KIEL INSTITUTE FOR THE WORLD ECONOMY

KIEL WORKING PAPER

Higher economic growth in poor countries, lower migration flows to the OECD

Revisiting the migration hump with panel data

No. 2145 June 2020

David Benček, Claas Schneiderheinze

Kiel Institute for the World Economy
ISSN 2195–7525

Higher economic growth in poor countries, lower migration flows to the OECD – Revisiting the migration hump with panel data

David Benček[1] and Claas Schneiderheinze[2]

[1]Monopolies Commission, david.bencek@monopolkommission.bund.de
[2]Kiel Institute for the World Economy, claas.schneiderheinze@ifw-kiel.de

June 17, 2020

Abstract

Comparing emigration rates of countries at different stages of economic development, an inverse u-shape emerges. Although merely based on cross-sectional evidence, the "migration hump" is widely interpreted as a causal relationship. Therefore, economic progress in developing countries is assumed to increase migration. For policy makers in destination countries that implies a sensitive trade-off between supporting development and reducing immigration pressures. In this paper we investigate whether the migration hump holds up to more scrutiny, finding that the cross-sectional pattern is misleading. Using 35 years of data on migration flows to OECD destinations, we successfully reproduce the hump-shape in the cross-section. However, more rigorous fixed effects panel estimations that exploit the variation over time consistently show a negative association between income and emigration. This result is independent of the level of income a country starts out at and thus casts doubt on any causal interpretation of the migration hump.

JEL-Classification: F22, F63, O15.

Keywords: International migration, economic development, development assistance.

Acknowledgment: This research was funded by Stiftung Mercator within the framework of the MEDAM project (Mercator Dialogue on Asylum and Migration; www.medam-migration.eu). Special thanks are also expressed to Mauro Lanati, Robert Lucas, Tobias Stöhr, and Rainer Thiele for very helpful comments on earlier drafts.

Competing interests statement: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

1 Introduction

International migration is as old as nation states. In recent decades, however, it has become highly focused on a small number of destination countries. While the global share of international migrants increased only moderately from 2.9 percent in 1990 to 3.5 percent in 2019 (UN, 2019), migration towards OECD destinations has increased at a much higher pace (OECD, 2019). As a result, about half of the 272 million international migrants today reside in just 10 countries (UN, 2019). Between 2000 and 2018, the share of international migrants in OECD countries has increased from 9.5 to 13 percent. This accounts for more than 75 percent of the total population increase in European countries and for almost 40 percent of the increase in the United States (OECD, 2019). According to data from the Gallup World Poll this trend is unlikely to shift: Globally 750 million individuals intend to move abroad, and two thirds of them aim at one of just 18 destinations (Esipova et al., 2018). In the years to come, climate change and population growth are forecast to further increase the pool of aspiring migrants (Cattaneo and Peri, 2016; Hanson and McIntosh, 2016). At the same time, economic development will allow more people to finance international migration and, thus, fulfil their aspirations. In many destination countries, immigration has become highly politicized and a cultural backlash fuels populist movements (Hooghe and Marks, 2018; Inglehart and Norris, 2016).

In search of common ground, policy makers emphasize the importance of tackling root causes of migration and have identified poverty and low economic development as major drivers of migration.[1] Influencing migration indirectly through development cooperation rather than directly by restrictive immigration policy comes with political and practical advantages. Development policies are more likely to gain public support from voters throughout the political spectrum. Moreover, upholding restrictive immigration policy regimes is extremely expensive and has been shown to shift regular to irregular migration (Czaika and Hobolth, 2016).

However, the attempt to reduce migration by supporting economic development has been heavily criticized by academics based on recent studies showing middle-income countries to have the highest emigration rates (Clemens and Postel, 2018; Haas, 2019). These authors argue that country-level income and emigration are related in a hump-shaped pattern (Haas, 2010; Clemens, 2014; Djajic et al., 2016; European Commission, 2018; Dao et al., 2018; Clemens and Postel, 2018), combining cross-sectional evidence with a plausible theory: At low income levels, credit constraints prevent aspiring migrants from emigrating, while at higher income levels decreasing economic incentives for emigration dominate ever less binding credit constraints (Dao et al., 2018). In consequence, emigration rates are assumed to follow and inverse u-shape along the economic development path of a country.

Such a relationship would have far-reaching implications: The peak implied by the existing estimates is located roughly at the current per capita income level of Bulgaria, China or Colombia. About two thirds of the world's population lives in countries below this threshold (Dao et al., 2018). Hence, interpreting the

[1] The Migration Partnership Framework initiated by the European Commission, the Global Compacts for Migration, and Emmanuel Macron in his speech at the Sorbonne each express the need to improve living conditions in origin countries to reduce international migration (EC, 2016; UN, 2018; Macron, 2018).

migration hump as a causal relationship means that economic growth in developing countries should be expected to boost emigration in the future. Effective development policy could thus raise immigration pressures to most primary destination countries. Clemens and Postel (2018, p. 686) explicitly emphasize this trade-off: *"development assistance to origin countries, to the extent that it is successful in fostering sustained development, is likely to create additional pressure on third-country hosting arrangements by encouraging greater overall emigration."*

Yet, while this relationship is inherently inter-temporal, these studies rely almost exclusively on cross-sectional evidence. The fact that middle-income countries experience higher emigration than their poorer counterparts might be a direct consequence of their income level or it might be due to fundamental differences between low and middle-income countries that simultaneously affect both development and emigration (Lucas, 2019). In that respect, the migration hump hypothesis resembles one of the most heatedly debated concepts in development economics: the Kuznets-curve. Based on the observation that middle-income countries experience higher economic inequality than their poorer and richer counterparts, Kuznets deduced that economic development in poor countries increases inequality (Kuznets, 1955). Only much later it was shown that the hump-shaped cross-country pattern was largely driven by systematic differences between countries and did not hold at the country level (Deininger and Squire, 1998; Field, 2002).

In this paper, we argue along the same lines for the relationship between economic growth and emigration to OECD countries. We demonstrate that the migration hump is merely a cross-sectional phenomenon that is significantly driven by small outlier countries. Moreover, countries at the upwards-sloping part of the migration hump, on average, differ markedly from richer countries with respect to crucial exogenous factors such as distance to OECD countries, size and past colonial ties. These exogenous characteristics are well-known to shape both development and migration.

We employ a dataset recently compiled by Wesselbaum and Aburn (2019) that covers bilateral migration flows between 198 countries of origin and 16 OECD destinations from 1980 to 2014 and test the existence of the migration hump in panel data. In contrasting cross-sectional with time-series estimates, we are, to our knowledge, the first to systematically analyze the dynamics underlying the migration hump. While we successfully reproduce the hump-shape in the cross-section of our sample, our fixed effects panel estimations focusing on the within variance over time robustly yield emigration rates that fall as incomes increase. This finding holds irrespective of the level of income a country starts out at and thus casts doubt on the validity of the migration hump hypothesis as a causal relationship and consequently questions its relevance for policy making.

The remainder of the paper proceeds as follows: In section 2 we review the migration and development literature and critically discuss both the theoretical argument and the empirical evidence that underpin the migration hump. After introducing the data in section 3, section 4 presents the empirical analysis. Specifically, we demonstrate inconsistencies between cross-sectional and time-series estimates of the influence of economic development on emigration in poor countries and provide interpretation. Section 5 sums up and concludes.

2 The development–emigration nexus: Theory and existing empirical evidence

Studying the relationship between economic development and migration has a long tradition in development economics (e.g. Harris and Todaro, 1970). The vast majority of the academic literature used to focus on the influence of migration on development (Beine et al., 2001; Giuliano and Ruiz-Arranz, 2006). How development affects migration has received much less attention. As international migration gained political relevance in destination countries due to large numbers of irregular arrivals of migrants from poor countries, the focus started to shift. Several empirical and theoretical studies have begun to analyze the role of economic development in emigration patterns more systematically (Docquier et al., 2014; Dustmann and Okatenko, 2014; Clemens, 2014; Dao et al., 2018; Haas et al., 2018). While these authors' empirical findings sometimes diverge, they broadly agree on the main theoretical argument: An individual's decision to migrate generally depends on (i) aspirations and (ii) capabilities to move (Carling and Schewel, 2018).

At the macro level, numerous factors systematically influence aspirations and capabilities. These include economic, political, cultural, environmental, and demographic conditions. Due to the complex relationship between economic progress and these other dimensions of development, their individual effects are difficult to disentangle. Large parts of the literature rely on GDP as a universal measure of development. Economic growth, for example, improves local incomes as well as the state's ability to provide public goods.

A priori, the overall influence of development on emigration is ambiguous. If local livelihoods improve, migration aspirations decrease (Dustmann and Okatenko, 2014). However, higher disposable income simultaneously relaxes budget constraints that may previously have prohibited migration. Hence, economic development decreases migration aspirations but increases migration capabilities. Which of these effects dominates likely differs across countries and between different groups of individuals within countries.

2.1 The migration hump: Concept, evidence and interpretation

The migration hump hypothesis (or mobility transition theory) dates back to Zelinsky (1971) and is among the best known stylized facts regarding the development–migration nexus. The hypothesis posits an inverted u-shaped relationship between development and emigration. This fundamentally differs from a traditional neoclassical view of migration, as for example employed in the gravity literature, which omits credit constraints at the individual level and thus assumes emigration to decrease along the development trajectory as rising living standards at home render migration less attractive. Many scholars have argued in favor of a hump-shaped relationship between development and emigration using different terms, e.g. 'migration curve' (Akerman, 1976), 'migration transition' (Gould, 1979), 'migration hump' (Martin, 1993) and 'emigration life-cycle' (T. Hatton and J. Williamson, 1994).[2] While these scholars broadly agree

[2] In line with Clemens (2014) we use the term 'migration hump', which is the most illustrative in our view.

on the inverse-U shaped pattern, they hold different factors responsible for it (see Clemens (2014) for an excellent review).

