Migration and Development: Dissecting the Anatomy of the Mobility Transition *

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Abstract

Emigration first increases before decreasing with economic development. The observed inverted-U relationship between emigration and development was first hypothesized by the theory of the *mobility transition* [71]; the upward segment of which cannot be explained by traditional neoclassical theories. Several mechanisms have been attributed to this pattern the most common, in the neoclassical tradition, being the existence of financial constraints. This paper empirically revisits the relationship between migration and development and quantifies the main drivers of the mobility transition curve. Our analysis distinguishes between migration aspirations and realization rates of college-educated and less educated, working-age individuals. Credit and institutional constraints influence the realization rates of the less educated at low levels of developments but have a limited effect on the aggregate. More than 50% of emigration increases from poor countries is due to the changing skill composition of working-age populations; while traditional (behavioral) explanations only account for about 10% of the total effect in low-income countries and between 5 and 10% percent in lower-middle income countries. We further find evidence that migration aspirations may be governed by a relative deprivation model, whereas realization rates are affected by migration policies and also depend upon the endogenous opportunity costs of preparing

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1 Introduction

Migration is a complex phenomenon, which interacts with, and is affected by, numerous broader development processes at all levels of observation. A deeper understanding of the mechanisms underpinning the migration-development nexus is crucial for constructing realistic models of migration decisions and understanding the effects of various types of economic development and migration policy reforms on the size and structure of migration flows. While traditional neoclassical models of migration posit that narrowing wage gaps between country pairs monotonically reduce migration along specific corridors, in reality we rather observe an inverted-U relationship between migration and development. This is is perhaps best known as the *mobility transition* curve following the seminal work of [71]. While various explanations of the observed relationship have been conjectured in specific contexts; this paper is the first to evaluate these competing theorems simultaneously, in order to provide an answer to the decades-old puzzle as to what drives the upward segment of the observed relationship. We test rich aggregated microdata on individuals' aspirations and recent data on actual migration, in a unified multi-country framework, to show conclusively, conditional on all other potential explanations, that the observed pattern is predominantly driven by the skill composition of the working age population at origin.

Wilbur Zelinsky in his classic paper [71], developed the theory of the *mobility transition*. This descriptive theory, combining insights from modernisation theory and demographic transition analysis, hypothesizes that societies pass through five distinct phases of development, from pre-modern traditional societies to future super-advanced societies, which are accompanied by various forms of internal and international migration patterns. The theory predicts an inverted-U shape between average emigrate rates and levels of income per capita, although this relationship, which is observed in practice, which we term the *mobility transition curve*, was only empirically established in subsequent decades (see Section 2). The mobility transition curve has since been confirmed as a cross-country relationship. Using *aggregate* stock data for the years 1960 to 2000, [20] shows that emigration increases with economic development at origin until a level of development commensurate with a per capita income of around $5,000 in PPP terms, while falling thereafter.[1] Figure 1, drawing upon the most recent bilateral migration data from the *DIOC* database (see Section 3), exhibits the same pattern. Figure 1.a illustrates the relationship between net emigration rates[2] and income per capita at origin over the period 2000 to 2010. Adults' emigration rates increase with economic development until an income per capita of around $6,000 and decrease thereafter.[3]

The observed inverted-U relationship between emigration and development is not predicted by neoclassical models of migration. The classic paper by [66], which laid the foundations for the modern approaches for theorising migration in economics, places wage or income differentials at the heart of rational agents' decision as to whether to remain at home or mi-

[1] Comparisons between decades reveal that the turning point has only slightly increased over time.

[2] These are calculated as changes in emigration stocks between 2000 and 2010 as a percentage of the resident population in 2000

[3] The difference in the estimate of the turning point of the Mobility Transition likely derives from the selection of destination countries included. We focus solely upon OECD destinations, while [20] includes all destination countries of the world.

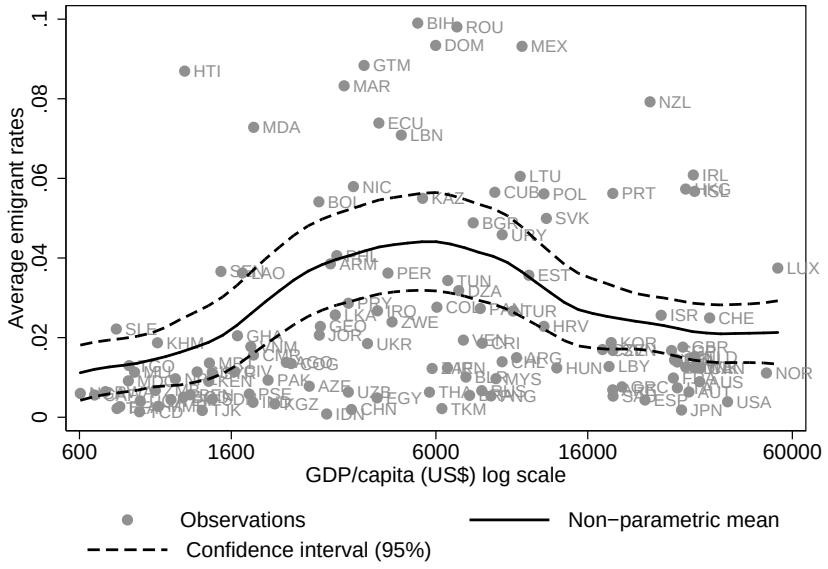
grate elsewhere. This class of models predicts that narrowing income differentials between rich and poor countries will (monotonically) reduce the intensity of international migration, such that neoclassical theory fails to explain the increasing segment of the mobility transition curve. These theories have since created a common belief among policymakers that the root cause of emigration from lower-income countries is poverty, such that further economic development is believed to alleviate migration pressures from poorer nations. As Figure 1a demonstrates, and contrary to the neoclassical tradition, economic development is instead likely to result in additional emigration from countries in early stages of development ([22], [23], [24]). It is no surprise therefore that co-development policies based on these beliefs have largely proven unsuccessful [20] [58]. Figure 1.b shows the density of the world population by income level, disregarding within-country inequality. Approximately two thirds of the world population reside in countries characterised by incomes per capita of less than $6,000, while one third lie close to the peak of the migration transition curve. *A priori* we can therefore expect that further global economic development will result in higher volumes of international migration.

Given this stylised fact, economists and geographers have, for almost half a century, put forward a number of theories to explain the observed relationship between emigration and economic development. A survey of these channels can be found in [20], who lists five alternative theories of the migration transition that have been developed since the pioneering work of [71]. These alternative mechanisms are (i) demographic transitions (development affects the size of the population in the age of migration), (ii) immigration barriers abroad (especially policies that aim to attract high-skilled immigrants), (iii) within-country income inequality (that affects the relative incentives of high- and low-skilled individuals), (iv) structural transformation (trade policies that affect relative prices and internal mobility) and (v) information asymmetry (linked to the relative size of past migration and networks). These alternative theories, which in specific contexts have been argued to give rise to an inverted-U relationship between emigration and development have variously been referred to in the literature as: the *mobility transition* ([71]), *migration curve* ([2]), *migration transition* ([35]), *migration hump* ([47]), and *emigration life cycle* ([38]). We term these explanations *non-behavioural drivers*. While some mechanisms have been studied in existing empirical studies, they have not been examined in a systematic way.[4] As argued by [20], *"We do not know enough about the mechanisms that create this observed pattern. Theories of the transition are well-developed, though they could benefit from more formalization and unification in a single framework that can explain patterns observed at both the macro- and micro-levels".*

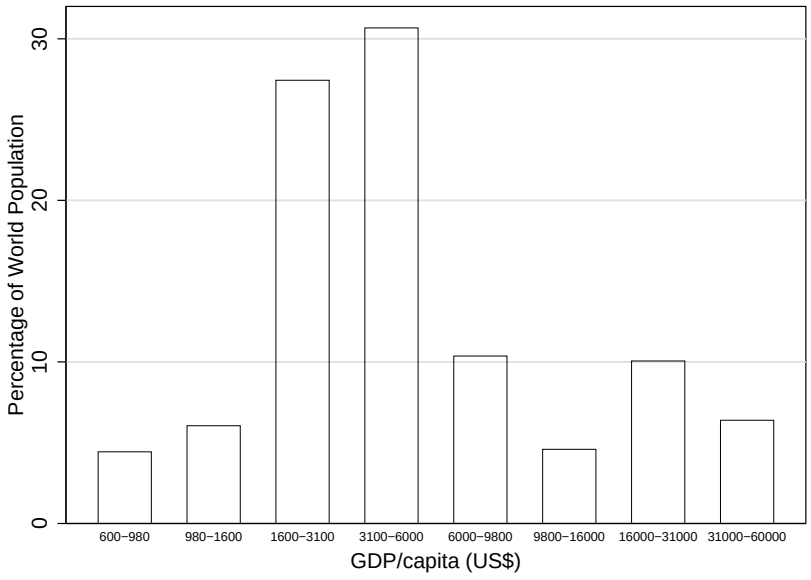
[4]For example, [15] control for gravity drivers. In [61], the set of controls includes geography, quality of institutions, trade and aid with Germany, and urbanization rates. Various specifications controlling for country size, fertility, literacy rate and political rights were compared in [24].

Fig 1. Emigration rates and development

1.a. Nonparametric regressions of emigration rates on income per capita



1.b. Density of the world population by income level



Notes: Non-parametric regressions using Epanechnikov kernel (see [29]), local-mean smoothing, bandwidth 0.5. Our sample includes 126 countries with populations above 2.5 million. We omit small states that typically exhibit unusually large emigration rates as well as countries in war. Average migration rates are calculated as the difference between migrant stocks in 2000 and 2010, normalized by the population at origin. The migration data derive from the *OECD-DIOC database*. Data on GDP per capita at PPP in 2000 are taken from the *Penn World Tables 7.0*. Population data in 2000 are provided by the *UN-DESA World Population Prospects 2012*.

Economists have traditionally studied the impact of migration on various facets of economic development, whereas scant attention has been paid to the opposite directional-link. The work to date, in the neoclassical tradition, has largely focused upon the interplay between emigration incentives and migration constraints, which we term *behavioural drivers*. Emigration aspirations increase with poverty at origin, while migration costs decline with economic development. Credit constraints for example, represent major obstacles for potential migrants attempting to meet the high costs of (legal and illegal) international migration, especially in developing countries (see [25]). Institutional constraints also matter. [54] shows that high passport costs are associated with poor governance, and thus lower levels of emigration. Papers at the macroeconomic level remain scarce however, and this paper is the first, to the best of the authors' knowledge, that seeks to quantify the competing mechanisms that underpin the mobility transition.

