SIE - 60ª RSA - Università di Palermo - 24-26 ottobre 2019

Links between emigration, income and development.

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August 2019

Abstract. This paper tests the relationship between emigration and per capita income in developing countries. A dataset of 130 developing countries and 25 years, from 1991 to 2015 is used. Basic regressions with country fixed effects show that the relationships between emigration and income are either negative or U-shaped. In further controls, some characteristics of origin countries, especially education, demographics, political terror and climate change, influence the shape and sign of these relationships. Once these variables and their interactions with income are controlled for, the correlations between emigration and income are negative and significant, and stronger in poor countries. The links between forced emigration (of refugees and non-voluntary emigrants) and income are negative, and stronger as political terror is higher. Voluntary emigration to developed economies is unrelated to income at home, but positively correlated with education. Hence, policies promoting development can lead to lower emigration rates. However, growing average temperatures can weaken their impact.

JEL classification: F22, J11, O11

Keywords: voluntary and forced emigration, income, development

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1. Introduction

Is there a link between development and emigration? Some empirical investigations find that emigration appears to increase as poor countries develop, to reverse its pattern after they reach a certain level of development. Zelinsky (1971) calls this bell-shaped relationship a 'mobility transition'. Analysing past mass migration from Europe, Hatton and Williamson (1994) find that its relation with development is mainly driven by demographic changes: population grows rapidly in the early stages of industrialization, glutting home labour markets and boosting emigration, and lowers its pace afterwards, mainly because of rising education levels and decreasing birth rates. Demography is a leading factor also in Dao et al (2018b), who analyse recent world migration movements.

A partially different explanation of an inverted-U relationship between emigration and development focuses on income rather than demography. In it, higher income allows resource-constrained people to afford the costs of emigration. Consistently with this hypothesis, the emigration response should be stronger in poor countries (Clemens, 2014). The other potential role of a higher income – that of being an incentive to remain – is assumed to be more than compensated by this resource effect. Emigration reverses its path when the country reaches a level of income at which the resource constraint ceases to be binding. Recently, the mobility transition hypothesis has gained popularity to the point of being sometimes considered a 'stylized fact', despite its empirical foundations are known to be weak.[1]

This paper analyses the potential links between emigration and income in the emigrants' home countries. It uses a wide panel dataset, comprising 130 developing countries and 25 years. An initial investigation of the data highlights some facts. First, non-parametric or between-countries estimation can produce a bell-shaped relationship between emigration and per capita income, but the result is not robust to further controls, such as countries' fixed effects or first differences. With them,

[1] Several studies find the relation between emigration and income to be not significant (Dao et al. 2018a), negative for emigration from African countries (Lucas, 2006), or U-shaped (Hanson and McIntosh, 2016).

the relation is more likely to be negative, U-shaped or not significant. This suggests that bell-shaped outcomes based on between countries variation omit important cofounding factors. Second, when the sample is restricted to emigration moving mostly to developed countries, the bell-shaped relationship between emigration and income is a likely outcome. Third, when forced – rather than voluntary – emigration is considered, the relationship between emigration and income is always significantly negative, both in between and within variations.

This paper aims to identify the cofounding factors that can explain these regularities, and the resulting links between emigration and income. Using country fixed effects in different specifications, it measures the correlations of political, social, economic and climatic characteristics of countries with emigration and their interactions with income. The relevance of factors that do not change in time or change very slowly is measured by regressing them on the countries' fixed effects. Similar tests are conducted on refugee and, more generally, forced migration. This investigation adds to the current literature on international migration by shading light on the links between emigration and development in the migrants' home countries. It contributes to the debate on future migration inflows into rich economies as poor countries develop.

This study main findings are that some covariates, especially education, political terror, demography and climate change, are significantly correlated with voluntary and forced emigration both directly and indirectly, through their interactions with income. Specifically, once these factors are controlled for, the overall relationship between income and voluntary emigration is significantly negative and robust for the majority of countries, except for those with higher levels of development, where it becomes non-significant. The coefficients on factors concerning constant characteristics of countries add to the understanding of these results.

Further findings are that controlling for covariates in the relationship between refugee migration and income reinforces its negative sign. There is a negative and strong relationship also between forced emigration, rather than just that of refugees, and income. Moreover, tests based on

samples restricted to immigration into developed economies, rather than on overall emigration, tend to produce bell-shaped relationships between immigration and income in the origin countries. However, they tend to become non-significant when covariates are controlled for. This study measures correlations, no causal relationships. However, it bears some clear policy implications. The main one is that promoting development, especially income growth and education, can deter emigration. Climate change weakens the links between income and emigration. Hence, curbing climate change leaves room for policy. The rest of the paper is structured as follows. In Section 2 previous studies are described; Section 3 presents the data and some initial results; Section 4 presents and discusses estimations results; Section 5 focuses on emigration to developed economies; Section 6 presents estimates of the relationships between forced or voluntary emigration and income. Section 7 concludes.

2. Related literature.

According to the neoclassical model, emigration should respond to the difference between average income in origin and destination countries. Given everything else, it should decrease with development in the origin economy. Empirical evidence supporting this prediction is provided, among others, in Hatton and Williamson (2005), Mayda (2010), Grogger and Hanson (2011), Ortega and Peri (2013). In Hartog and Vriend (1989), Katseli and Glystos (1989), Lundborg (1991) Bauer and Zimmermann (1998) migration flows are positively related to income in the destination economy. Ortega and Peri (2013) find that per capita income negatively affects emigration. In Dao et al. (2018a), income in the origin country only marginally influences emigration to OECD economies. However, other empirical studies do not find support for the neoclassical hypothesis. In them, migration first rises as income increases in the origin country, and then falls after a certain level of income. Analysing a small sample of countries and years Zelinsky (1971), observed this bell-shaped pattern of internal and international emigration. He interpreted it as a 'mobility transition' of people, which occurs with development. A similar pattern emerges in Hatton and Williamson (1994),

concerning the European mass emigration of past centuries, in Faini and Venturini (1993) regarding emigration from Southern Europe, especially Italy, and, among others, in Martin and Taylor (1996), de Haas (2007, 2010, 2011), Vogler and Rotte (2000) and Clemens (2014). Several recent empirical investigations finding a bell-shaped relationship between emigration and income, rather than, more generally, development, are based on between-country variations or on samples restricted to immigration into OECD economies.[2] Wider or different samples of countries, and more severe econometric specifications, make the inverted-U relationship less likely to emerge.[3] Relatively to this point, Clemens (2014) argues that a bell-shaped relationship between emigration and income might re-emerge in a long timespan, longer than that of most panel databases. Several empirical studies find that other variables significantly affect emigration. Among these are economic factors, such as unemployment, as well as demographic, geographic, political and institutional (Hatton and Williamson 2005; Dao et al. 2018b, Docquier et al. 2014) and climatic characteristics of countries (among others, Coniglio and Pesce, 2015).

A general finding of the empirical literature on the determinants of voluntary and forced migration is that economic factors tend to be more important for voluntary migration, and political factors for forced migration (Neumayer 2005). Accordingly, studies on refugee and asylum migration find that it is strongly associated to political and institutional variables, such as protest, oppression, conflict and genocide in the origin country (Marfleet 2006; Schmeidl 1997; Davenport et al. 2003; Moore and Shellman 2007; and Hatton 2009). However, forced migration is also influenced by economic conditions. Neumayer (2005), Hatton (2009) and Hatton (2016), finds that refugee and asylum seeker flows to OECD economies diminish with higher income in the home country. This is in contrast to the 'mobility transition' hypothesis.

[2] Income is a strong proxy of development, but not the only one. Development is usually interpreted as involving improvements in the economy, institutions and individuals' rights.
[3] Among others, Lucas (2006) finds emigration from Africa to be negatively correlated with income at home. In Dao et al. (2018a) income marginally influences migration to OECD economies.

3. Data and descriptive statistics

3.1 Data.

The dataset comprises 130 developing countries and 25 years, from 1991 and 2015. Emigrant data are extracted from the *UN Department of Economic and Social Affairs – Population Division*. As figures are available every 5 years, intermediate numbers have been imputed by taking averages of the two nearest available figures. UN data comprise both general and refugee emigration. In order to have a better proxy of 'net' emigration, I have subtracted the number of refugees in correspondence to each country and year. Data on the refugee outward stock is extracted from *UNHCR, Population statistics, Time series*. The refugee stock is the number of people who fled the home country and have been recognized as refugees. Emigrant rates and refugee rates are the numbers of emigrants and refugees from each country divided by the population of the country. The proportion of emigrants moving to either developing or developed countries is the percentage of total emigrants from the origin country moving to each type of destination each year. These percentages are computed from UN data on emigration. A complete list of variables and sources is in Table A1.

