Migration, remittances and educational levels of household members left behind: Evidence from rural Morocco[*]

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Abstract

In this paper, we empirically investigate the relationship between international migration and education attainment levels. We ask whether rural children who live in households that experience migration or/and receiving remittances are more likely to complete school at a given age than children who live in non-migrant households. Higher secondary and higher education levels are examined separately. Our results clearly show that children in remittance-receiving households complete significantly more years of schooling. In particular, remittances increase the probability of a male child completing high school. However, the evidence suggests that the international migration lowers deeply the chances of children completing higher education. Evidence also indicates the utmost importance of households' socio-economic status in determining to what extent the household mitigates the possible detrimental effects of migration on their children's educational outcomes.

1. Introduction

Remittances have seen a considerable increase in recent years. For many developing countries, remittance inflows exceed the value of foreign direct investment and the amount of official development aid. These financial flows, needless to say, have already and will continue to have, profound effect on migrants' countries of origin. At the macro level, remittances seem to be more stable than other forms of external finance, and they also tend to be countercyclical, increasing during economic downturns (World Bank, 2012; Chami et al., 2005). Another important aspect of remittances is their impact on economic growth (Driffield and Jones, 2013; Benmamoun and Lehnert, 2013). At the micro level, it appears that migrants' remittances improve human welfare. For example, several studies have shown the beneficial effects of remittances on transient poverty reduction (Acosta et al., 2007; Esquivel and Huerta-Pineda, 2006). They can also affect the long term welfare of recipients by affecting human capital formation. There is empirical evidence for concluding that in some contexts international remittances have a positive impact on education and child labor reduction, thereby increasing the demand for child schooling (Mansuri, 2006; Acosta, 2006; Yang, 2008; Lopez Cordovas, 2006). This is particularly true for recipient households who are from disadvantaged groups.

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While international remittances can apparently help to increase educational attainment of children in receiving households by lifting liquidity constraints, migration of a family member may, however, have a deleterious impact on children' educational success in a given local area. For example, by implying that unskilled work can be an important source of wealth whereby additional income from remittances can be earned independently of schooling, migration may become a source of disruption in households. Further, the division of household labour will be done at the expense of the non-migrant members so reducing the time allotted to their education. Other potential negative influence of migration is that it may increase the likelihood that family members migrate in the future and reduces the desired schooling and, hence, decreases the educational attainment. Furthermore, migrants invest less in education of their own children if the return of education is low in their host countries (as noted by McKenzie and Rapoport (2011), this is the case of Mexican migrants living in United States). In sum, emigration may increase or decrease household investments in children's schooling, depending on whether the income effects from remittances offset the effects of household disruptions.

Remittance flows to Morocco, which originate primarily from France, have increased remarkably over time. According to World Bank data, during the period 2001-2011 the amount of international remittances increased from 2.8 to 7.2 billions US$. Together with tourism, migrants' remittances represent the country's major source of foreign currency receipts. At over 6.5 billion US$ in 2012, they placed Morocco as the 15th largest recipient of remittances in developing countries. In the case of this recipient country, migrants' remittances are an important resource that can be a means to promote its development. However, beyond their quantitative importance, the possible impact of these remittances should be viewed in terms of their use. In this respect, the African Development Bank report (2007) found that in Morocco the priority is given to household consumption (essential goods and services), health and education. Unfortunately, empirical studies have not documented any significant work on the intra-family benefits of remittances to Morocco. For example, there is no evidence that international remittances can increase the educational attainment of children and of adults. This relation between remittance receipts and child education is of particular interest due to the constraints faced by families with respect to educational decisions. Our paper attempts to show how international remittances can play a significant role in shaping recipient family decisions on child education in Morocco (in particular on completion of non-compulsory grades). Do they have a chance to make a difference? Do they affect children at distinct educational stages differently? This paper is trying to effectively answer these questions. It examines the relation between the migrant inflow and educational attainment, measured by the level of education completed by children inside the typical age of graduation. This research is the first to empirically evaluate the effect of remittances on the schooling of children and to gauge whether or not being a girl is disadvantageous, by estimating probit models of higher secondary and higher education levels for male and female children separately. To accomplish this, we use data from an original Moroccan household survey, which provides information on household structure, education, income, housing and health and identifies all sources of income to Moroccan households. The main results is that when we consider the probability of completing secondary and higher education as measure of academic success, a strong statistically significant relationship emerges between remittances and educational attainment. More precisely, we find that remittances promote children's

school attainment in rural Morocco, particularly among secondary school-age children. However, the impact of remittances on education attainment levels is heterogeneous with regard to child's gender and educational level.

Beyond the conventional education impact of remittances, this study also tries to identify the effect of the migration itself on children's educational outcomes. It is thus the first to explore whether aggregation of data at the household level can explain the true impact of international migration -i.e., considering the sample of migrant households who have members abroad but do not receive remittances. The ability to identify migrant and not just recipient households allows us to directly analyze the relationship between international migration and educational attainment, and to compare our results with the ones that we obtain when we follow the more standard approach in the literature. In fact, the implicit assumption in most of the existing studies of remittances is that migration only affects children's educational success through remittances. However, the overall effect of migration on child education could be negative which was supported by results of this research. In fact, we find evidence of a negative impact of migration on educational attainment among adult children aged 21-24 whereas the positive effect of remittance receipt effectively disappears when we consider these school-age children. Further, the results show that the households' socio-economic status may determine to what extent the household mitigates the negative effects of migration on their children's educational outcomes. In sum, the present study acknowledges a complex and ambiguous relationship between migration and children's outcomes.

The remainder of the paper is as follows. Section 2 presents the theoretical framework. Section 3 describes the data and explains our methodological approach. Section 4 presents and discusses the empirical results. Section 5 concludes.

