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Children's Education and Household Mobility

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Children's Education and Household Mobility

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Table of Contents

Chapter 4 - The Effect of Family Mobility on Children's Educational Outcomes. The Case of Uganda

Chapter 1
Introduction

The aim of this work is to assess the relationship between family mobility and children's educational outcomes.

Family mobility has been chosen consciously because of its broad meaning. The term "mobility" in itself encompasses all types of different movements that can occur within a household. The whole family can move and change residence, or one or more members of the household can move independently. In addition, the movement can be temporary or permanent. Mobility is therefore a more general term than migration, and in part it overlaps with it. The specific features of the term migration, as it is used in the literature, are that it generally refers to a permanent change of residence, and that it usually concerns the decision of a single individual, not of the whole family. Also, even if internal migration is a relevant phenomenon, in the economic literature migration has become an almost synonym of "international migration", because the phenomenon has become increasingly relevant over the years, drawing a growing amount of interest especially in the developed countries that have become the recipient of these migration flows. For these reasons, in the present work the term mobility has been preferred, so as to encompass a broader range of phenomena.

The two main bodies of economic literature concerning migration have mainly investigated the macro effects of migration flows in the receiving labour markets, and the flows and effects of migrants' remittances to their native households. The first economic model of individual migration dates back to the work by Harris and Todaro (1970), which analyses the individual choice of moving or staying, as determined by the conditions of the labour market in the two alternatives.

In the economic literature, mobility has been studied primarily as an individual decision, in strict relation to the labour market. Nonetheless, in developing countries, migration can be a household strategy to obtain additional income thanks to remittances, or a strategy to

diversify income sources, like an insurance against adverse economic conditions in a context characterized by constraints and market failures. More generally, for its effects on human capital, mobility has been considered a family investment.[1]

The first theoretical model to characterize mobility as a family decision is the one by Mincer (1978), which models the decision to move in a two-person household. His model assumes that each member of the couple obtains different payoffs from the decision to move, and that the decision is made if the "family net gain" from moving is positive. Mincer's model, nonetheless, is based on assumptions that are typical of developed countries.

The effects of mobility on children has been addressed in the literature from two different points of view. In the context of developed countries, family residential mobility has mostly been studied in the fields of psychology and health. In general, residential mobility has been found to have negative effects on children's educational outcomes and on adolescents' behaviour. Scanlon and Devine (2001) review the relevant literature, mainly in the field of sociology, which finds mostly negative correlation between moving and children's welfare. On the other hand, these studies attract a lot of criticism because of inherent specification problems (Alexander *et al.*, 1995), which have to be taken into account. The overall evidence seems mixed, and very context-specific.

More recent literature has started to address mobility as a family topic, investigating its effects on the family members "left behind". Empirical studies generally find detrimental effects on the family left behind by migrants, especially on women and children, who are the most vulnerable members of the household. The findings on children's left behind are generally more controversial than the results of studies on remittances, for which there is a general agreement that remittances flows have a significant positive impact on child school attendance and literacy, especially for girls.[2]

Literature on left behind women finds mixed results. It seems that the labour supply response of women to male migration is driven by the need to replace the migrant man,

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[1] See, for example, Klemp et al. (2012) and Konseiga (2007).

[2] See McKenzie and Rapoport (2006).

rather than by a relaxation of the household constraints due to remittances inflows. These results are found in Egypt (Binzel and Assaad, 2011) and in Albania (Mendola and Carletto, 2009). In another recent study on women in Egypt, Elbadawy and Roushdy (2010) find that empowerment of left behind women seems to be more due to the husband's absence than to a real empowerment and improvement in status.