3.2 Emigrants, refugees and income in the origin country

Figure 1(a) depicts the non-parametric relation between emigration rates (calculated as number of net emigrants – emigrants minus refugees – divided by its population of the origin country) and per capita income. Its pattern is U-shaped for levels of *ln pcGDP* up to about 8.67 (corresponding to an income level of 6,000 constant 2011 US$); then it becomes bell-shaped, but the final part, concerning medium-income countries, is non-significant.[4] Figure 1(b) shows the relation between refugee rates (calculated as number of refugees abroad divided by the population of the home country) and *pcGDP*. Differently from the case of emigrants, the slope is always negative.

[4] Several countries in Figure 1(a) with an average level of ln pcGDP below 8.6 are in Sub Saharan Africa; other countries are Afghanistan, Armenia, Bangladesh, China, Georgia, Honduras, India, Cambodia, Laos, Morocco, Moldova, Nepal, Pakistan, Philippines, Papua New Guinea, Syria, Uzbekistan, Viet Nam, and Yemen.

Figure 2 shows the relations between changes in emigrant or refugee rates and changes in income, calculated as differences between the values taken by the variables in *t* and *t-1*. In Figure 2 (a), the relationship between changes in net emigration and changes in income is now U-shaped. This pattern, quite different from that of Figure 1(a), suggests that the relationship between income and emigration of Figure 1 (a) can be spurious. Figure 2 (b) shows that the relationship between refugee rates and income is still negative, but steeper than that of Figure 1(b).

4. Estimation

4.1. Base estimation

To test the correlation between emigration, or refugee emigration and income in the origin country, the base specification is

$$y_{it} = \alpha_i + \alpha_t + \beta_1 ln\ pcGDP_{it} + \beta_2 squared\ ln\ pcGDP_{it} + \varepsilon_i \quad (1)$$

where y_{it} is either emigrant stocks – net of refugees – or refugee stocks, from country *i* at time *t*; *ln pcGDP* is the log of per capita GDP of country *i* at time *t*; α_t and α_i are time and country effects, ε_{it} is the error term.

Table 1 reports the coefficients of regressions based on pooled OLS, fixed effects (FE) and first differences specifications. Time dummies are included in all regressions. The dependent variables are, respectively, emigrant rates (columns 1-5) and refugee rates (columns 6-10). Results qualify the basic evidence provided by the non-parametric estimations of Figures (1) and (2). In Table 1, the relationship between emigration and income turns from being positive (column 1), or bell shaped but not significant (column 2) in the pulled OLS regressions, to be U-shaped (columns 4-5) in the FE or first differences regressions. The relationships between refugee rates and income are negative in all specifications (columns 6-10), but they are stronger and more significant in the within estimations (8-10).

4.2. Omitted factors

In principle, there can be more than one omitted factor affecting results, and each of them can interact with income differently. These omitted factors can be time varying or constant countries' characteristics, or external shocks. For example, a shock that, at the same time, liberalizes peoples' international movements and increases trade, investments and technology transfers is likely to boost both migration and income. In Figure 3(a), it would make the slope of the relation between the two variables less elastic. Data collected at times t_0 and t_1, before and after the change, would comprise outcomes A and B, and suggest the existence of a positive correlation between emigration and income. However, *ceteris paribus*, the relation is negative. A positive shock of this type is the fall of the Berlin Wall, which freed the international movements of people from Eastern Europe and, at the same time, increased trade, investments, knowledge diffusion and income growth. Another example, concerning the past, is the diffusion of the industrial revolution across Europe (Hatton and Williamson, 1994).

Other circumstances can involve variations in income or in income growth, without structural changes taking place in the country's economy and institutions, and in peoples' regular access to richer economies. For example, the economic and political crisis in Venezuela from 2018, the economic stagnation in Mexico after the eighties (Hanson and Spilimbergo, 1999), or famine in Ireland in the first half of the nineteenth century, lead to more emigration and lower or constant income. Symmetrically, new lands put to use, new natural resources extracted, or aid received from abroad (Murat, 2019), can be associated with more income and less emigration. These cases would correspond to movements along the negatively sloped curve relating emigration and income (respectively to the left and to the right), without major shifts of the curve itself (Figure 3.b). Hence, OLS results in Table 1, concerning between variations (columns 1-2- and 6-7), can follow from observations situated in different curves, such as in Figure 3(a), while FE findings, and within

variations (columns 3-5 and 6-10), are more likely to be related to movements along the curve, as in Figure 3(b).[5]

4.3. Cofactors and interactions

In what follows, I test the correlation of potential cofactors with the dependent variable and their interactions with income. The choice of variables is suggested by the literature on the determinants of migration. Time-varying variables will be included in FE regressions and subsequent specifications, while factors that do not vary or change very slowly in time will be regressed on countries' fixed effects.

Correlations of time-varying cofactors are estimated in an augmented version of equation (1):

$$y_{it} = \alpha_i + \alpha_t + \beta_1 ln\ pcGDP_{it} + \beta_2 squared\ ln\ pcGDP_{it} + \phi j Xjit + \\ + \gamma_d ln\ pcGDP_{it} * X_{jit} + \delta_m\ squared\ ln\ pcGDP * X_{jit} + \varepsilon_{it} \quad (2)$$

where *Xjit* (*j* = 1…n) (d = 1…n) (m = 1…n) are the following variables and their interactions with income and squared income: *Political terror*, a categorical variable that varies from one to five, with five being the highest level of political terror. As in previous literature, it is expected to be significantly correlated with refugee migration (Hatton, 2009; Hatton, 2016). *Unemployment rate* can be a push factor of emigration. *Population growth rate*, expected to be a strong determinant of emigration (Dao et al., 2018 b). *School life expectancy*, can either push or deter emigration; it is a significant factor in Dao et al. 2018 a. Two climate change indicators, the deviations of *Temperature* and *Rain* in the country with respect to the respective past averages during years 1901-24, are expected to boost emigration (among others, Coniglio and Pesce, 2015). The number of people

[5] Extremely negative and persistent events or structural changes can make the curve emigrants-income steeper and shift it down and to the left. This is consistent with less income and more emigration, as well as with more emigration being forced rather than voluntary. One such example is a substantial fall in trade between the country and the rest of the world and in its access to modern technologies.

affected by natural disasters (*Disasters*) can also be expected to push emigration (Naudé 2010; Neumayer 2005).

Results are in Table 2. Time dummies and FE are included in all regressions. In columns 2-9, each cofactor is interacted with income and squared income. Coefficients on some variables and their interactions with income are significant; they are political terror, education, demography and changes in average temper. Specifically, the interactions between income and political terror and between income and population growth are negative (an those on the interacted squared income are positive and significant), while the interactions between income and education and between income and temperature are positive (and coefficients on the squared variable interactions are negative and significant).

The bottom part of Table 2, from column 2 to 8, shows the total coefficient on income computed at different levels of the interacted variables, while in column 9 the total coefficient is computed at three different values of income and at the average levels of the interacted variables. Total coefficients on income are the linear combination of the estimators involving *pcGDP* and its interactions. The three values considered correspond to the 10^{th}, 50^{th} and 90^{th} percentiles of each variable's distributions. For example, in column 2, the three total coefficients on income are the sum of the coefficient on *pcGDP* (at its average level), plus the coefficient on *squared pcGDP,* plus the one on *pcGDP* interacted with *Political terror*, evaluated at each of the three levels of *Political terror*, plus the coefficient on *squared pcGDP* interacted with *Political terror* at its three different levels.[6] Columns 3-8 in the bottom part of Table 2 report the results of these calculations in relation to the other cofactors. In column 9, which includes all cofactors, total coefficients on income are computed differently: they are calculated at the three different income levels and at the average values of all cofactors.

[6] Total coefficients and standard errors are computed with STATA's *lincom*.

Results show that the overall relation of income with emigration is always negative. Specifically, the negative response of emigration to changes in income becomes stronger as political terror increases (column 2, bottom part of Table 2). With higher political terror, more people leave the country with income contractions (and vice versa). In terms of in Figure 3, this means that the relation between the two variables becomes steeper. Similarly, in column 4, the negative relationship between emigration and income is stronger with more rapid population growth.