The effect of economic development on emigration selectivity has seldom been examined due to the paucity of available data on the skill composition of migrants; although exceptions exist. The need for such data arises since the degree to which financial constraints are binding will likely depend upon the level of educational attainment at origin. Using cross-country data on migration to the OECD by education level, [15] show that poverty is associated with more highly educated migration streams, especially from distant countries when migration costs are greater. [21], using migration data disaggregated by occupation to the United States between 1899 and 1932,[5] shows that liquidity constraints play an important role in the selection of US immigrants in the early 20^{th} century. Immigrants from poor countries tend to be more educated than those originating from richer countries. If migration constraints limit the capability of low-skilled individuals to move therefore, a rise in income per capita in low-income or lower-middle income countries should result in a significant increase in low-skilled migration.[6]

In this paper, we dissect the anatomy of the mobility transition by simultaneously incorporating all relevant *behavioral* and *non-behavioural* mechanisms into a unified cross-country model. This allows us to disentangle and quantify the various channels through which development affects emigration; while importantly moving away from specific case studies that have been the focus of the literature to date. Distinguishing between skill groups proves key, since many of the underlying mechanisms affect individuals of various educational attainments differently.[7] Importantly, the roles of both geography and culture, which jointly affect both migration costs and economic development ([33]), also need to be accounted for. Methodologically speaking therefore, the appropriate model with which to dissect the mobility transition need be bilateral in nature and encompass skill heterogeneity, while also accounting for all channels of transmission that have been identified in the literature.

Using such a model based on particularly rich aggregated microdata, we quantify the

[5] A period in which immigration was initially unrestricted by law and then highly limited.

[6] Other studies showed that the levels of income per capita and return to schooling at destination are key determinants of the size and skill composition of international migration flows (see among others [34], [52], [44]).

[7] For example, greater inequality in less developed nations, strongly affects the incentives and financial capabilities of less educated individuals. Alternatively, the effect of migrant networks on migration costs have been shown to be greater for the low-skilled (as shown in [13] and [12]).

effect of each mechanism on average migration aspirations and realization rates of college-educated and less educated individuals, using a large sample comprising over 4,000 country dyads over the period 2000-2010. Our empirical and numerical analyses reveal that behavioral drivers (i.e. private incentives and migration constraints) are relevant, but in fact only have a limited effect on the aggregate. In poor countries, around 50 percent of the rise in emigration is rather due to the changing skill composition of the working-age population. Overall, the contribution of behavioral drivers accounts for around 10 percent of the total in low-income countries and between 5 and 10 percent only, in lower-middle income countries. Shedding light on the micro-foundations of migration decisions, we also find that migration aspirations may be governed by a relative deprivation model, according to which decisions are based on the relative position of an individual in a social hierarchy, as opposed to the absolute level of their income. Conversely, realization rates are not only affected by migration policies but also depend upon the opportunity costs of preparing for migration.

The remainder of the paper is organized as follows. A summary of the existing literature on the mobility transition is provided in Section 2. Section 3 describes our data and provides aggregate stylized facts on various components of the mobility transition. In Section 4, we estimate the determinants of (bilateral) migration aspirations and realization rates by education level. Section 5 uses counterfactual experiments to quantify the relative contribution of the various underlying mechanisms and identifies the residual effect of behavioral drivers. Finally, in Section 6 we conclude.

2 Review of a 45 Year-old Literature

The inverted-U shaped relationship between emigration and economic development was first predicted by [71] in his seminal text. His mobility transition theory conjectured that mobility patterns are a function of societies' levels of development that are driven by processes of modernization, industrialization and urbanization. Subsequently, numerous studies have examined the effect of economic progress on emigration. This section provides a summary of existing analyses, while reviewing the theoretical mechanisms that are purported to give rise to the observed inverted-U relationship.

2.1 Emergence of the Mobility Transition curve

The pioneering theory of [71] predicts an inverse-U shaped relationship between emigration and development. The origins of the empirical relationship, which we term the *mobility transition curve*, resulted from work that examined the mass migration of 55 million Europeans to the New World from 1820 until the onset of the Great War ([39], [35], [9]). This exodus began from Western European countries (UK, Germany, Scandinavia, the Netherlands, France) and from 1870 included poorer Southern (Italy, Portugal, Spain, Greece) and Eastern Europe (Poland, Russia, Austria-Hungary). In their analysis of transatlantic migration from Europe between 1850 and 1913, [38] questioned: "Why emigration rates were not always highest from the poorest countries, whose populations clearly would have gained the most from the move, and why emigration rates often rose from low levels as successful development took

place at home". They referred to this phenomenon as the *emigration life cycle*. Similarly, [2] characterized the volume of emigration from Sweden to America between 1850 and 1915 as a *migration curve* with four phases of evolution: starting from low levels in the introductory phase, sharply increasing in the growth phase, reaching the maximum in the saturation phase and then declining in the regression phase. [35] coined the term *migration transition* Taking a completely different tack, [47] argued that an inverted-U relationship, which he called the *migration hump* may result from policy reforms that promote development, specifically trade liberalisation, which he argued for in the case of Mexican emigration to the United States following the introduction of NAFTA.

The observed inverted-U relationship has since been documented in a variety of contexts. Studying the Italian case, [31] showed that increasing income at home accounted for much of the surge in Italian emigration after the 1870s. [32] observed that the propensity to migrate from Southern to Northern European from 1962 to 1988 i.e. from relatively poor sending countries, increased in income. [42] documented various migration peaks to the United States during the early 1970s from Latin America, Africa and Asia. Migration from Latin America rose sharply until the early 1990s before slightly falling, whereas migration from Asia rose sharply, reaching a high point in 1980-84, before declining considerably. Aggregate cross-country data have also been used to identify the inverse U-shaped relationship between economic development and emigration, examples include [15], [61], [1],[64], [22], [23] and [24]. Specifically, [15] show that potential emigration from poor to rich countries is constrained by poverty. Using immigration flow from Africa and Asia into Germany between 1981 and 1995, [61] found that migration constraints dominate incentives of individuals in African nations with incomes per capita below $2,220, and in Asian countries with incomes per capita below $3,250 in PPP value. Using emigration data from 74 low- and middle-income developing countries and controlling for geography, institutional quality, average education and population density, [1] found a return point of the emigration hump at $1,630 (in 1995 prices). Using bilateral migrant stock data for the year 2000, [24] found return points between $2,000 and $6,000 depending upon the control variables included. These results are confirmed by [64] who uses emigration data from 48 developing countries in Africa, Asia and South and Central America to the UK over the period 1973-2005.

2.2 Underlying Mechanisms of the Mobility Transition

While neoclassical migration theory predicts a negative effect of income and wealth on emigration, it fails to to explain the increasing segment of the inverted-U shaped relationship between migration and development (see Figure 1.a). Since [71], the literature has proposed several channels through which economic development may stimulate emigration in the early stages of national development. While these are defined as distinctive channels, they may of course mutually interact with one another at both the microeconomic and macroeconomic levels.

2.2.1 Non-behavioural Drivers

Demographics Globally, demographic transitions that begin with declining mortality and then declining fertility rates ([46]) can explain the mobility transition curve. Low-income countries, those usually characterized by high infant mortality rates, which experience economic development, may host more youthful and economically-active populations. Should domestic labor markets be unable to absorb the rising labor supply, international migration represents an important outside option for employment opportunities. [28] finds a strong positive relationship between European emigration rates and historical population growth between 1861 to 1910, which is attributed to an excess supply of labor. Similarly, [40] predicted that rapid growth in the cohort of potential young emigrants coupled with slow economic growth will likely intensify emigration pressures from Africa to high-wage OECD countries over the preceding two decades. Cohorts aged 20 to 25 are likely most mobile, since migrating to higher-income countries sufficiently early, increases the spell of higher returns to migration and thus lifetime utility. Indeed, it is widely observed that migrants tend to be younger than the sending country average, such that migration aspirations tend to be stronger in developing countries that are characterized by more youthful populations.[8] If economic progress increases the size of the cohort aged 20-25 in the early stage of development, emigration rates are mechanically stimulated.

Structural Change and Labor Relocation Trade linkages emerge concurrently with the formation of transportation and communication networks that may facilitate mobility. ([49], [48], [32]). Openness to trade and international investment fosters production activities, structurally transforms the economy and stimulates migration. When moving from an agrarian to a modern, urbanized economy, developing countries may experience both increased rural to urban migration and as well as international movement ([71], [51]). *Ceteris Parabus* if economic progress translates into greater economic openness both internal and international labor mobility may result.

Networks Migrants having settled, may provide information and send remittances to potential migrants thereby reducing migration costs (see [13], [12]). The US Immigration and Nationality Act of 1965 Act for example, widened emigration opportunities from the developing world which, accompanied by economic growth and declining education gaps in Asia, Latin America and MENA, resulted in sharp increases in immigration from those regions. A migration multiplier results, whereby migrant stocks continue to grow due to the cumulative effects of the initial migration, the effects of which persist long after other migration determinants cease to apply. ([42]). [50] attributes the rapid increase in Mexican emigration to the US during the 1970s to migrant network growth. Networks prove particularly important for the movement of low-skilled migrants ([55]), especially if family reunification programs in

[8] Using the Americas Barometer survey to analyze people's desire to emigrate from 24 countries in America, [6] showed that for many countries, the youngest members of society are the most likely to leave among all age groups. In a similar study on emigration intentions from Africa, [70] documented that the typical potential migrant from Ghana, Senegal, Morocco and Egypt is a young male, exhibiting relatively modern values and optimism with the benefits of emigration.

receiving countries prove generous ([12]).[9]

Education Legal barriers to migration, for example visas, are typically lower for citizens of wealthier nations and for high-skilled workers, meaning that they are far more migratory than their lower-skilled compatriots. Causality is bidirectional. Education may stimulate migration aspirations of potential migrants, while selective immigration policies at destination favor educated migrants. Moreover, [34] find evidence of positive sorting among skilled migrants in that such individuals choose destinations that offer higher rewards to schooling. The impact of development on the skill composition of migration remains ambiguous however. At early stages of development, improvements in education provision likely increase the success rate of potential migrants. Since education quality is endogenous with economic development however, further educational improvements likely reduce potential migrants' willingness to move, an effect which is likely compounded by the narrowing educational gaps between origins and potential destinations. [42] document that 'education catch-up' in the 1960-1970s played an important role in augmenting emigration rates to the US, especially from Asia. [24] used literacy rates as proxies for overall educational levels, finding a significant positive effect of increased education provision on emigrant stocks from less-developed countries; thereby concluding that education plays an emigration-accelerating role in early phases of development through its positive effect on both aspirations *and* capabilities. Conversely, [41] in studying emigration from Latin America to the US conclude that increased education provision partly captures the effects of rising incomes at origin, which reduce emigration incentives. Similarly, [32] demonstrate in the European context that higher levels of income and education increase the probability of not migrating. Overall therefore, if economic progress is correlated with the proportion of high-skilled workers, middle-income countries will likely exhibit greater emigration rates than poorer nations.