When looking at children's outcomes, the underlying idea is that parental migration can entail negative outcomes for children left behind by one or both parents. The absence of parents may entail a psychological cost, and change the decision making power within the household. If a household member leaves, intra-household duties and responsibilities change and children may be asked to take on their parent duties, and thus they may spend less time in school-related activities. Moreover, if one parent is absent, part of the parental effort of sending children to school and monitoring them is missing, while the remaining parent could be loaded with extra duties. Consequently, parents' absence can result in school dropout or grades repetition. It is also likely that the decision power shifts to older men in the household, less educated and less prone to understand the value and importance of human capital, especially for girls (Ginther and Pollak, 2004). In their study on children left behind in Albania, Giannelli and Mangiavacchi (2010) find evidence that father's absence negatively influences children's schooling in the long term, increasing the probability of dropping out and delaying school progression. They also find that the impact is worse for girls than for boys, implying that parents migration can reduce gender equality and women's empowerment in the long term.

On the other hand, recent studies on Mexico find no compelling evidence of this type of negative effects. Antman (2011a, 2011b and 2012), finds evidence that households where a father has migrated to the U.S. are more likely to spend more on girls than on boys, and that this effect drops once the father returns. However, she finds no evidence of a detrimental effect on education. On the contrary, she finds that father's migration has a positive impact on the schooling of young girls, especially if the father migrates when they are younger, while it has no impact on boys' schooling.

Because of the inherent problems in addressing these topics on an empirical basis, more research in this field is needed, and this thesis aims at contributing to this effort.

The other strand of literature this work refers to is the literature on human capital formation. It is a huge body of literature, that goes as far as Becker's (1964) and Mincer's (1974) work (and possibly even further back in time). Human capital has become crucial in the economic analysis of different types of phenomena and models, and it has been analyzed in relation to both economic growth and individual incomes, and more recently as a part of children's welfare.

The core of the present work relies mostly on two crucial works on human capital. The first one is the model developed by Glewwe (2002) that specifically takes into account the quality of children's schooling and it is therefore more suited to analyze developing countries, where the quality of the educational system is often one of the major obstacles to an effective education. The second reference work is the work by Becker (1975), that links household production theory to the human capital theory, linking household resources and investments to the educational attainment of children. Becker's analysis introduces the concepts of the "quality of children" and of the household choice between investments in human capital of each child and the number of children they have. Becker's work is essential in understanding the importance of family background and decisions in children's educational outcomes.

As household decisions are a crucial point of human capital investment, household models are also a part of the literature the present work stems from. Most of these theoretical models assume that the family acts like a unique decision maker, where children are not part of the decision-making process, and are subject to their parents' decisions. More recently, household economics theory has evolved in models that consider intra-household bargaining, especially between the two main decision-makers. [3]

In general, both the empirical and the theoretical literature stress the importance of family's background and decisions for children's outcomes, especially those stemming from decisions concerning education. The understanding of the transmission mechanisms of these effects is of crucial importance to better targeting policies aimed at increasing human capital and children's welfare. In addition, much of the most recent literature stresses the

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[3] For a review on the topic see Lundberg and Pollak, 1996.

importance of early childhood investment, which is more closely related to family dynamics and allocations of time and resources than later educational outcomes, that may be a result of a more global setting.

The aim of the present work is to link these three main strands of literature (migration, human capital and family decision mechanisms) in the same conceptual framework, if not with a comprehensive theoretical model. As mobility and children's education are both family decisions, and mobility can affect education itself, then it seems logical to analyze the two phenomena trying to take into account a broader framework and trying to assess the existing links. In this respect, the household economics framework serves as a theoretical background to construct the empirical analysis to address the effects of mobility on children's outcomes.

This work is organized in three papers, which can stand alone, but are conceptually linked together in the framework just discussed.

The first paper reviews the relevant literature in the three fields of research mentioned in this introduction. It first reviews the theme of education in the economic literature, with an emphasis on economic growth and individual earnings. It then presents the research on family decisions and children's education, both empirical and theoretical. Then, the paper discusses three models of human capital accumulation: the one by Glewwe (2002), the one by Hanushek and Woessmann (2008) which is derived from Glewwe's, and finally, the one by Heckman (2007), which is based on the capability approach and models the accumulation of a person's human capital over time. The last part of the paper presents the relevant literature on mobility and migration, stressing in particular the findings on children's educational outcomes.

