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ORIGINAL ARTICLE

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# Migration and educational aspirations – Another channel of brain gain?

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## Abstract

International migration not only enables individuals to earn higher wages but also exposes them to new environments. The norms and values experienced in destination countries can change the behavior of migrants and also of family members left behind. This paper suggests that brain gain can take place due to a change in the educational aspirations of caregivers in migrant households. Estimates for Moldova show that international migration raises parental aspirations in households located at the lower end of the human capital distribution. The identification of these effects relies on GDP growth shocks in the destination countries and migration networks. These results imply that aspirations are a highly relevant determinant of intergenerational human capital transfer and that even temporary international migration can shift human capital formation to a higher steady state by inducing higher educational aspirations among caregivers.

**JEL classification:** D03, O12, I21, J61.

**Keywords:** Education; Aspirations; Migration; Brain gain

## 1 Introduction

The nexus between international migration and human capital remains a disputed topic. At the individual level, the positive effect remittances can have by relaxing liquidity constraints and thus enabling educational investments are often cited and widely acknowledged (see Antman 2013). However, at the aggregate level, the outflow of skilled migrants – what has been termed brain drain – has been characterized as detrimental to the sustainable growth of developing countries. Only recently has this perspective been challenged by various authors (e.g., Stark et al. 1997, Beine et al. 2001), who theoretically demonstrate that the option to migrate can increase human capital investments by individuals. Their argument is rooted in a neo-classical framework emphasizing that the incentive to invest is driven by the possible higher returns to education from going abroad. Since not all individuals who invest in education to migrate actually leave the country, a net increase of the human capital stock in the sending countries takes place. This hypothesis has been supported empirically by recent macro studies (e.g., Beine et al. 2007), but only few studies have attempted to empirically test the human capital externalities of migration at the household level. Batista et al. (2012) are a notable exception, presenting evidence for the case of Cape Verde that cannot reject the brain gain hypothesis.

This paper empirically studies the effect of migration on children in migrant sending households and suggests a brain gain effect through a different causal channel. It argues that individuals and households do not maximize their utility independent of their environment and social context but that their decisions, to e.g., invest in education, are bound to the goals and aspirations set by their environments. This approach was suggested recently by Ray (2006), who pointed out that aspirations are an important determinant of behavior and could represent a key element of economic development. In line with this perspective, the hypothesis that individuals adapt their aspirations if exposed to new environments is tested. The variation of norms and values that international migrants are exposed to makes it possible to find out if migration has positive or negative human capital externalities, such as through changing the educational aspirations of households.

The empirical analysis of household data from Moldova shows a strong relationship between enrollment, schooling expenditures and the educational aspiration caregivers have for their children. This finding supports the importance of aspirations for the analysis of household behavior. More importantly, using a 2SLS approach to address the endogeneity of migration, the empirical analysis shows a positive short-run impact of international migration on educational aspirations. These results provide a new perspective on the ongoing discussion about human capital externalities of migration and a possible brain gain. The paper thereby contributes to the growing literature about the effects of migration on households in the sending countries with an emphasis on human capital accumulation. By focusing on aspirations, the present analysis is also related to the nascent discussion about the transfer of norms and values in the context of international migration.

The paper proceeds as follows. The next section reviews the literature on aspirations and human capital investment and describes the role of migration in this context in depth. Section 3 formulates a simple conceptual framework. The data used for the empirical analysis is introduced in section 4, and section 5 describes the econometric strategy used. Descriptive statistics and estimation results are presented in sections 6 and 7, respectively. Section 8 discusses possible limitations of the analysis, and section 9 concludes.

## **2 Previous literature**

Because the concept of aspirations is a social construct, it lends itself to a variety of definitions. Broadly defined, aspirations can be understood as a desire to achieve a certain objective. Aspirations differ from expectations in that they represent ideals or higher values. Expectations, on the other hand, account for constraints and perceived limitations. Accordingly, the term aspirations will be used to describe goals that one would like to achieve in an ideal world without constraints and with full information and expectations as probabilistic goals that one expects to achieve taking into consideration all limitations one faces.

In economics, the idea of aspirations has been latently present for some time. Questioning classical economic theory and utility maximization, Herbert Simon (1959:263) noted “[...] the conditions for satisfying a drive are not necessarily fixed, but may be specified by an aspiration level that itself adjusts upward or downward on the basis of experience”. When Kahneman and Tversky (1984) speak of the importance of reference

points for utility maximization, they reconcile ordinal utility theory with the observation that judgment and evaluations are based on prior experiences. Broadly speaking, reference points are one major determinant of the goals people aspire to achieve.

The connection between human capital accumulation and aspirations has recently gained more attention and has been used to model inequality and poverty persistence. Dalton et al. (2010) show formally that aspirations can serve as a behavioral explanation of poverty persistence. Their model establishes a theoretical link between constraints that are internal to the economic agent and persistent poverty. They define aspirations as a reference point and consider effort to be complementary to this reference point. The authors argue that an initially low reference point raises the likelihood of a persistent and binding internal constraint leading to a poverty trap. Dalton et al. (2010) use these results as a normative justification for empowerment programs that increase individuals' aspirations. Mookherjee et al. (2010) analyze the effect of social context and parental aspirations as determinants of investments in children's education. At the core of their model stands the assumption that parental pride in their children's achievements is on the one hand determined by the economic situation of their neighbors, and on the other hand determines their investment behavior. They conclude that spatial segregation and the implicit limitation of the aspiration window can lead to persistent inequalities.

Apart from the possible presence of a low aspiration equilibrium, the central question is why low aspirations prevail and how they can be changed. Various authors have proposed that aspirations can be influenced by the exposure to new role models. Chiapa et al. (2012) exploit data from the Mexican anti-poverty program *Progresa* and find that children that were randomly exposed to highly educated staff such as doctors and nurses had significantly higher educational aspirations. Another study that focused on the importance of role models is Beaman et al. (2012). The authors provide strong evidence from a randomized natural experiment in India where female community leadership inspired girls' educational attainment. Macours and Vakis (2009) also use the random variation of female leadership in communities in Nicaragua to identify the effect of role models on human capital and educational aspirations. The authors show that changing aspirations brought about by new role models can have significant impacts on the investment behavior of households. An example of a direct intervention is presented by Krishnan and Krutikova (2013). The authors evaluate a NGO-program that attempts to raise the self-esteem and aspirations of children in slums of Bombay. They find that the program increased the aspiration window, which is measured by the number of people children could name who were wealthier and served as role models.

These studies suggest that aspirations are responsive to changes in the environment and can be modified. Yet, they cannot overcome two problems. First, the authors often do not distinguish between aspirations and information. For example, Chiapa et al. (2012) base their aspiration measure on a question that does not distinguish between the change in information asymmetries and aspirations (i.e., "Up to what level would you like your daughters [sons] to study?"). In a situation of incomplete information, it is impossible to disentangle the information and aspiration effect. A pure aspiration effect must be understood as goal setting under perfect information. The aspiration measure employed in this analysis (see Section IV) considers this aspect and might therefore be closer to a pure aspiration effect than previous contributions. Second, it

must be noted that ambitious goals or high expectations do not translate with certainty into high educational achievements. Alexander et al. (1994) have shown that children from less advantaged backgrounds are less likely to convert their educational aspirations into desired educational achievements. Ideally, this problem should be addressed in a panel-data approach. However, regardless of the data structure, there is no doubt that with low aspirations, high educational achievements are more unlikely.

While the importance of aspirations for human capital formation is well established, there is no consensus as to whether the externalities of international migration are positive or negative for children's education. While migration can improve the financial situation of households through remittances, thereby alleviating resource constraints, it can also negatively affect intra-household time allocation. Kandel and Kao (2001) find positive effects of parental migration on children's school performance in Mexico. They attribute their findings to the improved financial situation of migrant families but also argue that parental migration changes the motivation of children to attain a good education. Mansuri (2006) presents evidence for Pakistan that points in the same direction. Although migration eases resource constraints and has positive effects on human capital accumulation in general, the prospect of migration does not alter schooling decisions. In contrast to these two contributions, Antman (2011) finds that paternal migration from Mexico to the U.S. results in a reduction of time allocated to studies and an increased work load of children. Her estimates suggest that these negative short-term effects are driven primarily by boys in the age range of 12 to 15. Similar results are presented by McKenzie and Rapoport (2006), who also observe that migration seems to depress the educational attainment of children. Additionally, they show that the reduction in schooling is accounted for by the increased propensity of migration for boys and an increased household workload for girls.