Inequality Migration incentives and constraints vary across skill groups and with income inequality. Inequality and development are commonly hypothesized to be represented by the Kuznets curve ([45]), which depicts the relationship between the two variables as hump-shaped. Accordingly, during initial stages of development that are characterized by rising inequality, worse-off individuals feel relatively deprived and seek other 'reference frames'. [59] finds a significant impact of relative deprivation in motivating domestic migration decisions in Mexico, while [21] argues that policies attempting to reduce rural out-migration must consider both absolute and relative community outcomes. [1] conclude that on average, a 10 percent increase in income inequality (as measured by the Gini coefficient) raises the share of international migration by between 15.2 and 24.5 percent.

Gravity The increasing segment of the Mobility Transition curve may also by explained by 'gravity'; economic development on the one hand and migration costs on the other. These

[9]The formation of migrant networks may either be slow or sudden. Large diasporas in European countries resulted from guest-worker agreements signed in the 1950s and 1960s, for example of Turks to Germany, Moroccans to Belgium etc. These policies abruptly ended in the early seventies, although network externalities continue to operate.

mechanisms, referred to as gravity drivers henceforth, have been understudied in the literature in this context. Remote countries located near the tropics exhibit lower income levels. Potential migrants from these countries face greater migration costs in terms of greater geographic, linguistic and cultural distances, such that emigration is bounded by both financial and geographical constraints. The closer countries are therefore to major migrant-receiving nations, the higher their income levels and the lower the costs of migration. Thus absolute geography may explain why emigration rates and economic development are positively correlated. Many studies, for example [15], [61] or [1] show that geographic distance to major labor-receiving regions (e.g. United States or Western Europe) has an important effect on international migration. We will rely on gravity equations to estimate migration responses to bilateral costs.

2.2.2 Behavioural Drivers

Behavioural drivers, the interplay between emigration incentives and constraints, can give rise to the Mobility Transition curve. While increases in personal income make migration more affordable they simultaneously reduce individual's willingness to migrate. The existence of credit constraints may therefore explain the paradox whereby emigration is limited from low-income regions in which many citizens would benefit the most from emigrating to higher-income regions. As economies converge in levels of development, incentives to migration fall however due to the higher opportunity cost of preparing for migration ([25]), i.e. the net expected benefits from working abroad decline relative to the forgone amount of time and money taken to prepare for a migration spell and to obtain visas. [24] proposes to incorporate the notions of agency and individual aspirations into transition theory, by conceptualizing migration at the microeconomic level as a function of aspirations (as characterized by an inverted-U shaped relationship) and capabilities (that increase monotonically with development). de Haas hypothesizes that aspirations overshoot during the initial stage of economic take-off since increased access to education (and information) results in people becoming more aware of life elsewhere. Should the gap between living standards at home and abroad become large, people have increased aspirations to migrate. The willingness to migrate only decreases when this gap countries becomes substantively smaller.

Both mechanisms, emigration incentives and constraints (or aspirations and capabilities), are captured by income and are therefore difficult to distinguish. There is ample historical evidence on the role of liquidity constraints in the 18th and 19th centuries ([38], [39], [31], [21]). For example, the transatlantic migrations of the nineteenth century predominantly arose from relatively developed European nations, England, Germany and the Nordic countries. Poorer countries in Southern Europe by contrast, represented relative latecomers as sources of migrant workers ([39]). [56] finds evidence that Bangladeshi households with international migrants tend to be wealthier than average. In El Salvador, [37] reports that greater household wealth is positively associated with emigration to the US. [4] argues that financial constraints to international migration are binding for poor Mexicans, such that economic growth and anti-poverty and micro-finance programs will result in increased migration to the US. Unconditional cash transfers for example are associated with a 60 percent increase in the average migration rate. Using administrative data from Indonesia, [10] provides evidence

that financial constraints limit international labor mobility, such that positive agricultural income shocks result in significant increases in international migration, particularly among villages with higher numbers of small landholders.

3 Data and Stylized facts

To disentangle the various potential drivers of the mobility transition curve (as detailed in the previous section), we construct measures of migration intensity, by education level, over the 2000-2010 period. We further distinguish between actual and potential migration intensities. Actual migrants are those who have already left their country of origin. Potential migrants include those who live abroad (i.e. actual migrants) and those who have not yet migrated but express a desire to do so. We consider potential migration intensity as a proxy for migration aspirations. The ratio of actual to potential migration we term the realization or success rate. In this section we first describe the data sources used to compute our migration intensity measures before presenting some aggregate stylized facts.

3.1 Migration Data

Data on actual migration flows over the 2000-2010 period, derive the Database on Immigrants in OECD Countries (*DIOC*) for the 2000 and 2010 census rounds. The *DIOC* database documents bilateral migration stocks by education level from all countries of origin ($i = 1, ..., I$) to OECD destinations ($j = 1, ..., J$). Data from the 2010 census round are described in [18], while the corresponding data for 2000 are presented in [57]. We only consider migrants aged 25 and above (as a proxy for the working-age population) and distinguish between migrants with college education (denoted by h and referred to as the highly skilled) and other levels of education (denoted by l and referred to as the low-skilled). For each country pair, net migration flows are computed as the difference between the bilateral migrant stocks in 2000 and 2010. We denote the net flow of migrants from country i to country j of education level $s = (h, l)$ as M_{ij}^s. Aggregating these numbers across OECD destinations allows us to characterize the size and structure of emigration flows to the OECD from all the countries of the world i.e. $\overline{M}_i^s = \sum_j M_{ij}^s$.

To compute actual migration *intensities*, we divide our net migration flows by the origin resident population in 2000. This requires data on the number and average education levels of working-age residents (proxied by the resident population aged 25 and above, which corresponds with our migration data) in each sending country in our sample. This variable, denoted by N_i^s, is taken from [7], which proxies the size of the native population in country i from which we can extract the proportion of college educated (σ_i^l) and low-skilled (σ_i^l). By definition, we have $\sigma_i^l + \sigma_i^h = 1$. Actual migration intensities can be measured as $m_{ij}^s \equiv M_{ij}^s / N_i^s$ at the bilateral level, and as $\overline{m}_i^s \equiv \overline{M}_i^s / N_i^s$ on the aggregate. It follows that the average emigration rate of each sending country is defined as:

$$\overline{m}_i \equiv \sigma_i^h \overline{m}_i^h + \sigma_i^l \overline{m}_i^l. \tag{1}$$

Existing studies of the migration transition curve have characterized the empirical relationship between $\overline{m}_i$ and the development level of the origin country, proxied by its level of

income per capita (y_i).

Our decomposition by education level allows us to examine how the skill composition of the native population affects the migration transition curve. In addition, distinguishing between actual and potential migrations lets us identify the effect of economic development on migration aspirations and realization rates. We rely upon the *Gallup World Poll surveys*, which identify the proportion of non-migrants expressing a desire to emigrate to another country. The Gallup survey has been canvassing opinions annually in more than 150 countries since 2005. As well as documenting various individual characteristics (such as age, gender and education), these surveys also include two relevant questions emigration intentions. These questions, posed in 142 countries, which represent about 97 percent of the world population, were: (i) *Ideally, if you had the opportunity, would you like to move to another country, or would you prefer to continue living in this country?* (ii) *To which country would you like to move?* In line with actual migration and population data, we only consider respondents aged 25 and above and distinguish between individuals with college education or otherwise. As in [27] and [26], we aggregate four waves of the Gallup survey (i.e. the years 2007 to 2010) and consider that these four waves represent a single period of observation. Adding desiring migrants to actual migration flows, we define the concept of potential migration flows P_{ij}^s, i.e. the total migration flows that would have been observed between 2000 and 2010 if all desiring migrants had been able or allowed to emigrate, $\overline{P}_i^s = \sum_j P_{ij}^s$. Thus, potential migration intensity, which captures emigration aspirations can be measured as $p_{ij}^s \equiv P_{ij}^s/N_i^s$ at the bilateral level and as $\overline{p}_i^s \equiv \overline{P}_i^s/N_i^s$ on the aggregate. For reasons that will be explored later, desiring migrants can fail to realize their migration aspirations, such that we define bilateral and aggregate realization rates as $r_{ij}^s \equiv m_{ij}^s/p_{ij}^s$ and $\overline{r}_i^s \equiv \overline{m}_i^s/\overline{p}_i^s$. Our decomposition of emigration rates by skill level, allows us to investigate whether the effect of economic development on emigration is driven by migration aspirations or else by realization rates.

3.2 Stylized Facts

In this section, we provide stylized facts based upon aggregate migration rates, disaggregated by skill level, which elucidate the need for more detailed migration data to explain the existence of the mobility transition, when moving beyond traditional neoclassical explanations. We examine the relationship between aggregate migration rates and economic development as measured by the level of income per capita (y_i). The databases described above allow us to identify skill differences in emigration rates and distinguish between migration aspirations and realization rates. The average emigration rate of country i ($i = 1, ..., I$) can be decomposed as:

$$\overline{m}_i = \sigma_i^h \overline{p}_i^h \overline{r}_i^h + \sigma_i^l \overline{p}_i^l \overline{r}_i^l \tag{2}$$

where $\overline{p}_i^s$ is the proportion of potential migrants and $\overline{r}_i^s$ is the realization rate. The product of these two variables give the proportion of individuals who have already realized their migration among all potential migrants. This corresponds to the observed migration rates by skill groups.

Figure 2 shows the evolution of each component $\overline{m}^s(y)$, $\overline{p}^s(y)$, $\overline{r}^s(y)$ and $\sigma^s(y)$ with regards the level of GDP per capita in US dollars. We consider a sample of 126 countries, excluding

small states with populations lower than 2.5 million inhabitants as well as those experiencing episodes of conflict. The results are estimated using the non-parametric Epanechnikov kernel density estimation (see [29]). The skill compositions of populations vary with economic development. Education levels, taken in isolation, likely prove crucial in understanding the foundations of the mobility transition curve since the hypothesized drivers underpinning the relationship likely affect individuals of various educational attainments differently.