2.   Results of past research

Researchers have conducted several studies of associations between remittances and child schooling. These studies turn to regression-based analysis and consider a number of basic assumptions:

Parents' level of schooling is one of the major factors behind the academic success and achievement of children. More-educated parents or heads are better informed about the benefits of education and the wage enjoyed by those who have higher levels of education (Cox and Ureta, 2003). These parents will encourage their children to pursue their studies, instead of working (Hanson and Woodruff, 2003; Gang et al, 2008). By the same token, several empirical studies on the development impact of remittances have shown the existence of a strong correlation between the educational level of parents and the academic success of their children. For example, McKenzi and Rapoport (2007) studied the impact of Mexican migration on the academic success of rural children aged between 12 and 18. They highlighted the important role of maternal education in the schooling of children living in migrant households. Indeed, the authors found that international migration reduced the educational level of girls aged between 16 and 18 if their mothers were educated, and reduced that of boys whatever the mother's level of education. However, their results show that migration has no effect on the education of girls aged between 12 and 15. In contrast, Hanson and Woodruff (2003) note an improvement in the education of girls whose parents have a low level of education. They justify this by the fact that Mexican migration, by reducing financial constraints on households, can be involved in financing the education of their children.

Parents from disadvantaged backgrounds will compare the return on educational investment to alternative investments which could also increase the human capital of a child such as food, medical services and clothing. These families often find it difficult to send their children to school, if the costs of their education are too high. It appears therefore that there is a link between family income or wealth and the education of children[3]. For Mansuri (2006), prosperous parents invest more in human capital because in return they can receive the lifetime earnings of children deriving from their educational attainment. Cox and Ureta (2003) present separately the effect of both income remitted by international migrants and income from other sources on the academic success of children in El Salvador. Their results show that in urban areas, the effect of international remittances on children's education expenses is at least 10 times higher than income received from other sources. In rural areas, the effect of remittances is multiplied by 2.6. For Calero et al. (2008), if the financial transfers of Ecuadorian migrants reduce the non-enrollment of children by 19%, their positive effect is greater on girls and children from poor households and on those living in rural areas. In other words, according to the authors remittances can essentially increase enrollment among the poorest households.

Several studies have analyzed the impact of remittances on the education of children according to their age. For example, the study of Lopez Cordovas (2006) shows that funds remitted by Mexican migrants have a significant impact on the proportion of schoolchildren under 5. More specifically, an increase of 1% in the transfers received will increase school attendance by 11%. However, the impact of remittances appears negative on adolescents aged between 15 and 17 and has no effect on the 6-14 age group. The author argues that this negative effect is due to migrant households preferring to finance the future emigration of their children instead of their education in those communities which have a higher emigration rate. Similarly, McKenzie and Rapoport (2007) reported that, although remittances can play a positive role in the education of children, international migration can, on the contrary, have an adverse effect in some countries like Mexico.

There is consistent evidence that the household living area has an important impact on children's schooling. Cox and Ureta (2003) show that children who live in urban areas, unlike children living in rural areas, have a higher probability of achieving any grade level. Indeed, in urban areas, migrants' remittances increase the number of children attending school beyond Grade 6 by 50%. In fact, the authors acknowledge that, in the case of El Salvador, remittances have a much greater impact on the risk of school dropout, especially in rural areas. In practice, based on cross-sectional data, the authors found that remittances, regardless of their amount, decreased the risk of dropout in rural areas by 24% and had no effect on the continuation of urban children's studies. More specifically, in rural areas, the probability that a child from a family receiving the median amount ($ 100) would abandon the educational system, decreased by 14%.

The capacity of the education system to provide quality education at all levels within a reasonable time, and the proximity of schools to children' homes, are also factors that may affect potentially the demand for education and, in particular, the costs and the benefits of education (Glewwe and Jacoby, 1994).

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[3] Several studies have examined the relationship between parental income and child education (Keane et al, 2001, Frenette, 2007, Beffy et al, 2009, etc.).

3.   Data and empirical method

In this paper we use data from Moroccan household survey that we conducted in 2009 in Souss-Massa-Draa region of southern Morocco (from February to June 2009). While households are randomly selected within community, communities are not randomly selected because the survey focused mostly on rural communities in southern Morocco, a historical point of origin for France migrants. The data set includes a survey of 598 households and more than 2,700 children. It collects, among other data, information on human capital of each household. The information on children' education success is limited to the last educational level that they had attained at the time of the survey. In the empirical analysis, we focus in particular on completion of non-compulsory grades and thus two educational outcomes are examined: higher and postsecondary school completion. Survey information relating to the educational attainment of children indicates that 21% of children have received no formal education, while 19% have completed high school. Those not achieving the high school education do not exceed 11%. Children with undergraduate and postgraduate degrees constitute about 5% of child population. Figure 1 illustrates the gender differences in schooling attainment in rural Morocco. A decomposition exercise suggests that in the sample, the gender gap in educational attainment is marked by the improvements in the early years of education of female, rather than the females' overall advancement in education.

Figure 1. Distribution of children aged 6-24 years by level of education and gender (%)
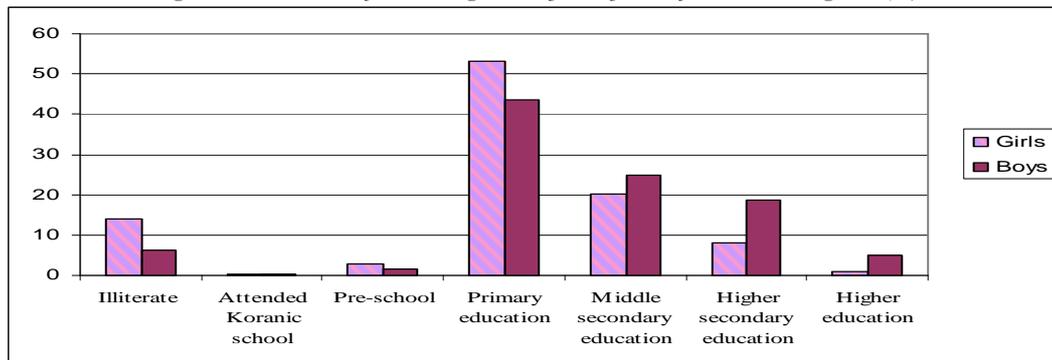
The survey asks several questions concerning migration, including whether any household members have gone to live in another country, capturing migration for study (or other non-work purposes) or work. We should note that one of the main limitations of using household surveys is that they only identify the relationship between the head of household and other members of the family. Since the focus of our paper is on children living in migrant households, we restrict the sample to children of the heads of household. This helps ensure that we are observing children for whom the parents (and not someone else) make decisions regarding schooling.