There are other factors that moderate the effects of migration on educational investments apart from the additional financial resources obtained via remittances. First, the permanent absence of one parent and the resulting lack of guidance and encouragement can have adverse effects on the educational attainment of children and can produce changes in family roles (Biavaschi et al. 2015). This is especially important since the parental nurture effect is one of the main drivers of intergenerational human capital transfer (Holmlund et al. 2011) and might not be compensated by increased income (Shea 2000).

Second, migrants are exposed to new environments and ideas that can lead to an adjustment of their pre-migration priors. This migration-induced transmission of knowledge, norms and values has been demonstrated to affect the up-take of low-fertility norms (Beine et al. 2013) but also the political realm (Spilimbergo 2009). In the case of Moldova, empirical evidence by Omar Mahmoud et al. (2013) suggests a strong link between the political atmosphere in the migration receiving country and the subsequent voting behavior of migrant households in the sending country. More precisely, westward migration seems to reduce the electoral support for the far left of the Moldovan political spectrum.

Third, migration itself can become a viable option for the children who see their parents work abroad and thus affect educational attainment. Jensen (2012) has demonstrated that individuals adjust their behavior quickly to new job market opportunities. Using data from a randomized labor market intervention in India, he shows that young

women increase their schooling investments and postpone marriage when given the opportunity to engage in non-farm employment. That migration has a similarly strong but qualitatively different effect on the life-cycle planning of households has been proposed by Kandel and Massey (2002). They argue that migration becomes part of the household's life plan in the migrant sending countries. They find that the prospect of migration to the U.S. shapes children's behavior in Mexico by increasing the likelihood of migrating to the U.S. and by lowering their odds of continuing with school. Thus, the low aspirations of children could be the result of their perception that education is not necessary to migrate, i.e., an underestimation of the return on investments in education induced by the exposure to an apparently "easy" exit. In line with this argument, McKenzie et al. (2013) present evidence from Tonga showing a systematic bias in the expected wage differential. The authors attribute this bias to the underreporting of earnings by current migrants, moderate demands for remittances and the disproportionate emphasis potential migrants put on negative migration experiences reported by other people. An alternative explanation could be the employment of their highly educated migrant parents in low skill jobs. Returns to foreign education are often low (e.g., Hartog and Zorlu 2009, Sanromá et al. 2009) and could therefore discourage parents and children who plan to migrate to adjust their aspirations upwards.

There are only few papers that have focused on the relationship of educational aspirations and migration. In a sample of Mexican students, Dreby and Stutz (2012) detect a positive impact of maternal migration on educational aspirations, while the migration of fathers leaves unchanged the aspirations of children. Using the Indonesian Family and Life Survey, Czaika and Vothknecht (2014) report a positive correlation between economic aspirations and migration. Opposed to this finding, Kandel and Kao (2001) report lower educational aspirations at all academic levels of Mexican children growing up in households with international migrants. These contributions often remain descriptive and do not investigate the causal link between migration and educational aspirations convincingly. The present analysis makes a contribution to the literature by carefully trying to establish a causal relationship.

### 3 Conceptual framework

Most models that are concerned with the effect of migration on human capital investments and a possible brain gain are built on the premise that wage differentials are the main determinant of migration (e.g., Stark et al. 1997, Mountford 1997, Vidal 1998, Beine et al. 2001). A problem with this setup is that it does not account for the intrinsic value of education (see Bénabou and Tirole 2003 for a detailed discussion). The present framework intends to clarify the relationship between aspirations and human capital investments. To allow an accessible interpretation, matters are kept as parsimonious as possible. A simple static model with no general equilibrium effects based on Stark et al. (1997) shows that the exclusion of the intrinsic value of human capital can lead to underestimating the effects of migration on human capital investments. The presentation of the framework proceeds in three steps looking at investments (1) under autarky; (2) with migration; and (3) with dynastic migration.

Assume individuals live for two periods, childhood and working age. Individuals derive utility from consumption  $c_t$  in both periods and from the intrinsic value of

human capital  $\theta$  in the first period in each dynasty  $d$ . In the first period, individuals can invest in human capital  $\theta$  or work to finance consumption  $c_1$ . In the second period, individuals can only work to finance consumption  $c_2$ . Their objective function is given by:

$$U_d \equiv U(c_1, \psi(\theta), c_2) \tag{1}$$

Consumption is financed only by wages. Individuals can earn wage  $W^H(\theta)$  in their home country. Labor demand and the wage function are exogenously determined and identical for all individuals. To keep matters simple, a linear wage function will be used such that  $W^H(\theta) = w_0^H + w_1^H\theta$ , where  $w_1^H$  is the education premium which is time invariant. Individuals face an exponentially increasing human capital cost function  $C(\theta) = \gamma\theta^2$  where  $\gamma > 1$ . Human capital is acquired instantly in the home country in period one and remains unchanged in period two. For ease of exposition, no restrictions are imposed on the total amount of human capital that can be accumulated. Also, there is no capital market. The individual faces the following resource constraints in the first and second period, respectively:

$$c_1 = W^H(\theta) - C(\theta) = w_0^H + w_1^H\theta - \gamma\theta^2 \tag{2}$$

$$c_2 = W^H(\theta) = w_0^H + w_1^H\theta \tag{3}$$

In addition to these standard elements, the model contains a reference point dependent disutility, following the discussion by Kogszegi and Rabin (2006), which is represented by  $\psi(\theta)$ . The individual will choose the education of a certain reference group  $\theta^R$  that acts as a benchmark to evaluate her own household's education level<sup>1</sup>. This reference point, or aspiration level of education, will most likely be influenced by the environment the individual is exposed to, e.g., family, neighborhood, co-workers. This relates to the results by Mookherjee et al. (2010), who have argued that spatial segregation will lead to persistent reference points, i.e., aspirations traps. The individual will aspire to this reference point and experience increasing disutility the further away she is from this benchmark. Let  $\psi(\theta) = (\theta^R - \theta)^2$ . It is reasonable to assume that individuals aspire to higher goals and therefore – if it is possible – choose a higher reference group than their current educational level such that  $\theta^R \geq \theta$ .

Before introducing migration, let us consider the optimal human capital investment in autarky. By substitution it can be shown that the individual will maximize the following objective function:

$$U_d \equiv U(c_1, \psi(\theta), c_2) = w_0^H + w_1^H\theta - \gamma\theta^2 - (\theta^R - \theta)^2 + w_0^H + w_1^H\theta \tag{4}$$

Solving for  $\theta$ , it can be observed that the optimal autarky level of human capital  $\theta^*$  is:

$$\theta^* = \frac{w_1^H + \theta^R}{\gamma + 1} \tag{5}$$

In autarky human capital accumulation will be driven by the education premium  $w_1^H$ , by the reference level  $\theta^R$ , and by the cost of education  $\gamma$ . The next step is to allow for the possibility to migrate temporarily in the second period to work abroad. Assume at the probability to migrate  $p$  is exogenous and applies equally to all individuals. In the foreign country, individuals can earn a wage  $W^F(\theta)$  where  $W^F(\theta) = w_0^F + w_1^F\theta$ . Let the education premium in the foreign country be bigger than the education premium in

the home country, i.e.,  $w_1^F > w_1^H$ . Migration will be costly such that migrants will earn  $\kappa W^F(\theta)$  in the foreign country where  $0 < \kappa \leq 1$  is a cost factor. The resource constraint in the second period will therefore take the following form:

$$c_2 = p\kappa W^F(\theta) + (1-p)W^H(\theta) = p\kappa[w_0^F + w_1^F\theta] + (1-p)[w_0^H + w_1^H\theta] \tag{6}$$

By substituting the second period consumption of equation (6) into equation (4), the objective function reads:

$$U(c_1, \psi(\theta), c_2) = w_0^H + w_1^H\theta - \gamma\theta^2 - (\theta^R - \theta)^2 + p\kappa[w_0^F + w_1^F\theta] + (1-p)[w_0^H + w_1^H\theta] \tag{7}$$

The optimal level of human capital  $\theta^*$  given the probability to migrate  $p$  thus becomes:

$$\theta^* = \frac{2(w_1^H + \theta^R) + p(\kappa w_1^F - w_1^H)}{2(\gamma + 1)} \tag{8}$$

Notice that the only difference between equations (5) and (8) is that the latter contains the probability weighted wage difference term  $(\kappa w_1^F - w_1^H)$ . It is readily observable that a higher probability to migrate and/or a higher wage differential will increase the investments in education in the first period. Given that migrants are only temporarily permitted to work abroad, each generation faces the same decision. This dynamic represents the standard brain gain argument.