Taking the derivative of the average migration rate in (1) with respect to income per capita, we have:

$$\frac{d\overline{m}}{dy} \equiv \frac{d\sigma^h}{dy}(\overline{m}^h - \overline{m}^l) + \sigma^h \frac{d\overline{m}^h}{dy} + \sigma_i^l \frac{d\overline{m}^l}{dy}$$

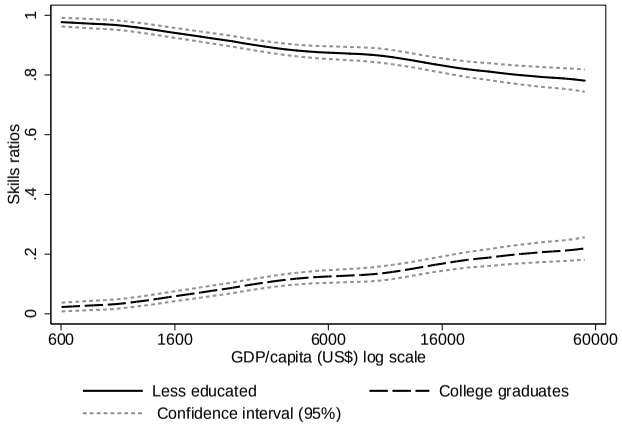
As shown in figure 2.a., the share of high-skilled in the population σ^h rises constantly with development, which is greater by a factor of more than 20 in rich, as when compared with the poorest countries. In addition, the average migration rates $\overline{m}^s$ are always greater among college graduates than among the less educated, as depicted in figure 2.b. At low levels of income per capita, positive selection is strong ($\overline{m}^h \simeq 30\overline{m}^l$). In the richest countries, positive selection is much weaker ($\overline{m}^h \simeq 3\overline{m}^l$). Overall, the emigration rates of the college-educated $\left(\overline{m}^h\right)$ decrease with development, while those of the less-educated $\left(\overline{m}^l\right)$ are inverted-U shaped. The first term in the derivative above is always positive therefore. If poor countries were counterfactually endowed with the same share of college graduates as in rich countries, they would therefore exhibit very large emigration rates. The increasing segment of the mobility transition curve will be observed when the effect of the first term dominates, even if the emigration rates of each skill group decrease with development, i.e. $d\overline{m}^s/dy$ are jointly negative.

The observed emigration rates are the products of migration aspirations and realization rates. Figure 2.c. shows that migration aspirations decrease with development for both college-educated and less educated individuals.[10] We observe a positive selection in migration aspirations, but this selection is somewhat weaker when compared to actual migration. At low levels of development, the average willingness to migrate among the highly-educated is greater by a factor of four (when compared to the lower-skilled) $\left(\overline{p}^h \simeq 4\overline{p}^l\right)$. In the richest countries, the ratio falls to one and a half $\left(\overline{p}^h \simeq 1.5\overline{p}^l\right)$.

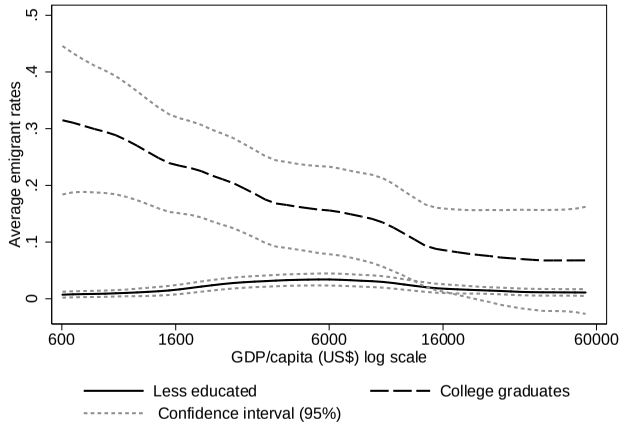
[10]Total potential migration, is equal to the sum of those potential migrants expressing a willingness to migrate (from the Gallup data) and the actual migrants who effectively migrated between 2000 and 2010.

Fig 2. Nonparametric regressions of the aggregate components of emigration on income per capita

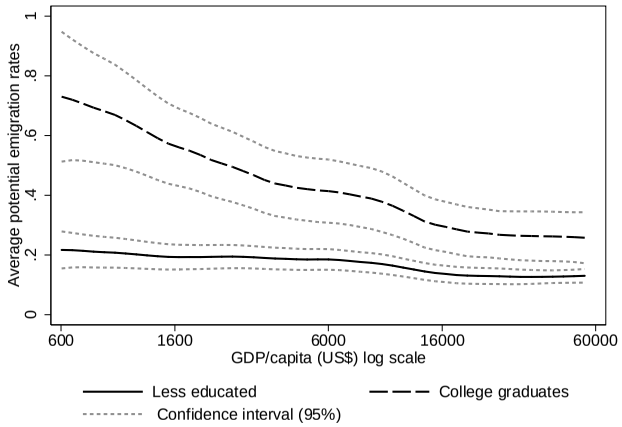
2.a. Shares of college graduates and less educated natives



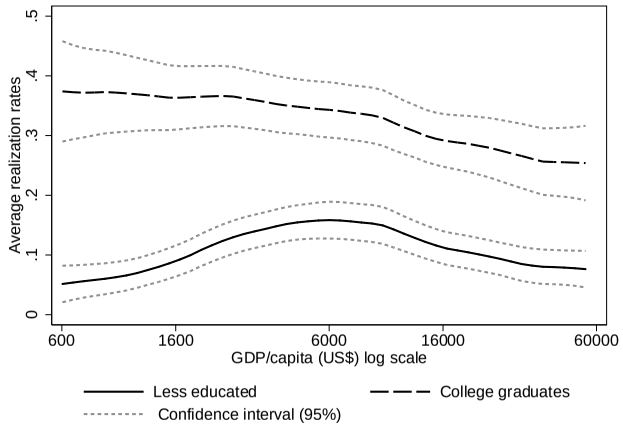
2.b. Emigration rates by education level



2.c. Migration aspirations by education level



2.d. Realization rates by education level



Notes: Non-parametric regression using Epanechnikov kernel, local-mean smoothing, bandwidth 0.5. The skill migration rates are the differences between migrant stocks in 2000 and 2010, normalized by the skill population of the origin countries. The migration aspirations rates are calculated as the sum of the number non migrants expressing a willingness to emigrate and actual migration flows between 2000-2010, normalized by the origin country populations. Realization rates are obtained by dividing the 2000-2010 migration flows by the total number of potential migrants. The sample consists of 126 countries. Data on GDP per capita at PPP in 2000 are taken from the *Penn World Tables 7.0*.

Figure 2.d. describes the relationship between income per capita and the realization rates of college graduates $\left(\overline{r}_i^h\right)$ and the less-educated $\left(\overline{r}_i^l\right)$. Overall, the realization rate of the high-skilled slightly decreases with development. Its slope is not as sharp as that of the $\overline{p}^h$ curve. The realization rate of the less educated however, is the only inverted-U shaped component of the decomposition equation (1). At low levels of income per capita, the high-skilled are eight times more likely to realize their migration aspirations compared to the low-skilled $\left(\overline{r}^h \simeq 8\overline{r}^l\right)$. This ratio falls to 2 at intermediate income levels (around US $5,000) and reaches 3 in the richest countries.

4 Empirical Analysis

The stylized facts described in the previous section reveal that average aspiration and realization rates of both high and low-skilled individuals are strongly correlated with the level of economic development of origin countries. Importantly, the only inverted-U shaped component is the realization rate of the low-skilled. In this section, we implement regressions to explore the relationship between emigration intensity and development. Given our foregoing discussions, our aim is to estimate (and subsequently quantify) the relative contributions of all the factors that the literature has highlighted as being potential explanations of the mobility transition including : behavioural drivers, macroeconomic variables, and the influence of gravity and networks. Importantly, we evaluate the impact of all these variables on both high-skilled and low-skilled emigration rates. Identifying the influence of gravity drivers requires our analysis to be conducted at the bilateral level, as well as controlling for absolute geography and other exogenous determinants of migration flows. Hence, building upon (2), the average emigration rate of country i $(i = 1, ..., I)$ can be decomposed as following:

$$\overline{m}_i = \sigma_i^h \sum_{j \neq i} p_{ij}^h r_{ij}^h + \sigma_i^l \sum_{j \neq i} p_{ij}^l r_{ij}^l \tag{3}$$

Our empirical analysis distinguishes between four dependent variables, namely the bilateral migration aspirations and realization rates of both college-educated and less educated adults, p_{ij}^s and r_{ij}^s $(s = h, l)$. The set of explanatory variables includes the following variables: **[Need to add bit on internal migration/urbanisation, trade etc.]**

- Gravity drivers (denoted by G_{ij}) includes the log of geographic distance between sending and receiving countries and a set of dummy variables that equal one should the sending and receiving countries by contiguous, speak a common language or share a colonial heritage after 1945. These variables are obtained from the *CEPII Dyadic Distance Database* described in [53]. We also include a measure of genetic diversity as a proxy for cultural distance; we use the probability that two alleles (a particular form taken by a gene) at a given locus selected at random from two populations are different (proxy for time since isolation) from [67]. Finally, we control for the size of origin country populations size and the proportion of Muslims in their populations. Data on country-specific religious adherence are taken from the *CIA World Factbook*.

- To account for pre-existing migrant networks (denoted by S_{ij}), we use the total stock of bilateral migrants from i to j in the year 2000, divided by the native population of country j in the same year. This variable captures the probability that a native from country i has a friend or relative in country j at the beginning of the period.

- Macroeconomic drivers (denoted by A_i) include: the share of the population in country i aged between 15 and 24 in 2000 as a proxy for the adult population in the age of migration between 2000 and 2010, average weighted import tariffs, as proxies for the degree of openness of country i and an index of education quality. The shares of the population aged 15-24 are obtained from the *UN-DESA World Population Prospects 2012*. Information on weighted import tariffs comes from the *World Integrated Trade Solution (WITS)* as of the year 2000. This variable is constructed using the average of all effectively applied import tariffs weighted by their corresponding trade value.[11] The lower the import tariffs, the more open a country. Data on education quality are proxied by the test score results of high school students in maths, science and reading skills, which are taken from [5].

- Having controlled for gravity, network and macroeconomic channels (i.e. all the relevant, origin-specific mechanisms identified in the existing literature), we further consider the remaining effects of income and inequality (denoted by y_i and ω_i); those due to behavioral responses. We construct proxies for skill-specific levels of income, y_i^h and y_i^l and include their logged levels and their squares. Our measures of income proxy for income inequality. We use GDP per capita data at destination (PPP in 2005) international USD (Chain series) in 2000 (y_i) from the *Penn World Tables 7.0* and data on the wage ratio between college educated and less educated workers (ω_i) from [43]. We combine these values with the proportions of high-skilled and low-skilled workers from [7]. Skill-specific income levels are computed as $y_i^l = y_i / \left(\sigma_i^h \omega_i + \sigma_i^l\right)$ and $y_i^h = \omega_i y_i / \left(\sigma_i^h \omega_i + \sigma_i^l\right)$.

