in Romania', *Empirical Economics*, 23, pp. 203–235.
- Elrick, T. and Ciobanu, O. (2009). 'Migration networks and policy impacts: Insights from Romanian–Spanish migrations', *Global Networks*, 9(1), pp. 100–116.
- Elsner, B. (2013). 'Emigration and wages: The EU enlargement experiment', *Journal of International Economics*, 91, pp. 154–163.
- EU-SILC (2004). European Union Statistics on Income and Living Conditions, Eurostat, 2009. An online resource available at: [http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/eu\\_silc](http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/eu_silc) (Last accessed: September 2013).
- Fernandez-Huertas Moraga, J. (2011). 'New evidence on immigrant selection', *The Review of Economics and Statistics*, 93, pp. 72–96.
- Grubel, H. and Scott, A. (1966). 'The international flow of human capital', *American Economic Review*, 56, pp. 268–274.
- Hartog, J. and Winkelmann, R. (2003). 'Comparing migrants to non-migrants: The case of Dutch migration to New Zealand', *Journal of Population Economics*, 16, pp. 683–705.
- Hazans, M. (2008). 'Post-enlargement return migrants earnings premium: Evidence from Latvia'. Paper presented at EALE Conference in Amsterdam, 18–20 September 2008.
- Kaestner, R. and Malamud, O. (2010). 'Self selection and international migration: New evidence from Mexico', *NBER Working Paper No. 15765*, Cambridge, MA.
- Kahanec, M. and Zimmerman, K. F. eds. (2010). *EU Labor Markets after Post-Enlargement Migration*, Berlin: Springer.
- Kilic, T., Carletto, C., Davis, B. and Zezza, A. (2009). 'Investing back home: Return migration and business ownership in Albania', *Economics of Transition*, 17, pp. 587–623.
- Luo, Y.L. and Wang, W.J. (2002). 'High-skilled migration and Chinese Taipei's industrial development', in *International Mobility and the Highly Skilled*, OECD editions, Paris: OECD, pp. 253–269.
- Maddala, GS (1983). *Limited-Dependent and Qualitative Variables in Economics*. New York: Cambridge University Press.
- Martin, R. and Radu, D. (2011). 'Return migration: The experience of Eastern Europe', *International Migration*, 50, pp. 109–128.
- Mayr, K. and Peri, G. (2009). 'Brain drain and brain return: Theory and application to Eastern-Western Europe', *Berkeley Electronic Journal of Economic Analysis & Policy, Contributions*. 9 (1), Article 49.
- McCormick, B. and Wahba, J. (2001). 'Overseas work experience, savings and entrepreneurship amongst return migrants to LDC's', *Scottish Journal of Political Economy*, 48, pp. 164–178.
- Mountford, A. (1997). 'Can a brain drain be good for growth in the source economy?' *Journal of Development Economics*, 53, pp. 287–303.
- National Demographic Survey (2003). Center for Regional and Urban Sociology (CURS), Bucharest.
- OECD (2008). *International Migration Outlook: SOPEMI*, Paris, OECD.
- Ortega, F. and Peri, G. (2009). 'The causes and effects of international migrations: Evidence from OECD countries 1980–2005', *NBER Working Paper No.14833*, Cambridge, MA.