Information on the receipt of remittances by the household reveals that migrants' origin households receive, on average, 15,000 MAD per year ($ 1, 316), and 45% of households have received in the past year transfers from abroad. Furthermore, in our sample, only migrant households (i.e. households with migrant members abroad) receive remittances and 35.6% of households that have members abroad do not receive remittances.

Table 1. Distribution of migrants based on their family relationship to the household head

	All migrants*		Migrant who remit		Migrant who do not remit	
	Number	%	Number	%	Number	%
Spouse	22	3.88	21	5.50	1	0.54
Son/ daughter	272	47.97	213	55.76	59	32.07
Brother/sister	203	35.80	100	26.18	102	55.43
Nephew /niece	9	1.59	6	1.57	3	1.63
Grandson /	11	1.94	11	2.88		
Father/mother	20	3.53	17	4.45	3	1.63
Others' parents	22	3.88	9	2.36	13	7.07
Unrelated individuals	8	1.41	5	1.31	3	1.63
Total	567	100.00	382	100.00	184	100.00

*Note: * Frequency missing = 5*

The data collected indicate that 55.7% of households received remittances from their children abroad and 26% from siblings (Table 1). This may be mainly attributed in the case of Morocco (particularly in rural areas) to the fact that households are large and often contain not just vertical but also horizontal extensions. Indeed, in Moroccan society the nuclear family, which is often augmented with elderly parents, widowed sisters or daughters, grandchildren or maids, is the only important kinship unit. It means, all of the family members pool their earnings into one household account and this economic group appears to rely more heavily on extended family for support[4].

Table 2 provides summary statistics for the key variables used in this study. As can be clearly seen in this table, non-receiving households have larger amounts of farmed land than receiving households, which suggests that the labor burden associated with agricultural activities may discourage international migration. Not surprisingly, recipient households on average have slightly fewer incomes. Further, recipient households are generally larger, and are more likely to be female headed. Finally, there is a sharp difference in the level of spending between the recipient and non recipient households.

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[4] In migration literature, there is strong evidence suggesting that remittances are sent to a household from a family member who has specifically migrated in order to provide her family with additional resources. In the case of Moroccan migrants, study on their remittances behavior (Bouoiyour and Miftah, 2015) supports the altruistic hypothesis involving that remittances are sending to households with low levels of welfare; it also provides evidence that in situations where parents have financed their education and their costs incurred by migratory family (travel and settle in a foreign country), migrants will remit more than otherwise. In the latter case, migrants repay the earlier human capital expenditure financed by parents and continue to invest sufficiently in migration-oriented human capital of the next generation migrants.

Table 2. Descriptive Statistics

Variable	Households receiving Remittances			Households receiving no remittances			All households		
	Obs	Mean	S. D.	Obs	Mean	S.D.	Obs	Mean	S. D.
Male household head (%)	266	0.875	0.330	323	0.944	0.229	598	0.914	0.279
Age of household head	264	54.68	13.68	320	51.33	12.71	593	52.89	13.23
Annually income (excluding remittances)	264	13,824	30,741	323	25,551	32,045	596	20,346	31,892
Monthly expenditure	266	2,231	1,096	319	1,909	1,090	594	2,055	1,100
Total land area [5]	253	9.367	27.14	274	15.894	85.281	535	12.64	63.85
Number of livestock	243	10.14	8.31	271	12.66	18.259	523	11.43	14.36
Share of children attending school (pupils and students)	232	0.689	0.938	295	0.677	0.900	535	0.685	0.923
Household size	232	7.03	3.00	291	6.52	2.08	531	6.76	2.54
Distance to high school (Km)	264	11.01	10.54	322	11.46	10.80	595	11.326	10.72
Child's age (Age 6–24)	1,225	16.11	10.35	1,429	15.02	9.203	2,700	15.572	9.757
Male child (%)	1,225	0.5714	0.495	1,429	0.565	0.495	2,700	0.569	0.495

The aim of our work is to assess the chances for a child to be educated, and to continue his studies, depending on the reception of migrants' remittances. Our study will also attempt to account for the migration effect when examining the impact of remittances on children's schooling to better understand the impacts of these private transfers. It is expected that educational impacts of household migration and household remittance receipt are likely to work in opposite directions. We thus try to separate the "remittance-effect" from the "migration-effect". One way to obtain the migration effect is to look only at households who have a family member abroad (and don't receive remittances), and exploit the fact that 35.6% of them do not receive remittances. Households which report having migrants abroad but do not receive international remittances are classified as non-remittance receiving households. Then for comparison purposes, our empirical analysis was performed by considering the sample of non-remittance receiving households and using as dependant variable whether the household has a family member abroad taking the value of 1 if the household has a migrant abroad and 0 otherwise (i.e., migration status variable).

To better understand the parental schooling investment decision, we examine the likelihood of graduating from higher and postsecondary school[6] among two distinct age-groups[7]. Two categories are formed and each individual is assigned to one of these

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[5] Local unit of measurement is "âbra" or 1/8 hectare.