  The (gravity) regressions that we estimate below, although not formally derived from an underlying random utility model, nevertheless manifest similarly. One particular concern in this regard is the potential role of multilateral resistance to migration (MRM) - see [17], which is the observation that the attractiveness of a particular destination country for potential migrants at origin will likely depend upon the relative attractiveness of alternative destinations To account for any potential bias that might arise from the existence of MRM, we follow the approach of [8], one adapted to the case of migration as in [36] and control for MRM with the inclusion of two additional terms, for distance ($MRDIST_{ij}$) and adjacency ($MRADJ_{ij}$). These are calculated as:

[11] Data for 12 European countries (Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, United Kingdom) are not available. While under the common trade policy, the EU15 (plus Austria, Finland, Sweden) apply the same tariff rates to all their imports. The weighted tariffs are not equivalent due to the differences in import volumes. For the sake of simplicity given the difficulty of working with 6-digit commodity lines in order to calculate the exact weighted tariffs for each country however, we decided to use the average value of the European Union, which is available, for those 12 countries.

$$MRDIST_{ij} = \left(\sum_{k\neq j}^{I} \theta_k lnDist_{ik}\right) + \left(\sum_{m\neq i}^{I} \theta_m lnDist_{mj}\right) - \left(\sum_{k\neq j}^{I}\sum_{m\neq i}^{I} \theta_k\theta_m lnDist_{km}\right)$$

$$MRADJ_{ij} = \left(\sum_{k\neq j}^{I} \theta_k lnAdj_{ik}\right) + \left(\sum_{m\neq i}^{I} \theta_m lnAdj_{mj}\right) - \left(\sum_{k\neq j}^{I}\sum_{m\neq i}^{I} \theta_k\theta_m lnAdj_{km}\right)$$

- Finally, each regression includes a full set of destination fixed effects. These capture the relative attractiveness of all destinations as well as accounting for immigration policies that do not discriminate between origins.

To estimate potential bilateral emigration rates p^s_{ij} we use the Poisson pseudo-maximum likelihood estimator (PPML) described in [62] and [63], for three reasons. First, the variance of the error in gravity equations, which is non-linear, varies across country-pairs such that the OLS estimator may be biased due to heteroskedasticity. Second, the PPML estimator is consistent in the presence of fixed effects. Third, the potential bilateral rate variables p^s_{ij} contain a large proportion of zero values (7.25 percent for college graduates and 8.8 percent for the less educated) due to the absence of migrants between many country-pairs. The PPML estimator does not exclude these zeroes and thus eliminates sample selection bias.

Our measures of realization rates r^s_{ij}, contain high proportions of both zeroes and ones. The cause of zero realization rates is the same as for actual migration rates. Values of one, which are equivalent to a one hundred percent probability of realizing migration, are due to the total absence of individuals expressing a desire to emigrate in the Gallup World Poll and having not yet emigrated between 2000-2010. Realization rates of 0 and 1 among the less- and college-educated account for 3.85 and 9.52 percent of the total migration of their skill groups respectively and 2.3 and 3.9 percent of the total migration stock. The presence of these zeroes and ones may lead to our results being inconsistent since our estimations may be biased towards smaller and less important corridors that account for a large number of observations in our sample. We decide to drop these observations and rely upon OLS.

The specifications of our potential and realization equations are:

$$p^s_{ij} = \exp\left[\alpha^s_0 + \alpha^s_j + \alpha^s_G G_{ij} + \alpha^s_S S_{ij} + \alpha^s_A A_i + \alpha^s_{y1}\log y^s_i + \alpha^s_{y2}\left[\log y^s_i\right]^2 + \varepsilon^s_{ij}\right] \quad (4)$$

$$r^s_{ij} = \gamma^s_0 + \gamma^s_j + \gamma^s_G G_{ij} + \gamma^s_S S_{ij} + \gamma^s_A A_i + \gamma^s_{y1}\log y^s_i + \gamma^s_{y2}\left[\log y^s_i\right]^2 + \epsilon^s_{ij} \quad (5)$$

where p^s_{ij} in equation (3) is the potential bilateral migration rate and r^s_{ij} the realization rate. Both are regressed on the same set of explanatory variables: gravity drivers G_{ij}, migrant networks S_{ij}, macroeconomics determinants A_i, skill-specific logarithmic wages y^s_i, destination country fixed effects α^s_j and γ^s_j. The exp(.) specification in (4) is due to the use of the PPML estimator.

Regression results for migration aspiration and realization rates are presented in Tables 1 and 2. All estimations include both destination fixed effects and variables controlling for multilateral resistance to migration. The standard errors are clustered by country of

origin. Columns (L1) and (H1) include the full set of controls and the log of the skill-specific level of income (linear specification). Columns (L2) and (H2) add the squared level of income (quadratic specification). Finally, columns (L3) and (H3) represent our parsimonious specifications comprising significant controls only, in addition to the log level of income. The latter variable is only included in the parsimonious specification if it is significantly different from zero. The correlations between income, gravity and macroeconomic determinants prove important and in our subsequent counterfactual simulations, we use the estimates of the parsimonious regressions to minimize collinearity problems.

Focusing first upon migration aspirations, Table 1 reveals that the effect of skill-specific income level is only significant for the less-educated. When both the linear and squared income terms are included, in model (L2), the low-skill wage loses its significance. This suggests that migration aspirations of the less educated are linearly decreasing with income. We find no evidence that migration aspirations increase in early stages of development.

Among the macroeconomic drivers, the share of population aged between 15 and 24 has the most significant effect, especially for the highly skilled. Young individuals express higher willingness to emigrate. Education quality has no significant impact. This variable only reflects the cognitive abilities of high-school students and so it plausibly has little influence on global attitudes towards migration. Higher average import tariffs, which correspond to lower degrees of openness, result in slight increases in migration aspirations. This suggests that poorer countries are less open to trade and host more immobile workers.

The coefficients on the gravity variables exhibit the expected signs. Geographic distance reduces migration aspirations while common language increases them. These effects are smaller for college graduates. Genetic distance exerts a small negative effect on the desire to emigrate of the less-educated and no effect for the high-skilled. These differences between skill groups, can be explained be relatively more open attitudes towards distant cultures. The results on population size are negative, although insignificant, which might be indicative of the fact that larger countries usually exhibit lower (international) migration rates since their citizens have access to wider ranges of job opportunities at home. Our results do show that countries populated by relatively young and educated citizens experience higher average willingness to emigrate however.

The determinants of realization rates are presented in Table 2. Interestingly, both the linear and squared terms of the low-skill wage variable are now highly significant, suggesting that the relationship between realizing migration and financial capacity is non-linear. Realization rates tend to increase at low income levels and reach a maximum when wages are around \$4,800, decreasing thereafter. This suggests that economic progress increases the capacity of the less educated to financially meet the cost of international movement during early stages of development. For the college-educated, we do not identify a similar non-linear pattern; the effect of income is insignificant (in the most comprehensive regression), and becomes negative and significant in the parsimonious regression. Financial hurdles are partially captured by geographic distance however, which has negative effect on realization rates. The closer an origin to a major OECD destination, the more potential migrants realize their aspirations. Geographic distance represents both financial and psychic costs of being far from family and friends however. Migrant networks mitigate these costs related to long-distance movement and have sizable effects on the success of migration, although the

network effect is slightly greater for the less-educated. Sharing colonial ties or a common language increases realization rates, but these variables only remain statistically significant for the college-educated. Macroeconomic factors do not have any impact upon realization rates, except for the small positive effect of education quality on the realization rates of the low-skilled. The gravity channels however play an important role in determining both the willingness and realization of migration.

Tab 1. Determinants of migration aspirations (PPML regressions)

	Less educated			College graduates		
	(L1)	(L2)	(L3)	(H1)	(H2)	(H3)
Geo. dist. (log)	-0.746***	-0.750***	-0.764***	-0.723***	-0.723***	-0.732***
	(0.079)	(0.079)	(0.090)	(0.159)	(0.160)	(0.154)
Contiguity	-0.421	-0.363	-	-0.732**	-0.721**	-0.855**
	(0.399)	(0.407)		(0.350)	(0.368)	(0.353)
Com. Lang.	0.965***	0.986***	0.954***	0.763***	0.767***	0.799***
	(0.155)	(0.153)	(0.141)	(0.175)	(0.178)	(0.162)
Colonial link	0.679***	0.678***	0.697***	0.868***	0.869***	0.844***
	(0.138)	(0.138)	(0.138)	(0.184)	(0.186)	(0.188)
Genetic dist.	-0.219**	-0.201*	-0.213*	0.045	0.048	-
	(0.108)	(0.109)	(0.112)	(0.093)	(0.091)	
Muslim (%)	-0.008***	-0.008***	-0.009***	-0.005**	-0.005**	-0.005**
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
Population (log)	-0.056	-0.060	-	-0.064	-0.066	-
	(0.048)	(0.049)		(0.058)	(0.058)	
Network (% pop.)	2.161	1.921	-	2.765***	2.724***	3.125***
	(1.994)	(1.953)		(1.273)	(1.263)	(1.187)
Pop 15-24 (%)	0.053*	0.044	0.063**	0.112***	0.112***	0.132***
	(0.031)	(0.031)	(0.029)	(0.042)	(0.043)	(0.035)
Import Tariff	0.021*	0.021*	0.024*	0.001	0.001	-
	(0.012)	(0.012)	(0.013)	(0.017)	(0.017)	
Educ. Quality	-0.006	-0.005	-	-0.012	-0.012	-
	(0.011)	(0.011)		(0.010)	(0.011)	
Low-Skill Wage	-0.232***	0.518	-0.262***	-	-	-
	(0.083)	(0.875)	(0.077)			
Low-Skill Wage Sq.	-	-0.043	-	-	-	-
		(0.049)				
High-Skill Wage	-	-	-	-0.122	0.196	-0.166
				(0.092)	(2.002)	(0.104)
High-Skill Wage Sq.	-	-	-	-	-0.016	-
					(0.099)	
Constant	-2.635	-5.523	-7.552**	1.921	0.448	-2.413
	(4.419)	(5.374)	(3.451)	(4.894)	(11.560)	(3.165)
Dest. FE	Yes	Yes	Yes	Yes	Yes	Yes
MRM	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.469	0.469	0.486	0.450	0.449	0.440
N. of obs	3443	3443	3443	3605	3605	3605

Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Regressions use the Poisson pseudo-maximum likelihood (PPML) estimator. All regressions include Destination Fixed Effects and variables to control for Multilateral Resistance to Migration. The full sample consists of 4125 observations corresponding to bilateral migration between 126 origins and 33 destinations. The less- and high-educated migration aspirations variables contain, respectively, 682 and 520 missing values, thus 3443 and 3605 observations remain. Standard errors are clustered by country of origin.