- Piracha, M. and Vadean, F. (2010). 'Return migration and occupational choice: Evidence from Albania', *World Development*, 38, pp. 1141–1155.
- Reinhold, S. and Thom, K. (2009). 'Temporary migration and skill upgrading: Evidence from Mexican migrants', *MEA Discussion Paper No. 182–09*, University of Mannheim.
- Roy, A. (1951). 'Some thoughts on the distribution of earnings', *Oxford Economic Papers*, 3, pp. 135–146.
- Sandu, D. (2005). 'Emerging transnational migration from Romanian Villages', *Current Sociology*, 53(4), pp. 555–82.
- Sandu, D. et al. (2006) *Living Abroad on a Temporary Basis. The Economic Migration of Romanians: 1990–2006*, Open Society Foundation, Bucharest.
- Santos, M. and Postel-Vinay, F. (2003). 'Migration as a source of growth: The perspective of a developing country', *Journal of Population Economics*, 16, pp. 161–175.
- Șerban, M. and Voicu, B. (2010). 'Romanian migrants to Spain: In- or outside the migration networks – A matter of time?' *Revue d'études comparatives Est-Ouest*, 41, pp. 97–124.
- Stark, O., Helmenstein, C. and Prskawetz, A. (1997). 'A brain gain with a brain drain', *Economics Letters*, 55, pp. 227–234.
- Stark, O., Helmenstein, C. and Prskawetz, A. (1998). 'Human capital depletion, human capital formation and migration: A blessing or a 'curse'?' *Economics Letters*, 60, pp. 363–367.
- United Nations (2009). *Trends in International Migrants Stocks: The 2008 Revision*, Department of Economic and Social Affairs, The United Nations Population Division. May 2009.
- Voicu, A. (2005). 'Employment dynamics in the Romanian labor market: A Markov chain Monte Carlo approach', *Journal of Comparative Economics*, 33, pp. 604–639.
- Zucker, L. and Darby, M. (2007). 'Star scientists, innovation and regional and national migration', *NBER Working Paper No. 13547*, Cambridge, MA.

## Appendix A: Overview of data sources

Table A1. Description of the datasets

Country	Datesets	Year(s)	Variables /constructed characteristics
Romania	Census	2001	Employment and population frequencies
	National Demographic Survey (NDS)	2003	Individual monthly wages, non-migrants and returnees
	Administrative migration registers	1995–2001	Cross-tabulations (flows) on migrants by education and destination countries (only for Figure 1)
US	Census	2002	Employment, population and average monthly wages of Romanian migrant
Austria	Census	2002	Employment and population frequencies for Romanian migrants
	EU-SILC 2004	2004	Average monthly wages of Romanian migrants
Spain	Census	2003	Employment and population frequencies for Romanian migrants
	EU-SILC	2004	Average monthly wages of Romanian migrants

*Note:* The database is designed as a cross section of Romanians (c. 2003), residing either in Romania (non-migrants or returnees) or in the US, Austria or Spain. Returnees are identified as persons born in the country and who had spells of at least 6 months of employment abroad over the previous 10 years. We restrict our sample to individuals between 15 and 65 years of age. All wages are converted into 2003 US\$. The vector of individual characteristics is defined by the following categorical variables: education, with the categories No Degree, Primary, Secondary and Tertiary; age, taking ten values from 15 to 65 in 5 years intervals; gender, with the two categories and family-size with four categories: Single with no children, Married with no children, Single with children, and Married with children.

## Appendix B: Stocks of migrants and returnees

For the period of interest, around the year 2000, we estimate the stocks of migrants from 14 CEECs to OECD countries using the dataset constructed by Docquier and Marfouk (2006). Table B1 shows these figures as shares of the domestic population for 1990 and 2000. Around the year 2000 these shares varied between 3–4 percent in large countries (like Poland and Romania) and 17–19 percent in smaller countries (like Albania and Macedonia).

**Table B1. Stock of emigrants to OECD countries as ratio of the population in the home country**

Country of origin	1990	2000
Albania	0.162	0.190
Bulgaria	0.060	0.080
Croatia	0.123	0.140
Czech Republic	0.021	0.027
Estonia	0.028	0.054
Hungary	0.042	0.041
Latvia	0.020	0.033
Lithuania	0.057	0.054
Macedonia	0.138	0.169
Poland	0.041	0.044
Romania	0.020	0.031
Russia	0.003	0.006
Serbia and Montenegro	0.069	0.091
Slovenia	0.044	0.072

*Source:* Docquier and Marfouk (2006). The data are obtained from national censuses of the receiving country and include all OECD countries as receiving. The data are relative to the census year of the receiving countries and those are clustered around 1990–1991 and 2000–2001.

**Table B2. Imputed return relative to gross migration flows (any OECD destination), 1990–2000; Selected Eastern European source countries**

Source	Return flows (imputed)	Gross flows	Return/gross
Albania	20,476	34,207	0.60
Bulgaria	24,353	42,109	0.58
Czechoslovakia	24,230	18,697.5	1.30
Estonia	5,859	12,099	0.48
Hungary	54,450	40,535	1.34
Lithuania	2,824	12,010	0.24
Latvia	3,053	9,713.5	0.31
Poland	282,984	306,841.5	0.92
Romania	54,197	132,311.5	0.41

*Note:* The data are obtained by authors' calculations (as described in the text) using Docquier and Marfouk (2006) and the UN (2009) datasets. The return flows are imputed assuming that all re-migration is return migration.