In a dynastic migration setting, the implications of the reference point  $\theta^R$  become even more pronounced. Let the migration of the last generation only have an effect on two variables: the migration cost  $\kappa$  and the reference point  $\theta^R$ . To emphasize the inter-generational transmission of these two variables, the subscript  $d$  will be used.

First, migration might decrease the migration cost. This effect reflects the strong evidence on the importance of migrations networks (e.g., Munshi 2003). By introducing the indicator variable  $m_d = \{0, 1\}$  — where  $m_{d-1} = 1$  if the last dynasty migrated and zero if not — this can be written as  $\kappa_d = \kappa_{d-1} + \alpha(1 - \kappa_{d-1})m_{d-1}$ . Alpha ( $\alpha$ ) is a deterministic indicator reflecting how much the migration experience reduces migration costs and is defined as  $0 < \alpha < 1$ . Thus, if the probability of migration is non-zero ( $p > 0$ ) and the last generation also migrated ( $m_{d-1} = 1$ ), one would observe increased human capital investment compared to a scenario where there is no connection between dynasties.

Second, the migration in the last generation could also raise the reference point the dynasty uses. This change could come about through either externalities in the labor market in the destination country due to the matching of the migrant with a certain sector or other market interactions, or through externalities in social surroundings, i.e., interactions with co-workers, friends or neighbors. Let  $\lambda$  represent the difference between the home and the foreign reference group such that  $\lambda = \theta^{R_F} - \theta^{R_H} \geq 0$ . The link of the reference point between dynasties can be thought of as:

$$\theta_d^R = \theta_{d-1}^R + \lambda m_{d-1} \tag{9}$$

If the last generation has migrated ( $m_{d-1} = 1$ ) and the migrants have adopted a higher reference point ( $\lambda > 0$ ), then the aspired level of education  $\theta_d^R$  will increase compared to migration without dynasties.

#### 4 Data

To empirically investigate the role and evolution of aspirations, a unique household survey dataset that was collected in Moldova between October 2011 and February 2012 will be employed. Moldova is an excellent environment to study the effects of migration on aspirations and education. After Moldova emerged from the Soviet Union, it faced the transition problems also observed in other post-Soviet countries. High unemployment and a stagnant economy in the late 1990s led to the increasing emigration of Moldovans. Thus international migration is a relatively new socio-economic phenomenon in Moldova. Nevertheless, only few states worldwide have a higher net migration rate than Moldova, among them Samoa and Tonga<sup>2</sup>. This is also reflected in the high volume of official remittances, which is about 24% of the Moldovan GDP.

To understand the effects of migration on “Children and Elderly Left Behind” (CELB), a face-to-face survey was conducted. The survey was built as a national representative survey of households with children, elderly people and migrants using the National Labor Force Survey (LFS) as sampling frame. In line with the LFS, the survey is a stratified random sample of 3,539 households in 129 communities<sup>3</sup>. The questionnaire consisted of four modules. The first module elicited basic household characteristics including the household composition, labor market activity and income. It also contained an extensive section on the international migration of household members. This migrant section captures in detail the migration history of each household member since 1999. Based on this first module, caregivers of all children, children in the age range of 10 to 18, and all elderly people in the household were identified. In a second module, all caregivers were interviewed about topics such as health, education and the behavior of their children. All caregivers of 3,594 children were interviewed in 2,082 different households. In a separate third module, 1,282 children between the ages of 10 and 18, i.e., all children in the sample households, were interviewed concerning similar topics privately. Due to the structure of the sample, the empirical analysis concentrates on cases in which migrants have left Moldova at some stage during the last 12 months while their child stayed behind<sup>4</sup>. The interviews were conducted by trained surveyors from a specialized survey company in Moldovan and Russian, depending on the primary language of the household. Additionally, information on general aspects such as education, health, infrastructure and labor markets was collected by means of a community questionnaire in each community.

Central to the analysis are the questions asked to caregivers. Two specific questions focused on the aspirations and expectations caregivers had for their children. First, caregivers were asked the following question:

(1) *“Imagine finances were not a problem and everything else went right, what is the highest level of formal education you WISH [CHILD] could complete?”*

As noted before, the literature often does not go into detail when defining what constitutes aspirations: a change in the information set available or a change in the utility maximization reference point under perfect information. Since Moldovans have good access to modern communication technologies and media as well as free education, the estimation results are more likely to capture the before mentioned aspiration effect than a simple change in the information set of migrant households.

For the level of formal education, a scale was used that resembles the International Standard Classification of Education (ISCED) designed by UNESCO for the specific purpose of compiling education statistics on recognized educational qualifications and to make them comparable<sup>5</sup>. In the following analysis, this ordinal classification of educational attainment was converted into years of schooling to allow a better interpretation. In addition to these absolute aspirations, the survey also elicited the level of expectations. This supplementary measure allows us to contrast the novel notion of aspirations with the traditional expectations and investigate possible differences and similarities. Caregivers were asked the following question to measure their expectations:

(2) *“Consider your current financial situation and the child’s prospects. Using this card on which 0 means impossible and 10 is certain, how likely is it that [CHILD] will complete this level of education?”*

This question aims at capturing the probabilistic expectations of parents. This approach was chosen in line with the recommendations by Delavande et al. (2011) and Attanasio (2009). More specifically, the respondent was presented the stylized image of a ladder with 10 steps, the concept of probability was explained to her, and it was made clear that the last step represented the full achievement of a set goal.

To corroborate the parental aspirations, children were also asked about their aspirations in separate interviews. While a very high correlation between the two can be observed in the data, the empirical analysis will concentrate on parental aspirations for two reasons. First, whether educational plans can be interpreted as long-term goals is contested. For example, Alexander and Cook (1979) showed that the mere expression of intent by children can be volatile over time. Second, parents do control the financial resources of the household. Their decisions will therefore have a larger impact on the allocation of resources as compared to the aspirations of children.

Aspirations are defined as the unconstrained goal parents set for their children (i.e., question 1) and expectations as the product of the aspired years of education (question 1) and the expected probability of achieving this goal (question 2).

To evaluate how migration as an alternative to local employment is transmitted between generations, one question about migration aspirations was included in the questionnaire of the caregivers.

(3) *Do you think it would be good for [CHILD] to live or work in a different country when [CHILD] finishes his/her formal education?*

About one in five of the caregivers answered this question affirmatively; they were also asked about the reason for giving this answer, which country they would their children like to go to and whether formal education was important to work in the particular destination country. The two main reasons they stated were the absence of job opportunities in Moldova and a better way of life abroad. Family reunions were only mentioned by roughly 2% of the caregivers as a reason. In line with the two major migration corridors of Moldova, about 41% of the caregivers named Russia as the most preferable destination followed by 20% who wanted their children to go to Italy.

Irrespective of the destination, there was a broad consensus regarding the importance of formal education: 96% of the caregivers said that it would be an important requisite for working in the destination country.