Tab 2. Determinants of realization rates (OLS regressions)

	Less educated			College graduates		
	(L1)	(L2)	(L3)	(H1)	(H2)	(H3)
Geo. dist. (log)	-0.015**	-0.015**	-0.018**	-0.034***	-0.033***	-0.036***
	(0.007)	(0.007)	(0.007)	(0.009)	(0.009)	(0.009)
Contiguity	-0.005	0.014	-	0.023	0.028	-
	(0.028)	(0.026)		(0.030)	(0.031)	
Com. lang.	0.004	0.015	-	0.080***	0.086***	0.081***
	(0.013)	(0.012)		(0.022)	(0.022)	(0.023)
Colonial link	0.026	0.037	-	0.164***	0.168***	0.156***
	(0.028)	(0.027)		(0.043)	(0.043)	(0.042)
Genetic dist.	-0.030***	-0.021*	-0.020**	-0.003	0.000	-
	(0.011)	(0.010)	(0.010)	(0.016)	(0.016)	
Muslim (%)	-0.000	-0.000	-	-0.000	-0.000	-
	(0.000)	(0.000)		(0.000)	(0.000)	
Population (log)	-0.016***	-0.017***	-0.017***	-0.031***	-0.033***	-0.028***
	(0.005)	(0.005)	(0.005)	(0.009)	(0.008)	(0.008)
Network (% pop.)	2.258***	2.100***	2.188***	2.001**	1.947**	2.077**
	(0.341)	(0.340)	(0.316)	(0.788)	(0.792)	(0.804)
Pop 15-24 (%)	0.004	-0.002	-	0.001	-0.001	-
	(0.004)	(0.004)		(0.006)	(0.007)	
Import Tariff	-0.001	-0.001	-	0.003	0.003	-
	(0.001)	(0.001)		(0.002)	(0.002)	
Educ. Quality	0.002*	0.002	-	0.002	0.002	-
	(0.001)	(0.001)		(0.002)	(0.002)	
Low-Skill Wage	-0.024**	0.407***	0.356***	-	-	-
	(0.011)	(0.109)	(0.095)			
Low-Skill Wage Sq.	-	-0.024***	-0.020***	-	-	-
		(0.006)	(0.005)			
High-Skill Wage	-	-	-	-0.030	0.536	-0.028**
				(0.018)	(0.421)	(0.013)
High-Skill Wage Sq.	-	-	-	-	-0.028	-
					(0.021)	
Constant	1.089***	-0.698	-0.387	1.141***	-1.474	1.366***
	(0.319)	(0.476)	(0.440)	(0.413)	(2.023)	(0.379)
Dest. FE	Yes	Yes	Yes	Yes	Yes	Yes
MRM	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.228	0.254	0.241	0.361	0.366	0.355
N. of obs	1438	1438	1438	1079	1079	1079

Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Regressions use Ordinary Least Squares (OLS). All regressions include Destination Fixed Effects and variables to control for Multilateral Resistance to Migration. The full sample consists of 4125 observations that correspond to bilateral migration between 126 origins and 33 destinations. The less- and high-educated migration realization variables contain, respectively, 981 and 883 missing values, 109 and 74 values of zero, 1597 and 2089 values of one, thus 1438 and 1079 observations remain. Standard errors are clustered by country of origin.

5 Dissecting the Anatomy of the Mobility Transition

In this section, we quantify the relative contributions of those factors that have been documented in the literature as providing potential foundations for the mobility transition curve. We compute counterfactual emigration rates and compare their trend with that observed. Our counterfactuals are emigration rates that would be obtained should one set of explanatory variables at the time be equal to the average level observed in the richest countries (all countries in our sample with income per capita above $25,000).[12]

Given the bilateral decomposition of observed emigration rates used in our empirics, we can generalize (3) and write:

$$\overline{m}(\sigma_i, G_{ij}, S_{ij}, A_i, \omega_i, y_i) \equiv \sigma_i^h \sum_{j \neq i} p_{ij}^h(.) r_{ij}^h(.) + \sigma_i^l \sum_{j \neq i} p_{ij}^l(.) r_{ij}^l(.). \tag{6}$$

If a set $X = \{\sigma, G, S, A, \omega, y\}$ of determinants is set to the level observed in the richest countries (X^*), the variations in potential emigration rates, $\Delta \ln p_{ij}^s = \alpha_X^s (X^* - X_i)$, and in realization rates, $\Delta r_{ij}^s = \gamma_X^s (X^* - X_i)$, can be computed for each pair of countries using the estimated coefficients (α_X^s, γ_X^s) from (4) and (5). In these simulations, we only consider those coefficients that are significantly different from zero at the 95 percent confidence level in our parsimonious specifications (i.e. columns L3 and H3 in Tables 1 and 2). We then use (6) to aggregate the new aspirations and realization rates to compute counterfactual emigration rates, migration aspirations and realization rates for the whole population and particular skill groups.

5.1 Drivers of the Mobility Transition Curve

Our main variable of interest is the average emigration rate. We conduct six counterfactual experiments. The first consists of weighting skill-specific average emigration rates by the average proportions of college graduates and less educated workers in the labor force of the richest countries (σ^{s*} instead of σ_i^s). Our second replaces the distance matrices (G_{ij}) by the average distance between the richest countries and each destination (G_j^*).[13] Similarly, our third counterfactual replaces the bilateral network sizes (S_{ij}) by the average network sizes in the richest countries in each destination (S_j^*). The fourth counterfactual replaces the level of macroeconomic determinants A_i by the average levels observed in the richest countries A^*. In the fifth counterfactual, we assess the impact of inequality, by replacing the skill-specific income levels by those obtained if the wage ratio was equivalent to the average ratio in the richest countries (keeping income per capita at its observed level, y_i), i.e. $y_i^l = \overline{y}_i / \left(\sigma_i^h \omega^* + \sigma_i^l\right)$ and $y_i^h = \omega^* \overline{y}_i / \left(\sigma_i^h \omega^* + \sigma_i^l\right)$. For our final counterfactual, we implement the average level of income per capita observed in the richest countries (keeping the wage ratio at its observed level, ω_i), i.e. $y_i^l = \overline{y}^* / \left(\sigma_i^h \omega_i + \sigma_i^l\right)$ and $y_i^h = \omega_i \overline{y}^* / \left(\sigma_i^h \omega_i + \sigma_i^l\right)$. We obtain six counterfactual

[12] The richest countries include: Australia, Austria, Belgium, Canada, China. Hong Kong, Denmark, Finland, France, Germany, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, United Kingdom, and the United States.

[13] G_j^* basically captures the average distance between country j and the other OECD countries.

vectors of emigration rates labeled as $\overline{m}_{X,i}$ henceforth and defined as:

$$\overline{m}_{X,i} = \begin{cases} \overline{m}_{\sigma,i} \equiv m(\sigma^*, G_{ij}, S_{ij}, A_i, \omega_i, \overline{y}_i) \\ \overline{m}_{G,i} \equiv m(\sigma_i, G_j^*, S_{ij}, A_i, \omega_i, \overline{y}_i) \\ \overline{m}_{S,i} \equiv m(\sigma_i, G_i, S_j^*, A_i, \omega_i, \overline{y}_i) \\ \overline{m}_{A,i} \equiv m(\sigma_i, G_i, S_{ij}, A^*, \omega_i, \overline{y}_i) \\ \overline{m}_{\omega,i} \equiv m(\sigma_i, G_i, S_{ij}, A_i, \omega^*, \overline{y}_i) \\ \overline{m}_{y,i} \equiv m(\sigma_i, G_i, S_{ij}, A_i, \omega_i, \overline{y}^*) \end{cases}$$

For each counterfactual vector of emigration rates, we estimate the nonparametric trend $\overline{m}_X(y)$ using the Epanechnikov kernel method with a bandwith of 0.5 and compare it with the inverted-U shaped curve computed for the observed emigration rates, $\overline{m}(y)$. Deviations in levels and variations can be expressed as:

$$\begin{aligned} \Delta_X(y) &\equiv \overline{m}(y) - \overline{m}_X(y) \\ \delta_X(y) &\equiv \frac{d\overline{m}}{dy} - \frac{d\overline{m}_X}{dy} \end{aligned}$$

The results of the decompositions of average emigration rates are depicted in Figure 3. In Figure 3.a, the level of $\Delta_X(y)$ shows how the set of determinants X affects the emigration rates for any level of economic development. The magnitude of $\Delta_X(y)$ is determined by the effect of the set X on aspirations and realization rates and by the correlation between economic development and the determinants, i.e. $X(y)$. If $\Delta_X(y) > 0$, it means that, compared to the emigration rate of the richest countries, channel X tends to increase the emigration rates at the level of development y. If $\Delta_X(y) < 0$, channel X tends to decrease emigration rates. In Figure 3.b, the sign and level of $\delta_X(y)$, the slope of $\Delta_X(y)$, tells us whether a marginal increase in economic development stimulates or reduces emigration rates through channel X.

Figure 3.a reveals that gravity drivers and the skill composition of the population tend to lower the emigration rates of all developing countries as compared to the richest countries ($\Delta^G(y)$ and $\Delta^\sigma(y)$ are always negative). Conversely, macroeconomic characteristics, networks and income, tend to increase emigration ($\Delta_A(y), \Delta_S(y)$ and $\Delta_y(y)$ are always positive). The effect of income inequality is negligible ($\Delta_\omega(y) \simeq 0$). In terms of magnitude, at low levels of development (income per capita of \$1,000), the most important channels are the skill composition (-6.0 percentage points compared to the richest countries), gravity drivers (-1.5 percentage points) and the income effect (+1.0 percentage points). At intermediate levels of development (income per capita of \$6,000), the effects of macroeconomic characteristics and networks are important (+1.5 percentage points), the income effect is at its peak (+2.0 percentage points), the effect of the skill composition is smaller (-2.0 percentage points) and the influence of gravity drivers become negligible.

Figure 3.b disentangles the marginal impact of development by channel of transmission. It shows that all derivatives are positive below \$4,000 per year, implying that all channels contribute to increasing emigration. Above \$4,000, behavioral and macroeconomic drivers tend to decrease emigration, effects reinforced by the network channel when income per capita exceeds \$5,000. The marginal impact of each channel thus varies with economic development:

- At low levels of development (income per capita of $1,000), the slope of the emigration curve is positive (around +0.038). Most of the effect is driven by the skill composition (60 percent of the total), followed by the macroeconomic, network and income channels (12 percent each).

- If income per capita is around $2,000, the slope of the migration curve peaks at +0.048 and the contribution of the skill composition is still dominant (50 percent of the total), followed by the macroeconomic and network channels (16 percent both) and gravity drivers (12 percent). The contribution of behavioral drivers only reaches 10 percent of the total.

- Finally, if income per capita is around $4,000, the slope is equal to +0.025, 65 percent of which is driven by the skill composition, 26 percent is due to gravity drivers against 9 percent for the network channel. Behavioral drivers in this scenario have no effect.