[6] We have eliminated primary and middle secondary education because the net enrolment rate in primary school was estimated in 2009 to 90.7% (UNESCO Institute for Statistics), and our results related to the probability of completing middle secondary education (available upon request) have shown that remittances and migration have no significant impact in explaining educational attainment for children aged 15-17.

[7] The age groups are chosen taking into account the effects of repeated years in relation to the number of years necessary for training of graduates. According to the Ministry of National Education (2008) statistics, the length of school attendance is six years for primary school, then three years of middle secondary education and then three years of qualifying secondary education (i.e., high school education),

categories. However, while schooling is complete for adults, we have no information on the past remittance receipt by household in which they lived during their childhood. For that raison, we have restricted our sample to children of school age.

Studies of determinants of children's access to education in developing countries consider individual and household characteristics, as well as educational provision in the community. The form of our data suggests a possible specification of a Probit model which explains the likelihood of graduating from high schools, but also from university, so the dependent variable Y_{ih} is defined as follows:

$$\mathrm{Y}_{ih}^{*} = \beta X_{ih} + \omega R_{h} + u_{ih} \tag{1}$$

where X_{ih} is the vector of explanatory variables and u_{ih} is the error term. This latent variable which corresponds to the outcome variable of individual i in household h is observed with $Y_{ih} = 1$ if $Y_{ih}^{*} > 0$ and $Y_{ih} = 0$ otherwise. Our dependent variable is whether child is a graduate from higher and postsecondary school according to age range. It is estimated for each age group, the probability of completing appropriate study cycle. The set of explanatory variables used are as follows. Child characteristics include sex, age at survey and age-squared. The number of schoolchildren aged between 6 and 17 is used to test the assumption of whether or not the high numbers of schoolchildren could account for the differences in schooling behavior but also whether relatively fewer school-aged children in the household (i.e., signaling less competition for household resources) is associated with greater investments in human capital. This variable is therefore used as a proxy for the cost of schooling. In fact, in developing countries, parents participate in the funding of, at least part, of the education of their children (Hillman and Jenkner, 2004). Household characteristics, which are important determinants of schooling, include household head's sex and education (measured by the number of years), household size and income, and transfers received from abroad R_{h} (or M_{h} : an indicator for whether the household has a migrant abroad). To control for income effects, we use household wealth rather than income or consumption because of potential endogeneity problems with these two measures. For instance, income may increase because unenrolled children may work and earn income for the household, and child schooling may increase household consumption/expenditure (expenditure related to tuition and studying materials for example). Hence, we were trying to find a good household-level income measure or proxy, i.e., factors influencing the household's financial ability to send children to school which are based on incomes from various sources such as wage employment in farming and nonfarming activities and nonwage income sources. Specifically, the two following variables available in the data may be considered: a dummy for wage labor (measured by the employment status of household

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if there are no interruptions of study or years that have to be repeated. However, according to the same statistics, because of years are repeated, the national average length of education is 6.7, 4 and 4 years respectively. In Morocco, children start primary education at the age of 6, so they can finish their compulsory education (primary and middle secondary education) at the earliest, when they are 15 years old. In this research, we restricted our sample to individuals aged 18 to 20 when studying the determinants of completing high school since children aged 18 must have finished secondary schooling by that age. When doing the analysis for the determinants of higher education the sample is restricted to those aged 21 to 24 (adult children with at least undergraduate degrees).

head[8]) and a measure of nonwage income i.e. the household asset ownership whose acquisition is less likely to be caused by child wage and/or current remittance flows[9] (Acosta, 2006). The household asset ownership (a proxy for wealth) corresponds to the heritage declared by households. In fact, household's inherited land is an appropriate proxy for household wealth (Mansuri, 2006) because land is primarily inherited in rural Morocco. This measure takes also into account the intertemporal nature of child schooling decision.

To take into account the household cultural capital, we include as explanatory variable the possession of a television and a dish (a dummy variable)[10]. In fact, cultural capital equips children with cultural endowments and with skills with which to demonstrate their cultural endowments (Jæger, 2010). Community characteristics are represented by the municipal human development index ("ICDH")[11] and the distance home-school (in kilometers)[12]. ICDH allows better assessment of the level of development of municipalities. The characteristics of the locality also include the distances of the communities to the nearest schools. This can also be used to approximate indirect education costs (for example, transport costs).

In our survey, as in most inquiries, the problem of endogeneity is common. It is possible that an outcome may well influence migration and/or remittances and vice versa and migrants can tend to be self-selected for migration on the basis of unobservable characteristics. Furthermore, measurement errors in the reported amount received as remittances would introduce a downward bias in the coefficient of the impact of remittances on children's outcomes. In which case, estimation results will be biased. Use of instrumental variables is prevalent in the literature on migration and remittances. It is clear that a powerful instrument can eliminate bias from three sources, i.e. simultaneity, omitted variables and measurement error. However, finding an exogenous instrumental variable that can identify the causal relationship between migration or remittances and schooling outcomes is not easy. Since, a good instrument for successfully addressing the endogeneity problem is one that is sufficiently correlated with migration or remittances, and that does not affect the schooling by any means

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[8] This variable could act as proxies of short-run shocks on household income. If a household head is employed, the household does not face a severe income risk.

[9] Note that the correlation between remittances and household income can also arise from the presence of lurking variables. For instance, it is the case where there are some fluctuations of income caused by the household-level shocks. Studies on the field conclude that the decisions to remit are responsive to the shocks (Azam and Gubert, 2005) that affect household income which, in turn, is likely to spur the children to drop out or remain in school. In order to control for this problem, we have applied instrumental variable estimation.

[10] The variable related to culture capital used here gives us an idea about the level of parent knowledge, particularly mothers who are mostly illiterate in our sample (90%).