**Table B3. Imputed return relative to gross emigration flows from Eastern Europe, 1990–2000; Selected OECD destination countries**

Destination	Return flows (imputed)	Gross flows	Return/gross
Australia	28,933	15,012	1.93
Austria	26,385	110,096	0.24
Belgium	11,219	13,151	0.85
Canada	101,096	108,537	0.93
Finland	1,007	9,265	0.11
France	49,413	19,982	2.47
Norway	4,247	6,649	0.64
Sweden	19,483	22,684	0.86
USA	230,643	303,148	0.76

*Note:* The data are obtained by authors calculations (as described in the text) using Docquier and Marfouk (2006) and the UN (2009) datasets. The return flows are imputed assuming that all re-migration is return migration.

We use these data on the stocks of migrants abroad to obtain (by difference) the net immigration country by country between 1990 and 2000. From the United Nations (2009) data on yearly gross flows from the same countries of origin to the same destinations, we obtain the cumulative gross flows of migrants (1991–2000). The difference between gross flows (from country  $i$  to  $j$ ) and the net changes of people from country  $i$  living in country  $j$  constitutes a measure of re-migration. Following Borjas and Bratsberg (1996) and Dustmann and Weiss (2007), we assume that most of the re-migrants are returnees. We summarize the results in Tables B2 and B3 by aggregating gross and imputed return flows by source and host country, respectively.

These aggregate figures have to be interpreted with caution since they are likely to be fraught with various methodological problems. They may be biased if, for instance, undocumented migrants are better counted in census data than in the official entry statistics, or if the definition of immigrants (by nationality, place of birth or country of last residence) is not consistent between census and administrative data. We also neglect both the effects of natality and of mortality of migrants, which do not necessarily even out.

The ratio of returnees to gross migrants can be larger than 1 since not only migrants who arrived in this decade but also earlier migrants returned during this period. Table B2 shows that Czechoslovakia, Hungary and Poland experienced return migration close to or even larger than their gross emigration flows. This is reasonable since these countries have a longer history of migration before 1989 and might experience a ‘retirement migration’ of migrants who left around 1968.

However, all other Eastern European countries have very substantial return rates between 0.3 and 0.6.

## Appendix C: Model

### *Migration, return and average wages in Romania*

Table C1 shows the simulated effects on years of schooling and wages (we standardize to 1 the wage with no migration) of the young and old generation when changing the probability of migration  $P$  from 0 to 0.30 by increments of 0.05. To match the current percentage of Romanians abroad as of 2003, the value of  $P$  should be around 0.10. For that value, returnees equal 4.5 percent of the population in Romania and migrants (still abroad) equal 4.6 percent of Romanians. These numbers are not too far from the 5 percent of returnees found in the NDS and the 3.2 percent of migrants in the Docquier and Marfouk (2006) data.

**Table C1. Simulated effects of increasing freedom of migration,  $P$ , in Romania on schooling and wages parameters as in Romania 2003; migration and return**

$P$	0	0.05	0.10	0.15	0.20	0.25	0.30
<i>Years of schooling</i>							
Average schooling of young	12	12.16	12.33	12.49	12.64	12.78	12.91
Average schooling of old	12	12.32	12.66	13.01	13.37	13.75	14.15
Average schooling, overall	12	12.24	12.50	12.76	13.03	13.30	13.59
<i>Wages (standardized to 1 with no migration)</i>							
Average wages, young	1	1.01	1.02	1.04	1.05	1.07	1.08
Average wages, old	1	1.04	1.09	1.15	1.22	1.29	1.36
Average wages, overall	1	1.03	1.06	1.10	1.14	1.18	1.23
Average wage no primary	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Average wage primary–secondary	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Average wage tertiary–young	1.41	1.43	1.45	1.48	1.50	1.52	1.55
Average wage tertiary–old	1.41	1.48	1.56	1.64	1.73	1.82	1.92
<i>Migration rates</i>							
Share of emigrants	0	0.045	0.091	0.137	0.183	0.230	0.276
Share of returnees among emigrants		0.471	0.482	0.492	0.502	0.512	0.521

**Note:** We standardized all the wages to be relative to the average wage in the case of no emigration. The simulations follow Mayr and Peri (2009).