Among these are demographic change (Easterlin, 1961; T. Hatton and J. Williamson, 1994), financial constraints (Faini and Venturini, 1994; T. Hatton and J. Williamson, 1994), information asymmetries (Greenwood, 1969; Massey et al., 1993; Epstein, 2008), structural economic transformation (Zelinsky, 1971), economic inequality (Stark, 2006) and immigration barriers abroad (Timothy J Hatton and Jeffrey G Williamson, 2005). All these proposed determinants are strongly related to development and arguably also to emigration and tehre are different mechanisms through which they may give rise to a hump-shaped long-term relationship between development and emigration. Yet, such a migration hump is not a unique outcome that will always occur. Even if all these factors operate as suggested, the negative relationship between development and emigration, that is induced by improving living standards and increasing opportunity costs for migration might still prevail.

Haas (2010) was the first of several researchers who provided empirical evidence in support of the migration hump hypothesis at a global level. Descriptively and by means of bivariate and multivariate regression analysis, he detected a non-linear, hump-shaped relationship between per capita GDP and emigrant stocks with a peak at an income level of 12 000 USD per capita. Using cross-sectional data from the World Bank and the United Nations, Clemens (2014) showed that the migration hump also exists in migration flow data. The highest emigration rates are observed in countries in the middle of the global income distribution, while the richest and the poorest countries experience systematically less emigration. According to his non-parametric regressions, the rate of emigration steadily increases up to a peak around a per capita income of 6000–8000 USD. This pattern holds for each of the decades from 1960 to 2010. In a more recent study, Clemens and Postel (2018) locate the peak to be at a somewhat higher level of 8000–10 000 USD.

Dao et al. (2018), Djajic et al. (2016), and the European Commission (2018) provide similar descriptive evidence.[3] Yet, the location of the peak in their studies varies between 4000 USD (Djajic et al., 2016) and 7000–13000 USD (European Commission, 2018). Since these studies differ in terms of their migration and GDP data, time periods, and country selection, varying peak levels do not question the general relationship. Despite differences in the location of the peak, the descriptive evidence from these studies convincingly demonstrates: Emigration is, on average, higher in middle-income countries than it is in either high- or low-income countries.

However, the migration hump's policy relevance is based on a causal interpretation. Supported by the different theoretical arguments that link development to rising emigration, the cross-sectional evidence for the migration hump is widely interpreted as a natural time path at the country level. For example Clemens and Postel (2018) suggest a causal relationship when stating that: "economic growth has historically raised emigration in almost all developing countries". This interpretation typically builds specifically on the role of individual incomes and the feasibility to finance migration. To explain the effect of rising incomes on emigration in the context of the migration hump,

[3]We label a regression that simply creates a best fit in a two-dimensional model as "descriptive" because it is a way of describing the relationship between the two variables and not an approach that aims at isolating underlying components.

the migration decision is depicted as an investment decision: Any increase in individual income affects both the feasibility of migration by easing the financial constraint and the incentive to stay by increasing the opportunity costs. At low income levels, the former effect dominates, creating a positive income–migration relationship until income is sufficiently high to discourage emigration. In consequence, over the long-term development path of a country, emigration rates are assumed to increase universally until per capita incomes of 6000–10 000 USD are reached. This very intuitive explanation is backed up by microeconomic evidence. Using census data from Indonesia, Bazzi (2017) provides some empirical support for the existence of a capital constraint to international migration in a causal setup.

While in poor rural areas of Indonesia positive income shocks are found to increase emigration, the opposite effect occurs for the most developed regions within the country. It has to be noted, however, that this convincing evidence comes from a single country where similarity between different origins is much higher than in the global cross-country samples that underlie the migration hump.

Microeconomic support, a rich and intuitive theoretical foundation and the empirical reproducibility across data sets and time have created a powerful narrative to interpret the migration hump as a universal relationship at the country level. However, a causal interpretation based on cross-sectional evidence, might still be misleading, especially since various omitted variables could govern this relationship.

2.2 A closer look at the cross-sectional migration hump

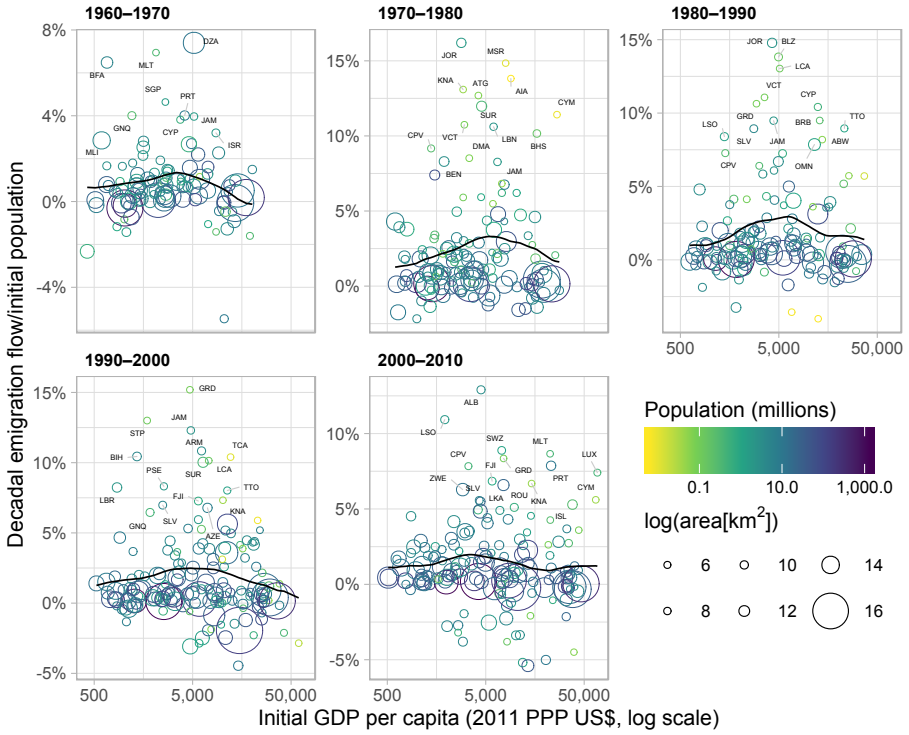
The causal interpretation of the migration hump hypothesis is based on the assumption that today's poor and middle income countries are fundamentally similar with respect to important factors such as migration cost. However, if today's poor countries differ from their richer counterparts in important omitted factors such as for example geographical location, language, or culture, such an assessment could be misguided.

Economically speaking, systematic heterogeneity across countries may endanger valid causal inference.[4]

As a first step in our exploration of the cross-sectional migration hump, we reproduce the central plot in Clemens (2014) showing the inverted u-shaped relationship between per capita GDP and emigration rates in different decades. For this we employ updated versions of the same data: Our decadal migration flows are also derived from global bilateral migration stocks by Özden et al. (2011) except that we include an additional decade taken from the 2010 edition of the World Banks bilateral migration matrix[5]; GDP and population data come from the Penn World Table but instead of version 8 we employ version 9.1 (Feenstra et al., 2015).

[4] As Lucas (2019, p. 18) puts it: "In the end, cross-country evidence may tell us little about the time-path of emigration as development proceeds; those countries currently in the middle-income range may simply differ in fundamental ways from what their poorer counterparts are evolving into:"

[5] https://www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-remittances-data



Note: Black lines represent Nadaraya-Watson kernel-weighted local means (Epanechnikov kernel, bandwidth of 0.5 natural log points); for each decade, countries with emigration rates above the 90th percentile are labeled.

Figure 1: Migration hump in World Bank global migration flows by decade

We follow the approach described by Clemens (2014), estimating nonparametric regressions of decadal emigration rates on initial GDP per capita for each decade. We make two changes, though. First, we include all the individual data points in the plot shown in Figure 1, which helps us to detect outliers. Second, we depict the size of each country , measured in two distinct ways: (1) physical size (measured as the surface area in log km^2), reflected in the area of the circles and (2) population size reflected in the color of the circles (fewer inhabitants correspond to a lighter color). Figure 1 closely corresponds to the left panel of figure 6.2 in Clemens (2014), showing a distinct inverted u-shape of the cross-sectional correlation with a peak around 5000 USD across all decades.

In comparison to Clemens's (2014) original plot, it becomes immediately apparent that the migration hump looks less pronounced. This is because we incorporate all countries into the plot, which implies significant changes in scale of the y-axis. This leads us to the next observation: While the large majority of countries experiences decadal emigration rates close to zero, about 15 to 20 countries are positive outliers. Except for the most recent decade, these outliers are concentrated in the middle of the income distribution. Hence, the overall hump-shape seems to be driven significantly by rather few stark outlier countries. Furthermore, our exercise suggests that almost all countries above

the fitted regression line, i. e. those countries that drive the inverted u-shape, are small in at least one of the two depicted dimensions. The outliers in this analysis include countries such as Barbados, Cape Verde, Portugal, Albania, Eswatini and Luxembourg.

It is well established that small countries often exhibit higher emigration rates than large ones not least because of a lack of opportunities for specialization (Haas, 2010). Short-distance moves, for example to the next large city, are far more likely to involve crossing international borders if the country's land area is small. Furthermore, leaving a small country is much easier in terms of monetary and physical effort as the nearest border is much closer.