The second and third papers are empirical case-studies for Egypt and Uganda.

The second paper analyzes the effects of fathers' absence on children's education in Egypt. The empirical analysis on the grades of schooling achieved by children has been conducted using data drawn from the Egypt Labor Market Panel surveys of 1998 and 2006.[4] The use

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[4] Economic Research Forum, Cairo. Data from the third wave have been published in November 2013.

9

of panel data has allowed to overcome part of the endogeneity problems due to unobservable or omitted variables (the individual fixed effects). The analysis has been carried out estimating both fixed and random effects models for ordered dependent variables, such as school grades. The results show that the absence of the father has indeed a detrimental effect on children's schooling, especially at lower levels of education, and are robust to the different model specifications.

The third paper investigates the effects of family mobility on children's primary school attendance in Uganda, using data from the Uganda National Panel Survey of 2005-06, 2009-10 and 2010-11.[5] Panel data where used here for the same reasons as in the second paper. The empirical strategy has consisted in estimating a household-level model, using household ratios. Mobility has been addressed with two dummy variables which proxy past mobility of household members. They take value one if at least a child or an adult, respectively, has moved from the household in the past five years. The use of this "lagged" information has the advantage of reducing the endogeneity problems connected to mobility decisions. The results show that children's school attendance is improved in households where children have moved, while it decreases in households where adults have moved. These results are in line with previous literature and coherent in a context such as Uganda, where children may be moving in order to reach areas with better services. The same results don't hold for school completion (neither mobility of adults, nor mobility of children have significant effects on school attendance), which points to problems of school quality. A multilevel analysis, added as a robustness check, confirms these findings. Significant results mirroring the ones for schooling are found for "idle" children, *i.e.* children who don't go to school neither work. Mobility has effects on time spent doing nothing (neither going to school nor working), in that the mobility of children reduces the probability of children doing nothing, while the mobility of adults rises it. These results, combined with the lack of significant results for child labour, hint that the actual problem opposing children's education is "idleness", not child labour.

This thesis adds to the literature in several ways. Using newly available panel data, it enhances the empirical research investigating mobility and education in two countries for

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[5] The survey is a part of the Living Standards Measurement Surveys project of the World Bank.

10

which, to the author's knowledge, there was no previous empirical research on this topic. It assesses the effects of mobility in two different, but complementary, ways. In the case of Egypt, it addresses the effect of present mobility (e.g. father's absence), while, in the case of Uganda, it investigates family mobility in a more general and original way addressing past residential mobility of family members. Last but not least, it tries to set a conceptual framework, linking together three different strands of economic literature, and establishing a framework for further empirical and theoretical research.

References

Alexander K.L., D.R. Entwisle et al., 1996 "Children in motion: School transfers and elementary school performance" Journal of Educational Research, vol. 90(1), pp. 3-12

Antman F.M., 2011a "The intergenerational effects of paternal migration on schooling and work: What can we learn from children's time allocations?" Journal of Development Economics, vol. 96 (2), pp. 200-208

Antman F.M., 2011b "International Migration and Gender Discrimination among Children Left Behind" American Economic Review, vol. 101(3), pp. 645-49

Antman F.M., 2012 "Gender, Educational Attainment, and the Impact of Parental Migration on Children Left Behind" Journal of Population Economics, vol. 25(4), pp. 1187-1214.

Becker G. S. 1964 *Human Capital: A Theoretical and Empirical Analysis* National Bureau of Economic Research, New York

Becker G.S., 1975 *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education* Columbia University Press for NBER, New York.