[11] In the report of High Commission for Planning (2004), municipal human development index (ICDH) is measured by: i) Health situation, measured by the infant mortality rate or the indicator of the level of development of the health sector. ii) Education level, measured by an indicator combining the literacy rate among persons age 15 and over (two-thirds) and the enrolment rate of children aged between 7 and 12 (one third). iii) Living standards of the population, attained from the average annual expenditure per year, per person: this will be a more appropriate way to assess a households' ability to cover their needs at municipal level when GDP per capita is unavailable.

[12] The average estimated distance to the closest primary school is 0.48 kilometers (10 km and 11.32 km for college and high school respectively). The survey data reveals that, on average, 93% of children may have to travel one hour to the nearest primary school, while only 64% and 46% of them take the same time to get college and high school respectively. We note that the primary school is generally more accessible to children than college, which is itself more accessible than high school.

other than through its correlation with migration or remittances. In this study, to address the endogeneity of migrants' remittances, we use the Rivers-Vuong approach (1988). However, for migration status variable, as there are binary outcomes (i.e., migration status and schooling decisions), the bivariate approach offers a solution to the problem of potential unobserved heterogeneity. One empirical difficulty in attempting to estimate a bivariate probit is finding a set of identifying restrictions which ensures that the unobserved variables that determine the migration status and schooling decisions are not correlated. Suitable instruments should explain variation in migrant propensity. We have two variables that effectively work as instruments of migration and remittances (Amuedo-Dorantes and Pozo, 2010; Mansuri, 2006; McKenzie and Rapoport, 2011). One tracks the historical migration rates in the geographic areas in which the household is likely to have migrant networks and the other one tracks economic conditions in these areas (i.e., the Gross National Product per capita)[13]. For each household, we gather information on the geographic location of current migration of its members and take the historical stock of migrants in each host country that receive these members. Migration networks and history increase the prospect of migration, help lower migration costs by giving individual information about obtaining a job in the host countries, finding housing, etc, and may help migrants abroad to earn more. The incentive for an individual to migrate will also depend on expected earnings profiles in the host countries. Further, the economic conditions in the destination areas are likely to be correlated with the sending of remittances by migrants. We have therefore chosen to include the Gross domestic product, a measure of economic activity in these countries. These instruments are not used simultaneously across all the models estimated for age and gender sub-samples. However, one of these instruments is selected separately for each model specification conditional on passing the instrument relevance test.

4. Econometric results

The results of the empirical analysis are divided into two sub-sections. In the first, the analysis of remittance effects is conducted to explore two main questions: (1) is there any evidence that the migrants' remittances favour males over females? And (2) do they affect children at distinct educational stages differently? The second sub-section explores whether aggregation of data at the household level (i.e., considering the sample of migrant households who have members abroad but do not receive remittances) can explain the true impact of international migration which is often opposed to the positive impact of remittance receipt. To this end, we estimate separate models for each education level by focusing our attention on higher- level and secondary-level educational attainment.

In the first instance we discuss the main findings on the sample as a whole. Table 3 gives the marginal effects of the selected covariates on the probability of attaining different levels of schooling. The main results in this table are also presented for each sex-age group[14]. More precisely, two sets of regressions performed are reported in Table

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[13] Gross domestic product data were obtained from the World Bank Indicators at: http://data.worldbank.org and the migration network and history of the household correspond to the number of migrants in such country of destination in which the household has likely established migration networks (in the early 1990s).

[14] In the model estimated the probability of completing higher education for female children, the convergence of the optimization algorithms is impossible. The empirical problem here is that the female

3: the first set presents the results related to the probability of completing high school for adult children aged between 18 and 20 while the last 2 columns report the results for the probability of university attendance among adult children aged 21-24[15]. Table 4 reports the results of the migration effects on educational attainments computed using sample of non-remittance receiving households. Further, we address the endogeneity of remittances and migration through the use of an instrumental variable approach in the estimation of equation (1).

Educational success of children as captured by level of education attained is likely to depend not only on current remittance flows, but also on past flows. As noted by McKenzie and Rapoport (2011), schooling decisions may depend on the expectation of migration in the future but this expectation will depend in part on previous household migration experience. In that regard, we have restricted our sample to migration by household members five or more years ago for higher-level educational attainment and three years or more for secondary-level educational attainment. This migration may -and still- influence the ability of a household to pay for schooling later on. Certainly, educational attainment is affected by cumulative inputs, but there are likely to have effects at the intensive margin.

The results from the first-stage estimation in the bottom of Tables 3&4 are reasonable and show that the selected instrument helps predict household migration and household remittance-receipt. More precisely, we argue that the instrument used (i.e., migrant network or Gross National Product per capita) is as expected positively correlated to household migration or/and receiving remittances (its coefficient is statistically significant at the 1% -or 5% - level). Further, we check for the strength of the selected instrument with the F-test listed at the bottom of the Table 3.

Before discussing our findings, note that in order to isolate the impact of remittances, we should focus on non-migrating households (i.e., households that receive remittances but surprisingly do not experience the emigration of a family member (s)), however, as mentioned early, in practice only migrant households (i.e. households with migrant members abroad) receive remittances[16]. In such case, the remittance coefficients can capture the combined effect of migration and remittance receipt. As these two effects are expected to have opposite impacts on children's schooling, our results (to be discussed in the next subsection) can assess which of the two dominates.

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sample size is often much smaller than that of males (1% of our sample). This can be due to the high secondary school dropout rate of girls in rural areas. It may also be that the sequential nature of the educational process may selectively eliminate girls with for example lower aspirations, and those with disadvantaged status from the educational ladder.

[15] In the model estimated the probability of completing higher education for female children, the convergence of the optimization algorithms is impossible. The empirical problem here is that the female sample size is often much smaller than that of males (1% of our sample). This can be due to the high secondary school dropout rate of girls in rural areas. It may also be that the sequential nature of the educational process may selectively eliminate girls with for example lower aspirations, and those with disadvantaged status from the educational ladder.