Table 1: Selected country characteristics by income group

	low–income: <5000 GDP pc N=69	remaining non-OECD N=84	p-value
Av. GDP pc as of 2010 (PPP $2011)	2367 (1058)	16489 (17564)	<0.001
Distance to OECD country (km)	4744 (1754)	3872 (2359)	0.012
Common border with OECD	0.00 (0.00)	0.04 (0.19)	0.083
Colonial ties with OECD	0.46 (0.50)	0.70 (0.46)	0.004
Landlocked	0.31 (0.47)	0.10 (0.30)	0.002
Av. population (millions, 2010)	44.6 (156)	10.1 (23.1)	0.073

Note: Countries are clustered by average real per capita incomes between 1960 and 2010; the last column features the p-values for between group differences; data sources: Penn World Tables 2015 and CEPII's GeoDist Database

As a second step in this exploration, we briefly examine differences in basic country characteristics that are known to influence both development and migration. In doing so, we focus on the group of poor countries on the upward-sloping part of the hump and test if these are similar to their richer counterparts (summarized in table 1). Specifically, the first group consists of all countries with an average income per capita of less than 5000 USD between 1960 and 2010, while the second group includes all the remaining non-OECD countries. We exclude OECD countries for this descriptive table because geographical proximity to these primary destination countries is among the factors we want to investigate. The geographical measures are taken from CEPII's GeoDist Database (Mayer and Zignago, 2011). The dissimilarities are striking. Poorer countries left of the hump's peak are on average located significantly further away from OECD-countries, less likely to have colonial ties with them and are more frequently landlocked. In addition, these countries host much larger populations. Even after excluding China and India the average population in the poor country group is almost twice as high. It is important to note that these factors are well known to impact development and migration and at the same time are plausibly exogenous. More specifically, they are negatively related to both development and emigration, and hence, provide a competing explanation for low

emigration rates in poor countries.Such factors are therefore likely to confound any empirical analysis of the relationship between development and emigration that does not account for them.

In sum, the cross-sectional migration hump is significantly driven by a small number of outliers and along the GDP distribution countries differ in fundamental characteristics that will affect emigration rates. These insights cast some doubt on the hump's validity as a universal relationship and questions any inferences based on cross-sectional data. For a robust identification of the link between economic development and emigration we need to control for differences across countries. That is the natural domain of panel studies.

2.3 Time-series evidence regarding the impact of development on emigration

In contrast to cross-sectional studies, time-series approaches allow to account for differences between countries and investigate changes within countries over time. While economic development is included in most studies on migration as an important driver, very few explicitly focus on the impact of economic development on emigration, and hardly any study accounts for non-linear relationships or explicitly tests the migration hump. We are only aware of two papers that specifically test the migration hump in time-series data (Vogler and Rotte, 2000; Telli, 2014). However, these studies only focus on migration to one specific destination country (Germany and the UK, respectively), and both rely exclusively on annual data. Furthermore, and likely to be most problematic, both studies use merely a squared term in their panel regressions to account for a hump-shaped relationship and do not test more flexible frameworks, thus forcing the data to either take a hump shape, a linear shape or no shape at all. Recent econometric studies show that using only a squared term to detect (inverse) u-shaped relationships often leads to false conclusions (Lind and Mehlum, 2010; Haans et al., 2016; Simonsohn, 2018). Most of today's gravity-style migration models focus on the determinants of bilateral migration flows and hence on the destination choice rather than on root causes of emigration in origin countries. In consequence, existing studies yield inconclusive results (Clemens, 2014). While for example Bazzi (2017) and Dao et al. (2018) detect a positive relationship between GDP and migration at low income levels, Ortega and Peri (2013) and Böhme et al. (2019) find a universal negative relationship. Other studies do not return a statistically significant relationship at all (Mayda, 2010; Naudé, 2010; Ruyssen et al., 2012).

According to Clemens (2014), existing time series studies that seek to explain the relationship between income at origin and emigration fail to detect the migration hump, because they suffer from three major shortcomings. First, the time horizon they employ (15–20 years) is too short to detect long-term patterns. Second, by using annual data, short-term economic fluctuations mask the influence of income levels and long-term trends. Third, as time-series studies typically do not allow for a non-linear effect, the different direction of impact (negative for richer countries, positive for poorer countries) leads to inconsistent results and coefficients that are close to zero. We agree with this evaluation and specifically design our empirical methodology below to address these limitations.

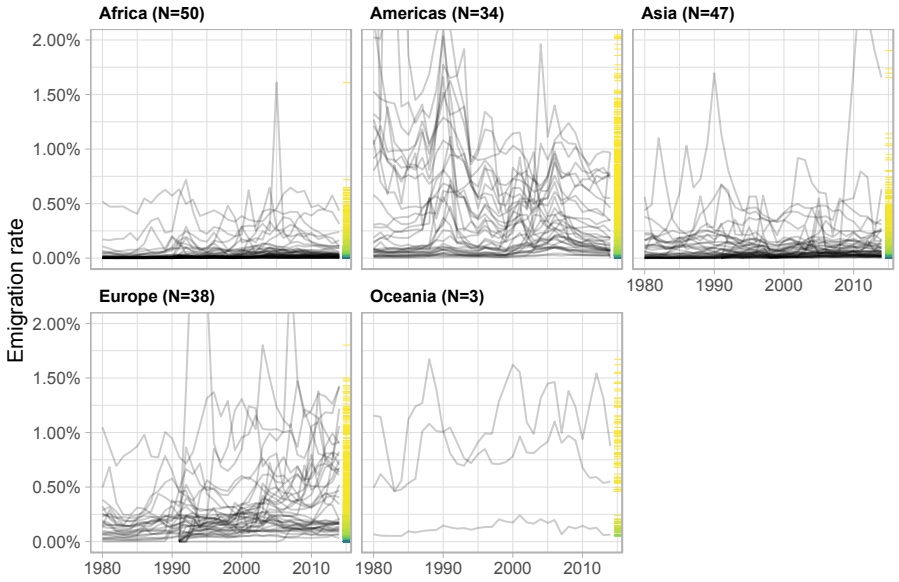


Figure 2: Emigration rates towards 16 OECD countries across time and continents

3 Data

Data availability is among the main constraints to quantitative migration research in general. This is particularly relevant for studies that investigate long-term trends. Any conclusive analysis must be based on a large time dimension in order to be able to identify substantial changes and avoid relying on short-term fluctuations in migratory patterns due to exogenous shocks. Furthermore, a large sample of observational units is desirable to prevent biased estimates resulting from idiosyncratic characteristics of individual units.

The migration panel dataset compiled by (Aburn and Wesselbaum, 2019) meets both of these requirements. By merging information from the 2015 Revision of the United Nations' Population Division with the OECD's migration database and data from Ortega and Peri (2013), the authors compile one of the longest and most exhaustive time series of bilateral net migration flows, covering 198 countries of origin and 16 OECD destinations from 1980 to 2014. Still, the panel is unbalanced because missing data, especially in the early 1980s when data is available for only about half of the country dyads. But since our research question focuses on the relationship between incomes and emigration, we are not interested in directions of migration flows but rather their variations in total volumes over time (and income). Therefore we aggregate all bilateral flows by their origin to calculate the number of emigrants per country and year. To a certain extent, this aggregation also mitigates a potential selection bias from missing observations early on in the observation period.

Our main variable of interest is economic development for which we rely on GDP data provided the Penn World Table (Feenstra et al., 2015). In addition, our empirical analysis uses several common control variables: country sizes are

Table 2: Summary statistics of the explanatory variables

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Emigrants (thousends)	5,768	17.34	37.05	0.00	0.81	18.05	949.10
Emigration rate (%)	5,768	0.19	0.33	0.00	0.02	0.20	6.52
GDP (PPP billions $2011)	5,768	324.89	1,170.37	0.08	9.09	187.55	16,395.20
GDP per capita (PPP $2011)	5,768	12,400.51	16,194.58	223.09	2,429.61	16,822.63	215,721.00
GDP per capita growth(%)	5,745	2.53	9.12	−69.63	−1.11	6.17	142.68
Population (millions)	5,768	34.07	125.78	0.01	2.14	21.90	1,382.79
Diaspora (millions)	5,768	0.33	0.77	0.00	0.01	0.30	13.12
Conflict	5,768	1.20	0.50	1	1	1	3
FH index	5,433	1.87	0.81	1.00	1.00	3.00	3.00
Air passengers	5,768	25.52	7.71	15.41	19.50	30.60	42.99
Immig. pol. restrictiveness	5,103	0.40	0.03	0.37	0.38	0.41	0.46

measured by their total population (also included in Penn World Table); to account for existing migrant networks, a significant determinant of bilateral migration flows, we control for the size of a country's diaspora population within the 16 OECD destinations in our sample (based on decennial migrant stocks published by the World Bank and Özden et al. (2011)). To incorporate potential shocks from conflict we use UCDP's armed conflict database to construct a categorical variable that distinguishes peace, minor conflict, and war (Pettersson and Eck, 2018; Gleditsch et al., 2002). In addition we also control for varying political rights and civil liberties using data from Freedom House (2018) (FH) via Teorell et al. (2019). In order to account for changing political trends with respect to migration, we include an index by the International Migration Policy in Comparison Project (IMPIC), measuring the restrictiveness of migration policies among the OECD destinations considered in our sample (Helbling et al., 2017); lastly, we control for the changing cost of migration during the study period by including the number of air travel passengers as a percentage of world population in the model (World Bank, 2019). For a brief description of the data, Figure 2 visualizes the migration panel and table 2 provides summary statistics for all variables we employ across different specifications.

4 Empirical analysis

4.1 Methodology

The main objective of this paper is to test whether the cross-sectional finding of an inverse u-shaped relationship of migration and income holds in a more reliable panel setup. As a first step, we replicate the cross-sectional migration hump using our data. For one, this ensures that we can compare our panel estimates with prior cross-sectional analyses and potential discrepancies do not simply result from differences in data sources. For another, replicating the migration hump enables us to identify the critical income threshold up to which emigration is hypothesized to increase and truncate our sample accordingly. As existing empirical studies identify this turning point at different levels between 4000–13 000 USD, it is important to identify the upward-sloping range of the migration hump for our specific data set. Hence, our empirical analysis of the influence of economic development on emigration in poor countries proceeds in three steps:

1. Employing the same methodology as Clemens (2014), we reproduce the

cross-sectional migration hump with the OECD migration data set compiled by Aburn and Wesselbaum (2019).

2. We truncate our sample of countries and only include observations where incomes have remained left of the cross-sectional peak during the entire observation period. This way we specifically focus on the upward-sloping part of the cross-sectional migration hump where we would expect a robust positive relationship between GDP and the number of emigrants.

3. We estimate a range of fixed effects panel emigration models, which are based on the recent literature and aim at explaining changes in emigration within countries over time by changes in GDP and other control variables.