Binzel C., and R. Assaad, 2011 "Egyptian Men working abroad: Labor Supply Responses by the Women Left Behind" Labour Economics, vol. 18, pp. 98-114

Elbadawy A. and R. Roushdy, 2010 "Impact of international Male Migration on Women Status. The Case of Egypt" Mimeo presented at International Conference on *Women and Youth in Arab Development*, Cairo

Giannelli G.C. and L. Mangiavacchi, 2010 "Children's Schooling and Parental Migration: Empirical Evidence on the `Left-behind' Generation in Albania" *Labour*, vol. 24, pp. 76-92

Ginther D. K. and R. A. Pollak, 2004 "Family structure and children's educational outcomes: blended families, stylized facts, and descriptive regressions" Demography, vol. 41(4), pp. 671–696

Glewwe P., 2002 "Schools and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes" *Journal of Economic Literature*, vol. 40(2), pp. 436-482

Hanushek E. A. and Ludger Woessmann, 2008. "The Role of Cognitive Skills in Economic Development" Journal of Economic Literature, American Economic Association, vol. 46(3), pp. 607-68

Harris J. R. and M. P. Todaro, 1970 "Migration, unemployment and development: a two-sector analysis" *The American Economic Review*, vol. *60*(1), pp. 126-142.

Heckman J. J., 2007 "The Economics, Technology and Neuroscience of Human Capability Formation," NBER Working Papers 13195, National Bureau of Economic Research, Inc.

Klemp M., C. Minnis, P. Wallis and J. Weisdorf, 2012 *Family Investment Strategies in Pre‑modern Societies: Human Capital, Migration, and Birth Order in Seventeenth and Eighteenth Century England* European Historical Economics Society (EHES) Working Paper No. 18, June 2012

Konseiga A., 2007 "Household Migration Decisions as Survival Strategy: The Case of Burkina Faso" *Journal of African Economies*, vol. 16(2), pp. 198-233

Mendola M. and C. Carletto, 2012 "International migration and gender differentials in the home labor market: Evidence from Albania" Labour Economics, vol. 19 (6), pp. 870–880

Mincer J., 1974 "Schooling, Experience, and Earnings" Columbia University Press for the National Bureau of Economic Research, New York

Mincer J., 1978 "Family Migration Decisions" Journal of Political Economy, vol. 68(5), pp. 749-773

Scanlon E. and K. Devine, 2001 "Residential Mobility and Youth Well-Being: Research, Policy, and Practice Issues" Journal of Sociology and Social Welfare, vol. 28(1), pp. 119-138

Chapter 2
The Economics of Children's Education and Family Mobility: a survey

Abstract: The aim of this review is to present the findings of three strands of literature which are usually addressed separately: migration, human capital and family decision mechanisms. The purpose is to link them in the same conceptual framework, in order to provide a broader benchmark for further research in those areas. This work first reviews the theme of education in the economic literature, with an emphasis on economic growth and individual earnings. It then presents the research on family decisions and children's education, both empirical and theoretical. Then, the paper discusses three models of human capital accumulation. Finally, the last part of the paper presents the relevant literature on mobility and migration, stressing in particular the findings on children's educational outcomes.

Introduction

The aim of this review is to present the findings of three strands of literature which are usually addressed separately: migration, human capital and family decision mechanisms. The purpose is to link them in the same conceptual framework, in order to provide a more comprehensive benchmark to approach further research in these areas, and especially in the field concerning the effects of mobility on educational outcomes. As mobility and children's education are both family decisions, and mobility can affect education itself, then it seems logical to analyze the two phenomena trying to take into account a broader framework and trying to assess the existing links. In this respect, the household economics framework serves as a theoretical background to construct the empirical analysis to address the effects of mobility on children's outcomes.

This work reviews the relevant literature in the three fields of research mentioned above. It first reviews the theme of education in the economic literature, with an emphasis on economic growth and individual earnings. It then presents the research on family decisions and children's education, both empirical and theoretical. Then, the paper discusses three models of human capital accumulation: the one by Glewwe (2002), the one by Hanushek and Woessmann (2008) which is derived from Glewwe's, and finally, the one by Heckman (2007), which is based on the capability approach and models the accumulation of a person's human capital over time. The last part of the paper presents the relevant literature on mobility and migration, stressing in particular the findings on children's educational outcomes.

