

HOUSEHOLD WELFARE, INTERNATIONAL MIGRATION AND CHILDREN TIME ALLOCATION IN RURAL MOROCCO

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This paper examines the impact of remittances on child labor and education in recipient Moroccan households. Based on propensity-score matching methods, we find a positive effect of remittances on the investment in education. Furthermore, living in migrant households who combine school with work is clearly lower compared to the number of children from households of the control group. Our results show the positive effect of remittances on the schooling of the poor children. It also seems that the partial participation of poor children in work declines significantly through migrant remittances.

Keywords: Children Time Allocation, Propensity-Score Matching, Remittances, Morocco
JEL classification: F24, J22, O15, O55

1. INTRODUCTION

Workers' remittances to Morocco have seen a considerable increase over the past few years, from US\$ 3.2 billion in 2001, to almost \$US 7.2 billion in 2011. They represented more than 7% of Morocco's GDP (Gross Domestic Product). In 2012, the country continued to depend on these external flows which provided an essential financial support to its balance of payments. Furthermore, the sums transferred have contributed to improving emigrants' family welfare and finance education and healthcare. According to Agence Française de Développement (AFD), between 30% and 40% of rural incomes depend on migrants' remittances to Morocco (AFD, 2009). Interestingly, remittances bring additional money to recipient households for spending on higher consumption and better access to education and health services.

Micro-level studies have found mostly positive and a few negative consequences of remittances. There is a general consensus that international remittances constitute a

* We would like to thank the anonymous referee for valuable comments. All remaining errors are our own.

valuable input to family income. However, these remittances impact a wide range of family needs beyond income, including income distribution, and investment in human and physical capital.¹ Specifically, it has been found that international remittances tend to increase the investment in human capital (Cox Edwards and Ureta, 2003; Hildebrandt and McKenzie, 2005; Valero-Gil, 2008), reduce poverty and have negative impact on income inequality in the country of origin (Brown and Jimenez, 2007; Gubert *et al.*, 2010). In reality, the evidence from many studies shows that remittances from international migration have a positive impact on the education and reduce the working time of family members who continue to reside in the country of origin, especially when the beneficiary families belong to disadvantaged social groups. These findings have been confirmed in a number of subsequent studies (Acosta, 2006; Mansuri, 2006; Calero *et al.*, 2008; Yang, 2008).

It is necessary to understand the underlying mechanisms of the evolution of the labor supply and the demand of education on a household, as economic and social consequences that could change the lives of children present in the household. It is in this context that we propose the present contribution. It should be noted that in Morocco, no empirical study has been conducted on the determinants of work and education of children by integrating the remittances of international migrants into the modelling of the decision of parents to make work and/or to educate their children. We propose an estimate of the effect of these remittance flows on the time allocation of Moroccan children.

To the best of our knowledge, this is the first study to directly examine the behaviour of Moroccan families benefitting from remittances, in education and child labor. We also take into account the standard of living of households to emphasize the potential role of the poverty status of children in their allocation of time for work and/or education. The purpose of the present paper is not to analyze all the factors explaining school achievement and children's activity, but to evaluate the role of migrants' remittances on the increasing demand for education, and its corollary, the decline in the supply of child labor. The heterogeneity of households, in terms of the differences in socio-economic characteristics between recipients and non-recipients of remittances, and the problem of self-selection, or selection into migration and selection into remitting,² are challenging

¹ On the negative side, some studies have shown that remittances may create a dependence syndrome among the recipients, which may reduce the productivity of labor of households and communities of origin (Chami *et al.*, 2005; Azam and Gubert, 2005). They also exacerbate income inequality between remittance-recipient and non-recipient households (Adams, 1991; Barham and Boucher, 1998). Some studies find negative effects of international migration and remittances on education such as McKenzie and Rapoport (2007) and Battistella and Conaco (1998).

² Recent studies have pointed out the potential problems of selection bias (Acosta, 2006; Barham and Boucher, 1998; Adams, 2006). This is typically the case when one considers that the pool of migrants and remittance senders is not a random sample, for example, migrants will tend to come from the upper (lower)

the evaluation of the “causal” effect of remittances on education and child labor. Propensity Score Matching (PSM) is one promising approach to deal with this problem of causal inference with observational data. The comparison of outcomes of interest between recipients and non-recipients is performed using treated and control groups who are similar, as the receipt of remittances can be seen as a treatment. In that case, the effect of migrants’ remittances does not depend on differences between these two groups; this motivates our decision to use the PSM method in our paper.

Although this method controls for bias among observed covariates, it is unable to shed much light on the possible hidden bias problem due to unobserved variables that determine individual outcomes. The “Rosenbaum bounds” are therefore used in this study to check whether the results are sensitive to these unobserved covariates (Rosenbaum, 2002).

The organization of this paper is as follows. Section 2 contains a review of the literature on the effects of migrant remittances on the allocation of children’s time. Section 3 presents the context of this study. Section 4 shows the various aspects of the data. We give empirical strategy, estimation results and test the robustness of the findings to the unobserved heterogeneity in Section 5. The paper concludes in Section 6 with the main findings.