On the other hand, in column 5, the negative and significant relationship between income and emigration becomes flatter and less significant as school life expectancy increases. Higher growth in average temperatures leads to a similar pattern. In sum, the negative association between income and emigration is stronger when the country has low levels of education, rapid population dynamics, or high levels of political terror. One or another of these factors is likely to be present in poor countries; together they can be more frequent in some world areas, such as Sub-Saharan Africa. The prediction, therefore, is higher income in developing countries are associated with less emigration; the negative relationship is stronger in poor countries. On the other hand, the negative link between emigration and income becomes weaker with higher education levels, slow population dynamics and low levels of political terror, as well as with higher increases in average temperatures. Except for climate change, these factors are more likely to characterize medium-income developing countries, such as those of Eastern Europe.[7]

In the bottom part of column 9 coefficients are computed at the low, mean and high levels of income (corresponding to values in the 10^{th}, 50th and 90th percentiles in its distribution) and at the mean value of each covariate. Results evidence that the total correlation of income with emigration is strongly negative and significant at all income levels, but stronger at the lowest levels. In particular, at the mean level of all variables, including income, as income increases by one per cent, the

[7] In particular, higher education levels and higher temperatures relatively to past averages weaken the correlation between emigration and income. In the case of education, more people will be able to choose whether and where to emigrate. In the second, people from the poor rural parts of the country will be forced to leave. In both cases, the outcomes will be unrelated or only weakly related to income levels.

emigration rate falls by 0.004 percentage points. The average emigration rate is 0.068; by falling to 0.064, it decreases by about six per cent.

Findings in Table 2 also allow some interesting comparisons between countries or regions. One criterion for grouping countries is geography: it can be reasonably thought that countries in the same regions share characteristics that can influence emigration and its relationship with income. Other criteria for grouping countries will be explored below. In Table 3, total coefficients on income are computed at the average values taken by the variables *pcGDP*, *Political terror*, *Population growth*, *School life expectancy* and *Temperature* in each world region during the period considered. The Table includes also the total coefficients on the other significant cofactors.

Results in Table 3 evidence some important differences and regularities across regions. The coefficient on income is always negative and significant, except for Eastern Europe, where it loses significance. This finding was expected: the region is characterized by medium-high levels of income and education, below average levels of political terror, negative population growth (all weaken the income coefficient) and small changes in average temperature. At the opposite, Sub Saharan Africa has the strongest negative coefficient. This also was expected. On average, the region has low levels of per capita income and school life expectancy, and high levels of political terror and population growth (all contribute to strengthen the negative income coefficient). Everything else equal, a one per cent increase in per capita income in Sub Saharan Africa is associated to a fall in the emigration rate of almost 0.006 percentage points. As the average emigration rate in the region is 0.034, it decreases to 0.028; which corresponds to a 17 per cent. Of course, the opposite also holds: income shrinkages are associated with very substantial increases in emigration.

Total coefficients on income in the other regions are the outcomes of different combinations of the values taken by income and the significant cofactors. The coefficient is strongly negative and significant in the Middle East, where income and education levels are medium-high (which make the coefficient to shrink), but are more than compensated by high rates of population growth and

political terror. In South America, political terror is above the mean, but school life expectancy is high, and population growth and income per capita are at average levels. Table A3 shows the average values of these variables in each region. More generally, these results show that no predictions on the emigration-income relationships can be made without taking fully into account the mechanisms on which they depends. Once cofactors and fixed effects are controlled for, the overall relationship between emigration and income is negative in poor countries and not significant in less poor ones.

The direct correlations of cofactors with emigration rates are also of interest. Their total coefficients in Table 3 are also based on the full specification of column 9 of Table 2 and are computed at the average values of variables in each world region. Results show some interesting patterns. On the one hand, the coefficients on political terror and population growth are strongly heterogeneous, taking opposite and significant values across regions. This depends on their strong interactions with income, which has a non-linear relationship with the emigration rate. On the other, the coefficients on school life expectancy and temperature have always the same sign and, in the case of education, also similar values. As above, Sub Saharan Africa is an extreme case: emigration strongly increases with population growth and political terror, and, as in the other regions, decreases with education. Population growth is also positively correlated with emigration from Eastern Europe, but population in this region grows at a negative rate. The coefficient on population growth is negative in the Middle East, where growth rates are high, but they are interacted with medium-high levels of income. More generally, the same given population growth rate has a strong positive correlation with emigration from poor countries and weak one (or even negative) from less poor ones. Therefore, population growth is not an unstoppable force in pushing emigration (Dao et al. 2018b); can be curbed by income growth.

4.4. Constant factors and emigration

The characteristics of countries that are constant or change slowly in time can also affect emigration, but their impact cannot be measured with specifications that include countries' fixed effects, such as those of this study. Hence, I regress them on the fixed effects coefficients of countries. In particular, I use the fixed effect coefficients from an estimation that includes all varying cofactors and controls for time effects. Hence, the correlations reported in Figure 4 are long-run features of the origin country that influence emigration once the country's time-varying characteristics have been controlled for. Results show that the correlation is positive and significant at the one per cent level in countries directly affected by the fall of the Berlin Wall; and it is smaller, but also positive and significant at the one per cent level in the broader group of socialist countries. *Ceteris paribus*, this implies an upward shift of the relationship between income and emigration. On the other hand, the correlation is negative and significant at the one per cent level in oil producing countries. In this case the relationship shifts downward: for any given income level, there is less emigration. Coefficients are not significant for British or Portuguese former colonies, and for *Life expectancy*. The latter is the average value over the period considered. Testing for the specific colonial past was meant to capture features of the country that can ease migration to the former colonial power or its settlement countries, such as common language or similar institutions. *Life expectancy* was used as a further indicator of the level of development of the country.

A similar exercise is performed with world regions. In this case, Eastern European countries share characteristics that facilitate emigration. This is consistent with the positive coefficient on *Berlin Wall*. A positive coefficient concerns also countries of North and Central America (with significance at the five per cent level) and Central Asia. Regarding North and Central America, the result might be related to the shorter distance between the region and the United States; the positive coefficient for Central Asia can be the result of long-term political and institutional instability. At the other extreme, everything else given, structural characteristics of the Sub-Saharan area make emigration less likely. In this case, the coefficient is negative and significant at the one per cent level.

Coefficients are negative also in South America (significance at the 10 per cent level) and the Middle East (significance at the five per cent level). The result on Middle Eastern countries is consistent with the above result on oil producing economies. One possible explanation for South America can be the distance to developed and rich countries, and, with some exceptions, political and civil institutions that make emigration less desirable than in other developing areas.

5. Emigration to developed countries and immigration into OECD economies.

Results up to now are that countries' characteristics are correlated with the rates of emigration, but these same characteristics might be associated also with the prevailing destinations of emigrants. If destinations are distinguished between developed and developing, then the proportion of emigrants from the origin country moving to one or the other can be associated with several characteristics of countries, but among them, one can be especially important: education.[8] (Dao et al. 29018a). This is mainly because most developed countries facilitate the immigration of skilled and educated individuals relatively to that of unskilled ones. This selects among individuals but, implicitly, also among origin countries because the likelihood that an immigrant is educated increases with the home country's average level of education, and because bilateral agreements on the recognition of foreign academic degrees and professions are more frequent with countries having higher education levels.

To test whether destinations change significantly with education and the other significant characteristics of countries, I regress the proportion of emigrants moving to a developed economy on the above variables. In Table 4, the dependent variable is the share of emigrants from the origin country moving to a developed destination.[9] This proportion varies across time but especially across

[8] The policies of several developed countries facilitate the immigration of skilled and educated individuals relatively to that of unskilled ones. This implicitly selects amongst origin countries, because the likelihood that an immigrant is educated increases with the home country's average level of education, and because bilateral agreements on the recognition of foreign academic degrees and professions are more frequent between countries with higher education levels.

[9] Developed destinations are OECD economies, except for Mexico, Turkey and Chile, and including Singapore.

regions: during the period considered, the average proportions of emigrants moving to a developed country range from 25% in Sub-Saharan Africa to above 90% in Eastern Europe.