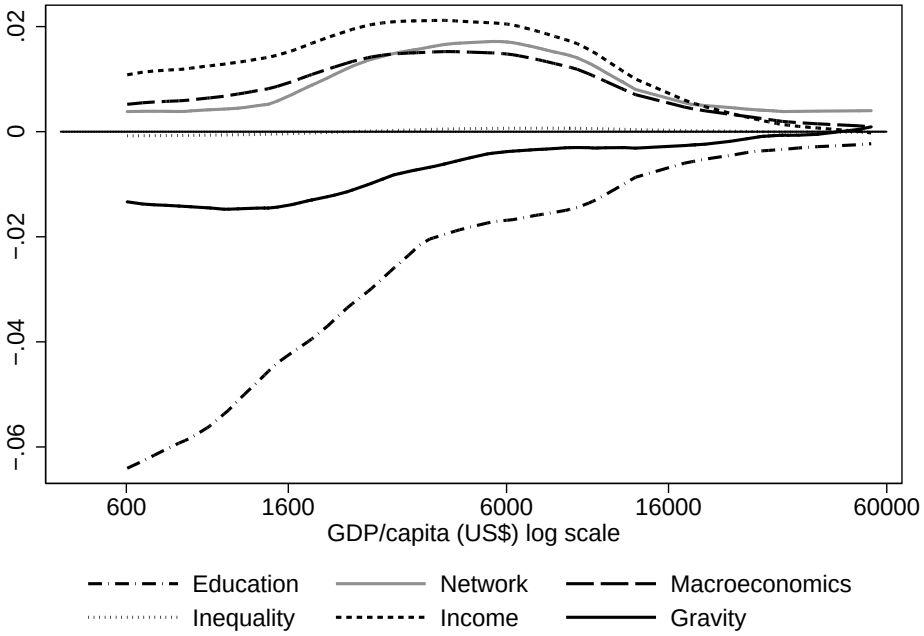
Contrary to the prediction of standard neoclassical models, average emigration rates increase with income per capita in the early stages of development (below $6,000 in Figure 1). Our decompositions allow us to identify the main drivers of the increasing segment of the migration transition curve. Given the high levels of selectivity observed in poor countries, more than 50 percent of the rise in emigration is due to the changing skill composition of the working-age population. Emigration increases with development, because the proportion of college graduates in the native population increases and this group has the greatest propensity to emigrate. The contribution of behavioral drivers (i.e. income and inequality effects) is rather small. They account for about 12 percent of the total in the poorest countries and between 5 and 10 percent in lower-middle income countries. The remainder is explained by a changing combination of network, macroeconomic and gravity effects.

5.2 Analysis by Education Level

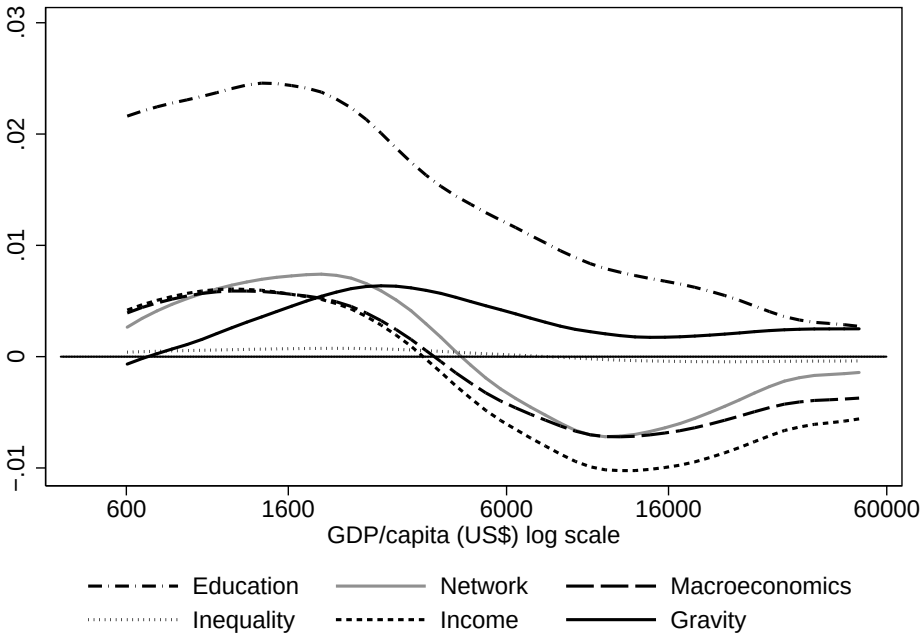
Counterfactual emigration rates can be calculated for college graduates and the less educated separately. In this section, we simulate counterfactual emigration rates $\overline{m}^s_{X,i}$ for each group of workers ($s = h, l$) and for each country i, we estimate the nonparametric trends $\overline{m}^s_X(y)$ using the Epanechnikov kernel method with a bandwith of 0.5. We compare these with the trends computed using observed values, $\overline{m}^s(y)$. Figure 4 depicts the deviations in level, $\Delta^s_X(y)$ and their slopes, $\delta^s_X(y)$.

Fig 3. Drivers of the average emigration rate

3.a. Effect in level



3.b. Effect in variations



Notes: The curves in figure 3.a. show the difference between the observed average migration rates and the counter-factual ones. The curves in figure 3.b. show the variation of the difference curves with respect to income per capita. The curves are smoothed using using Epanechnikov kernel estimations at local mean and bandwidth 0.5. The sample consists of 126 countries.

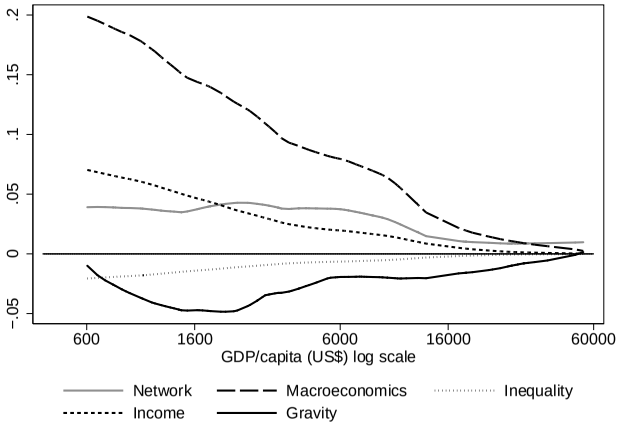
Compared to the richest countries, Figure 4.a shows that the macroeconomic, network and income channels lead to greater high-skilled emigration rates in developing countries ($\Delta_A^h(y)$, $\Delta_S^h(y)$ and $\Delta_y^h(y)$ are positive), while the gravity drivers and inequality result in lower rates ($\Delta_G^h(y)$, and $\Delta_\omega^h(y)$ are negative). Greater distances between the richest and poorest countries restrain the emigration of college-educated workers. In terms of magnitude, the macroeconomic and income channels are most important. As far as income is concerned, the (behavioural) effects that prove central to neoclassical models of migration result from the comparison of the private costs and benefits from emigration. Overall, low levels of income in the poorest countries stimulate the emigration rate of college graduates. We find no evidence of binding migration constraints for the highly skilled. Indeed, although smaller in magnitude (because within-country inequality is much less important than between-country inequality, as explained in [65]), the inequality effect also leads to smaller high-skilled emigration rates in poor countries meaning that greater returns to schooling in poor countries (which slightly increase income of the highly skilled) reduce high-skilled emigration. At low levels of development (income per capita of $1,000), the observed emigration rate of the highly skilled is 15 percentage points greater than would otherwise prevail if individual income was equivalent to that observed in the richest countries. In Figure 4.b, we observe that economic progress reduces the emigration rate of college graduates through all channels, with the exceptions of the gravity channel when income exceeds $2,000 and the (smaller) inequality channel. The most important mechanisms are again the macroeconomic and income channels.

As for the less educated, deviations in levels have the same sign as for the highly skilled. Figure 4.c reveals that all channels result in higher emigration rates in developing countries ($\Delta_X^l(y)$ are all positive), except for the gravity drivers. The major difference in comparison with college graduates is that these effects are no longer monotonic, as shown in Figure 4.d. At income levels below $4,000, a marginal increase in economic development stimulates the emigration of the less educated through all channels, especially through the macroeconomic, network and income channels, which all turn negative above $4,000 to $5,000. This suggests that behavioral drivers (e.g. credit constraints) matter for the low-skilled. Migration constraints likely dominate the greater benefits from emigration at low levels of development. Notably distance decreases with development and restrains emigration from poor countries. As for the effects of inequality, these are smaller than any effect of income but play a similar role. At low levels of development, reducing inequality (i.e. increasing the wage rate of the poorest) would increase the emigration rate of the low-skilled.

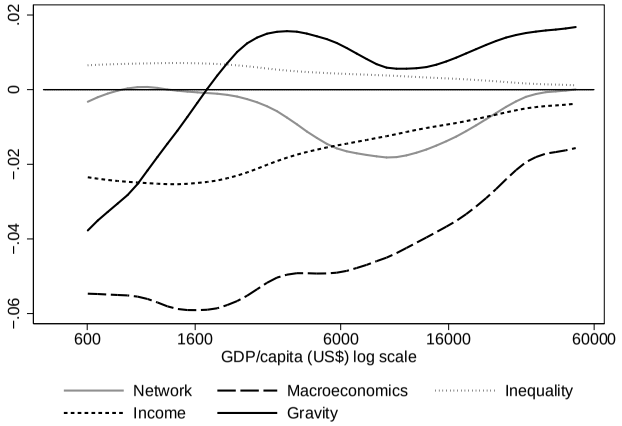
Our analysis by education level reveals that during early stages of development, migration constraints matter for the low-skilled but these can be attenuated by economic progress. These constraints may include credit constraints (the impossibility of financing emigration costs in poor countries) or institutional constraints (higher emigration costs in poor countries). These findings suggest that a micro-founded models of migration decisions need account for the existence of such constraints, but as demonstrated in Figure 3, the effect of behavioural drivers are limited on the aggregate. This is because their effect on the amplitude of variations in low-skilled emigration rates is rather small (+1.0 percentage point when income increases from $1,000 to $4,000), while their influence is also dominated by the changing skill composition of the population, as discussed in the previous section.

Fig 4. Decomposition by education level

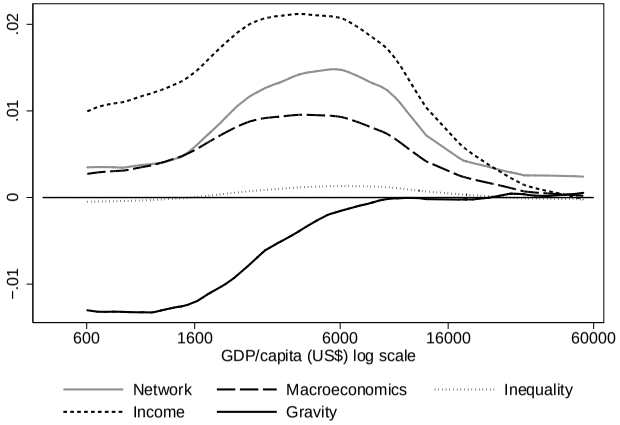
4.a. Effect in level - College graduates



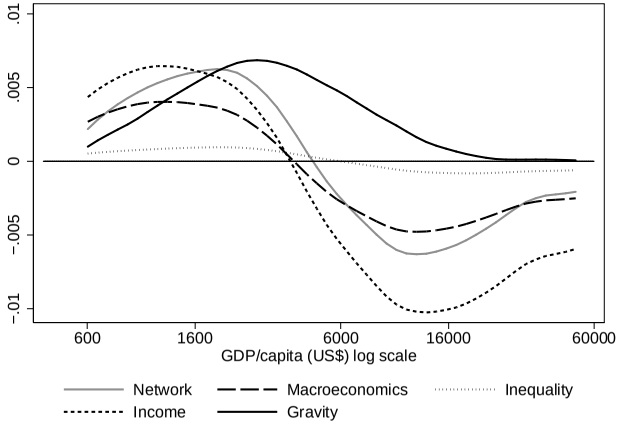
4.b. Effect in variations - College graduates



4.c. Effect in level - Less educated



4.d. Effect in variations - Less educated



Notes: The curves in figures 4.a. and 4.c. show the difference between the observed average migration rates and the relevant counterfactuals. The curves in figures 4.b. and 4.d. show the variation of the difference curves with respect to income per capita. The curves are smoothed using using Epanechnikov kernel estimations at the local mean and bandwidth 0.5. The sample consists of 126 countries.