2. BACKGROUND LITERATURE

The empirical literature on children’s activity shows that several factors may be responsible in their participation in labor such as poverty, inefficiency of the credit market and social norms. There is clear evidence that poverty tops the list (ILO, 2006). It forces parents to take their children out of school and send them to work in order to survive. Some studies suggest that remittances can mitigate the effects of financial constraints on households and also influence the decision of parents to work and/or to invest in the education of their children, taking into account their particular role in the relaxation of the budget constraint of migrant households (Acosta, 2006; Mansuri, 2006; Calero *et al.*, 2008) and in the improvement of their general well-being. In addition, remittances can be a kind of private insurance which covers socio-economic, health and environmental risks incurred by the society of the origin of the migrants (Amuedo-Dorantes and Pozo, 2006; Gubert, 2002; Calero *et al.*, 2008; Halliday, 2006; Agarwal and Horowitz, 2002).³ In other words, it is quite possible that the family of origin

end of the income distribution.

³ As emphasised in the recent literature on motives for household private transfers, the theory of implicit co-insurance arrangement implies that the family invests in education and livelihood of migrants in the country of origin, and will eventually cover the cost of their future migration. As a first step, the immigrant must in return support their family by sending a portion of their income earned in the host country. These

receives more funds from abroad in the event of a negative shock, such as sickness, unemployment, crop failure, etc. In the same vein, Ebeke (2010) examines the role of remittances in child labor in the case of income instability and financial constraints in a sample of 97 developing countries (including 31 African countries). His results show that with a credit market imperfection, the household faces uncertainty over income. In such a context, remittances can be very effective because they reduce the working time of children.

The effect of remittances on school attendance and child labor also depends on the socio-economic characteristics of households from which people have emigrated, such as child gender and area of residence. Gender is a crucial determinant of whether a child engages in labor. Some empirical studies find that remittances significantly reduce the child labor of both sexes (Mansuri, 2006; Boutin, 2011), while others suggest that they have no effect on child labor among boys (Acosta, 2006), or have an important influence only on boys (Yang, 2008) or only on girls (Calero *et al.*, 2008). The latter authors found the impact of remittances on reducing labor supply is relatively important for girls, and for children living in rural areas. They also found that remittances reduce child labor only among households who are not poor. For poor households, however, these remittance flows are insufficient to offset the loss of income that results from children going to school instead of working. There could be another possible explanation for this result: remittances are less frequent and are unable to replace the regular income of a child. This may explain why these flows sometimes fail to influence the decision of parents to send their children to school instead of work (Boutin, 2011).

In a new study by the World Bank which aims to establish the impact of remittances on final educational attainment and child labor in migrant households, Mansuri (2006) notes that the annual number of working days by children fell through international remittances. They decreased from 27 to 10 days for males, and from 27 to 9 days for girls. According to the Mansuri study, economic migration has positive effects on the accumulation of human capital, and contributes to the reduction of inequality between the sexes with regard to access to schooling. The author also examined the role of migrant household structure in the education of his children and the divisions of labor between the sexes, finding households headed by women tend to discourage the education of girls or their pursuit of a career, contrary to their attitude towards boys.

Moreover, the presence of older siblings would reduce the average time spent on economic activities among both sexes. Some authors have focused on the impact of parental education on educational demand and supply of child labor. For example, Hanson and Woodruff (2003) and Gang *et al.* (2008) believe that educated parents tend to encourage their children to pursue their studies, instead of working.

new resources will allow the receiving family to cope with potential negative shocks (illness, unemployment, poor harvest, etc.), and to undertake new projects. Secondly, the migrant finances the costs of the possible migration of other families.

Yang (2008) estimated the impact of remittances when the currency of the host country had appreciated, in term of a positive shock on the exchange rate, on schooling and child labor. He found that this positive shock contributed to improving the education of Filipino children and to reducing their working hours.

3. NATIONAL CONTEXT

Poverty is a strong determinant of child labor in Morocco. In most cases, poor parents report that their children combine work and school attendance. In fact, according to official statistics (High Commission for Planning “HCP”, 2011), the share of children aged between 7 and 15 years in employment fell sharply, from 10% in 1999 to about 3% in 2010. By studying the situation of children in Morocco’s active labor market, some differences should be noted, such as the sharp decline in the female labor force participation rate in urban areas between 1999 and 2010, from more than 32% at the end of 1990s, to about 13% today (2013). In parallel, this rate remains lower than that recorded in rural areas (about 40%). In addition, national data reveal that in a country where male workers aged over 15 years represent 75% of the jobs created annually,⁴ only 60% of active children are male (56% in rural areas and 87.1% in urban areas).