[16] Papers including Amuedo-Dorantes and Pozo (2010) and Amuedo-Dorantes et al (2008) are among the few researches which have attempted to disentangle the effects of remittances from those of migration on child education in the countries like Haiti and Dominican Republic by focusing on children residing in migrant households who don't receive remittances ("migration effect") or using only households that receive remittances but surprisingly do not experience the family emigration ("remittance effect").

4.1. Remittances and educational attainment

Overall, the results confirm that remittances increase the probability of completing high school for the overall sample, as well as for the sample of boys. This suggests that the higher the level of remittances, the higher the likelihood of completing high school. In contrast with the boys' results, we can reject the hypothesis that the effect of remittances is the same for girls. Our estimates thus found that the remittances generally benefit boys more than girls, by increasing their probability of completing high school. Further, for the full sample of boys and girls estimated together, being male is associated with a 29% increase in educational attainment. Many parents in rural Morocco believe that it is not appropriate to send girls to school. Unfortunately, this discrimination against girls is also reinforced by migrants' remittances. This result reinforces the well know finding that investment in women's education is less of a priority in households especially for female youth beyond compulsory education. Some misogynistic societal pressures are being exerted on women to get married and start their own families. We know that in rural Morocco, the early marriage of girls persists[17]. Other factors also contribute to the systematic gender differences in the time allocation of parent including religious beliefs, parents' education, and differences in the wages paid to male and female employees (i.e. investments in boys might have larger returns).

The effects of the individual and household variables on the pursuit of higher secondary education are as expected. In particular, the proxies of income had significant effect in all regressions. More precisely, we find that children living in families where household heads working as employee increase their probability of competing high school by 27%. Another interesting finding is the positive coefficients associated with the child's age in all samples which indicate that the probability of completing high school increases with age. In fact, we have a positive effect of age and a negative effect of age squared which indicates that child schooling increase at a decreasing rate and older children attain lower schooling. Further, having additional siblings increases the probabilities of graduation. In reality, we would expect the household size to affect the educational attainment for males and females children differently since an increase in number of children in the household may induce the old members to work more for wages to support their families and the female to drop out of school.

We find evidence of distance home-school[18] and education access consistent with the literature. In particular, our results suggest that the distance between high school and

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[17] According to the UNICEF report (2008) on the situation of children in the world, between 1998 and 2007, 16% of Moroccan women aged between 20 and 24 years were married before age 18.

[18] Some studies have raised an issue regarding the problem of endogeneity between educational outcomes and distance home-school (Glewwe and Jacoby, 1994). In particular, this problem arises when the choice of residence by the household is affected by the distance between a family's home and school. It is likely that the parents have settled in areas close to schools in order to avoid transport costs which can sometimes be prohibitive. In the presence of such selectivity bias, the endogeneity of distance variables could be tested using IV techniques (Rivers-Vuong approach (1988)). The variable used as instrument for distance from child home to high school is the distance between home and community care access centers. After considering IV technique that takes into account potential endogeneity of the variable distance between school and children's homes, the evidence signals that it does not seem to be an endogenous variable. Our failure to detect strong selectivity effects may be the result of the scarcity of schooling in rural areas due to their geographic isolation. It could also be argued that households may not be perfectly mobile when the choice of their residential location is dictated by the externally-driven constraints (e.g., living close to their workplace or family). The results of the first stage regression of the IV estimation suggest that in the sample for adult children aged 18–20, we get an F-statistic of 19.34. It falls to 16.98 and 12.14 for the samples of boys and girls, respectively.

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family's home has a significant affect on the probability of children attending high school, regardless of their sex, i.e., children in households who live farthest from high schools are less likely to attend school. The distance to the nearest secondary school can act as proxy of the cost of schooling.

Table 3 also reports the results for the probability of university attendance among adults aged 21-24 for the overall sample, as well as for the sample of boys. Note that the fact of being male increases this probability by 15%. This confirms the findings regarding higher secondary education. Another point worth emphasizing in the empirical analysis is the fact that remittances have a negative impact in explaining educational achievement of older children while they have positive effect on secondary school-age children attainment. One possible explanation for this finding is that the sequential nature of the educational process may selectively eliminate students with lower ability and aspirations[19] from the educational ladder, thus reducing the effects of remittances - or increasing the adverse effects of migration- at the higher educational level. Note that, we consider 21- to 24-year-olds, who are at the age when migration's adverse effect becomes stronger because migration for work starts to become a possibility, especially for male adults with disadvantaged family backgrounds. This finding could be suggested that the migration effects on educational attainments may be negative on adult children aged 21-24 and justifies the estimated effects of the migration in this empirical section. Another possible explanation is that, for older children the opportunity cost of attending school increases significantly and with this a pressure to work or to get married. This is reinforced by the loss of adult labor in the household (migration of adults).

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[19] The unemployment rate of university graduates and the general lack of opportunities in Morocco can discourage less ambitious young women and men to attend university.