For the core of our analysis (step 3), we employ a straightforward panel emigration model to test if cross-sectional and time-series estimates of the development–emigration nexus concur. The setup of our model is influenced by Mayda (2010) and Ortega and Peri (2013). Departing from their setup, we only model emigration at the level of origin countries instead of bilateral flows because we are not interested in the destination choice. Hence, we do not include destination country factors. In that sense our empirical model is very similar to the "unilateral" (origin-country level) model by Böhme et al. (2019). While the decision to model aggregate emigration instead of bilateral flows is based on our research question, it comes with the additional advantage of having hardly any zeros in the dependent variable.

Our main specification is

$$y_{it+1} = \alpha + \beta \text{GDP}_{it} + \gamma X_{it} + \delta_i + \tau_t + \varepsilon_{it}, \tag{1}$$

where y_{it+1} denotes the number of emigrants from country i in year $t+1$. GDP_{it} is the main variable of interest and represents total GDP for a given country and year. X_{it} represents a set of control variables that vary over countries and time. δ_i and τ_t are vectors of country and year fixed effects, respectively, and ε_{it} represents the error term.

In comparison to cross-sectional regressions, this panel setup is much less likely to suffer from omitted variable bias, since country and time fixed effects control for unobserved heterogeneity. Hence, our estimates more likely represent a causal relationship. Moreover, as the subsequent analysis reveals, adding different sets of control variables has very little impact on our core results.

In line with Böhme et al. (2019), we model emigration in absolute terms. Hence, we regress the absolute number of emigrants on absolute GDP and control for population size.[6] Using the emigration rate and GDP per capita might impede the identification of the true effect of economic development on emigration as, at least in the short run, variations in these parameters may largely be driven by population growth. Moreover, population growth exerts an influence on emigration beyond increasing the pool of potential migrants. It shapes the age distribution within countries, which affects average emigration propensities, and more populous countries yield higher opportunities for internal migration (Haas et al., 2018).

[6] Our results are robust to modeling this relationship in per capita terms (see Table 9 in appendix B).

We use explanatory variables lagged by one year on the right hand side of equation (1) in order to account for time-consuming preparations that usually go along with migration as well as to mitigate issues of reverse causality.

For all high-magnitude variables (i. e. emigrants, GDP, population and diaspora) we use the inverse hyperbolic sine (IHS) transformation instead of a logarithmic one in our estimations. This has the advantage that observations with zero values do not need to be discarded or altered (by adding a constant) as IHS is defined for any real number (see Burbidge et al., 1988; MacKinnon and Magee, 1990). At the same time, IHS retains the properties of a log transformation and we can interpret estimated coefficients as percentage changes or elasticities (Pence, 2006; Bellemare and Wichman, 2019).

Another important feature of any long-term migration model is the way to incorporate time trends in the feasibility of international migration. Global technological progress in communication and transportation likely decreases migration costs over time; immigration policies change (Haas et al., 2018). We use two different approaches. Most conservatively we include year fixed effects. As an alternative to the strict year fixed effects specification, we employ two variables that reflect migration-relevant technological and political changes: Decreasing transport costs and ease of travel are approximated by the number of air travel passengers per year (as a percentage of world population); changes in migration policies are reflected in the IMPIC-index for restrictiveness of migration policies among the destination countries.

Besides using year fixed effects to absorb aggregate changes over time (which controls for sudden global shifts in emigration), we tackle the issue of yearly fluctuations on the right hand side of equation (1) by also specifying a model based on 5-year and 7-year averages that smooth the time-series data.[7]

Based on the prevailing literature, we would expect the time-series estimates to resemble their cross-sectional counterparts (Vogler and Rotte, 2000; Telli, 2014; Clemens and Postel, 2018; Haas et al., 2018). For the poorest countries we would expect a positive relationship between between GDP and emigration to OECD countries.

4.2 Results

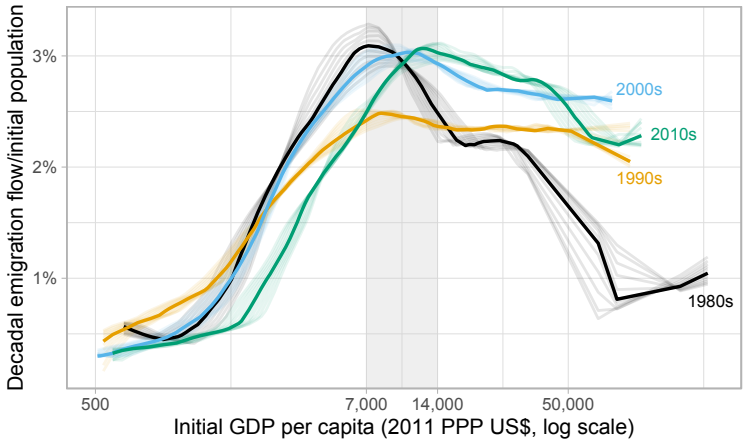
Even though our migration data only feature OECD destination countries, we are able to replicate Clemens and Postel's (2018) cross-sectional result of a hump-shaped income–emigration relationship very closely in Figure 3. Throughout the decades, emigration peaks somewhere between 7000 and 14 000 USD per capita. Based on these estimates, we restrict the data in the rest of our analysis to those countries with per capita incomes below 7000 USD throughout the entire time period.[8]

That leaves us with a balanced panel of 54 low-income countries. The average per capita GDP over the entire time period is roughly 2000 USD, mean annual

[7] We retain the lagged structure of our estimation by matching averaged time periods that are shifted by one year, e.g. the average number of emigrants from 1981–85 regressed on averages of our RHS variables from 1980–1984.

[8] This sample restriction is based on data exceeding the observation period of our analysis since Feenstra et al. (2015) provide longer time series of GDP and population data. While this distinction barely changes the set of countries under consideration and has no effect on our results, we choose to use all of the information available to us to restrict the sample.

economic growth and emigration rates equal 1.52 percent and 0.06 percent, respectively. A complete overview of summary statistics for all relevant variables is shown in Table 8 in appendix A.



Note: Bold lines are Nadaraya-Watson kernel-weighted local means (Epanechnikov kernel, bandwidth of 0.5 natural log points); transparent lines depict varying bandwidths between 0.4 and 0.6 natural log points; initial GDP per capita means at the beginning of the respective decade; to correct for the shorter 2010 decade in the data we have scaled up the estimated migration flow, allowing for a direct comparison.

Figure 3: Non-parametric regression of decadal emigration rates on initial real income per capita, 1980–2014

Our main estimation results are reported in Table 3, which first includes two pooled specifications of equation 1 without country fixed effects as models 1 and 2. The estimates are in line with the cross-sectional evidence in the migration literature and show a robust positive effect of income on emigration that corresponds to the upward-sloping part of the migration hump. Hence, controlling for time trends and excluding all countries beyond 7000 USD of GDP per capita does not change the positive cross-sectional relationship between GDP and emigration for poorer developing countries. Explicitly including a time trend based on global air passengers and OECD migration policies reflect the increased total number of emigrants and a mild dampening effect of migration restrictiveness, suggesting a 1 percent decrease in emigrants between the most open and the strictest migration policies observed in the data. The estimated effect of income remains unchanged and corresponds to an increase of 0.8 percent in emigration with 1 percent GDP growth. Overall, this pooled estimation is very much in line with the existing migration hump evidence. Yet, the Breusch-Pagan test advises against the use of a pooled model due to heteroskedasticity. The Hausman test favors the fixed-effects estimator.

Turning to the panel estimates in models 3–6 of Table 3, we observe that the cross-sectional relationship does not hold up at the country level. Here, rising incomes actually reduce the total number of emigrants from a given country. This effect is robust to the addition of time-varying country-level control variables (models 5 and 6) as well as to using the time trend variables instead of time fixed effects (models 4 and 6). It also holds if we do not control for time

effects at all (see Table 10 in appendix B). In all cases GDP growth rates of 1 percent reduce emigration by about 0.5 percent. Our estimates for the effects of institutional environments and the occurrence of violent conflict show expected signs: Emigration increases as armed conflicts intensify, autocratic regimes exhibit lower emigration rates.[9]

Most importantly, these results do not support a hump-shaped income–emigration relationship and rather suggest that economic development, on average, reduces emigration towards OECD destinations.

Table 3: Main results: Pooled versus panel regressions

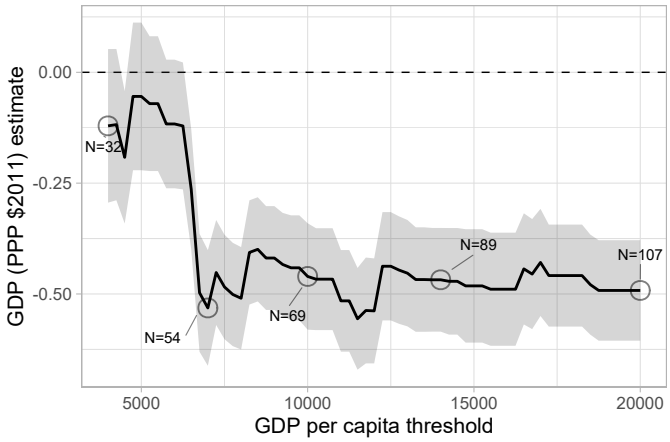
	Pooled		Panel			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
GDP (PPP $2011)	0.775*	0.788*	−0.532***	−0.537***	−0.481***	−0.471***
	(0.339)	(0.353)	(0.067)	(0.076)	(0.059)	(0.068)
Population	0.222	0.219	1.591***	2.673***	0.921***	1.768***
	(0.361)	(0.372)	(0.280)	(0.290)	(0.251)	(0.268)
Air passengers		0.062***		0.052***		0.045***
		(0.015)		(0.010)		(0.009)
Immig. pol. restrictiveness		−10.009***		−4.157***		−4.911***
		(1.930)		(1.023)		(0.949)
UCDP: Minor conflict					0.356***	0.335***
					(0.055)	(0.062)
UCDP: War					0.508***	0.514***
					(0.076)	(0.087)
FH: partly free					0.055	−0.039
					(0.072)	(0.079)
FH: not free					−0.107	−0.250**
					(0.078)	(0.086)
Diaspora size					0.168***	0.254***
					(0.038)	(0.040)
Country FE	no	no	yes	yes	yes	yes
Year FE	yes	no	yes	no	yes	no
Num. obs.	1858	1645	1858	1645	1769	1560
R^2 (overall)	0.535	0.513	0.891	0.883	0.916	0.907
R^2 (within)	0.457	0.513	0.047	0.522	0.096	0.565

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Note: The dependent variable is emigration (total number of emigrants). The sample consists of 54 relatively poor countries with less than 7000 USD per capita over the entire observation period (1980 – 2014). The high magnitude variables emigration, GDP, population, and diaspora size are transformed using the inverse hyperbolic sine function. The interpretation of the respective coefficients is similar to logarithmic values. Conflict (UCDP) and political freedom (FH) are captured by categorical variables with three levels each. All explanatory variables are lagged by one year.