On another level, Morocco is among the countries that have long placed education at the top of their list of priorities for development. The net enrollment rate in primary school was estimated in 2009 to 90% (statistical data published in the 2011 edition of the Social Logbook). However, despite the great strides in literacy in this country, high rate of illiteracy persist. Several factors seem to account for such a deficit; chief among them are the slow down in the rate of increase in enrolment during the 1990s compared with the 1980s and the household poverty.

Analysis of recent developments of living standards of Moroccans (2000-2010) shows a marked improvement in the level and structure of consumption expenditure. Similarly, GDP per capita rose from \$1,270 in 2000 to \$2,795 in 2010. The country’s economic performance in the 2000s (reaching an average growth rate of 3.2% over the period 1999-2002,⁵ and 5% over the period 2003-2009) and the implementation of structural reforms to improve economic performance are perfectly reflected in the evolution of the standard of living of Moroccans. These reforms have been complemented by initiatives to promote human and social development. Thus, since

⁴ High Commissioner for the Plan (HCP), “Employment and Unemployment Situation in Morocco and its structural and political determinants in a context of transition,” (http://www.hcp.ma/Situation-de-l-emploi-et-du-chomage-au-Maroc-etses-determinants-structurels-et-politiques-dans-un-contexte-de_a617.html, accessed 17 June 2013).

⁵ Department of Research and Financial Forecasts (2011), “Dashboard of macroeconomic indicators,” Ministry of Economy and Finance.

1999, major reforms in health and education have been initiated by Morocco; for example, the introduction of a compulsory health insurance base (2005) and the National Charter of the Education and Training (1999). These efforts have resulted in significant progress in the field of children's education, the fight against extreme poverty and the access to health care especially in rural areas.

4. DESCRIPTION OF THE DATA

4.1. Descriptive Statistics

The data used for this study come from the Morocco Household Survey conducted by the Network of Educational Institutions and Research in Economics (FEMISE) in the Souss-Massa-Draa region of southern Morocco in 2009. It was supervised by a team of French-Moroccan researchers.⁶ The sample provides information on 598 households and 2701 children (1,537 boys and 1,164 girls).

Figure 1 notes that 21% of children have received no formal education, while 19% have completed high school. Those reaching a BAC-level degree (i.e., French Baccalaureate) do not exceed 11%. Children with undergraduate and postgraduate degrees constitute about 5% of the child population.

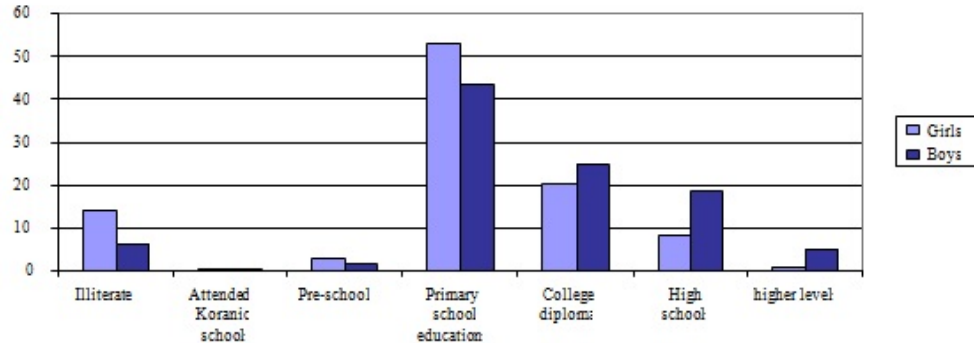


Figure 1. Distribution of Children Aged 6-24 Years by Level of Education and Gender (%)

Furthermore, it is noted that boys' education is generally higher than girls' for all levels of education considered. This trend is very common in the rural world.

⁶ A survey conducted in Morocco by A. Bahani and H. Hanchane (University Mohammed V-Souissi) as part of the research project "Impact of migrant remittances on poverty and inequality: a comparison between Morocco and Algeria," funded by the European Union within the context of the FEMISE program and managed by the Centre for Economics of Paris-North University and LEDa-DIAL Paris Dauphine University.

The analysis of Table 1 reveals that the boys' participation in the labor force is greater than that of girls. Thus, active girls represent 48.5% of total actives in our sample. Moreover, the combination of work and schooling is less prevalent among active girls aged between 10 and 17 years, since it concerns only 35% of girls against 65.7% for boys.

Table 1. Distribution of Children Aged 10-17 Years by Education and Professional Activity or Leisure Activities (raw figures)

Age	Total Working Population			Workforce Attending School			Workforce Not Attending School			Inactive Population Not Attending School		
	Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Total
10	6	7	13	3	6	9	3	1	4	4	8	12
11	18	15	33	11	12	23	5	3	8	1	3	4
12	18	23	41	9	19	28	9	4	13	7	3	10
13	7	11	18	1	8	9	6	3	9	12	2	14
14	19	20	39	7	14	21	12	5	17	11	9	20
15	17	21	38	4	16	20	13	5	18	3	8	11
16	33	21	54	9	10	19	24	10	34	14	8	22
17	17	25	42	3	9	12	14	16	30	7	5	12
Total	135	143	278	47	94	141	86	47	133	59	46	105

It is also noteworthy that children without activities are more numerous: 72.6% of boys and 68.9% of girls are in this situation. As Table 2 shows, the majority of inactive children are students or housewives.