Table 4 comprises two indicators of education: *Literacy rates* (an average over the period considered) and *School life expectancy*. Coefficients in column 1 show that the proportion of emigrants moving to developed countries has a positive time trend. In all the subsequent specifications there is a strong and positive correlation between education in the home country and the proportion of its emigrants moving to a developed destination. In columns 3-7, the inclusion of other cofactors does not alter significantly the coefficients on school life expectancy. In column 5, one more year of school life expectancy increases the proportion of emigrants moving to a developed destination by almost one percentage point (the mean percentage is about 52 per cent). Other findings are that population growth rates, political terror and the size of the emigrant stock are all negatively associated with the proportion of emigrants moving to developed countries. Interestingly, the coefficient on *pcGDP* is strongly negative and significant in specifications including country and time effects (columns 2-5), but it is positive in column 6, where time effects or the time trend are excluded. Hence, when both time and country effects are controlled for, the proportion of emigrants moving to developed countries grows with education but not with income in the origin country.

These results, however to do not show whether the *total number* of emigrants moving to the developed economies increases or decreases with income, education, and, more generally, development in the origin countries. For example, results up to now are that education has a negative correlation with overall emigration rates, but positive with the proportion of these emigrants moving to developed countries. Hence, the question at this point is whether migration rates to the rich economies increase or diminish with income and development in the origin country. To measure this rate, the data are split between observations where the percentage of emigrants from the origin country moving to a developed economy is above or equal to the mean, of 52 per cent, and observations where this percentage is below the mean. This is a time-varying variable, with

percentages computed on the total number of emigrants (Table A2). In each subsample, the dependent variable, emigrant rates, is regressed on countries' characteristics (Table 5). All specifications include time and country effects.

Results in Table 5 show that, without controlling for covariates, coefficients on income and on square income in the two subsamples take opposite values. With the majority of emigrants moving to other developing countries, the relationship between emigration and income is U-shaped (column 1), while when most emigrants move to developed economies coefficients on income are those a bell-shaped relationship, but they either weakly or not significant (column 2). In the more complete specifications of columns 3 and 4 the signs and significance of the total coefficients on income differ (bottom part of Table 5). Emigration of people moving mainly to other developing countries is negatively, strongly and significantly related with income at home. When income increases by one per cent, the emigration rate decreases by 0.007 percentage points. As the average rate is 0.044, it falls to 0.037 (Table A2). Emigration to developing economies mostly originates from other poor countries. Results show that, in these cases, higher income at home is associated with less emigration. On the other hand, the emigration to developed economies originates mostly from less poor countries. In this case, and consistently with previous findings, the decision to leave is unrelated to the level of per capita income at home. The total coefficient on income, in the bottom part of column 6, is not significant.

Interestingly, the values and signs of the coefficients on covariates vary with destinations. The coefficient on political terror is positive when most emigrants move to other developing countries (columns 3 and 5), and negative when most of them move to developed economies (column 6). Similarly, the sign of the population growth rate is positive for the emigration to other developing countries (columns 3 and 5) and negative for the emigration to the developed economies (column 6). Their interactions with income vary accordingly.

6. Forced emigration

In initial tests, the relationship between refugee emigration and income was either negative or U-shaped (columns 6-10, Table 1). Once fixed effects or first differences specifications were used, negative coefficients on income became stronger, suggesting, as in the emigrants' regressions, that the coefficients in the pooled OLS specifications were upward biased because of omitted variables.

Table 7 shows the results of regressing the refugee rate on further potentially significant variables. Columns 2-8 include each variable separately, while the full regression of column 9 depicts the full regression. The results of these tests evidence that refugee migration appears to respond to simpler mechanisms than general emigration. The full regression of column 9 shows that there are only two variables interacting significantly with income and correlated with refugee rates: *Political terror* and *Temperature*. Specifically, higher levels of political terror increase the strength of the negative correlation between refugee emigration and income. As could be expected, given the nature of refugee movements, the correlation of political terror with refugee migration and its interactions with income are stronger than in the emigrant regressions of Table 2. The coefficients on temperature, instead, are very similar to those in Table 2. Also in this case, higher temperatures relatively to past averages weaken the correlation between refugee migration and income (Table 7, column 9).[10]

An interesting question is whether the stronger negative correlation of refugee migration with income depends on the forced nature of this type of emigration; forced emigrants would not leave with improved conditions at home. In this case, a similar correlation result should apply to forced emigration in general, for example to emigration from situations of high political instability or war.[11] Hence, high or low levels of political terror in the home country can help to distinguish between the forced or voluntary nature of emigration movements. It can also help to widen the concept of forced

[10] Coefficients in Table 2 (concerning emigrants) and Table 7 (refugees) differ regarding *Population growth*, which is correlated positively with emigration and negatively with refugee migration. The signs on the interactions of the variable with income also hold opposite values.

[11] A similar criterion can apply to migration forced by climate change or famine.

migration beyond that of just refugees and, at the same restrict that of refugees to its genuine component. Neumayer (2005) denominated 'bogus refugees' those migrants who apply for the refugee status without really fleeing from perilous situations. Symmetrically, people fleeing from unsustainable situations who do not apply for asylum can be denominated 'non-voluntary' emigrants. In both cases, it can be thought that people originating from countries where political terror levels are above median levels are more likely to be abandoning their country because they are forced than because they are freely choosing to do it. To distinguish between the relations of these categories with income, the data regarding both refugees and emigrants are spilt between observations with political terror above and below its median value. Results on each subsample are in Table 8.

As expected, Table 8 shows, both for refugees and emigrants, that the relationship between migration and income is stronger and more negative when levels of political terror in the home country are high. Coefficients in columns 1 and 3 can be interpreted as corresponding to forced emigration (both of genuine refugees and non-voluntary emigrants), while those of column 2 and 4 can be those of 'bogus' refugees and voluntary emigrants. In them, coefficients are small or non significant.

7. Conclusions

This study tested the relationship between emigration and income in the home country under different specifications. The base general result is that the relationship between emigration and income can be bell-shaped in some tests based on between country variations, but it is negative or U-shaped in country fixed effects or first differences regressions. Refugee migration is negatively linked to income in all specifications.

The economic rationale of these basic findings becomes clearer when some features of origin countries, and their interactions with income are accounted for. Characteristics such as the level of education, population growth, political terror and climate change, significantly influence the

correlations between emigration from the country and income. The features, especially the first three, are proxies of the country's level of development. When they – and other controls – are considered, only the decreasing segment of the initially U-shaped relationship preserves its significance. The relationship between emigration and income is either negative, in poor countries, or non significant, in medium income ones. At the two extremes are Sub Saharan Africa and Eastern Europe. Higher income levels in the average country of Sub Saharan Africa are strongly associated with lower emigration rates (and income contractions are correlated with substantially higher emigration), while emigration from Eastern Europe is unrelated to income at home. In each region or country, the result does not depend just on the level of income, but on the levels taken by each of the significant covariates. More generally, the relationship between emigration and income is intrinsically related to the origin country's level of development, and the level of development is given by the interaction of several factors.

Emigration to developed economies differs from overall emigration. The first comprises a higher proportion of people originating from countries with above average education levels, and below average rates of population growth and political terror. In countries with these characteristics, the relationship between emigration and income is weak or non-significant. Moreover, results show that education is negatively associated with emigration, but positively correlated with the proportion of emigrants moving to developed countries. Hence, depending on which of the two effects prevails, immigration into the developed economies can increase with education abroad. In both cases, it does not increase with income (this provides support to Dao et al. 2018a).

Forced emigration, both of 'genuine' refugees and non-voluntary emigrants, is strongly and negatively related to income at home, while the emigration of 'bogus' refugees (as denominated in Neumayer, 2005), and voluntary emigrants is only weakly correlated with it. This supports the hypothesis that people forced to leave the home country because of strong political instability or poverty, prefer not to leave as conditions at home improve (Dustmann et al., 2016). Climate change

weakens the relationship between emigration and income. In particular, rising average temperatures are associated with increasing emigration, which can be only partially deterred by higher income levels.

This study measures the correlations between emigration and income, not causal relationships. However, results show that promoting income growth in poor countries, especially in the poorest ones, should lead to less emigration. More generally, promoting development, which implies higher education levels, lower population growth rates, and lower levels of political terror, should be followed by less emigration. However, higher income could be not sufficient to compensate for the effects of growing average temperatures on people's decisions to emigrate.