Table 3. Probit estimates of the determinants of educational attainment

| | Adult children aged 18-20 | | | Adult children aged 21-24 | |
| | Both genders | Males | Females | Both genders | Males |
	dF/dx	dF/dx	df/dx	dF/dx	dF/dx
Remittances	4.14e-06	.000010	3.13e-06	-.00005	-.00006
	(2.59e-06)*	(4.65e-06)**	(2.44e-06)	(.00002)*	(.00003)*
Child characteristics					
Boy	.29168			.149983	
	(.05046)***			(.03554)***	
Age in years	1.9606	2.2398	1.6496	.16018	.283509
	(.63706)***	(.93384)**	(.78678)*	(.1865)	(.36160)
Age in years squared	-.054663	-.06155	-.046503	-.00356	-.00647
	(.01877)***	(.02764)**	(.02304)*	(.00423)	(.00826)
Household characteristics					
Size	.022470	.042627	.000610	.012222	.019129
	(.01579)	(.02492)*	(.01812)	(.00759)*	(.014484)
Male household head	-.19429	-.17673	-.030050	()	()
	(.15991)	(.37719)	(.12568)		
Number of schoolchildren	.017953	-.027043	.031336	-.02035	-.018106
	(.02334)	(.04292)	(.02278)	(.01366)*	(.02036)
Educated head	.016115	.024467	.007830	.008213	.026199
	(.00939)	(.01751)	(.00977)	(.00495)	(.01130)**
Cultural capital	.092213	.026811		.38874	()
	(.17883)	(.28718)		(.23402)**	
Total land area	-.025015	.019576	-.03742	.002610	.02806
	(.02625)	(.04518)	(.03249)	(.01313)	(.02714)
Household head is employed	.275255	.43925		.092027	.241601
	(.03221)**	(.05315)**		(.03001)***	(.05359)***
Commune characteristics					
Distance home-high school	-.009583	-.013877	-.00481		
	(.00266)***	(.00442)***	(.00289)*		
ICDH	.291454	1.5584	-.59246	.24009	.372380
	(.72490)	(1.4136)	(.85307)	(.37896)	(.7341)
First-stage results : Instrument used	.011321 (.00388)*** (1)	.017252 (.00575)***	.547781 (.39459)**	.017926 (.00520)***(2)	.021853 (.00689)***
First-stage F-statistics	16.93	13.42	8.43	15.01	12.99
R2	0.2803	0.3142	0.2086	0.2796	0.3012

*Notes: * Significant at 10%; ** Significant at 5%; *** Significant at 1%. Standard errors are between brackets. ()
Dummy variables had been omitted due to a risk of colinearity which has made convergence of the optimization algorithms
impossible. Coefficients are after correction of heteroscedasticity. (1) The instrument used is the historical migration rates. (2)
The instrument used is the Gross National Product per capita.*

However, when the children's education is at stake, migrant households may exhibit heterogeneity in responding to the international migration (Berker, 2009). In that case, households' socio-economic status may determine to what extent the household mitigates these adverse effects of migration on their children's educational outcomes. As shown in Table 3, the proxies of household income as well as the household head education are significant in the case of a child's pursuit of higher education. More precisely, the educated head effect might be that higher-educated parents or heads invest more in the higher education of their children, especially among males. As it would be expected, higher-educated parents or heads are more likely than their counterparts to have the means to reduce the adverse effects of migrant inflows on children's educational outcomes, among males in particular. In view of the high cost of higher education, which is exorbitant for rural families, household welfare appears to play a fundamental role in the pursuit of higher education for adult children. It reinforces the generally accepted idea that children in wealthier households are more likely to succeed in their university studies (Frenette, 2007; Beffy et al., 2009). Their success is in part explained by the fact that these students are less likely to work to fund their studies, because they receive financial support from their families. This then leads us back to the issue of credit constraints faced by students in developing countries like Morocco. Finally, household cultural capital has a favorable impact on the probability of pursuing higher education for adult children in general. This variable has the expected effect on the students' ability to success in an academic environment, i.e. families offer another source of educational success and improvement outside the teaching effectiveness, which some would choose to call "cultural capital".

The coefficient of log of land is never significant in all our results. The most likely explanation of this result is that land is a form of wealth, and wealth is likely to have a positive effect on school attainment. At the same time, we can expected a household owning agricultural land to have a higher demand for child labour, which hence raises the opportunity cost of school attendance. Thus, the net effect of land ownership on the educational outcomes of children is still by and large an open empirical question.

As it would be expected, children's schooling is still more likely in households with a small fraction of schoolaged children. Specifically, the variable related to the number of children enrolled per household has a negative effect on the probability of completing higher education. In other words, a large number of school-age children within a family could put a constraint on the pursuit of higher education, probably because of the higher financial burden on the parental budget.

Interestingly, we find a positive impact of household size on school attendance for adult children aged 21-24. This may occur because a rural household with a large number of children available to engage in household work, the opportunity cost of education for any one child may be quite low.

4.2. Migration results: heterogeneity in estimated effects

Our empirical analysis examines the impact of remittances on educational attainment of children by separating the income effect of remittance receipt from the disruptive impact of simultaneous household emigration. After discussing our findings related to remittance effects, in this sub-section we evaluate the impact of migration on educational attainments. The results from such an exercise are displayed in Table 4.

The results show that international migration has a negative impact on school attendance of adult children aged 21-24, while it tends to have no significant impact in

explaining schooling achievement for adult children aged 18-20. It is argued that migration of working-aged household members forced older children to take on additional household responsibilities (McKenzie and Rapoport, 2011) and work to fill the short-term income deficit in the family and thereby reduce school attendance and success. Alternatively, it may be that the absence of adult supervision as a result of its migration translates into less input of adult supervision which explains the observed negative association between migration and educational achievement (Antman, 2012). As mentioned by McKenzie and Rapoport (2011) in the case of Mexican migrants, if higher education in host country has a lower return for migrants than for comparable native born, migration may be associated with significantly lower level of schooling in home country.

The findings of the previous subsection are complemented and further reinforced by the migration results. This suggests that, to the extent that remittances are preceded by the migration of household members in recipient household's sample, the remittance coefficient can capture, at times, the combined effect of migration and remittance receipt. As these two effects are expected to have opposite impacts on children's schooling, the remittance results can assess which of the two dominates. More precisely, it appears that the migratory effect measured by remittance effect contributes positively to the probability of schooling achievement, at least at high-secondary school levels.

As mentioned above, the households of higher socio-economic status are able to mitigate the negative effects of migration on their children's educational outcomes. The results report a significant positive effect of household head education on children school attainment. Such result suggests that the level of education attained by parents or heads are playing significant role in directing the education of children in the household. We also find a significant effect of heads' employment status on child school success. In particular, the effect of head household being employed was positive and statistically significant at the high school and higher education levels. Also, the coefficient estimates on land ownership was positive and significant at the higher education level.