Table 2. The Reasons for Inactivity for the Children Aged 10-17 Years

Age (years)	10	11	12	13	14	15	16	17
Student	71	57	116	47	94	60	87	42
Home Help	3	3	8	10	15	13	19	14
Sick Children					1		2	
Child Registered with Employment Agencies	1	1			1			
Do Not Know Looking for a Job	1		1	1			1	
Not of Working Age	3	1	3	1	3	2	4	1
Discouraged to Seek Sufficient Income	5	3	2	5	6	2	6	7
Others		3	4	2	5	2	6	5
Unanswerable	1	1	1	0	0	1	0	0
Total	87	70	139	70	131	90	143	84

A detailed analysis of the amounts transferred shows that 45% of households receive or have received in the past transfers from abroad. The average amount transferred exceeds 15,000 DH⁷ per year, while the median reached 10,000 DH. 68% of migrants reported that they have transferred money to Morocco and 81% of them are children or brothers (or sisters) of household head (Table 3).

Table 3. Distribution of Moroccan Migrants Based on Their Family Relationship to the Household Head

Relationship with the Head of the Household	All Migrants*		Migrant with Remittances**		Migrant without Remittances ***	
	Number	%	Number	%	Number	%
Spouse	26	4.63	24	6.30	2	1.10
Son/daughter	273	48.58	213	55.91	60	33.15
Brother/sister	196	34.88	98	25.72	98	54.14
Nephew/niece	9	1.60	6	1.57	3	1.66
Grandson/granddaughter	10	1.78	10	2.62	0	0
Father/mother	19	3.38	17	4.46	2	1.10
Others' parents	21	3.74	8	2.10	13	7.18
Unrelated individuals	8	1.42	5	1.31	3	1.66
Total	562	100.00	381	100.00	181	100.00

Notes: * Frequency missing = 6; ** Frequency missing = 5; *** Frequency missing = 1.

The survey data indicate that 11% of households have no income from work, and live through remittances. In addition, households receiving remittances from abroad have the highest average annual income.

4.2. Variables Used

In developing countries, child labor is a significant source of income for poor households. In other words, lack of family resources may force children to work instead of go to school; it could therefore be one of the causes of school dropout. In fact, it is quite possible that reducing the financial constraints of households through remittances may influence the work and the school experience of their children. To assess the relevance of these arguments, we take into account the activity of children aged between 10 and 15 years.⁸ It is important to note that child labor corresponds to the various tasks

⁷ In 2009, 1 Moroccan Dirham (DH) = 11.32 Euro.

⁸ These are children who have reported activity during the seven days before the date of the interview. Our data are restricted to working people over the age of 10 years.

performed by them as agricultural work, trade, activities related to the family business, etc. This definition excludes, as in other studies, domestic work.⁹ This type of work is done mostly by girls in developing countries.

In the empirical analysis, two broad categories of determinant factors of education and child labor can be distinguished. First, the socio-economic characteristics of the household include gender and age of household head, income 'off the child's income', education level within the household, and number of active members older than 15 years. A second category includes the economic characteristics of the commune of residence including the municipal human development index (ICDH).¹⁰

We suppose that if the household had suffered a negative shock during the year (especially unemployment and/or the illness of a family member), credit constraints compel the children to work. However, we believe that the explanatory power of this type of shock may be limited - it could also influence the migrant behaviour, because of the imperfection of the credit market in a country like Morocco. We think that, because of this situation, migrants often try to act as insurers by helping a household to cope with income shocks. In other words, we should expect an increase in the amounts transferred if unemployment and sickness affect the family of origin. Moreover, the unemployment of the household head and suffering from a chronic illness or disability occur rarely; only a small number of households suffered this shock. For example, the unemployed rate in our sample is 6%. This result is supported by the available statistics on the unemployment rate in the rural areas.¹¹ Regarding the illness or disability which a household member may suffer, Table 4 shows that this phenomenon affects 58 households (from a total of 598) and the share of migration remains relatively high in the funding for consultation and medical treatment. This result confirms our intuition about the role of insurer played by the Moroccan migrant.¹² The few studies that integrate microeconomic shocks and remittances in their analysis of the determinants of child labor do not mention the strong links that exist between these two variables (Calero *et al.*, 2008; Boutin, 2011).

⁹ In the definition of child labor of the International Labor Office (ILO), tasks which are limited to help parents at home are not considered as tasks assigned to child labor.

¹⁰ In the report of HCP (2004), Human Development Index communal (ICDH) is measured by three elements: (a) Health situation measured through the infant mortality rate, the number of infant deaths per 1,000 live births during the 2004 Census year or the indicator of the state of development of the countries in the field of health. (b) Education level measured by an indicator combining for two-thirds, the literacy rate of people aged 10 and over and, for one third, the enrolment rate of those aged 7-12. (c) The standard of living approached by the average annual expenditure per year and per person.