Next we investigate the sensitivity of our results to different sample selections, i.e. we employ different GDP per capita thresholds at which we truncate the sample. The initial threshold (7000 USD per capita GDP) is based on the cross-sectional peak and thus the corresponding sample is well-suited to compare cross-sectional and panel results. However, by design our working sample is somewhat unbalanced. It mainly consists of the poorest countries, observations in the 4000 to 7000 USD income range are underrepresented. Increasing the threshold level provides us with a larger sample size and additional country–year observations along the increasing segment of the migration hump. For example, shifting the cut-off level from 7000 to 10 000 USD per capita, gives us 15 extra countries and the average per capita GDP is still far below 7000. Yet,

[9] Results remain unchanged when using Polity IV data instead of the Freedom House index to measure the institutional framework in origin countries (see Table 13 in appendix B).



Note: The estimates for the influence of GDP on Emigration are based on model 4 in Table 3.

Figure 4: Estimated coefficient of IHS-transformed GDP (with 95 % confidence interval) conditional on varying GDP per capita thresholds for the underlying sample

it comes at the cost of including countries, which have surpassed the peak in recent years. For this sensitivity test, we estimate model 4 from Table 3 with year and country fixed effects on a range of sub-samples that correspond to maximum GDP per capita thresholds between 4000 and 20 000 USD.[10] The lower bound is based on the lowest peak level from the respective literature (Djajic et al., 2016). Yet, since our initial sample already comes with a low average income of about 2000 USD, it is more reasonable to increase our threshold than to decrease it.

We depict the estimated coefficients for GDP and their corresponding 95 percent confidence intervals in Figure 4. This exercise shows a significantly negative association starting from a threshold level of 4500 USD per capita that increases in size up to our original cutoff point of 7000 USD. At higher thresholds the estimate fluctuates slightly around the average value of about -0.5. The changing size of the estimated coefficient hints to somewhat heterogeneous impacts across countries. That is not surprising as economic progress may affect the economic opportunities of the respective populations differently, and thus we should be careful not to over interpret the exact size of the coefficients. Yet, and more importantly, the negative relationship holds across the whole cut-off range and the size of the estimated coefficients does not change systematically with income levels.

Such aggregate analysis might still mask heterogeneous outcomes across different countries since economic trajectories differ significantly. More specifically, the aggregate analysis does not reveal whether our estimates are particularly driven by high-growth or low-growth countries. For instance, the observed negative relationship between economic growth and emigration might be driven by economic crises spurring out–migration. To investigate heterogeneous impacts across different levels of economic growth, we split our sample further into high

[10] In appendix B Figure 5 we provide the results based on Model 5 including the additional control variables.

performers and low performers. The distinction is made based on the average GDP per capita growth (PPP) over the entire observation period.

Table 4: Panel estimation for varying growth sub-samples

	max 1% growth	max 2% growth	min 1% growth	min 2% growth
GDP (PPP $2011)	−0.206	−0.468***	−0.599***	−0.873***
	(0.132)	(0.081)	(0.091)	(0.177)
Population	−0.850	−0.708*	2.726***	5.810***
	(0.492)	(0.353)	(0.366)	(0.533)
Country FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Countries	18	36	36	18
Num. obs.	608	1238	1250	620
R^2 (overall)	0.885	0.904	0.894	0.880
R^2 (within)	0.017	0.046	0.070	0.197

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Note: The dependent variable is Emigration (total number of emigrants). The high magnitude variables Emigration, GDP, Populations, and Diaspora size are transformed using the inverse hyperbolic sine function. The interpretation of the respective coefficients is similar to logarithmic values. Conflict (UCDP) and political freedom (FH) are captured by categorical variables with three levels each. Explanatory variables are lagged by one year. The sample differs across regressions in this table, the selection is based on average GDP per capita growth between 1980 and 2014.

The specification is again identical to Model 4 in Table 3 including country and time fixed effects. We distinguish four different subsets of countries for this analysis (presented in Table 4): the low-performing countries with less than 1 percent average growth (column 1), or with less than 2 percent (column 2); and the high-performing countries with more than 1 percent average real economic growth (column 3), or with more than 2 percent growth (column 4). An interesting pattern emerges: For all but the least-performing countries the association between GDP and the number of emigrants is again significantly negative. The higher the average economic growth, the higher is the estimated coefficient. This makes intuitive sense since low growth rates leave most citizens unaffected in the short-term. In consequence, higher growths rates are easier to perceive and thus may be more relevant for the migration decision. Moreover, the small and insignificant coefficient for the worst performing countries with very little economic progress (Column 1) suggests that it is in fact economic growth discouraging emigration and not recessions spurring emigration. To further look into this we test outlier dummies [11] for positive and negative growth years. The results are provided in Table 11 in appendix B. Notably, these dummies do not return significant coefficients and hardly change the size of the general relationship.

In stark contrast to most of the previous literature, our findings thus indicate a negative impact of rising incomes on emigration in poor countries. We do not find support for a non-linear relationship between economic growth and emigration, i.e. a positive relationship at low average incomes and a negative

[11] Specifically, for each country we code years as positive growths outliers if the real annual growth rate exceeds the average value by at least two standard derivations. Negative outlier years are computed in a similar fashion.

one at higher levels. Instead the negative relationship is independent of income levels. This suggests that the migration hump in the cross-section is due to omitted variables at the country level.

4.3 Robustness Checks

A remaining concern with the robustness of our results may stem from the use of annual data. Clemens (2014) argues that in such kind of panel analysis short term fluctuations may overshadow the true relationship between economic development and emigration.

Table 5: Panel estimation: Using household consumption data and multi-year periods

	Consumption		5-year ave.		7-year ave.	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
HH consumption	-0.636^{***}	-0.624^{***}				
	(0.090)	(0.081)				
GDP (PPP $2011)			-0.359^{**}	-0.456^{***}	-0.359^{*}	-0.473^{***}
			(0.133)	(0.120)	(0.157)	(0.140)
Population	1.598^{***}	0.939^{***}	2.177^{***}	1.373^{**}	1.953^{***}	1.082^{*}
	(0.281)	(0.252)	(0.512)	(0.468)	(0.571)	(0.513)
UCDP: Minor conflict		0.341^{***}		0.388^{***}		0.373^{***}
		(0.055)		(0.097)		(0.109)
UCDP: War		0.483^{***}		0.573^{***}		0.561^{***}
		(0.077)		(0.134)		(0.148)
FH: partly free		0.038		-0.107		-0.106
		(0.072)		(0.153)		(0.178)
FH: not free		-0.154		-0.195		-0.241
		(0.079)		(0.165)		(0.187)
Diaspora size		0.152^{***}		0.155^{*}		0.349^{***}
		(0.038)		(0.074)		(0.102)
Country FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Num. obs.	1858	1769	424	416	318	312
R^2 (overall)	0.890	0.915	0.913	0.928	0.915	0.933
R^2 (within)	0.040	0.092	0.063	0.134	0.060	0.167

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Note: The dependent variable is Emigration (total number of emigrants). The sample consists of 54 relatively poor countries with less than 7000 USD per capita over the entire observation period (1980 – 2014). The high magnitude variables Emigration, GDP, Populations, and Diaspora size are transformed using the inverse hyperbolic sine function. The interpretation of the respective coefficients is similar to logarithmic values. Conflict (UCDP) and political freedom (FH) are captured by categorical variables with three levels each. Explanatory variables are lagged by one year.

In order to address these concerns we aggregate our data into five and seven year time intervals and run the same regressions again (see Table 5 Columns 3–6). This way, our estimates are much less vulnerable to short term fluctuations in economic conditions and migration opportunities. Especially business cycle fluctuations should have very little impact on this specification. This estimate can also be interpreted as the more long-term relationship between economic growth and emigration. Naturally, that comes at the cost of reducing the number of observations substantially, which risks insignificant results. To further investigate the robustness of our initial estimate we consider private consumption as an alternative measure for economic development. Especially for small countries, household consumption is often considered to be a less volatile welfare measure, and it is less influenced by exchange rate fluctuations. The re-

gressions are presented in Table 5 and support our initial findings. Using household consumption instead of GDP returns a slightly larger coefficient, while the regressions with aggregated data yield somewhat smaller coefficients. Yet, the negative relationship between economic progress and emigrations robust to these alterations.

Table 6: Pooled versus Panel estimation: Using alternative migration data

	Pooled		Panel	
	World Bank	IAB	World Bank	IAB
GDP (PPP $2011)	0.871	0.958***	−2.531**	−0.227***
	(0.593)	(0.275)	(0.798)	(0.068)
Population	−0.025	−0.247	−1.266	−0.436
	(0.611)	(0.278)	(2.341)	(0.284)
Country FE	no	no	yes	yes
Year FE	yes	yes	yes	yes
Num. obs.	372	372	372	372
R^2 (overall)	0.138	0.503	0.346	0.968
R^2 (within)	0.062	0.424	0.032	0.047

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Note: The dependent variable is Emigration (total number of emigrants). The sample consists of 54 relatively poor countries with less than 7000 USD per capita over the entire observation period (1980 – 2014). The high magnitude variables Emigration, GDP, Populations, and Diaspora size are transformed using the inverse hyperbolic sine function. The interpretation of the respective coefficients is similar to logarithmic values. Conflict (UCDP) and political freedom (FH) are captured by categorical variables with three levels each. Explanatory variables are lagged by one year.