### 5 Empirical identification strategy

The goal of this analysis is to find out if, as assumed in the conceptual framework, a causal relationship between migration and aspirations exists. The reduced form equation to test the hypothesis of Eq. (9) is:

$$\theta_{ij} = \alpha + \lambda M_{ij} + X'_{ij}\beta + \varepsilon_{ij} \quad (\text{a})$$

In this baseline specification,  $\theta_{ij}$  is the observed aspiration,  $X_{ij}$  a vector of individual characteristics of the child  $i$  in household  $j$ , and  $M_{ij}$  is the observed migration status of the household the child is living in. While the analysis is focused primarily on educational aspirations, as suggested by the framework, it will also contain the analysis of expectations and migration aspirations. The former makes it possible to examine whether the concepts of aspirations and expectations differ. The latter can be used to investigate the presence of chain migration dynamics.

Since none of the dependent variables is independent of migration ( $M_{ij}$ ), it cannot be expected that  $E(\varepsilon_{ij}|M_{ij}) = 0$ . Suppose a household consisted of two parents raising two children. One parent migrates to Italy, and the remaining caregiver has high educational aspirations for her children. The couple could have had high aspirations for their children before one of them migrated and have chosen to work abroad to overcome the credit constraints to fulfill these aspirations. They could also be very ambitious, which led them to choose the migration strategy but is reflected by high aspirations independently of this migration decision. Thus, because migrants are not randomly drawn from the population, OLS estimates could be severely upward biased if positive self-selection is present. Conversely, if negative self-selection is the dominant migration pattern, the OLS estimates could also underestimate the effect migration has on aspirations. To address this problem, an exogenous variable ( $Z$ ) is employed as an instrument for the migration status in a two-stage least squares (2SLS) setup. The structural equation of the first stage is then:

$$M_{ij} = \alpha + \phi Z_{ij} + X'_{ij}\beta + \zeta_{ij} \quad (\text{b})$$

Following McKenzie and Rapoport (2007) and Antman (2011), the instrumental variable is based on the GDP per capita growth rate in each of the destination countries between 2004 and 2010 weighted by the size of the migrant network proxied by the number of migrants from the community who had migrated to the destination country by 2004<sup>6</sup>. The instrument is based on the assumption that the higher GDP per capita growth, the more likely are migrants to find employment, and the higher their wages will be, i.e., it emphasizes the pull effects of economic growth at the destination. While there is no doubt that the change in GDP growth is completely exogenous to the conditions and characteristics of the household in Moldova, it seems necessary to adjust the strength of this pull effect by the size of the migrant network at the time of the change. The migration network is regarded as the information channel through which the exogenous shock operates. Migration networks proxied by current migrant

stocks have also been used in a number of studies to capture the migration cost reduction effect networks have as they improve the chances of employment and finding housing at the destination. According to the World Development Indicator database, GDP per capita (in constant 2005 international \$) grew on average 2.9% per annum in the 90 countries the index is built from. The most prevalent migration destinations in 2004 were Russia, Italy, Romania, Ukraine and Portugal, which consequently weigh most heavily in the index. These five countries had an average growth rate of GDP per capita of 2.6% between 2004 and 2010. The identifying assumption is that changes in economic growth represented by GDP per capita in the destination countries, weighted by the strength by which communities in Moldova were connected to these countries through migration networks in 2004, are predictive of current migration rates and only have an impact on current enrollment and educational aspirations through migration.

In the context of Moldova, there is – in addition to the issue of self-selection – the question of sorting. There are two major migration corridors that lead to the West, mainly Italy, due to linguistic proximity of Romanian and Italian, and to the East, mainly Russia due to historic ties. Yet, it is not possible to use GDP variation to estimate the effect of migration to one specific country since this instrument only represents an overall pull effect. Thus, the effect of going to Russia compared to migrating to Italy cannot be disentangled using only the GDP per capita growth rate. This difference is of crucial importance since Russia alone absorbs around 60% of Moldovan migrants in the sample. Hence, an additional second instrument is the presence of Soviet military personnel in each community before 1990. The assumption behind this binary variable is that the allocation of Soviet military in Moldova was independent of household characteristics and regional differences but that it was rather driven by strategic factors. Because Moldova, as part of the Soviet Union, constituted one of the border countries with the West, it was considered strategically important. Additionally, because of the small size of Moldova, Soviet military personnel were present in many communities. In about one-quarter of the communities in the sample, community leaders told us that Russian military personnel lived or worked in the community before 1990. The assumptions this instrument is based on are similar to those described in the case of migration networks. Since soldiers became part of the local social network, their presence could decrease the migration cost to Russia for people living in these communities. Thus, the presence of Russian military personnel before 1990 should only boost migration to Russia but have no effect on migration to the West. One problem with this instrument is that the presence of high ranking officers could have had a role model effect on local aspirations and would thus in the estimation setup also influence aspirations indirectly. However, there is no statistically significant difference in the aspirations of communities that hosted Russian military personnel and those that did not.

One threat to the validity of the instruments is the recent emergence of migration networks. Since migration in Moldova only took off in the late 1990s, relatively recent migration stocks are used as a proxy for the evolving networks. The risk this entails is that the instruments do not only capture the network effect but also the current economic conditions of the sending region. Thus, regional dummies and household control variables are included. To ensure that only the migration effects for one migration spell independent of the migration history are captured, the robustness of

the findings is tested by including a dummy variable that indicates if the household had migrants before 2011. This dummy did not alter the results qualitatively. A second problem is the non-linearity of the effects migration has on the households in the sending country. More specifically, parents would have to spend a longer time at the destination to update their priors about education, i.e., to decrease or increase their aspirations. Also from a financial perspective, migrants who leave the country for the first time have to bear more costs than regular migrants, which decreases the amount of money remitted to their families. The observed effects of recent migration can therefore be understood as the lower bound of the overall effect migration has.

### 6 Descriptives

Table 1 reports the basic summary statistics. On average, the household size is 4.9, and 2.1 children live in each household (see column 2). Out of all households with children, 28% had a member who lived or worked abroad for at least three months in 2011. About one-third of the migrants go to countries in Western Europe, and two-thirds

**Table 1 Descriptive statistics**

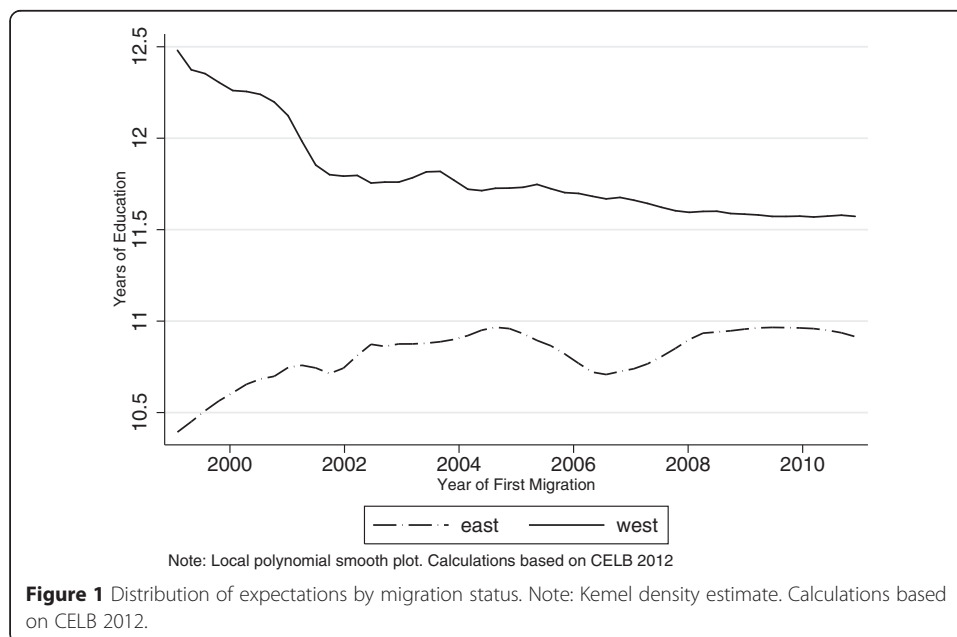
		(1)	(2)	(3)	(4)
		mean			p-value
		all	non-migrant	migrant	[diff (3)-(4)]
		(N = 3337)	(N = 2401)	(N = 936)	
<i>Panel A</i>					
Households	Household size	4.87	4.78	5.07	0.00
	Number of Children	2.12	2.16	2.00	0.00
	Migrant household	.28	-	1	-
	West Migrant	.10	-	.34	-
	East Migrant	.19	-	.69	-
	HH Income in US\$	3611.88	3166.18	4749.04	0.00
	Remittances as share of Income	.13	-	.46	-
	Educ. expenditure as share of Income	.21	.23	.16	0.00
	Below Poverty Line (2 Int. \$)	.02	.02	.02	.18
	Urban (yes = 1)	.22	.25	.15	0.00
<i>Panel B</i>					
Caregiver	Age of Caregiver	38.15	37.61	39.52	0.00
	Gender of Caregiver (male =1)	.10	.08	.16	0.00
	Education in years	11.01	11.03	10.95	.43
	Educ. Aspirations in years	15.41	15.36	15.53	.09
	Educ. Expectations in years	11.53	11.36	11.98	0.00
	Migration Aspirations (yes = 1)	.21	.21	.23	.14
<i>Panel C</i>					
Children	Age	9.84	9.78	10.01	.30
	Gender (male = 1)	.51	.52	.49	.16
	Enrolled (10 - 18 years)	.90	.91	.88	.11
	Enrolled (10 - 15 years)	.98	.99	.98	.49
	Enrolled (16 - 18 years)	.77	.77	.76	.73