¹¹ Generally, unemployment remains very low in rural Morocco (4% in 2011).

¹² Our survey data does not include a variable capturing the extent of other temporary adverse shocks. (drought, flood, etc.)

Table 4. The Share of Migration in the Funding for Consultation and Medical Treatment

%	Total
100	4
75	2
50	3
25	1
Less than 25	7
0	10
Unanswerable	31
Total	58

In this paper, we use assets as a measure of wealth and welfare. An advantage with asset measures is that it involves less recall bias and mis-measurement. Another advantage in the context of our study is that assets do not depend on the child's income. In fact, we take into account the heritage declared by households. Two kinds of legacy assets have been used in our estimation: 1) agricultural assets (agricultural land area) which correspond to the heritage declared by each household, 2) non-farm assets (housing built over 10 years). We believe that the child has not contributed to financing the acquisition of these assets.

5. EMPIRICAL STRATEGY AND RESULTS

5.1. Empirical Approach: Propensity Score Matching

One of the main challenges when estimating the causal effects of remittances on education and child labor is selection bias. There might be unobservable characteristics that affect both the probability of receiving international remittances and the outcome of interest. Hence, direct comparison of the proportion of children attending school and/or working between migrant households with that of other households without migrants could lead to bias and misinterpretation of the effect of transfers. To avoid econometric biases when assessing the probability of individuals to migrate (and receive remittances), we use a propensity score estimator. We also address for unobserved heterogeneity by implementing a sensitivity analysis in our model. Households are matched based on their observable pre-remittance characteristics. The comparison of outcome variables between recipient and non-recipient households is performed using treated and control groups who are similar ('treatment' in our case is the receipt of remittances); and the effect of migrants' remittances is independent on differences between these two groups. Therefore we can interpret the difference in the means of the matched recipient and non-recipient households with similar baseline characteristics as a "causal" impact of remittances. The objective is to determine the average effect of transfers in the

population of migrant households (ΔATT).

There were four outcome variables:

- the number of children who were attending school at the time of the survey,
- those who had been engaged in child labor,
- those who had not been engaged in child labor,
- those who were combining labor with schooling.

We define the average treatment effect on the treated group of household:

$$\Delta ATT = E(Y_{i1} - Y_{i0} / T_i = 1) = E(Y_{i1} / T_i = 1) - E(Y_{i0} / T_i = 1),$$

where Y_{i1} and Y_{i0} is the outcome of interest with and without treatment respectively for household i and T_i is a dichotomous indicator variable equal to one if the household receives transfers from abroad (zero otherwise). Y_{i0} represents the counterfactual outcome with $T_i = 0$. We define the average treatment effect on the entire population by:

$$\Delta ATE = E(Y_{i1} - Y_{i0}) = E(Y_{i1} / T_i = 1) - E(Y_{i0} / T_i = 0),$$

and

$$\Delta ATE = \Delta ATT + E(Y_{i0} / T_i = 1) - E(Y_{i0} / T_i = 0).$$

Since $E(Y_{i0} / T_i = 1)$ is never observed, the identification of ΔATT requires independence of Y_{i0} and T_i , so that:

$$E(Y_{i0} - T_i = 0) - E(Y_{i0} / T_i = 1) = 0,$$

where $E(Y_{i0} - T_i = 1) - E(Y_{i0} / T_i = 0)$ is a bias which is explained by the fact that the average situation of households receiving remittances would not have been the same as that of non-beneficiary households in the absence of these funds. In other words, the populations of migrant and non-migrant households are not identical. To eliminate this bias Y_{i0} and T_i must be independent. For this purpose, matching methods assume conditional independence and that, conditional on observable individual variables X , there is a controlled experiment with random assignment to treatment. In other words, given X , the outcomes of non-treated units can be used to approximate the counterfactual outcome of treated units in the absence of treatment and $E(Y_{i0} - T_i = 1, X_i) = E(Y_{i0} / T_i = 0, X_i)$.

The matching is made based on an index, the propensity score, which summarizes the pre-treatment characteristics of each household. Using the probit estimates, we then compute for each individual the propensity score $P(X) = \Pr(T=1|X) = E(T|X)$; the household untreated noted \tilde{i} which is paired with the treated household i is defined by $P(X_i) = P(X_{\tilde{i}})$ and $Y_{\tilde{i}} = \hat{E}(Y_{i_0}/T_i=1, X_i) = \hat{E}(Y_{i_0}/T_i=0, X_i)$.

The final estimator for the average treatment effect is obtained as the average of the differences between households treated and their counterfactuals:

$$\Delta \hat{ATT} = \frac{1}{N} \sum_{i=l} (y_i - y_{\tilde{i}}),$$

where N is the number of households treated.