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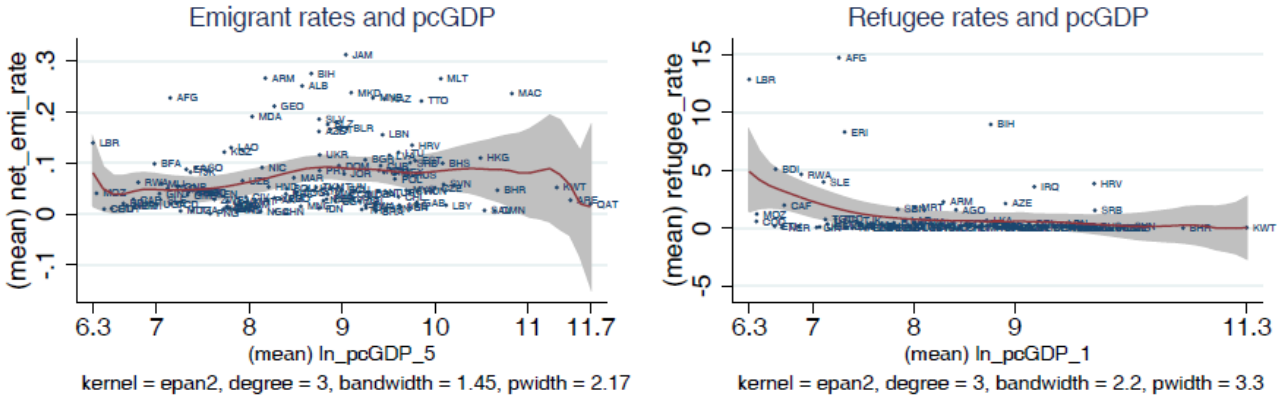
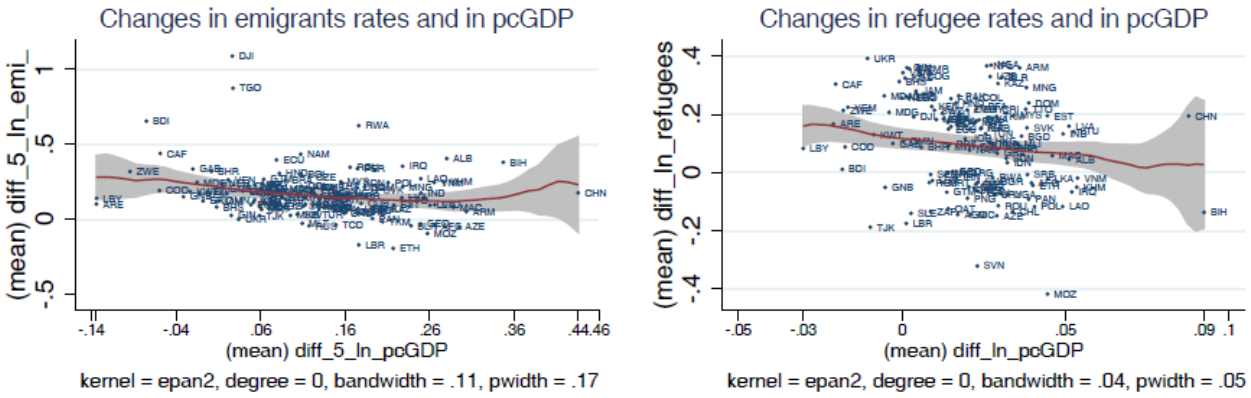
Figure 1. - Emigrant - refugee rates and pcGDP of origin countries



(a) (b)

Figure 2. - Changes in income and in emigrant and refugee rates



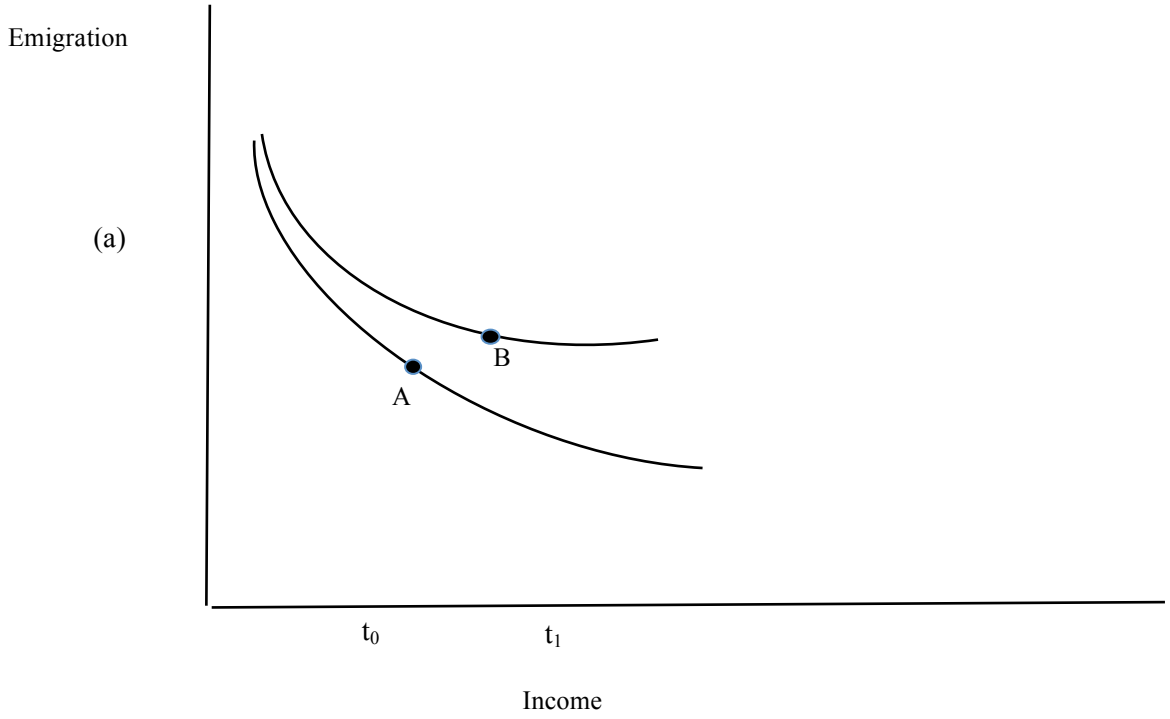
(a) (b)

Table 1.- Dependent variable: Emigrant rate - Refugee rate.

	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
	Emigrant rate					Refugee rate				
	Pooled OLS	Pooled OLS	FE	FE	First differences	Pooled OLS	Pooled OLS	FE	FE	First differences
pcGDP	0.012**	0.088	0.016***	-0.138***		-0.005**	-0.061*	-0.020***	-0.191***	
	(0.005)	(0.064)	(0.005)	(0.028)		(0.002)	(0.035)	(0.004)	(0.042)	
squared pcGDP		-0.004		0.009***			0.003*		0.010***	
		(0.004)		(0.002)			(0.002)		(0.002)	
D pcGDP					-0.105					-0.350**
					(0.064)					(0.148)
D squared pcGDP					0.006*					0.019**
					(0.003)					(0.008)
Time effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country effects	no	no	yes	yes	yes	no	no	yes	yes	yes
Observations	3,044	3,044	3,044	3,044	2,400	2,963	2,963	2,963	2,963	2,827
R-squared	0.044	0.054	0.907	0.911	0.009	0.065	0.107	0.544	0.583	0.178
Number of countries	129	129	129	129	129	129	129	129	129	129

Notes. Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Constant omitted. The sample is an unbalanced panel, comprising data between 1991 and 2015. pcGDP is in logs.