As a next robustness check, we repeat our estimation with different sets of migration data (Table 6). In column 1 and 3, we utilize the bilateral migration stock data provided by the World Bank (World Bank, 2018). This data set comes with the additional advantage of covering a longer time span, ranging from 1960 to 2018. Moreover it covers the full set of destination countries. Yet, in contrast to our main migration data, we only get eight points in time and inconsistent time intervals. In order to allow for a comparable analysis we restrict the World Bank migration data to OECD destinations. That gives us 14 additional destination countries. We then compute migration flows by subtracting each stock from the previous period. That leaves us with seven observations per country. Given the longer time period of the World Bank data, this regression also functions as an additional test of the long-run relationship between income and emigration. In column 2 and 4, we use the IAB brain drain data (Brücker et al., 2013). This data set consists of seven five year intervals ranging from 1980 to 2010 and covers four additional OECD destinations (20 in total). Still, we restrict our analysis to the same countries at the upwards-sloping part of the migration hump. Similar to Table 3, we use these data to investigate both the between-country and the within-country relationship between economic growth and emigration. In line with the cross-sectional migration hump, we again detect positive estimates in the pooled regressions (though the coefficient is only significant for the IAB data). Contrasting the cross-sectional results and corroborating the validity of our baseline results, the panel regressions yield significantly negative correlations between economic growth and emigration for

both data sets.

For the next robustness check, we use the entire sample of countries and a slightly changed setup. Instead of restricting our analysis to the poor countries at the upward-sloping domain of the cross-sectional migration hump, we compute a categorical variable capturing the location of each individual country-year. It consists of three levels: The increasing part (below 7000 USD per capita), the peak (between 7000 and 14 000 USD per capita), and the decreasing part (above 14 000 USD per capita). The cut-offs are based on the cross-sectional pattern depicted in Table 3. For the subsequent panel regressions, we interact this categorical variable with GDP and, thus, allow for distinct estimates of the income–emigration relationship across these different income levels. Except for the interaction terms, the regressions are identical to model 3 to 6 in Table 3. The results are depicted in Table 7. Contrasting the cross-sectional relationship, the panel estimates for the influence of GDP on emigration are negative and significant for all three groups. Moreover, the size of the estimates is almost identical. These results suggest that the negative influence of GDP on emigration holds independent of the income level.

Table 7: Panel estimation: Interaction terms (all countries)

	annual		5 year ave.	
	Model 1	Model 2	Model 3	Model 4
GDP:low income (<7000 USD pc)	-0.358^{***}	-0.159^{***}	-0.177^{*}	-0.153^{*}
	(0.049)	(0.037)	(0.086)	(0.075)
GDP:middle income (7-14000 USD pc)	-0.362^{***}	-0.163^{***}	-0.180^{*}	-0.160^{*}
	(0.048)	(0.037)	(0.085)	(0.074)
GDP:high income (>14000 USD pc)	-0.369^{***}	-0.167^{***}	-0.187^{*}	-0.163^{*}
	(0.048)	(0.036)	(0.084)	(0.074)
Population	1.130^{***}	1.462^{***}	1.570^{***}	1.574^{***}
	(0.111)	(0.087)	(0.179)	(0.163)
UCDP: Minor conflict		0.286^{***}		0.289^{***}
		(0.039)		(0.072)
UCDP: War		0.433^{***}		0.468^{***}
		(0.056)		(0.097)
FH: partly free		-0.084^{*}		-0.248^{**}
		(0.040)		(0.083)
FH: not free		-0.423^{***}		-0.530^{***}
		(0.047)		(0.096)
Diaspora size		0.119^{***}		0.106^{***}
		(0.015)		(0.029)
Country FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Num. obs.	5768	5433	1308	1274
R^2 (overall)	0.856	0.913	0.902	0.921
R^2 (within)	0.035	0.118	0.084	0.163

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Note: The dependent variable is Emigration (total number of emigrants). The sample consists of 172 countries observed between 1980 and 2014. The high magnitude variables Emigration, GDP, Populations, and Diaspora size are transformed using the inverse hyperbolic sine function. The interpretation of the respective coefficients is similar to logarithmic values. Conflict (UCDP) and political freedom (FH) are captured by categorical variables with three levels each. Explanatory variables are lagged by one year.

Furthermore, our results are robust to including country-specific dummies for

periods of unusually high or low growth (Table 11), excluding small countries (Table 12), and the use of different institutional variables (Table 13). The corresponding tables can be found in appendix B.

5 Concluding remarks

In this paper we revisit the relationship between economic development in low-income countries and migration to OECD destinations. Throughout the past decades, the highest average emigration rates are observed in countries in an income range of 7000 to 14 000 USD. Different scholars ascribe this to a universal mobility transition, which systematically shapes feasibility and aspirations to migrate along any country's development path and, thereby, causes a hump-shaped development–migration nexus at the country level (Haas, 2010; Clemens, 2014). In consequence, economic development in poor countries today is expected to boost global emigration in the future. From a destination country perspective, such an interpretation implies a policy trade-off between supporting development in poor countries and reducing immigration pressures.

We question this causal interpretation of the cross-sectional evidence. The hump-shaped, cross-sectional pattern is significantly driven by small outlier countries. Moreover, middle- and low-income countries differ in terms of exogenous characteristics that shape development and migration. At least to some degree, middle-income countries experience higher levels of emigration because they are smaller, closer to primary destinations, and more frequently have past colonial ties. To account for these and other unobserved differences we employ a panel setup and investigate the relationship between economic development and emigration within countries. Using annual data we identify a robust negative relationship for countries located in the upward-sloping segment of the migration hump. Our results are robust to using different income ranges, time trends, and controls. Most importantly they also hold for different migration data and different time periods (i.e. five and ten year intervals).

Our results do not imply that financial constraints would not be binding for many individuals. Yet, when economic opportunities improve, few of them seem to utilize their increasing capabilities to migrate. Furthermore, it is important to emphasize that our results do not necessarily contradict the existence of a migration hump at the country level. In the very long-run and especially in the absence of sustainable economic growth, higher income levels, most certainly, empower a larger number of people to migrate. Moreover, other factors that are associated with development but not closely related to rising incomes, might still contribute to rising emigration in the long-run. In order to better understand the relationship between long-run development and emigration, future research needs to better identify the actual impact that different dimensions of development have. However, in policy-relevant time periods of 5 to 10 years economic growth coincides with less emigration. Hence, policy makers should not be too concerned about trade-offs between development cooperation and immigration control. Even in very poor countries improving economic conditions rather discourage people from migrating, at least at the margin. Yet, given the reasonably small size of the effect and the struggle of development cooperation to sustainably increase economic growth, the scope to affect migration through this channel remains limited.

References

Aburn, Amelia and Dennis Wesselbaum (2019). "Gone with the Wind : International Migration Gone with the Wind : International Migration". In: *Global and Planetary Change* 178, pp. 96–109.

Akerman, Sune (1976). "Theories and methods of migration research". In: *From Sweden to America*, pp. 19–75.

Bazzi, Samuel (2017). "Wealth heterogeneity and the income elasticity of migration". In: *American Economic Journal: Applied Economics* 9.2, pp. 219–255. ISSN: 19457790. DOI: 10.1257/app.20150548.

Beine, Michel, Frédéric Docquier, and Hillel Rapoport (2001). "Brain drain and economic growth: Theory and evidence". In: *Journal of Development Economics* 64.1, pp. 275–289. ISSN: 03043878. DOI: 10.1016/S0304-3878(00)00133-4.

Bellemare, Marc F. and Casey J. Wichman (2019). "Elasticities and the Inverse Hyperbolic Sine Transformation". In: *Oxford Bulletin of Economics and Statistics* 0.0. ISSN: 1468-0084. DOI: 10.1111/obes.12325.

Böhme, Marcus H., André Gröger, and Tobias Stöhr (2019). "Searching for a better life: Predicting international migration with online search keywords". In: *Journal of Development Economics* April. ISSN: 03043878. DOI: 10.1016/j.jdeveco.2019.04.002.

Brücker, Herbert, Stella Capuano, and Abdeslam Marfouk (2013). "Education, gender and international migration: Insights from a panel dataset 1980-2010". In: *Mimeo* August, p. 13. URL: http://www.iab.de/en/daten/iab-brain-drain-data.aspx.

Burbidge, John B., Lonnie Magee, and A. Leslie Robb (1988). "Alternative Transformations to Handle Extreme Values of the Dependent Variable". In: *Journal of the American Statistical Association* 83.401, pp. 123–127. ISSN: 0162-1459. DOI: 10.1080/01621459.1988.10478575.

Carling, Jørgen and Kerilyn Schewel (2018). "Revisiting aspiration and ability in international migration". In: *Journal of Ethnic and Migration Studies* 44.6, pp. 945–963. ISSN: 14699451. DOI: 10.1080/1369183X.2017.1384146.

Cattaneo, Cristina and Giovanni Peri (2016). "The migration response to increasing temperatures". In: *Journal of Development Economics* 122, pp. 127–146. ISSN: 0304-3878. DOI: 10.1016/j.jdeveco.2016.05.004.

Clemens, Michael A. (2014). "Does Development Reduce Migration?" In: *International Handbook on Migration and Economic Development* 8592, pp. 152–185. DOI: 10.4337/9781782548072.00010.

Clemens, Michael A. and Hannah M. Postel (2018). "Deterring Emigration with Foreign Aid: An Overview of Evidence from Low-Income Countries". In: *Population and Development Review* 4, pp. 667–693. ISSN: 17284457. DOI: 10.1111/padr.12184.

Czaika, Mathias and Mogens Hobolth (2016). "Do restrictive asylum and visa policies increase irregular migration into Europe?" In: *European Union Politics* 17.3, pp. 345–365.