Several matching techniques have been developed when it comes to matching the households based on the estimated propensity score. Some of the most common estimators include nearest neighbor matching and kernel matching. In our data, the proportion of households that do not receive international remittances from abroad is relatively high. We decided to focus on the nearest neighbor method where a counterfactual can be chosen for each migrant household which is closest in terms of propensity score. We also use Kernel matching because it has the advantage of maximizing use of the control group data.

We must also ensure the existence of the common support in the distribution of propensity scores. No matches can be made to estimate the average treatment effects on the ATT parameter when there is no overlap between the treatment and non-treatment groups. The density distribution of the propensity scores for treated and non-treated is shown in Figure 2 below. In our case, the two distributions overlap, and a large number of remittance-receiving households found a suitable match among those who did not receive remittances.

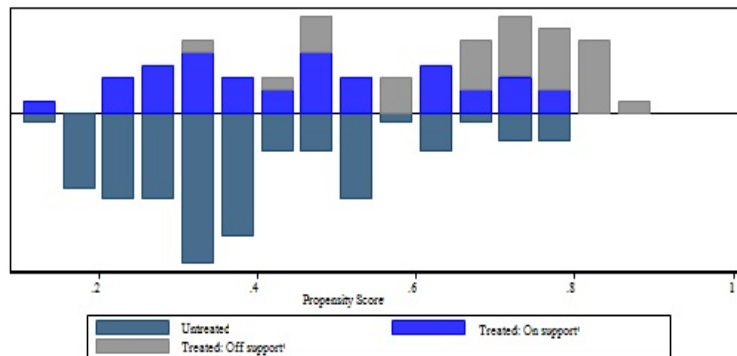


Figure 2. Distribution of the Propensity Scores for Migrant and Non Migrant Household (Treated and Control Groups) in Common Support Area

Econometric studies insist that the property of balancing variables observed in the two groups (treated and non-treated) should be satisfied in order to confirm the validity of matching. In other words, equality of means of each variable X for treatment and control groups must be ensured. The results of this analysis are found in Table A.1 of the Appendix. We noticed that the difference between these means is not significant.

5.2. Results

The first step in the analysis is to estimate the probability of receiving remittances as a function of household characteristics. We use a Probit regression explaining the probability that a respondent receives remittances and the list of covariates X includes gender and age of household head, household standard of living (family heirloom), educational level of parents, number of active people older than 15 years within the household, and ICDH.¹³

Table 5. Basic Results for a Probit Model of the Probability of Receiving Remittances

	Coef.	Z	P-value
Age in years of household head	0.04332	0.84	0.399
Age in years squared of household head	-0.00032	-0.70	0.483
Household head male (dummy)	-0.18897	-0.29	0.775
Number of active people aged above 15 years	0.33913	1.90	0.058*
Land surface (log)	-0.15138	-1.21	0.228
Number of livestock (cattle and horses) (log)	-0.17915	-0.90	0.368
Parental education	-0.19909	-0.80	0.421
Owning a home (dummy)	0.93256	4.36	0.000***
ICDH (log)	2.82703	1.71	0.088*
Constant	0.700376	0.37	0.715
	Number of obs=180; P-value(chi2)=0.0002; Pseudo R2=0.131		

Note: * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

¹³ We use a limited number of variables because according to Fougère (2010) what matters is not to describe as accurately as possible the probability of treatment, but simply to determine the variables needed to obtain property of independence. Introducing too many variables may have an adverse effect on the estimate for several reasons. First, if the description of the process variable is better, the supports of distributions of scores of treated and untreated individuals may dissociate more and the possibilities for matching will be smaller. But more importantly, introducing too many conditioning variables can lead to biased estimates. It is indeed possible that the independence property is satisfied for a set of conditioning variables, but is not so important when other conditioning variables were added, even if these would be significant in estimate the score.

The results of the estimation of the probit model are presented in Table 5. The probability of receiving remittances is expected to be positively correlated with physical assets, which could be seen as a proxy for household wealth, since it is costly to send a migrant abroad. Besides the fact that ICDH has a positive influence on remittances, our analysis showed that households with a higher number of people at work tend to receive relatively more remittances.

The results of the propensity score analysis are highlighted in Table 6. Firstly, it appears that the estimates using different matching methods provide very similar results. Secondly, the ATT is not significant for all four outcome categories. Thirdly, the results show that for children attending school, the difference compared with the control group is positive. This confirms the fact that remittances have a positive effect on the number of children enrolled within the families of origin. Then, the number of children from migrant households who combine work and school is higher compared with that of the children from households' counterfactuals. This result shows that there is a link between the remittances and the parents' decision to let their children combine the two activities, educational and economic.