Notes: Calculations based on households with children in CELB 2012. Answers "Don't know" and "Refused to answer" excluded. Observations used to calculate values might deviate due to missing values; two-tailed t-tests assuming unequal variances.

migrate to the East, i.e., almost exclusively Russia (see column 4). On average, about 60% of the migrants that leave for Western destinations are female. By contrast, migrants to the East are predominantly male (74%). The convergence of migrant skill levels for eastward and westward migrants shown in Figure 1 suggests that the positive selection of migrants who go to the West seems to have decreased since 1999<sup>7</sup>. Migrants are on average 34 years old and have 11.12 years of education. About 63% of all migrants are married. It is mostly the husbands who leave their wives and children behind. Nevertheless, an increasing feminization of migration seems to take place as also women migrate in increasing numbers, mostly to the West.

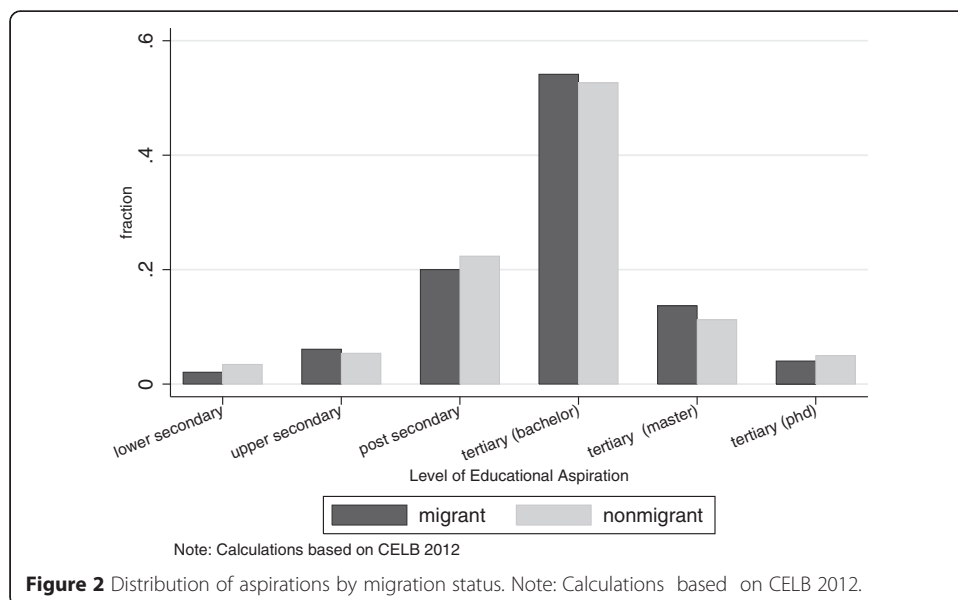
Nearly half the migrants were unemployed before they left for the first time, and most of them worked in agriculture and construction. Roughly 84% of the migrants come back at least once a year or go back and forth on a regular basis. While abroad, 85% communicate with household members at least once a week or more often. Thus, the connection between migrants and those left behind is by all means quite close. On average, 63% of the migrants have a work permit for their destination country. In the destination countries, the migrants work mostly in the construction sector or have individual household employers, i.e., sectors that are likely to have a low education premium. The remittances generated by these migrants make up about 46% of the total household income of migrant households in Moldova. This also explains the significant difference between the total income of migrant and that of non-migrant households<sup>8</sup>.

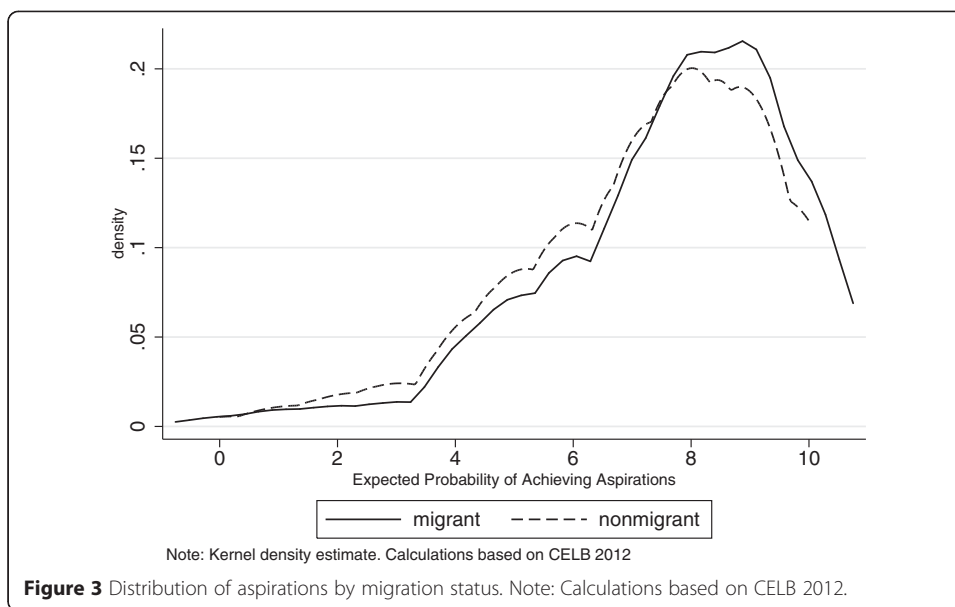
Caregivers are predominantly the biological parents of the children (87%). Yet, about 10% of the children live in so-called gap-household structures, where both biological parents have migrated and grandparents have taken on the role of caregivers. On average, caregivers are 38 years old and have 11 years of schooling (see Panel B in Table 1). The significant difference in age of about two years between migrant and non-migrant caregivers is attributable to the gap-households. There is no significant difference in the average years of schooling, neither between caregivers in migrant and non-migrant households nor between migrants and caregivers.