Figure 3. – Emigration and income



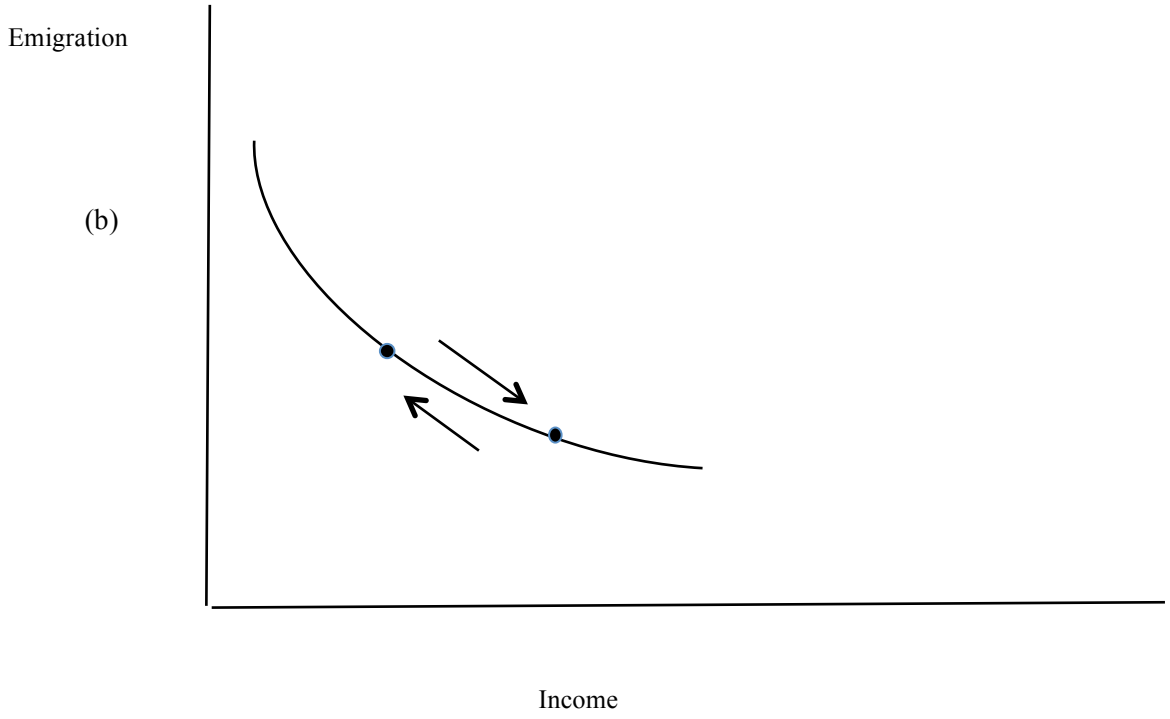


Table 2. - Dependent variable: Emigrant rates. FE.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Polit. terror	Unempl.	Demography	Education	Temperature	Rain	Disasters	Full
pcGDP	-0.138***	-0.023	-0.167***	-0.094**	-0.261***	-0.158***	-0.131***	-0.222***	-0.051
	(0.028)	(0.035)	(0.036)	(0.037)	(0.053)	(0.030)	(0.028)	(0.036)	(0.053)
squared pcGDP	0.009***	0.003*	0.010***	0.007***	0.016***	0.010***	0.009***	0.014***	0.005*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Political terror		0.193***							0.130***
		(0.044)							(0.045)
pcGDP * Political terror		-0.042***							-0.026**
		(0.010)							(0.010)
squared pcGDP * Political terror		0.002***							0.001**
		(0.001)							(0.001)
Unempl. rate			-0.883						
			(1.519)						
pcGDP * Unemployment			-0.047						
			(0.331)						
squared pcGDP * Unemployment			0.016						
			(0.018)						
Population growth				0.097**					0.149***
				(0.039)					(0.029)
pcGDP * Pop. growth				-0.019**					-0.030***
				(0.008)					(0.006)
squared pcGDP * Pop. growth				0.001**					0.001***
				(0.000)					(0.000)
School life exp.					-0.077***				-0.017
					(0.014)				(0.015)
pcGDP * School life exp.					0.017***				0.003
					(0.003)				(0.004)
squared pcGDP * School life exp.					-0.001***				-0.000
					(0.000)				(0.000)
Temperature						-0.224***			-0.194***
						(0.054)			(0.054)
pcGDP * Temperature						0.051***			0.045***
						(0.012)			(0.012)
squared pcGDP * Temperature						-0.003***			-0.003***
						(0.001)			(0.001)
Rain							-0.004		
							(0.003)		
pcGDP * Rain							0.001		
							(0.001)		
squared pcGDP * Rain							-0.000		

							(0.000)		
Disasters								-0.011	
								(0.011)	
pcGDP * Disasters								0.003	
								(0.003)	
squared pcGDP * Disasters								-0.000	
								(0.000)	
Total coefficients on income, at interacted variable level:		Political terror		Population growth rate	School life expectancy	Temperature			Full
Low		-0.333**	-0.708***	-0.293	-0.649***	-0.598***	-.556***	-.835***	-0.410**
		(0.115)	(0.136)	(0.179)	(0.177)	(0.139)	(0.137)	(0.124)	(0.138)
Median		-0.530***	-0.670***	-0.486***	-0.314*	-0.433**	-.489***	-.806***	-0.397**
		(0.106)	(0.114)	(0.135)	(0.164)	(0.130)	(0.132)	(0.121)	(0.144)
High		-0.726***	-0.580**	-0.620***	-0.157	-0.227*	-.420**	-.738***	-0.351**
		(0.114)	(0.208)	(0.126)	(0.166)	(0.134)	(0.143)	(0.138)	(0.140)
Observations	3,044	2,967	3,044	3,043	2,745	3,019	2,995	2,288	2,679
R-squared	0.911	0.912	0.916	0.916	0.924	0.911	0.911	0.922	0.935

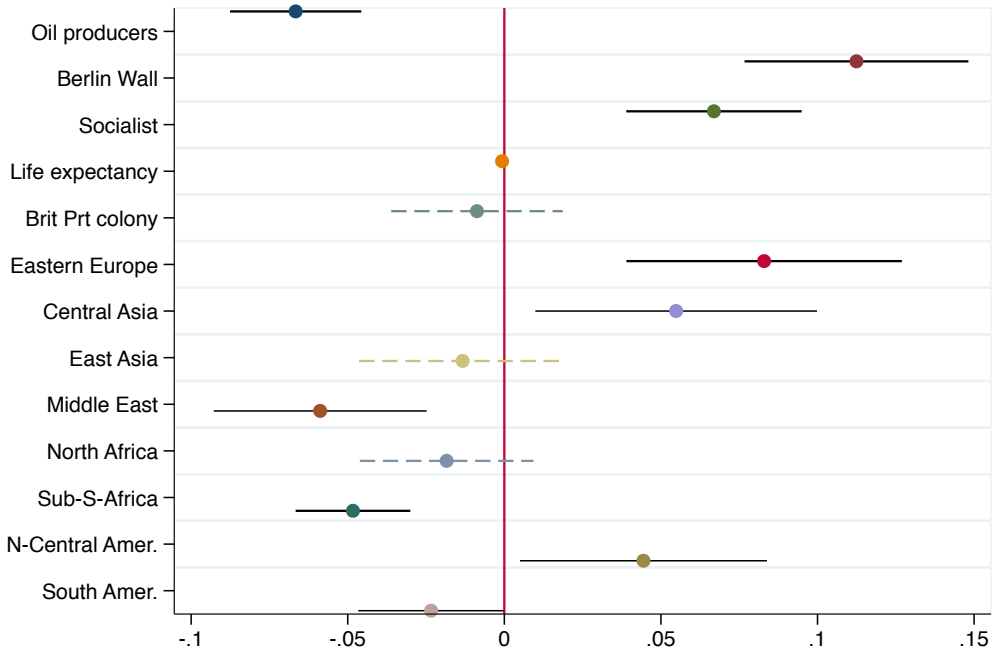
Notes. Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Constant omitted. Time and country effects in all regressions. pcGDP is in logs. The sample is an unbalanced panel, comprising data between 1991 and 2015. Columns 2-8: Total coefficients on income are the sum of the coefficient on pcGDP plus the coefficient on squared pcGDP, plus the coefficient on pcGDP and on squared pcGDP interacted with each covariate, computed at the mean level of income and, respectively, at the low, median and high level of the covariate. Levels of each covariate are at the 10th, 50th and 90th percentile. Column 9: the Total coefficient on income is calculated as above but, in this case, pcGDP takes the low, median and high values, while the covariates are computed at their mean levels.

Table 3. - Dependent variable: emigration rates. Total coefficients

	East. Europe	Central Asia	East Asia	Middle East	North Africa	Sub Saharan Africa	N. Cent. Amer.	South Amer.
Income	0.103	-0.362**	-0.334**	-0.523***	-0.297**	-0.593***	-0.268*	-0.353*
	(0.171)	(0.155)	(0.145)	(0.112)	(0.147)	(0.131)	(0.141)	(0.164)
Political terror	-0.008***	0.003	-0.006**	-0.012***	-0.009**	0.016***	-0.007**	-0.009***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Population growth	0.001**	0.004**	0.001	-0.011***	-0.002*	0.019***	-0.002*	-0.003**
	(0.0002)	(0.001)	(0.001)	(0.003)	(0.001)	(0.004)	(0.001)	(0.001)
School life expectancy	-0.014	-0.014**	-0.014**	-0.015	-0.014*	-0.014**	-0.014*	-0.015*
	(0.009)	(0.007)	(0.007)	(0.010)	(0.008)	(0.005)	(0.008)	(0.009)
Temperature	0.003**	0.0002**	0.002**	0.0003	0.003**	-0.001	0.002**	0.001**
	(0.001)	(0.0001)	(0.0001)	(0.0001)	(0.001)	(0.001)	(0.001)	(0.0005)
Observations	2679	2679	2679	2679	2679	2679	2679	2679
R-squared	0.935	0.935	0.935	0.935	0.935	0.935	0.935	0.935

Notes: Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Total coefficients of variables are computed from column 9 of Table 2. Total coefficients on *pcGDP* are the sum of the coefficient on pcGDP plus that on squared pcGDP, plus the coefficients on all the interactions of income with variables, all computed at the average values taken by income and each variable in each region. Total coefficients on each variable are the linear combination of the coefficient on the variables plus the coefficients on the interactions between the variable and income and squared income, computed at the average values taken by each variable and income in each region. Average values are in Table A3.