Dao, Thu Hien, Frédéric Docquier, Chris Parsons, and Giovanni Peri (2018). "Migration and development: Dissecting the anatomy of the mobility transition". In: *Journal of Development Economics* 132.2018, pp. 88–101. ISSN: 03043878. DOI: 10.1016/j.jdeveco.2017.12.003.

Deininger, Klaus and Lyn Squire (1998). "New ways of looking at old issues: Inequality and growth". In: *Journal of Development Economics* 57.2, pp. 259–287. ISSN: 03043878. DOI: 10.1016/S0304-3878(98)00099-6.

Djajic, Slobodan, Murat G. Kirdar, and Alexandra Vinogradova (2016). "Source-country earnings and emigration". In: *Journal of International Economics* 99, pp. 46–67. ISSN: 18730353. DOI: 10.1016/j.jinteco.2015.12.001.

Docquier, Frédéric, Giovanni Peri, and Ilse Ruyssen (2014). "The cross-country determinants of potential and actual migration". In: *International Migration Review* 48.s1, S37–S99. ISSN: 17477379. DOI: 10.1111/imre.12137.

Dustmann, Christian and Anna Okatenko (2014). "Out-migration, wealth constraints, and the quality of local amenities". In: *Journal of Development Economics* 110, pp. 52–63. ISSN: 03043878. DOI: 10.1016/j.jdeveco.2014.05.008.

Easterlin, Richard A. (Apr. 1961). "Influences in European Overseas Emigration before World War I". In: *Economic Development and Cultural Change* 9.3, pp. 331–351. ISSN: 0013-0079. DOI: 10.1086/449911.

EC (2016). *Migration Partnership Framework: A New Approach to Better Manage Migration*. Tech. rep. Strasbourg: European Commission. URL: https://eeas.europa.eu/sites/eeas/files/factsheet%7B%5C_%7Dec%7B%5C_%7Dformat%7B%5C_%7Dmigration%7B%5C_%7Dpartnership%7B%5C_%7Dfra%20mework%7B%5C_%7Dupdate%7B%5C_%7D2.pdf.

Epstein, Gil S. (May 2008). "Herd and Network Effects in Migration Decision-Making". In: *Journal of Ethnic and Migration Studies* 34.4, pp. 567–583. ISSN: 1369-183X. DOI: 10.1080/13691830801961597.

Esipova, Neli, Anita Pugliese, and Julie Ray (2018). *More Than 750 Million Worldwide Would Migrate If They Could*. Washington D.C. URL: https://news.gallup.com/poll/245255/750-million-worldwide-migrate.aspx.

European Commission (2018). *Many more to come? Migration from and within Africa*. Tech. rep. Luxembourg, Joint Research Center, Publications Office of the European Union, p. 36. DOI: 10.2760/1702.

Faini, Riccardo and Alessandra Venturini (1994). "Migration and growth: the experience of Southern Europe". In: *CEPR Discussion Papers* 964.

Feenstra, Robert C., Robert Inklaar, and Marcel P. Timmer (Oct. 2015). "The Next Generation of the Penn World Table". In: *American Economic Review* 105.10, pp. 3150–3182. ISSN: 0002-8282. DOI: 10.1257/aer.20130954.

Field, Gary (2002). *Distribution and development: a new look at the developing world*. MIT Press.

Freedom House (2018). *Freedom in the World 2018*. URL: https://freedomhouse.org/%20report-types/freedom-world.

Giuliano, Paola and Marta Ruiz-Arranz (2006). "Remittances, Financial Development, and Growth". In: *Journal of Development Economics* 90.1, pp. 144–152. URL: http://hdl.handle.net/10419/34035.

Gleditsch, Nils Petter, Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg, and Håvard Strand (2002). "Armed Conflict 1946-2001: A New Dataset". In: *Journal of Peace Research* 39.5, pp. 615–637. ISSN: 0022-3433. URL: https://www.jstor.org/stable/1555346 (visited on 02/13/2019).

Gould, J. D. (1979). "European inter-continental emigration 1815-1914: Patterns and causes". In: *Journal of European Economic History* 8.3, p. 593. DOI: https://search.proquest.com/docview/1292863303?accountid=200654.

Greenwood, MJ (1969). "An analysis of the determinants of geographic labor mobility in the United States". In: *The Review of Economics and Statistics*. URL: https://www.jstor.org/stable/1926728.

Haans, Richard F.J., Constant Pieters, and Zi-Lin He (2016). "Thinking About U: Theorizing and Testing U- and Inverted U-shaped Relationships in Strategy Research". In: *Strategic Management Journal* 37.7, pp. 1177–1195.

Haas, Hein de (2010). "Migration transitions: a theoretical and empirical inquiry into the developmental drivers of international migration". In: *DEMIG project paper* 1.

— (2019). *Why Development Will Not Stop Migration*. URL: https://www.macmillanihe.com/blog/post/why-development-will-not-stop-migration-hein-de-haas/.

Haas, Hein de, Mathias Czaika, Marie-Laurence Flahaux, Edo Mahendra, Katharina Natter, Simona Vezzoli, and Maria Villares-Varela (2018). "International Migration. Trends, Determinants and Policy." In: *IMI Working Paper Series* 142, pp. 1–59.

Hanson, Gordon and Craig McIntosh (2016). "Is the Mediterranean the New Rio Grande? US and EU Immigration Pressures in the Long Run". In: *Journal of Economic Perspectives* 30.4, pp. 57–82. ISSN: 0895-3309. DOI: 10.1257/jep.30.4.57.

Harris, John R. and Michael P. Todaro (1970). "Migration, Unemployment and Developmnent : A Two-Sector Analysis". In: *The American Economic Review* 60.1, pp. 126–142. URL: https://www.jstor.org/stable/1807860.

Hatton, Timothy J and Jeffrey G Williamson (2005). "What Fundamentals Drive World Migration ?" In: *Journal of Population Economics* 18, pp. 719–740.

Hatton, TJ and JG Williamson (1994). "What drove the mass migrations from Europe in the late nineteenth century?" In: *Population and Development Review* 20.3, pp. 533–559.

Helbling, Marc, Liv Bjerre, Friederike Römer, and Malisa Zobel (2017). "Measuring Immigration Policies: The IMPIC Database". In: *European Political Science* 16.1, pp. 79–98. ISSN: 1680-4333, 1682-0983. DOI: 10.1057/eps.2016.4.

Hooghe, Liesbet and Gary Marks (2018). "Cleavage theory meets Europe's crises: Lipset, Rokkan, and the transnational cleavage". In: *Journal of European Public Policy* 25.1, pp. 109–135. ISSN: 14664429. DOI: 10.1080/13501763.2017.1310279.

Inglehart, Ronald and Pippa Norris (2016). "Trump, Brexit, and the Rise of Populism: Economic Have-Nots and Cultural Backlash". In: *SSRN Electronic Journal*, pp. 1–53. DOI: 10.2139/ssrn.2818659.

Kuznets, Simon (1955). "Economic Growth and Income Inequality". In: *The American Economic Review* 45.1, pp. 1–28.

Lind, Jo Thori and Halvor Mehlum (2010). "With or without u? the appropriate test for a U-shaped relationship". In: *Oxford Bulletin of Economics and Statistics* 72.1, pp. 109–118. ISSN: 03059049. DOI: 10.1111/j.1468-0084.2009.00569.x.

Lucas, Robert E B (2019). *Migration and development The role for development aid*, p. 112. ISBN: 9789188021403. URL: https://eba.se/wp-content/uploads/2019/08/20195.pdf%7B%5C%%7D0Ahttps://www.delmi.se/en.

MacKinnon, James G. and Lonnie Magee (1990). "Transforming the Dependent Variable in Regression Models". In: *International Economic Review* 31.2, pp. 315–339. ISSN: 0020-6598. DOI: 10.2307/2526842.

Macron, Emmanuel (2018). *Initiative for Europe: Sorbonne speech of Emmanuel Macron.* Tech. rep.

Martin, P. L. (1993). *Trade and migration: NAFTA and agriculture.* Policy ana. USA.

Massey, DS, J Arango, and G Hugo (1993). "Theories of international migration: A review and appraisal". In: *Population and Development Review* 19.3, pp. 431–466. URL: https://www.jstor.org/stable/2938462.

Mayda, Anna Maria (2010). "International migration: A panel data analysis of the determinants of bilateral flows". In: *Journal of Population Economics* 23.4, pp. 1249–1274. ISSN: 09331433. DOI: 10.1007/s00148-009-0251-x.

Mayer, T. and S. Zignago (2011). "Notes on CEPII's distances measures : the GeoDist Database". In: *CEPII Working Paper 2011-25.*

Naudé, Wim (2010). "The determinants of migration from sub-saharan african countries". In: *Journal of African Economies* 19.3, pp. 330–356. ISSN: 09638024. DOI: 10.1093/jae/ejq004.

OECD (2019). *International Migration Outlook 2019.* 43rd ed. Paris: OECD Publishing. ISBN: 9789264528345. DOI: 10.1787/fa150dba-en.

Ortega, Francesc and Giovanni Peri (2013). "The effect of visa policies on international migration flows". In: *MIGRATION STUDIES* 1.1, pp. 47–74. ISSN: 16136373. DOI: 10.1093/migration/mns004.

Özden, Çağlar, Christopher R. Parsons, Maurice Schiff, and Terrie L. Walmsley (Jan. 1, 2011). "Where on Earth Is Everybody? The Evolution of Global Bilateral Migration 1960–2000". In: *The World Bank Economic Review* 25.1, pp. 12–56. ISSN: 0258-6770. DOI: 10.1093/wber/lhr024.

Pence, Karen M. (2006). "The Role of Wealth Transformations: An Application to Estimating the Effect of Tax Incentives on Saving". In: *The B.E. Journal of Economic Analysis & Policy* 5.1. ISSN: 1935-1682. DOI: 10.1515/1538-0645.1430.

Pettersson, Therése and Kristine Eck (July 1, 2018). "Organized Violence, 1989–2017". In: *Journal of Peace Research* 55.4, pp. 535–547. ISSN: 0022-3433. DOI: 10.1177/0022343318784101.