Caregivers would like their children to complete on average 15.4 years of schooling (see Panel B in Table 1). When taking into consideration the constraints they face, they expect their children to complete around 11.5 years of schooling, which equals upper secondary education. These average values conceal that aspirations are concentrated around first-stage tertiary education (see Figure 2). Caregivers desire in 53.15% of the cases a first-stage tertiary degree for their children. Note that few households in the total sample stated second tertiary education as their aspiration. There is also a strong gender-based divergence of aspirations. Caregivers have systematically higher aspirations for girls. The spread of this difference of educational aspirations for boys and girls seems to increase with the age of children. This divergence is driven mainly by decreasing aspirations for boys, while aspirations for girls remain constant independently of age. Caregivers expect that their children will reach the set educational goal, on average, with a probability of 74.2%. When asked what the main reason for not reaching the set goal was, 9 out of 10 caregivers cited financial constraints. Caregivers in migrant households expect their children to complete a significantly higher number of years of formal education. This is confirmed by the visual comparison of the distribution of expectations of migrant and non-migrant households in Figure 3. Caregivers in migrant households tend to have a more optimistic attitude towards the realization of the educational aspirations of their children. However, the enrollment rates of children in all cohorts are almost indistinguishable based on simple means testing (see Panel C in Table 1). The median expenditure per child is around 6% of the total household income<sup>9</sup>.

When asked about migration aspirations, 21% of the caregivers stated that it would be good for their children to work or live abroad (see Panel B in Table 1). Since the survey also asked this question to the children from 10 to 18 years of age, it is possible to compare their answers with the point of view of their caregivers. The transmission of migration aspirations between children and parents is quite strong. Even after controlling for individual and household characteristics, children appear to be much more likely to state that they would like to migrate if their caregiver was also in favor of migration.





### 7 Estimation results

Clearly, putting aspirations at the center of an economic analysis is only justified if it affects behavior. Before turning to the relationship of migration and aspirations, this hypothesis is tested by analyzing the correlations of aspirations and enrollment as well as the monetary expenditure of households for schooling (see Additional file 1). Because education is compulsory for nine years from the age of 7 to 16 in Moldova, the estimation concentrates on the narrow age range of 16 to 18, which captures enrollment in the upper

**Table 2 The effect of migration**

	(1) Educational aspirations			(4) Expectations			(7) Migration aspirations		
	OLS			OLS			Logit		
Migrant since 1999		0.33** (0.14)				0.46** (0.19)			0.26* (0.12)
Migrant in 2011			0.30** (0.14)			0.53*** (0.16)			0.24* (0.13)
Age of Child in years	0.02* (0.01)	0.02 (0.01)	0.02* (0.01)	0.10*** (0.02)	0.10*** (0.02)	0.10*** (0.02)	0.06*** (0.01)	0.06*** (0.01)	0.06*** (0.01)
Gender of Child (male = 1)	-0.77*** (0.11)	-0.76*** (0.11)	-0.76*** (0.11)	-0.98*** (0.15)	-0.97*** (0.15)	-0.97*** (0.14)	0.19** (0.09)	0.20** (0.09)	0.20** (0.09)
Education of Caregiver	0.25*** (0.02)	0.25*** (0.02)	0.25*** (0.02)	0.42*** (0.04)	0.42*** (0.04)	0.42*** (0.04)	0.01 (0.03)	0.00 (0.03)	0.00 (0.03)
Other children (yes = 1)	-0.38*** (0.13)	-0.35*** (0.13)	-0.35*** (0.13)	-0.19 (0.16)	-0.15 (0.16)	-0.15 (0.16)	-0.15* (0.09)	-0.12 (0.09)	-0.12 (0.09)
Obs	2197	2197	2197	2152	2152	2152	3547	3547	3547
R <sup>2</sup>	0.23	0.24	0.23	0.24	0.25	0.25			
McFadden's R <sup>2</sup>							0.08	0.08	0.08

Notes: Calculations based on households with children in CELB 2012. Robust standard errors in parentheses; \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1; Controlling also for orphan and semi-orphan, caregiver characteristics, marital status of parents, ethnicity, and household composition; district and grade dummies included; Standard errors clustered at the household level.

secondary level. This level is not compulsory since it permits access to higher education. Unfortunately, the effects of aspirations on higher education cannot be observed directly due to the cross-sectional structure of the data. The estimation results reported in the appendix show that a one-year increase in aspirations is associated with a 4% higher probability of being enrolled in the age range of 16 to 18. Aspirations and expectations also matter greatly for the investment in the education of children. A one-year increase in aspirations yields an average increase in schooling expenditure of about 12% per child per year. Overall, this evidence highlights the importance of aspirations and expectations for the extensive and intensive margin of human capital accumulation.

In Table 2, the OLS estimation results concerning the association between migration, aspirations and expectations are reported. Throughout all specifications, migration is associated with significantly higher levels of aspirations and expectations (see columns 2-3 and 5-6). Two different measures of migration experience were employed. The first variable captures if any migration has taken place in a household since 1999, which is when large scale migration from Moldova to other countries started. The main reason for introducing this variable is that first-time migration is likely to be more costly than repeated migration, and first-time migration could also be insufficient to alter the migrant's stance on education. Thus, someone with 10 years of migration experience will make different contributions to the household than someone who left the country recently for the first time. Since no significant differences between the accumulated migration experience since 1999 and the current migration in 2011 can be observed, there is no reason to be overly concerned about the non-linearity of migration effects. In columns 7-9, the household's migration status is related to the migration aspirations the caregivers have for their children. The estimation results show that caregivers in migrants households seem to favor the migration of their children.

Because estimating the causal effect of migration on an observable outcome is problematic due to endogeneity, an instrumental variable strategy will be used as outlined before. Using the conventional Wu-Hausman F and the Durbin-Wu-Hausman  $\chi^2$  test (not reported), the null that migration is an endogenous regressor cannot be rejected. Table 3 shows the effects of the instruments in the first stage. Both the first and second stage include variables containing the size of the different migration networks to make sure that identification only runs through the variation of economic growth in the countries of destination. As expected, the average GDP growth in the destination countries between 2004 and 2010 increases the propensity to migrate in communities that have networks with these countries. A one-unit increase of the growth in all destinations, weighted by the stock of migrants in each destination, increases the probability to migrate by 4-6% (see columns 1 and 4). This effect is statistically significant and robust over all specifications except for migration to the East. A clear specialization of networks can be observed; communities that had migrants in Italy in 2004 are less likely to witness migration to the East in 2011; while households in communities with strong migratory ties to the East in 2004 are less likely to migrate to the West in 2011. It is important to note that the former presence of Russian military personnel in the community increases the likelihood of migrating in 2011 to Russia by around 8% but has no effect on migration to the West. This makes it possible to instrument not only the migration decision of households, but also the self-sorting of migrants into Eastern and Western countries. Under the identification assumption, the strong effect of the exogenous GDP growth at the destination and the

**Table 3 First stage - the migration decision (Logit)**

	(1)	(2)	(3)	(4)	(5)	(6)
	All	West	East	All	West	East
GDPpc Growth 2004 weighted by migrant network	0.22** (0.11)	0.58*** (0.15)	-0.15 (0.14)	0.31*** (0.11)	0.58*** (0.13)	-0.06 (0.14)
Military Personnel				0.31** (0.15)	-0.05 (0.25)	0.48** (0.19)
Migrant Stock in Italy 2004	-0.00 (0.00)	0.01 (0.00)	-0.01** (0.00)	-0.00 (0.00)	0.01 (0.00)	-0.01** (0.01)
Migrant Stock in Russia 2004	-0.01 (0.01)	-0.04*** (0.01)	0.02* (0.01)	-0.02** (0.01)	-0.05*** (0.01)	0.01 (0.01)
Migrant Stock in Ukraine 2004	0.00 (0.01)	0.00 (0.02)	0.01 (0.02)	-0.00 (0.01)	-0.00 (0.02)	0.01 (0.02)
Migrant Stock in Romania 2004	-0.05*** (0.02)	-0.05** (0.02)	-0.01 (0.02)	-0.06*** (0.02)	-0.06*** (0.02)	-0.02 (0.03)
Age of Child in years	0.01 (0.01)	-0.01 (0.01)	0.02* (0.01)	0.00 (0.01)	-0.00 (0.02)	0.01 (0.01)
Gender of Child (male = 1)	-0.09 (0.09)	-0.12 (0.13)	-0.03 (0.09)	-0.11 (0.10)	-0.15 (0.14)	-0.04 (0.10)
Education of Caregiver	0.04 (0.02)	0.07** (0.03)	0.02 (0.03)	0.03 (0.03)	0.07** (0.03)	0.00 (0.03)
Other children (yes = 1)	-0.63*** (0.12)	-0.45*** (0.17)	-0.57*** (0.12)	-0.64*** (0.14)	-0.41** (0.18)	-0.59*** (0.13)
Obs	3547	3547	3547	2926	2926	2926
McFadden R <sup>2</sup>	0.08	0.14	0.07	0.07	0.16	0.06
Wald Chi <sup>2</sup>	205.3	231.9	104.8	204.3	256.6	86.49

Notes: Calculations based on households with children in CELB 2012. Robust standard errors in parentheses; \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1; Controlling also for caregiver characteristics, marital status of parents, ethnicity, and household composition; regional dummies included; Standard errors clustered at the household level.

quasi-random presence of Russian military personnel in the community on migration can be used to test the causal effect of migration on aspirations.