Figure 4. - Correlates of country fixed effects



Notes. Constant country characteristics regressed on countries' fixed effects. °: coefficients. Standard errors (segments associated to each coefficient): significance - - below 10%, - below 1%, ▬ at 1%

Table 4.- Dependent variable: Percentage of emigrants moving to developed destinations

	(1) FE	(2) Pooled OLS	(3) Pooled OLS	(4) FE	(5) FE	(6) FE	(7) FE
Literacy		0.893***	0.864***				
		(0.097)	(0.172)				
School life expectancy				1.022***	1.035***	1.941***	0.832***
				(0.168)	(0.168)	(0.150)	(0.170)
pcGDP			0.610	-2.063***	-2.269***	2.647***	-2.673***
			(3.591)	(0.768)	(0.775)	(0.630)	(0.812)
Emigrant stock					-0.488***	-0.130	-0.514***
					(0.182)	(0.167)	(0.179)
Population growth					-0.188	-0.377***	-0.261**
					(0.128)	(0.143)	(0.128)
Political terror						-0.331*	-0.718***
						(0.195)	(0.196)
Temperature						0.448*	-0.369
						(0.233)	(0.261)
Time	0.379***						
	(0.017)						
Time effects	no	yes	yes	yes	yes	no	yes
Country effects	yes	no	no	yes	yes	yes	yes
Observations	3,164	3,164	3,044	2,745	2,744	2,679	2,679
R-squared	0.973	0.344	0.338	0.977	0.977	0.976	0.978

Notes. Robust standard errors clustered by country in parentheses.*** p<0.01, ** p<0.05, * p<0.1. Constant omitted. pcGDP and Emigrant stock are in logs. The sample is an unbalanced panel between 1991 and 2015.

Table 5.- Dependent variable: Emigrant rate. FE.
Most emigrants moving to developing - developed countries.

	(1) >to developing	(2) >to developed	(3) >to developing	(4) >to developed	(5) >to developing	(6) >to developed
pcGDP	-0.164***	0.123*	-0.249***	0.049	-0.154*	-0.613**
	(0.029)	(0.065)	(0.041)	(0.061)	(0.081)	(0.238)
squared pcGDP	0.009***	-0.005	0.016***	-0.001	0.012**	0.034**
	(0.002)	(0.003)	(0.003)	(0.003)	(0.005)	(0.014)
Political terror			0.004***	0.001	0.123**	-0.186*
			(0.001)	(0.001)	(0.050)	(0.102)
pcGDP * Political terror					-0.027**	0.049**
					(0.012)	(0.024)
squared pcGDP * Political terror					0.001**	-0.003**
					(0.001)	(0.001)
Unemployment rate			-0.026	0.015	-0.036**	-0.004
			(0.021)	(0.031)	(0.017)	(0.033)
pcGDP * Unemployment					0.009**	0.007
					-0.004	(0.007)
squared pcGDP * Unemployment					-0.0005**	-0.0003
					(0.0002)	(0.0004)
Population growth			0.009***	-0.002	0.199***	-0.305**
			(0.003)	(0.001)	(0.040)	(0.145)
pcGDP * Pop. growth					-0.042***	0.074**
					(0.008)	(0.034)
squared pcGDP * Pop. growth					0.002***	-0.004**
					(0.000)	(0.002)
School life exp.			-0.002**	-0.001	-0.032*	-0.156**
			(0.001)	(0.001)	(0.016)	(0.079)
pcGDP * School life exp.					0.009**	0.031*
					(0.004)	(0.018)
squared pcGDP * School life exp.					-0.001**	-0.001
					(0.000)	(0.001)
Temperature			-0.001	0.002	-0.114	-0.224**
			(0.002)	(0.001)	(0.073)	(0.109)
pcGDP * Temperature					0.027	0.055**
					(0.017)	(0.026)
squared pcGDP * Temperature					-0.002	-0.003**
					(0.001)	(0.001)
Rain			-0.000	0.000*	0.003	0.003
			(0.000)	(0.000)	(0.004)	(0.005)
pcGDP * Rain					-0.001	-0.001
					(0.001)	(0.001)
squared pcGDP * Rain					0.000	0.000
					(0.000)	(0.000)
Disasters			0.000	0.000	0.010	-0.033*
			(0.000)	(0.000)	(0.010)	(0.020)
pcGDP * Disasters					-0.002	0.008*
					(0.002)	(0.005)
squared pcGDP * Disasters					0.000	-0.000*
					(0.000)	(0.000)
Total income coefficient					-0.734**	0.179
					(0.216)	(0.680)
Time effects	yes	yes	yes	yes	yes	yes
Country effects	yes	yes	yes	yes	yes	yes
Observations	1,523	1,521	1,012	1,026	1,012	1,026
R-squared	0.839	0.929	0.849	0.951	0.878	0.956

Notes: Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0. The sample is an unbalanced panel between 1991 and 2015. The total coefficient on income is the sum of the coefficient on income plus the one on squared income, plus the coefficients on all the interactions of income and squared income with the other variables, computed at the average values taken by income and each variable I each subsample. Average values are in Table A2.

Table 6. - Dependent variable: Refugee rates. FE

	(1)	(2) Polit. terror	(3) Unemployment	(4) Demography	(5) Education	(6) Temperature	(7) Rain	(8) Disasters	(9) Full
pcGDP	-0.191***	0.149***	-0.209***	-0.240***	-0.376***	-0.220***	-0.183***	-0.223***	-0.014
	(0.042)	(0.032)	(0.063)	(0.044)	(0.096)	(0.049)	(0.043)	(0.077)	(0.064)
squared pcGDP	0.010***	-0.008***	0.011***	0.013***	0.022***	0.012***	0.010***	0.012***	0.002
	(0.002)	(0.002)	(0.003)	(0.002)	(0.006)	(0.003)	(0.002)	(0.004)	(0.004)
Political terror		0.416***							0.393***
		(0.064)							(0.057)
pcGDP * Political terror		-0.093***							-0.089***
		(0.015)							(0.013)
squared pcGDP*Political terror		0.005***							0.005***
		(0.001)							(0.001)
Unempl. rate			-1.538						
			(1.600)						
pcGDP * Unemployment			0.371						
			(0.353)						
squared pcGDP*Unemployment			-0.023						
			(0.019)						
Population growth				-0.109**					-0.077
				(0.052)					(0.048)
pcGDP * Pop. growth				0.021*					0.015
				(0.011)					(0.010)
squared pcGDP*Pop. growth				-0.001*					-0.001
				(0.001)					(0.001)
School life exp.					-0.073***				-0.012
					(0.021)				(0.019)
pcGDP * School life exp.					0.018***				0.004
					(0.005)				(0.004)
squared pcGDP*School life exp.					-0.001***				-0.000
					(0.000)				(0.000)
Temperature						-0.233***			-0.193***
						(0.083)			(0.059)
pcGDP * Temperature						0.054***			0.044***
						(0.019)			(0.014)
squared pcGDP*Temperature						-0.003***			-0.003***
						(0.001)			(0.001)
Rain							-0.007*		-0.004
							(0.004)		(0.004)
pcGDP * Rain							0.001*		0.001
							(0.001)		(0.001)
squared pcGDP * Rain							-0.000*		-0.000
							(0.000)		(0.000)
Disasters								-0.028	
								(0.018)	
pcGDP * Disasters								0.006	
								(0.004)	
squared pcGDP * Disasters								-0.000	
								(0.000)	
Total coefficient pcGDP									-0.770***
									(0.167)
Time effects	yes	yes	yes	yes	yes	yes	yes	yes	yes

Country effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	2,963	2,906	2,963	2,962	2,672	2,940	2,916	2,257	2,602
R-squared	0.583	0.674	0.585	0.650	0.588	0.590	0.588	0.593	0.729

Notes. Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1. pcGDP is in logs. Constant omitted. The sample is an unbalanced panel, comprising data between 1991 and 2015. The total coefficient on pcGDP is calculated by summing the coefficient on pcGDP plus that on squared pcGDP, plus those on all the interactions of pcGDP with covariates, at the mean values of all variables.