The first result of the simulation, shown in the first three rows of Table C1, is that relative to the case of no migration the schooling of young and old people increases. In spite of having a loss of highly educated young workers due to positively selected migration, the incentive effect on schooling more than balances this tendency. The increase in average schooling of young individuals is driven by the incentive effect. The effect on old workers, on the contrary, also includes the positive selection of returnees. As the most educated individuals come back, this increases the average education of the old relative to the case with no migration. Overall, the effect is that average schooling in the population is higher by half a year because of international mobility relative to the case with no migration. With a probability of migration equal to 0.20, which is double the current value, there would be an increase of average schooling of the Romanian population by 1 year relative to the case with no migration.

The wage effects, reported in the fourth to the tenth row, are also interesting. The effect on the young is purely driven by the education incentive. It amounts to a plus 2 percent (when  $P = 0.10$ ) relative to no migration, and it could be increased to +5 percent for  $P = 0.20$ . The effect on old workers combines the incentive and the return premium and generates an average increase of 9 percent relative to no migration (for  $P = 0.10$ ). That gain increases to +22 percent when doubling the migration flows (by loosening the policy to  $P = 0.20$ ). The rows showing the effect on wages by schooling level also show that all the gains from migration and return accrue to the group with highest schooling, which is the one most affected by the positive incentives and most rewarded by the return premium. The less educated are those who do not migrate in the model, hence there are no effects for them. The intermediate education is the group that migrates but does not return, hence the return premium has no incentive effect on them nor a direct effect in raising wages. The wage of the highly educated, however, rises by 44 percent for young individuals (due to their much higher level of education) and by 58 percent for old individuals, due to higher level of schooling and the return premium.

If we were to eliminate the schooling incentive effect from the simulation (table available upon request) we would observe a negative schooling and wage effect of migration on the young generation (due to brain drain) but still a positive schooling and wage effect on the old generation (due to brain return and the return premium). The two effects in our model would still give a small positive average wage effect.

### *Some policy experiments*

The model also allows us to change by some small amount the policy variable and analyze what would happen to migration, return and wages in Romania.<sup>12</sup> For instance, a decrease (increase) of the variable  $M_1$ , the cost of residing abroad,

<sup>12</sup> The simulations reported below are based on our model. The effects on all schooling and wage variables are available upon request.



possibly associated with better (worse) communication, more (less) homogeneous institutions or more (less) integrated labour markets implies higher (lower) migration, lower (higher) percentage of returnees and thus a stronger incentive-effect of migration increasing the schooling level. For an increase of these migration costs by 20 percent, average wages and average years of schooling in Romania would decrease by 1 percent. More interestingly, an increase in the reward to the highly educated in the receiving countries would generate two opposite effects. On the one hand, as potential emigrants will have larger expected returns to skills in the receiving country, this will produce a stronger education incentive effect in the sending country and will increase average schooling of the young. On the other hand, fewer migrants would return, and this would decrease schooling of the old generation in Romania. For an increase in the returns to schooling from 8 percent to 8.3 percent in the receiving country, the two effects will produce a 2 percent wage and a schooling increase in Romania due to higher education of the young. Finally, the country of origin may introduce some fiscal incentive for highly skilled returnees, corresponding to an increase in the parameter  $\kappa$ . Introducing a fiscal incentive that increases by 30 percent the premium of returnees, proportional to their schooling, would double the percentage of returnees (to almost 80 percent of total migrants). It would also increase the share of people getting a high level of education. This increases average wages by 1–2 percent. The increase in the schooling-return premium is associated both with a stronger incentive effect that pushes young generations to higher educational achievements and with a steeper wage profile for highly educated returnees, which encourages a higher return for the highly educated. Both are certainly a boon for schooling and productivity in the sending country.