The corresponding IV estimates of migration effects are reported in Table 4. In column 1, the coefficient of migration is positive and statistically significant, which points to a strong effect of migration on the educational aspirations of caregivers for children in the household. Since the level of aspirations is capped at post-tertiary education, the migration experience cannot shift the aspirations any further than 22 years of education. Hence, the effect of migration should be stronger for households with a low human capital endowment. In column (2) the instrumental variable is interacted with a dummy variable (LEduc) if the caregiver has less than 11 years of education. The threshold of 11 years represents the mean level of education of caregivers. The migration of household members of households at the lower end of the human capital distribution has a significantly positive effect on the educational aspirations of caregivers for children in the household, while the overall effect of migration becomes indistinguishable from zero. One possible interpretation of this finding is that highly educated households already have aspirations for their children that are at the high end of the

**Table 4 The effect of migration (2SLS)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Educational aspirations			Expectations			Migration aspirations		
Migrant in 2011	3.22** (1.63)	0.58 (2.02)		3.79** (1.73)	2.71 (2.00)		0.39* (0.21)	0.75*** (0.24)	
Migrant in 2011*LEduc		4.95** (2.41)			0.81 (3.06)			-0.68 (0.49)	
Migrant in 2011 West			1.93 (1.99)			6.64** (2.99)			0.30 (0.24)
Migrant in 2011 East			4.80** (2.24)			0.77 (2.33)			0.57 (0.36)
Age of Child in years	-0.00 (0.01)	0.00 (0.01)	-0.01 (0.01)	0.00 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Gender of Child (male = 1)	-0.59*** (0.13)	-0.60*** (0.13)	-0.61*** (0.14)	-0.71*** (0.19)	-0.72*** (0.17)	-0.73*** (0.18)	0.04** (0.02)	0.04** (0.02)	0.04** (0.02)
Education of Caregiver	0.28*** (0.03)	0.25*** (0.05)	0.29*** (0.03)	0.47*** (0.05)	0.43*** (0.07)	0.45*** (0.05)	-0.00 (0.00)	0.01 (0.01)	-0.00 (0.01)
Other children (yes = 1)	0.07 (0.27)	0.05 (0.31)	0.18 (0.33)	0.28 (0.28)	0.19 (0.25)	0.12 (0.28)	0.02 (0.04)	0.03 (0.04)	0.04 (0.05)
Obs	2503	2503	2503	2435	2435	2435	2926	2926	2926
F-Statistic	19.21	16.76	15.01	22.71	26.68	19.93	7.246	5.507	6.376
CDW F-Statistic	15.70	8.418	11.66	16.43	9.197	13.53	10.66	4.415	7.837
Hanson J-Statistic	0.164	0.452	-	0.0976	0.193	-	0.416	0.192	-

Notes: Calculations based on households with children in CELB 2012. Robust standard errors in parentheses; \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1; Controlling also for caregiver characteristics, marital status of parents, ethnicity, and household composition; regional dummies included, migration stocks in Italy, Russia, Ukraine and Romania; Instruments are GDP per capita growth (2004-2010) in destination countries weighted by migrant network size in community in 2000; Standard errors clustered at the household level.

aspiration scale. Thus, the migration experience cannot shift the aspirations any further up. On the other hand, it does not seem to decrease their aspirations. If highly educated migrants were not able to generate a wage premium from their education during their stay abroad, they might be induced to consider education for their children as futile and reduce their aspirations. This is not the case. Splitting the effect of migration by destination shows that the sign for eastward migration is positive and significant at the 5% level, while the sign for westward migration is positive but statistically insignificant (see column 3). This also reflects the negative selection of eastward migrants. In conclusion, households with a small endowment of human capital seem to adjust the educational aspirations upwards due to the migration experience of the household members.

Columns 4-6 of Table 4 contain the estimates with respect to the relation between migration and expectations. The results indicate that caregivers become more confident about the educational attainment of their children. This may reflect the relaxation of the resource constraint of migrant households as a result of receiving remittances. Direct schooling cost and foregone earnings of the child due to continuing education appear less problematic, which allows caregivers to be more optimistic and to expect higher educational attainment. It is interesting that only caregivers in households with migrants in the West have more positive expectations, whereas living in a household with migrants in the

East has no effect on the expectations at any conventional significance level. This result could reflect the different returns to migration. Westward migrants sent on average 16% more remittances than migrants in the East. This interpretation is in line with the hypothesis that the expectations are strongly driven by the resource constraint of the household. The strong difference between the effect of migration on educational aspirations and expectations also underline the different implications of these closely related measures.

Contrary to the OLS results regarding the effects of migration on migration aspirations (see Table 2), a significant increase in migration aspirations in households with migrants is found. The linear probability estimates in columns 7 to 9 of Table 4 suggest an increase in the likelihood of favoring the migration of their children. In the context of the conceptual framework, the hypothesis that migration networks show self-reinforcing dynamics by transmitting preferences for migration to the next generation of the household cannot be rejected. This observation supports what has been called chain migration.

Differentiating by gender of children and migrants did not reveal structural differences in either case. The estimates of different sub-samples mostly did not differ in a statistically significant way. This might be due to the relatively small size of the sub-samples.

At the bottom of Table 4, the results of two tests are reported that evaluate the validity and strength of the instruments. First, the results for the Hansen J reported in the last row of Table 4 cannot reject the null that the excluded instruments are valid with one exception. Second, the Cragg-Donald F-statistic of the first-stage estimations is used to check the relevance of the instruments. These F-statistics show, based on a comparison with the reference values for weak instruments presented by Stock and Yogo (2002), that the instruments allow an identification of the effect of migration on aspirations and expectations. However, it is necessary to be cautious with the interpretation of the results regarding the effect of migration on migration aspirations due to possibly weak instruments.

While both OLS and 2SLS estimates point to the economically significant effects of migration, the considerable differences in estimated coefficients have to be noted. As mentioned before, one explanation for the higher coefficients of the instrumented estimation effects compared to OLS could be negative self-selection of migrants. Yet, since from the descriptive statistics no clear picture regarding self-selection emerges, a more plausible explanation for the higher 2SLS coefficients is the heterogeneity of the treatment effects. The 2SLS estimates only represent a local average treatment effect since those responsive to the instrumentation, i.e., the GDP per capita growth at the destination, might not be representative of the overall population (see Angrist et al 1996). Using a threshold of 0.5, the first stage correctly predicts around 3 out of 4 cases. The households which do not respond to the exogenous variation in GDP at the destinations but still migrate are concentrated in the north of the country and are mostly located at the border with the Ukraine or Romania. Migrants in these households are more likely to go to the East than those who comply with the variation of the instrument. However, these correlations do not reveal possible differences in unobservable characteristics such as the motivation to migrate because the true subpopulation of compliers cannot be identified. It is possible that the non-compliers leave out of economic necessity, irrespective of the change in situation in the destination country, and do not consider the option of migrating as an opportunity. This pressure could lead them to reject the norms of the destination country and thereby leave their aspirations unaffected. Those who respond to the improving situation at the destination,

**Table 5 Average treatment effects based on propensity score matching results**

Matching algorithm	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Educational aspirations			Expectations			Migration aspirations		
	Five nearest-neighbor matching	Radius matching	Nonparametric matching	Five nearest-neighbor matching	Radius matching	Nonparametric matching	Five nearest-neighbor matching	Radius matching	Nonparametric matching
ATT	0.42	0.42	0.34	0.58	0.32	0.40	0.04	0.05	0.04
Bootstrap SE	0.12	0.15	0.10	0.20	0.23	0.17	0.02	0.02	0.02
Pr( T  >  t )	0.000	0.01	0.00	0.00	0.15	0.02	0.02	0.03	0.01
Obs	3027	3027	3027	2944	2944	2944	3547	3547	3547

Notes: Calculations based on households with children in CELB 2012. Propensity score based on child age and gender, orphan and semi-orphan status, caregiver characteristics, marital status of parents, ethnicity, household composition, and districts; Balancing properties in 7 blocks was satisfied, Caliper fixed at 0.05; Only observations on common support were included; Bootstrapped standard errors based on 100 replications in parentheses.

reflected by the change in GDP, might be able to choose migration as a superior income source and may be more receptive to influences at the destination.