Table 7. - Dependent variable: Emigrant and Refugee rates. FE.
Political terror above - below median.

	Refugee rate		Emigrant rate	
	(1)	(2)	(3)	(4)
	PT >=median	PT< median	PT >=median	PT< median
pcGDP	-0.242***	-0.037**	-0.182***	0.074
	(0.052)	(0.016)	(0.032)	(0.054)
squared pcGDP	0.014***	0.002***	0.011***	-0.001
	(0.003)	(0.001)	(0.002)	(0.003)
Emigrant rate	0.087	-0.072***		
	(0.064)	(0.027)		
Political terror	0.005***	0.001**	0.003**	-0.002
	(0.001)	(0.001)	(0.002)	(0.002)
Population growth	-0.008***	-0.000	0.006***	0.001**
	(0.002)	(0.000)	(0.002)	(0.001)
School life exp.	0.001	-0.001	-0.001*	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Temperature	-0.000	-0.000	-0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.002)
Time effects	yes	yes	yes	yes
Country effects	yes	yes	yes	yes
Observations	1,599	1,024	1,610	1,069
R-squared	0.709	0.786	0.933	0.937

Notes: Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0. Constant omitted. The sample is an unbalanced panel between 1991 and 2015.

APPENDIX

Table A1. - Variables and sources

Variable	Description	Source
Emigrant outward stock	Number of people emigrated from origin country.	UN Department of Economic and Social Affairs - Population Division, International migration stock: The 2015 revision.
Emigrant rate	Emigrant outward stock/Population of origin country	Population: World Bank, Health, Nutrition and Population statistics - Population, total.
Refugee outward stock	Number of people that have fled a certain country and have been recognized as refugees.	UNHCR, Population statistics, Time Series - Refugee data.
Refugee rate	Refugee outward stock/ Population origin country	Population: World Bank, Health, Nutrition and Population statistics - Population, total.
Per capita GDP PPP	Gross domestic product per capita, converted to constant 2011 international dollars using purchasing power parity rates.	World Bank, Economy and growth data - GDP per capita, PPP (constant 2011 international $).
Population growth rate	$(Population_t – Population_{t-1})/ Population_{t-1}$	Population: World Bank, Health, Nutrition and Population statistics - Population, total.
Unemployment	Share of labour force that is unemployed, but available for employment.	ILO STAT - Unemployment rate, by sex and age.
Disasters	Number of the people that lost their lives (or are missing) during a natural/technological disaster, summed to the number of the 'total affected', which are the people requiring immediate assistance, injured, or homeless because of the disaster.	Centre for Research on the Epidemiology of Disasters, International Disaster Database
Temperature	Temperature in country *j* at time *t* minus average temperature in country *j* during 1901-1924.	World Bank Climate Change Data Portal - historical climate data
Rain	Rain in country *j* at time *t* minus average rain in country *j* during 1901-1924.	World Bank Climate Change Data Portal - historical climate data
Literacy	Adult total. % of people aged 15 and above.	World Bank statistics
Oil producing countries, Berlin Wall affected countries, Socialist countries, Former British or Portuguese former colonies.	Dummies taking values zero or one.	Bertocchi and Strozzi (2004). The Citizenship Law Database.
School life expectancy	Expected number of years that a child of a certain age can expect to receive	UNESCO Statistics

	in the future.	
Life expectancy	Life expectancy at birth.	World Bank statistics
Political Terror Scale (PTS)	Index that shows the level of state political violence and terror, ranging between 1 (minimum terror) and 5 (maximum terror), based on U.S. State Department Country Reports on Human Rights Practices.	Gibney M, Cornett L, Wood R, Haschke P, Arnon D (2016) The Political Terror Scale 1976- 2015. Data retrieved from the Political Terror Scale website.

Countries: Afghanistan Albania Algeria Angola Argentina Armenia Azerbaijan Bahamas Bahrain Bangladesh Belarus Belize Benin Bolivia Bosnia and Herzegovina Botswana Brazil Bulgaria Burkina Faso Burundi Cambodia Cameroon Central African Rep. Chad Chile China Hong Kong Macao Colombia Congo Costa Rica Cote d'Ivoire Croatia Cuba Czech Rep. Dem. Rep. of the Congo Djibouti Dominican Rep. Ecuador Egypt El Salvador Eritrea Estonia Ethiopia Gabon Gambia Georgia Ghana Guatemala Guinea Guinea-Bissau Honduras Hungary India Indonesia Iran Iraq Jamaica Jordan Kazakhstan Kenya Kuwait Kyrgyzstan Lao Latvia Lebanon Lesotho Liberia Libya Lithuania Madagascar Malawi Malaysia Mali Mauritania Mexico Mongolia Montenegro Morocco Mozambique Namibia Nepal Nicaragua Niger Nigeria Oman Pakistan Panama Papua New Guinea Paraguay Peru Philippines Poland Qatar Rep. of Moldova Romania Russian Federation Rwanda Saudi Arabia Senegal Serbia Sierra Leone Slovakia Slovenia Somalia South Africa Sri Lanka Sudan Swaziland Syrian Arab Rep. Tajikistan Thailand The former Yugoslav Republic of Macedon Togo Trinidad and Tobago Tunisia Turkey Turkmenistan Uganda Ukraine United Arab Emirates Tanzania Uruguay Uzbekistan Venezuela Viet Nam Yemen Zambia Zimbabwe.

Table A 2.- Descriptive statistics

	Full sample			Emigrants: majority to developed			Emigrants: Majority to developing		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Emigration rate	2963	0.068	0.072	1462	0.093	0.086	1501	0.044	0.044
Refugee rate	2963	0.007	0.026						
Emigrants stock (thousand)	2963	1,036	1,852	1462	1,226	2,062	1501	850	1,600
Refugee stock (thousand)	2963	66	236						
Per capita GDP	2963	10,213	15,823	1462	10,257	7,516	1501	10,171	20,961
School life expectancy	2672	9.5	2.4	1336	10.4	1.6	1336	8.6	2.6
Political terror	2906	2.85	1.03	1428	2.70	0.94	1478	2.99	1.09
Unemployment rate	2963	0.10	0.08	1462	0.11	0.08	1501	0.09	0.08
Population growth r.	2962	1.79	1.63	1462	1.07	1.28	1500	2.49	1.62
ln Disasters	2257	9.36	3.87	1115	9.16	3.88	1142	9.55	3.86
Temperature	2940	0.83	0.63	1439	0.92	0.67	1501	0.73	0.58
Rain	2916	0.19	14.99	1424	1.42	16.04	1492	-0.98	13.83
Population (million)	2963	43,761	156,177	1462	34,784	119,691	1501	52,505	184,543

Table A3.- Descriptive statistics. World regions

	Eastern Europe			Central Asia			East Asia			Middle East		
	Obs.	Mean	S.D.	Obs.	Mean	S.D.	Obs.	Mean	S.D.	Obs.	Mean	S.D.
ln pcGDP	400	9.32	0.57	339	8.22	0.73	322	8.87	1.08	277	9.91	1.26
Political terror	408	2.24	1.02	342	3.35	0.94	272	2.63	0.88	298	2.74	1.18
Population gr.	439	-0.32	0.78	350	1.30	1.56	325	1.54	0.73	296	3.59	2.75
School life exp.	416	11.04	1.00	294	9.46	1.86	283	9.84	1.81	269	10.54	1.52
Temperature	439	1.08	0.70	350	0.98	0.67	300	0.58	0.52	300	1.14	0.67

	North Central Africa			Sub Saharan Africa			North Central America			South America		
	Obs.	Mean	S.D.	Obs.	Mean	S.D.	Obs.	Mean	S.D.	Obs.	Mean	S.D.
ln pcGDP	117	9.12	0.48	1016	7.57	0.84	323	9.13	0.59	250	9.23	0.43
Political terror	125	3.18	0.79	1046	3.08	1.03	325	2.50	0.89	250	2.78	1.05
Population gr.	125	1.53	0.49	1046	2.58	1.01	325	1.48	0.78	250	1.40	0.51
School life exp.	115	10.56	1.80	909	7.57	2.63	299	10.38	1.26	240	11.34	1.18
Temperature	125	1.13	0.64	1050	0.69	0.57	325	0.83	0.41	250	0.42	0.49