Looking at the effect of other parental and child characteristics, the results reveal that the higher the size of a household, the more adult children are likely to be enrolled in university. Other factors such as children's gender and land ownership increase significantly educational attainments.

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Table 4. The impact of migration of educational attainment

	Adult children aged 18-20			Adult children aged 21-24		
	Bivariate probit		Univariate Probit	Bivariate probit		Univariate Probit
	migration equation	education equation	Education equation	migration equation	education equation	Education equation
Migration status			.06159 (.06596)			-.08862 (.04659)**
Child characteristics						
Boy	.002415 (.17142)	.42344 (.2835)	.24881 (.06619)***	-.01666 (.13599)	1.57720 (.41744)***	1.5772 (.03379)*
Age in years	.074359 (.02790)***	1.0577 (.20365)***	.92278 (.70685)	.065756 (.02331)***	.275647 (.09066)***	.15390 (.23756)
Age squared	-.001552 (.00068)**	-.0245 (.00531)***	-.02428 (.02084)	-.00133 (.00062)**	-.003761 (.001475)***	-.00347 (.00539)
Household characteristics						
Size	-.13560 (.04683)***	-.10841 (.07223)	-.02913 (.02117)	-.03030 (.04017)	.009641 (.04495)	.00964 (.01144)**
Male household head	-5.1979 (.16078)***	-.70869 (.51038)	.065169 .131075	-4.9170 (1224.0)	4.6567 (1381.5)	()
Number of schoolchildren	-.04156 (.07959)	.20418 (.13588)	.040605 (.029886)	-.06122 (.06769)	-.20301 (.10548)**	-.00245 (.01691)
Educated head	-.09788 (.02102)***	.072518 (.03569)**	.034857 (.011064)**	-.0468 (.01809)***	.04489 (.03313)	.01682 (.0065)***
Cultural capital	-4.5354 (.13138)***	-.24326 (.68633)	-.50548 (.28214)	-4.6352 (1326.9)	-.52721 (.55895)	()
Total land area	-.01714 (.12713)	.01486 (.17113)	-.02451 (.03531)	-.17511 (.10193)*	.166478 (.09291)*	.02393 (.0150)*
Household head is employed	.492825 (.55696)	.052106 (.42736)	.20299 (.04862)**	1.11538 (.71893)	.40799 (.32857)	.0835 (.0333)***
Commune characteristics						
ICDH	16.694 (4.313)***	-.7984 (3.293)	.71770 (.94033)	15.523 (3.3317)***	-2.7332 (3.6452)	-.2002 (.5713)
Constant	7.2934	-10.53		5.6575	-9.9365	
First-stage results: Instrument used	2.23e-14 (2.62e-15)***			1.29e-14 (1.98e-15)***		
R2			0.2182			0.3167

*Notes: * Significant at 10%; ** Significant at 5%; *** Significant at 1%. Standard errors are between brackets. () Dummy variables had been omitted due to a risk of colinearity which has made convergence of the optimization algorithms impossible. Coefficients are after correction of heteroscedasticity. The instrument used is the Gross National Product per capita.*

5. Conclusion

Over recent years, the positive impact of international remittances on developing economies has been the subject of considerable debate. The attention has turned to the relative importance of this form of capital flow and its effectiveness in alleviating poverty. At the same time, little attempt has been made to explore the issue of whether the receipt of remittances substantially increases the likelihood of completing post-compulsory schooling. In the Moroccan context in particular, the impact of remittances on the capital investment of recipient households is a pressing issue since the literacy rate of the population aged 10 years and older is less than 60% (71.6% in urban area and 44.4% in rural area). Increasing the educational attainment of children and of adults is all the more important given their importance as a key driver of long-term growth for developing countries like Morocco.

In this paper we investigate the determinants of education investments for male and female children in rural Morocco as they relate to migration or/and remittances, individual and household characteristics. Higher secondary and higher education levels are examined separately. More importantly, our empirical analysis examines the impact of remittances on educational attainment of children by separating the income effect of remittance receipt from the disruptive impact of simultaneous household emigration. We find significant gender difference in the effect of remittances on children's educational attainments in the migrants' origin households. In particular, these remittances increase the probability of completing high school for male children. Our result points to the possibility that male adults aged 18-20 are the main beneficiaries of international remittances. More generally, it appears that the remittance effect contributes positively to the probability of graduation at least at secondary school levels while they seem have a negative significant impact in explaining educational attainment of older children. This finding is consistent with the migration effects on educational attainments. In fact, our results show that international migration has a significant negative impact on schooling achievement for adult children aged 21-24. At the same time, the evidence suggests that households of higher socio-economic status are able to mitigate the negative effects of migration on their children's educational outcomes.

Furthermore, it appears that being male increases the probability of completing higher education and high school. This result reinforces the well know finding that investment in women's education is less of a priority in households especially for female youth beyond compulsory education. Gender differentiated treatment could in principle be attributed to an investment motive on the part of parents or heads but other factors could contribute to the systematic gender differences in the time allocation of parent including parents' education, high unemployment rate of university graduates and differences in the wages paid to male and female employees. This asymmetry in parental incentives to invest in sons' and daughters' education has obvious and important public policy implications.

In closing, international remittances seem play a key role in human capital accumulation in Morocco, but they are not a panacea for country' development problems and they are certainly no substitute for an effective public education policy and strategic political commitment and prioritization of the fight against discrimination between girls and boys. A more complete understanding of how parents make their educational investment decisions is useful for policymakers. Our findings suggest that the Government has an essential role to play in guaranteeing children (especially girls)

access to education by providing households in financial need with the conditions necessary for the academic success of their children. It is also necessary to consider school coverage needs in the most disadvantaged communes (i.e., distribution, schools in rural areas, etc) and gender issues.

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