Ruyssen, Ilse, Gerdie Everaert, and Glenn Rayp (2012). "Determinants and dynamics of migration to OECD countries in a three-dimensional panel framework". In: *Empirical Economics* 46.1, pp. 175–197. ISSN: 03777332. DOI: 10.1007/s00181-012-0674-1.

Simonsohn, Uri (2018). "Two Lines: A Valid Alternative to the Invalid Testing of U-Shaped Relationships With Quadratic Regressions". In: *Advances in Methods and Practices in Psychological Science* 1.4, pp. 538–555. ISSN: 2515-2459. DOI: 10.1177/2515245918805755.

Stark, O. (2006). "Inequality and migration: A behavioral link". In: *Economics letters* 91.1, pp. 146–152.

Telli, Henry (2014). "Less poverty, more emigration: understanding migrant flows from developing countries". In: *Migration and Development* 3.1, pp. 54–72. ISSN: 2163-2324. DOI: 10.1080/21632324.2013.831584.

Teorell, Jan, Stefan Dahlberg, Sören Holmberg, Bo Rothstein, Natalia Alvarado Pachon, and Richard Svensson (2019). *The Quality of Government Standard*

Dataset, Version Jan19. University of Gothenburg. The Quality of Government Institute. DOI: 10.18157/qogstdjan19.

UN (2018). *Global Compact for Safe, Orderly, and Regular Migration Draft Rev 2*. Tech. rep.

— (2019). "United Nations, Department of Economic and Social Affairs, Population Division (2019). International Migrant Stock 2019". In: *United Nations database, POP/DB/MIG/Stock/Rev.2019*.

Vogler, Michael and Ralph Rotte (2000). "The Effects of Development on Migration: Theoretical Issues and New Empirical Evidence". In: *Journal of Population Economics* 13.3, pp. 485–508.

Wesselbaum, Dennis and Amelia Aburn (2019). "Gone with the Wind: International Migration". In: *Global and Planetary Change* 178, pp. 96–109. ISSN: 0921-8181. DOI: 10.1016/j.gloplacha.2019.04.008.

World Bank (2018). "World Bank Bilateral Migration Matrix 2017". In: *Migration and Remittances Data*. URL: https://www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-remittances-data.

— (2019). "Air transport, registered carrier departures worldwide". In: *World Development Indicators*. URL: https://data.worldbank.org/indicator/IS.AIR.DPRT.

Zelinsky, Wilbur (Apr. 1971). "The Hypothesis of the Mobility Transition". In: *Geographical Review* 61.2, p. 219. ISSN: 00167428. DOI: 10.2307/213996.

A Descriptives

Table 8: Summary statistics for our working sample of 54 low-income countries (GDP per capita < 7000 USD)

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Emigrants (thousends)	1,858	8.42	23.84	0.00	0.28	5.77	286.69
Emigration rate (%)	1,858	0.06	0.12	0.00	0.004	0.05	1.66
GDP (PPP billion $2011)	1,858	74.94	379.30	0.18	5.55	33.20	6,361.84
GDP per capita (PPP $2011)	1,858	1,944.21	1,099.26	223.09	1,104.61	2,566.72	6,918.86
GDP per capita growth(%)	1,855	1.52	9.16	−51.61	−2.47	5.54	91.86
Population (million)	1,858	35.57	135.84	0.09	4.18	18.34	1,278.56
Diaspora (million)	1,858	0.12	0.32	0.0001	0.003	0.07	4.13
Conflict	1,858	1.33	0.62	1	1	1	3
FH index	1,769	2.34	0.68	1.00	2.00	3.00	3.00
Air passengers	1,858	25.32	7.72	15.41	19.50	30.60	42.99
Immig. pol. restrictiveness	1,645	0.40	0.03	0.37	0.38	0.41	0.46

B Robustness checks

Table 9: Panel regression using GDP per capita

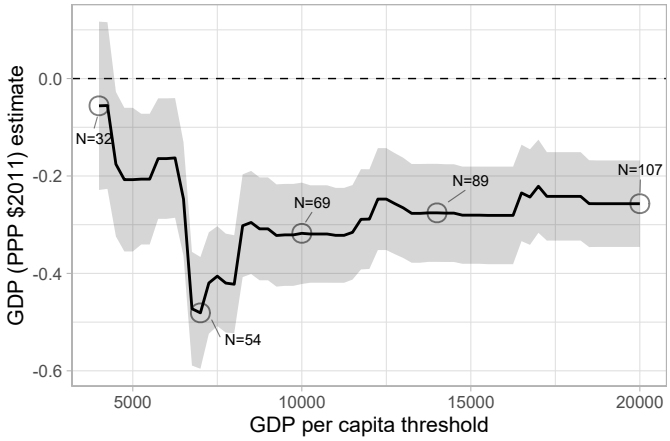
	Emigration	Emigration	Emigration rate	Emigration rate
GDP per capita	-4.593^{***}	-4.343^{***}	-0.235^{***}	-0.184^{***}
	(0.486)	(0.439)	(0.043)	(0.046)
Population	1.593^{**}	0.237		
	(0.556)	(0.505)		
UCDP: Minor conflict		0.353^{***}		0.008
		(0.055)		(0.006)
UCDP: War		0.502^{***}		0.023^{**}
		(0.076)		(0.008)
FH: partly free		0.045		0.028^{***}
		(0.071)		(0.008)
FH: not free		−0.112		0.022^{**}
		(0.078)		(0.008)
Diaspora size		0.397^{***}		−0.002
		(0.097)		(0.010)
Country FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Num. obs.	1858	1769	1858	1769
R^2 (overall)	0.892	0.917	0.661	0.675
R^2 (within)	0.060	0.111	0.016	0.026

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 10: Pooled and panel regressions without time control

	Pooled		Panel	
	Model 1	Model 2	Model 3	Model 4
GDP (PPP $2011)	0.917**	0.045	−0.490***	−0.461***
	(0.324)	(0.192)	(0.063)	(0.057)
Population	0.146	0.234	3.953***	2.953***
	(0.352)	(0.211)	(0.113)	(0.129)
UCDP: Minor conflict		0.199		0.372***
		(0.171)		(0.058)
UCDP: War		0.126		0.485***
		(0.251)		(0.081)
FH: partly free		−0.044		−0.095
		(0.229)		(0.075)
FH: not free		−0.127		−0.303***
		(0.195)		(0.081)
Diaspora size		0.818***		0.253***
		(0.050)		(0.033)
Country FE	no	no	yes	yes
Year FE	no	no	no	no
Num. obs.	1858	1769	1858	1769
R^2 (overall)	0.471	0.769	0.878	0.902
R^2 (within)	0.471	0.769	0.527	0.572

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$



Note: The estimates for the influence of GDP on Emigration are based on model 5 in Table 3.

Figure 5: Estimated coefficient of IHS-transformed GDP (with 95 % confidence interval) conditional on varying GDP per capita thresholds for the underlying sample

Table 11: Panel regressions with outlier dummies for high and low growth

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
GDP (PPP $2011)	−0.406***	−0.396***	−0.417***	−0.417***	−0.408***	−0.407***
	(0.065)	(0.074)	(0.064)	(0.074)	(0.065)	(0.074)
Population	1.942***	2.955***	1.967***	2.983***	1.944***	2.955***
	(0.268)	(0.279)	(0.267)	(0.277)	(0.268)	(0.279)
Air passengers		0.034***		0.033***		0.034***
		(0.010)		(0.010)		(0.010)
Immigration policy restrictiveness		−3.852***		−3.884***		−3.890***
		(0.972)		(0.972)		(0.972)
High growth	−0.059	−0.051			−0.060	−0.061
	(0.059)	(0.064)			(0.059)	(0.064)
Low growth			−0.009	−0.082	−0.014	−0.088
			(0.056)	(0.060)	(0.057)	(0.060)
Country FE	yes	yes	yes	yes	yes	yes
Year FE	yes	no	yes	no	yes	no
Num. obs.	1855	1642	1855	1642	1855	1642
R^2 (overall)	0.900	0.893	0.900	0.893	0.900	0.893
R^2 (within)	0.048	0.542	0.048	0.542	0.048	0.542

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 12: Panel regressions without small countries

	pop. > 2.5mio	pop. > 2.5mio	pop. > 5mio	pop. > 5mio
GDP (PPP $2011)	−0.626***	−0.618***	−0.337***	−0.148
	(0.071)	(0.081)	(0.093)	(0.099)
Population	−0.697*	0.841*	−1.460***	0.422
	(0.322)	(0.331)	(0.407)	(0.392)
Air passengers		0.111***		0.086***
		(0.012)		(0.015)
Immigration policy restrictiveness		−3.546**		−4.373***
		(1.159)		(1.301)
Country FE	yes	yes	yes	yes
Year FE	yes	no	yes	no
Num. obs.	1263	1118	714	632
R^2 (overall)	0.867	0.854	0.898	0.888
R^2 (within)	0.066	0.500	0.034	0.502

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 13: Panel regressions with different institutional variables

	Model 1	Model 2	Model 3
GDP (PPP $2011)	−0.481***	−0.553***	−0.423***
	(0.059)	(0.061)	(0.058)
Population	0.921***	1.257***	1.136***
	(0.251)	(0.247)	(0.241)
UCDP: Minor conflict	0.356***	0.231***	0.292***
	(0.055)	(0.060)	(0.054)
UCDP: War	0.508***	0.356***	0.481***
	(0.076)	(0.084)	(0.074)
FH: partly free	0.055		
	(0.072)		
FH: not free	−0.107		
	(0.078)		
Diaspora size	0.168***	0.191***	0.212***
	(0.038)	(0.038)	(0.039)
Polity IV			0.006
			(0.005)
Political Terror Score		0.177***	
		(0.028)	
Country FE	yes	yes	yes
Year FE	yes	yes	yes
Num. obs.	1769	1721	1774
R^2 (overall)	0.916	0.918	0.912
R^2 (within)	0.096	0.141	0.090

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$