Table 6. Average Treatment Effects

Variables	Treated group	Control group	Difference (ATT)	S.E.	T-stat
<i>Nearest Neighbor</i>					
Student	0.173138	0.058906	0.1142320	0.032734	3.49***
Economically Active Children	0.007657	0.009009	-0.001351	0.008548	-0.16
Active & Student	0.056939	0.143511	-0.086572	0.031931	-2.71***
Inactive	0.024850	0.028743	-0.003892	0.013432	-0.29
<i>Kernel Estimator</i>					
Student	0.163987	0.109140	0.0548472	0.025764	1.79*
Economically Active Children	0.015183	0.003317	0.0118657	0.008148	1.35
Active & Student	0.046145	0.122487	-0.076341	0.025887	-3.27**
Inactive	0.015675	0.027993	-0.012318	0.009084	-1.16

Notes: For the kernel estimator, we applied the bootstrap to calculate the standard errors (50 replications). Abadie and Imbens (2006) show that bootstrapped standard errors are not valid for nearest-neighbor matching with a fixed number of neighbors. We impose a common support condition in Stata to reduce poor quality matches. The Caliper is equal to 0.01 which correspond to maximum allowable distance between the propensity scores (with nearest neighbor). Matching with the nearest neighbor is without replacement (individual control group can only be chosen once in the construction of the counterfactual), and in descending order.

The non-significant differences concern only two variables: work and inactivity (children who drop out of school, and those who are not economically active). This result may be due to the low number of both active and inactive children in our sample and in the population as a whole in general. We actually need many more observations if we want to use the data on households which are similar.

Table 7. Estimated Effect of Remittances on Outcome Variables
(Poor and Non-Poor Households)

Variables	Treated group	Control group	Difference (ATT)	S.E.	T-stat
<i>Poor households</i>					
<i>Nearest neighbor</i>					
Student	0.157417	0.063811	0.093606	0.04612	2.03***
Economically active children	0.006410	0	0.006410	0.00641	1.00
Active & student	0.051923	0.187728	-0.13580	0.05458	-2.49***
Inactive	0.018681	0.007692	0.010980	0.01500	0.73
<i>kernel estimator</i>					
Student	0.176773	0.132062	0.044711	0.04062	1.10
Active and student	0.045047	0.112944	-0.06789	0.03063	-2.22***
Economically active children	0.015367	0.006438	0.008929	0.00830	1.08
Inactive	0.019088	0.023702	-0.00461	0.01253	-0.37
<i>Non-poor households</i>					
<i>Nearest neighbor</i>					
Student	0.1637973	0.060897	0.097380	0.102899	1.58
Economically active children	0.0192307	0	0.019230	0.019230	1.00
Active & student	0.0666666	0.097985	-0.03133	0.050744	-2.49***
Inactive	0.0109890	0.048076	-0.03708	0.023716	-1.56
<i>Kernel estimator</i>					
Student	0.1553221	0.093470	0.061851	0.055067	1.12
Economically active children	0.015625	0.002909	0.012715	0.014936	0.85
Active and student	0.0575163	0.143559	-0.08604	0.039709	-2.17***
Inactive	0.0084033	0.034550	-0.02614	0.014123	-1.85

Notes: For the kernel estimator, we applied the bootstrap to calculate the standard errors (50 replications). Abadie and Imbens (2006) show that bootstrapped standard errors are not valid for nearest-neighbor matching with a fixed number of neighbors. We impose a common support condition in Stata to reduce poor quality matches. The Caliper is equal to 0.01. Matching with the nearest neighbor is without replacement and in descending order.

In addition, the influence of remittances on children's activity would be low or insignificant if these flows were not large enough to offset child income, which justifies the need to add other estimates that distinguish poor households from other households.

As can be seen in Table 7, the results concerning the combination of employment and education become more remarkable if we consider household level welfare. When distinguishing between poor and non-poor households, we find that the negative difference between the two groups (treated and control) is between 3.1 and 8.6 percentage points for non-poor households and between 6.8 and 13.6 percentage points for poor households according to the estimated specification. Hence, we believe that the use of child labor by poor families could fall significantly as a result of financial transfers of migrants. These financial flows allow poor households to offset income from the partial working activity of their children, therefore ensuring the further education of these children.

Moreover, as Table 7 shows, for children who receive normal schooling, the effect of remittances is only significant for poor households (using the nearest neighbor method). The estimate of the average treatment effect of remittances, obtained by propensity score matching, indicates an effect of more than 9 percentage points. Here we find an anticipated effect, widely observed in the literature, that remittances encourage poor families to send their children to school instead of work.

Nevertheless, the propensity score analysis does not eliminate the bias generated by unobservable factors. As a second step in our analysis, we control for unobserved heterogeneity with the use of Rosenbaum's approach (2002). This method is based on a test that determines the bounds of the significance level (p-value) of the average effect of treatment (ATT) for different levels of hidden bias. The idea is to increase the values of γ (variable which captures the effect of unobservable variables on the probability of transfer), and check if the results are robust to possible hidden bias. The higher the level of γ at which the ATT remains statistically different from zero, the more robust the estimation results to the potential influence of hidden bias.

The results are presented in Table 8. In the first column, which reports estimates for households in general, the results are highly robust to unobserved heterogeneity, the threshold being higher than 2 (the point at which the treatment effect is not significant).