### **8 Robustness and limitations**

The robustness of the reported IV estimates was also evaluated using Propensity Score Matching (PSM)<sup>10</sup>. The counterfactual is constructed by matching migrants and non-migrants conditionally on observable characteristics, collapsed into a single index, in a random process. The results from three commonly used techniques, i.e., five nearest-neighbor matching, radius matching, and nonparametric matching, echo the findings obtained using instrumental variables (see Table 5). These estimations also suggest a positive relationship between migration and educational aspirations. However, the coefficients are much smaller, which stems from the fact the employed matching estimators produce average treatment effect on the treated and not local average treatment effects as observed with instrumental variable methods. Since the main assumption of matching methods is that the selection into migration is not affected by unobservable characteristics, these results have to be interpreted with care. As pointed out during the discussion of instrumental variable methods, both migration and aspirations are likely to be driven by characteristics that cannot be measured.

Several potential caveats remain in the interpretation of the findings. As noted before, it is difficult to disentangle the information and aspiration effect of migration. The presented results are more likely to reflect a pure aspiration effect, i.e., that migration changes the goal setting of households having full information, than a simple change in information available to households for two reasons: First, 91.6% of the households in the sample have a television, and about one-third of the households have a computer, i.e., people have the means to access information. Second, and more importantly, if migration were only an information channel, previous migration waves would have made pure information available before 2011. Since the estimations control for the migration stock in 2004, the access to information, e.g., about available education premia abroad, would have already been supplied by these migrant networks.

Another drawback of the analysis is that the effect of remittances cannot be observed directly. This means that the possibility that the additional financial resources are responsible for the change in aspirations cannot be eliminated. Although a condition of “unlimited resources” is explicitly included in the question for aspirations, it remains uncertain that this phrasing was enough to visualize this situation. While this income effect is a serious issue, the results suggest that it affects expectations rather than aspirations. If the observed effect was driven only by the decreased liquidity constraints due to remittances, the effect of aspirations and expectations should show no differences. Yet, by comparing columns 3 and 6 in Table 4, it becomes clear that migration to the East and to the West have significantly different effects on aspirations and expectations. While eastward migration changes aspirations, it has no effect on expectations. On the other hand, westward migration has a strong impact only on expectations. It could be argued that this difference reflects the different amounts of remittances received, with migrants in the West sending significantly more money, which allows households with migrants in the West to be more confident about the educational achievements of their children.

The interpretation of these results with respect to possible “brain gain” requires two qualifications. First, the cross-sectional nature of the dataset impedes the observation and analysis of the realization of the educational aspirations that constitute the core of

the argument. The benefit of increased aspirations will only materialize through the conversion of aspirations into educational attainment. Second, it must be acknowledged that the brain gain will only take place if not all children in migrant households leave the country after realizing more education. In this respect, the analysis relies on the same assumption as contributions that argue in favor of the monetary incentive effects.

## 9 Concluding remarks

This paper argues that international migration affects human capital accumulation not only by relaxing the resource constraints of households but through a change in the educational aspirations caregivers have for their children in migrant sending households. This hypothesis is tested using a unique household survey dataset. The different lines of evidence presented converge on the conclusion that parental migration can change the educational trajectory of children in migrant households with low human capital endowment through an upward adjustment of educational aspirations. This suggests that migrants update their priors about the importance of education while abroad and transmit them to the caregivers of children in the sending country. Since this relationship between aspirations and migration is tested in a country with high enrollment rates and a generally high level of formal education, the results must be interpreted as the lower bound of the effect migration can have on aspirations.

Overall, these findings suggest a new channel of brain gain as a result of international migration. While the current models are based on the premise that human capital investments will be increased by the opportunity to migrate, the present estimation results suggest that an increase in human capital could also be triggered by the positive externality migration has on educational aspirations. The estimation results imply that even a temporary migration spell could induce increased human capital investments. Thus, a brain gain could take place even if parents had the chance to migrate while children do not have this opportunity.

The present results are also highly policy-relevant in a broader context. Important determinants of human capital accumulation such as parental education are quite inflexible, whereas aspirations react flexibly to new impulses. If intergenerational human capital transfer is regulated strongly by the aspiration levels of parents, public policy could increase overall human capital accumulation by implementing measures that shift the educational aspirations parents have for their children upwards. Examples for these kind of measures include mentoring and peer education programs, extra-curricular activities, as well as parent involvement. Such policies would not only counter inequality but could also be more cost-effective than other policy measures, since supply-side interventions in the education sector will have a low return on investment without the necessary demand for education. More schools will not lead to an increased human capital stock without high educational aspirations of parents for their children.

## Endnotes

<sup>1</sup>One possible way of describing the evolution of  $\theta^R$  could be  $\theta^R = \sum_{k=1}^N \frac{\theta_k}{N}$ , where  $N$  represents the total number of families in the neighborhood. The relevant reference group could also be relatives, classmates, co-workers or friends.

<sup>2</sup>Comparisons are made based on the 2010 World Development Indicators compiled by the World Bank.

<sup>3</sup>Since the LFS does not include Transnistria, the sample is limited to households that are located in the West of the River Dniester.

<sup>4</sup>Migration is defined as being abroad for at least 3 months during the last 12 months.

<sup>5</sup>The resulting scale is composed of (1) primary education, (2) lower secondary education, (3) upper secondary education, (4) post-secondary education, (5) first stage tertiary education (bachelor), (6) first stage tertiary education (master), and (7) second stage tertiary education.

<sup>6</sup> $Z_{ij} = \frac{1}{C} \cdot \sum_{k=1}^C (MIG_{jk} \cdot \Delta GDP_{pcjk})$ , where the instrumental variable  $Z_{ij}$  for child  $i$  in community  $j$  is the GDP per capita growth ( $\Delta GDP_{pc}$ ) in the destination countries  $C$  weighted by the number of migrants in the destination country from this community ( $MIG$ ).

<sup>7</sup>The recent changes in visa requirements for Moldovans traveling to the European Union might have a direct effect on the observed mechanism of migration on aspirations. The regularization and integration of migrants that have been until now undocumented could increase their exposure to local norms and values and increase the observed effect. In the long run, the changed access to the European Union could change the composition of the flow of migrants, which could affect the relationship between migration and aspirations indirectly.

<sup>8</sup>Total income comprises the personal income of all household members coming from compensation for labor, pensions, social insurance benefits, remittances and other transfers, as well as the income of the household as a whole from the sale of agricultural production and livestock and social security benefits.

<sup>9</sup>Schooling expenditure per child comprises expenditures on schooling materials such as textbooks and uniforms as well as on additional gifts to school teachers, transportation expenditures and the cost of supplemental tutoring.

<sup>10</sup>See Caliendo and Kopeinig (2008) and Dehejia and Wahba (2002) for a discussion of this method.

## Additional file

**Additional file 1: Appendix.**

### Competing interests

The IZA Journal of Migration is committed to the IZA Guiding Principles of Research Integrity. The author declares that he has observed these principles.

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