5.3 Interpreting Aspiration and Realization Data

Our final set of results concern the skill-specific effect of development on migration aspirations and realization rates. In this section, we simulate counterfactual levels of potential migration and realization rates, $\overline{p}^s_{X,i}$ and $\overline{r}^s_{X,i}$, for each group of workers ($s = h, l$) for each country i. We then estimate the nonparametric trends, $\overline{p}^s_X(y)$ and $\overline{r}^s_X(y)$, using the Epanechnikov kernel method with a bandwith of 0.5 before finally comparing them with the trends computed using observed values, $\overline{p}^s(y)$ and $\overline{r}^s(y)$. Figure 5 depicts the marginal effect of economic progress on aspirations and realization rates, $\delta^s_{\overline{p},X}(y)$ and $\delta^s_{\overline{r},X}(y)$.

Turning first to the highly skilled - and bearing in mind Figures 2.c and 2.d that reveal that the migration aspirations and realization rates of college-educated individuals decrease with development - Figure 5.a shows that changes in aspirations are entirely due to the influence of macroeconomic characteristics (i.e. the share of the population aged 15 to 24, as shown in Table 1). Networks have a limited impact at the margin, while gravity drivers tend to increase aspirations for countries above \$1,000 per capita. Decreases in distance stimulate aspirations, as shown by the gravity curve.

Importantly, behavioral drivers have no significant impact on the aspirations of college graduates. This reflects the fact that aspirations are not totally driven by absolute financial incentives. This result is compatible with a micro-founded model of relative deprivation, according to which aspirations are based on the relative position of an individual in a particular social hierarchy, as opposed to the absolute level of an individual's income (as in [68] and [69]). Conversely, Figure 5.b shows that the negative effect of development on realization rates is mainly due to behavioral drivers (the income channel). When income increases, the realization rate of the highly skilled decreases, an effect which is partially compensated by the inequality channel. Realization rates are clearly endogenous and decrease with the level of development at origin. This might be due to the fact that the opportunity costs of preparing a migration spell increase with development. For countries with incomes per capita below \$13,000, this effect is reinforced by both the gravity drivers and by the inequality channel.

As far as the less educated are concerned, Figure 2.c and 2.d reveal that migration aspirations slightly decrease with development, while realization rates exhibit an inverted-U shaped relationship with a peak at \$6,000 of income per capita. Figure 5.c shows that the effect of development on aspirations is driven by the macroeconomic and income channels. Contrary to the case of college graduates, the willingness of the less educated to migrate decreases with income. Gravity drivers attenuate these effects, especially in countries where income per capital is lower than \$5,000. With regards realization rates, an increase in development stimulates emigration through the gravity, network and macroeconomic channels at low levels of development. The income channel has an ambiguous effect on realization rates (below \$1,600), while increases in income stimulate realization rates (reflecting lower migration constraints). Above \$1,600 however, realization rates decrease with income as for the college educated. The negative effect of income becomes dominant when income per capita exceeds \$6,000.

Our analysis thus sheds light on the microfoundations of migration decisions. Our results suggest that both aspiration and realization rates result from cost-benefit analyses. At the margin, an increase in development reduces the willingness to emigrate through the income

channel (at least for the less educated). In particular, the Gallup data on aspirations (or willingness to emigrate) show that while income disparities and migration costs matter for the low skilled, they exert no influence on high skilled individuals. A model of relative deprivation is compatible with these patterns. Realization rates decrease with income at intermediate and high levels of development, especially for the highly skilled. For the less educated an increase in income stimulates realization rates during early stages of development. This finding is compatible with the existence of endogenous migration constraints. Realization rates are clearly not exogenously determined by the legal restrictions imposed by the destination countries, as argued in [27] and [26]. These results are compatible with a two-step model of migration decisions. Aspiration data capture the perceived psychic costs and benefits of emigration of crossing borders. Realization data are suggestive of a decision model wherein the probability to obtain a visa increases with income differentials, but decreases with the development level of the origin country. This may reflect the fact that the time (or opportunity) cost of preparing for migration (and obtaining a visa) is valued at the market wage of the origin country.

6 Conclusion

[71] in his seminal paper, was the first to hypothesize an inverted-U shape between migration and development, a relationship that he termed the mobility transition, which has subsequently been observed in a variety of settings. Neo-classical explanations have been unable to explain the upward segment of the curve whereby migration increases with development at origin for countries with low or middling incomes per capita. The existence of this section of the curve has therefore constituted a decades-old puzzle for which several potential explanations have been proered in numerous geographical and historical contexts.

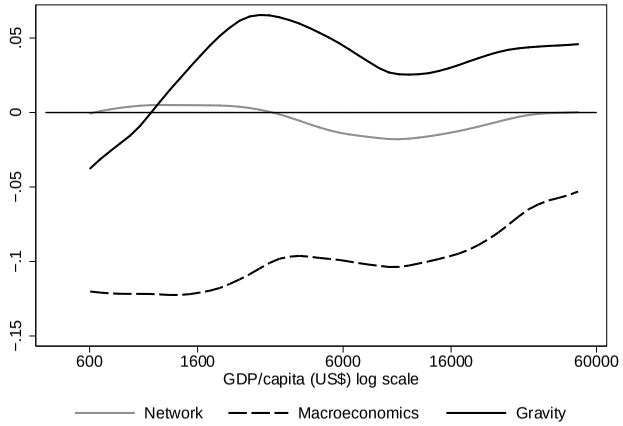
In this paper we analyse rich aggregated micro-data on individual's aspirations and realisation rates in a unified multi-country setting to address this apparent enigma. Having confirmed the existence of the mobility transition non-parametrically, we subsequently use regression analysis to run a horse race between all competing theories underpinning the observed relationship for the first time. Having identified statistically significant variables from this analysis, we simulate counterfactual emigration rates to quantify the relative contributions of each potential driver of the mobility transition. Our counterfactual emigration rates are those obtained when one of our explanatory variables is set to the average level prevailing across rich countries, from which we estimate non-parametric trends, which in turn are compared to actual emigration rates.

Our key result is that whereas the contributions of what we term behavioural drivers (i.e. income and inequality effects) are rather small, accounting for about 12% of migration increases from the poorest countries and between 5-10 in lower-middle income countries; our analysis clearly demonstrates that more than 50% of rises in emigration from developing countries are rather driven by the changing skill composition of the working-age population. While our conclusion is somewhat at odds with many pre-existing explanations, it is rather intuitive. Emigration increases with development, because the proportion of college graduates in the native population increases and it is precisely this group that has highest propensity

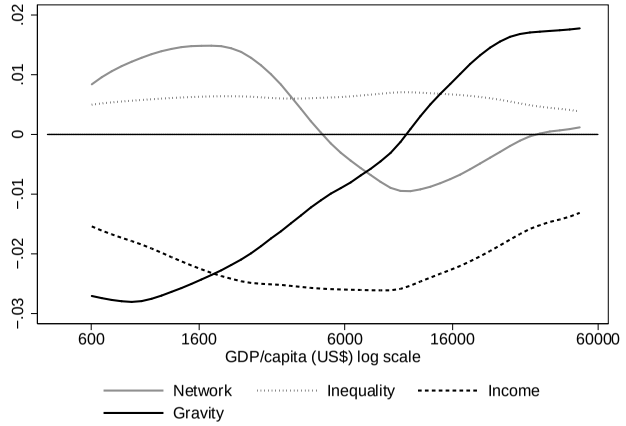
to emigrate abroad.

Fig 5. Marginal effect of development on aspirations and realization rates

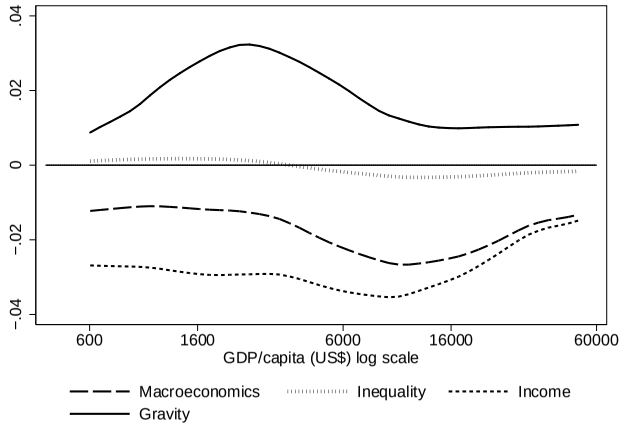
5.a. Effect on aspirations - College graduates



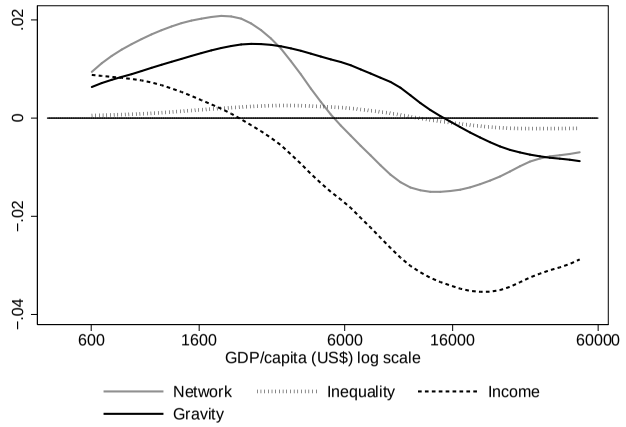
5.b. Effect on realization rates - College graduates



5.c. Effect on aspirations - Less educated



5.d. Effect on realization rates - Less educated



Notes: The curves in figure 5.a. to 5.d. show the variation of the difference curves with respect to income per capita. The curves are smoothed using using Epanechnikov kernel estimations at local mean and bandwidth 0.5. The sample consists of 126 countries.

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