On the contrary, the results for the number of children in school and economically inactive in poor households (second column) are more sensitive to heterogeneity. Indeed, the results may be biased at gamma values 1 and 1.5. In other words these results should be read with care due to the lower value of the corresponding critical threshold. It seems, moreover, that only estimates on the education of children from wealthier households are less robust to unobserved heterogeneity (third column).

Table 8. Results for Rosenbaum Bounds Sensitivity Analysis

Gamma	All Households p-value	Poor Household p-value	Non-Poor Household p-value
Student			
1	0.001324	0.065921	0.220277
1.5	0.018443	0.198073	0.367924
2	0.068189	0.343046	0.484463
2.5	0.147377	0.473798	0.575984
3	0.242958	0.583166	0.648649
Economically Active Children			
1	0.5	0.256761	0.158655
1.5	0.341613	0.153896	0.110336
2	0.239848	0.096038	0.07865
2.5	0.171498	0.061354	0.056923
3	0.124212	0.039804	0.041632
Active & Student			
1	0.008046	0.114717	0.021165
1.5	0.000294	0.031903	0.00476
2	0.000011	0.009123	0.001124
2.5	3.8e-07	0.00266	0.000273
3	1.4e-08	0.000786	0.000068
Inactive			
1	0.201975	0.185617	0.042108
1.5	0.063558	0.306625	0.017223
2	0.020073	0.403933	0.007304
2.5	0.006397	0.482651	0.003165
3	0.002056	0.547415	0.001391

Note: Gamma is the log odds of differential assignment due to unobserved factors. We use Wilcoxon Signed-Rank test and the command “rbounds” of STATA. The second, third and fourth columns provide Rosenbaum's bounds for the p-values from Wilcoxon's signed rank test (upper bound).

It is important to understand that sensitivity analysis unfortunately does not determine if biases really exist; it only shows how the existence of possible bias could alter the estimate (Aakvik, 2001) and thus test the worst-case scenario.

6. CONCLUSION

It is often argued that poverty is the cause of school dropout and child labor in developing countries. It is then natural to analyse the consequences of any form of financial support to a household on school attainment and child labor market activity. In this paper we investigate the impact of international remittances on human capital

investments for children in rural Morocco as it relates to their parents' welfare. Our results show that remittances have an overall positive effect on the proportion of school-enrolled children within migrant households. In addition, the number of children living in migrants' households who combine employment and education is significantly lower compared with that of the children from counterfactual households. On the contrary, remittances do not determine the employment of children. This result is quite intuitive, due to the low number of working children in relation to the entire population in general. Moreover, in most cases, children combine work life and school attendance, in particular in rural areas. Therefore, the variable 'cumulative employment and education' captures the effect of remittances on child labor.

Moreover, when we distinguish households according to their standard of living, we find that remittances have a positive and significant impact on the education of poor children: the proportion of school children belonging to poor households is greater with the presence of these remittances. This finding requires some caution because it does not satisfy the test of sensitivity to unobserved heterogeneity. It also appears that for poor families, the partial work activity of children or young people fell more significantly owing to the financial transfers of migrants (between 6.8 and 13.6 percentage points for poor households, and between 3.1 and 8.6 percentage points for non-poor households, according to the estimated specifications).

While the primary objective of our work was to confirm the role of remittances from migrants in the allocation of children's time, our results also allowed us to test some explanatory variables of the probability of receiving remittances. Variables such as the number of employed people in the household and the ICDH can increase this probability. Besides the fact that ICDH has a positive influence on remittances, our analysis showed that household with a higher number of people at work tend to receive relatively more remittances.

Finally, all our results concerning the education of children suggest that in the absence of public assistance for low-income families, migrants provide some support financial to their families of origin and finance children's education. This calls for greater efforts on the part of public authorities to protect children, and ensure their permanent schooling through targeted policies, especially for the poorest families.

APPENDIX

Table A.1. Balancing Tests for All Matching Covariates

Variable	Average			t-test	
	Treated	Control	% bias	<i>t</i>	p-value
Age in years of household head	50.054	52.27	-17.8	-0.75	0.458
Household head male (dummy)	0.97297	0.97297	0.0	0.00	1.000
Number of active aged higher than 15 years	0.69713	0.74577	-8.4	-0.36	0.716
Land surface (log)	1.5936	1.8355	-30.2	-1.23	0.222
Number of livestock (cattle and horses) (log)	0.34786	0.5044	-31.7	-1.32	0.192
Parental education (log)	2.1232	2.2024	-18.1	-0.86	0.395
Owning a home (dummy)	0.40541	0.37838	5.9	0.23	0.815
ICDH (log)	-0.65757	-0.64151	-24.1	-1.14	0.259
			Pseudo R2=0.049	p-value(chi2)=0.758	

Source: Survey of the impact of migrants' remittances on poverty and inequality: A comparison between Morocco and Algeria (2009).

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