1. Why is education important for economics?

Economists and other researchers have been stressing since the sixties the importance of education, and the consequent increase in human capital. All the analysis highlight the value of improving a country's human capital and provide the motivation for developing countries to invest in enhancing the skills of their population. The effects of education are

analyzed for at least three reasons: improvement in personal earnings, social effects, and economic growth at the macro level.

One of the main reasons for focusing the attention on education and schooling at the individual level, has been the analysis of the economic returns to different levels of school attainment. Following the innovative analysis of human capital[6] by Mincer (1974), this literature considers how investing in different amounts of schooling affects individual earnings. Over the past decades, there have been numerous studies investigating this effect. The main findings are that, in general, more schooling is associated with higher earnings, and that, in general, the highest returns to education are found in developing countries, for lower levels of education and for women.

One critical and much debated point is the actual role of education in personal earnings: one crucial point is whether more able people tend to obtain additional schooling because it is less costly for them than for less able people. If they do, it is still not clear whether the role of education is signalling pre-existing cognitive abilities as suggested by Spence's seminal work (1973), or actually enhancing and creating those abilities and skills. If a mixture of the two effects is at play, it is not clear to what extent each one contributes to economic returns. An answer to these question is crucial, because the implications for public policy are different. If the signalling function of schooling prevails, then publicly subsidizing higher grades of school may have regressive effects.

Also, there is an ongoing debate in the literature on how to measure returns to education: the question is far from trivial, as there are all kinds of possible endogeneity issues in the empirical assessment of schooling effects on private earnings. The differences in data availability and methods also makes it difficult to compare the results of different studies because the method can influence the results, as stated by Psacharopoulos and Patrinos (2004) in their review of the literature. To overcome this difficulties, researchers have employed all types of different methods. Harmon, Oosterbeek and Walker's (2003) review of empirical findings and analytical approaches concludes that different methods have an impact on the results' magnitude, but not on the causal effect of education on economic returns.

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[6] The concept of human capital was first introduced by the classic work of Becker (1964) and Shultz (1963).

Aside from economic reasons, the rationale for expanding education to all people lies in the arguments of equality of opportunities for all population, and in the presence of social returns to education, alongside the private ones. Education is found to have positive effects on diminishing crime, on health and fertility (more educated women have fewer but qualitative better children), on enhancing democratic participation through the access to information. Glaeser, Ponzetto and Shleifer (2007) in their work on the relationship between democracy and education, analyze the effects of education on democratic participation, and state that a better educated population is related to a better functioning democratic system, because education reduces the costs of social participation, thus reducing the likelihood of anti-democratic coups and dictatorships.

Defining and estimating the social returns of education, though, is much harder than estimating individual returns. Several attempts have been made during the years, but given the difficulty of disentangling pure externalities effects from private ones, the evidence is inconclusive. The evidence of direct effects on the labour market is more mixed than the previous one on generally positive effects on social aspects such as public health and crime rates. Moretti (2004) finds positive evidence of spillover effects of education among workers, while Ciccone and Peri (2006) find no evidence of this kind of spillover. They argue that what we observe are not externalities but wage changes, and find that the mincerian model results in an upward bias of the economic return of education. Acemoglu and Angrist (2001), using potentially exogenous changes in schooling due to changes in compulsory education law, also find no evidence of this type of education externalities.

The crucial point here is if private returns to education are higher than social ones: when the return is calculated according to the total cost, it seems to be so, at least for higher levels of education, which results being heavily subsidized by the public sector (Psacharopoulos and Patrinos, 2004). Assessing the extent of private and social returns to levels of schooling is an important policy issue when allocating public funds to education. More recently Lange and Topel (2006) in their review of empirical and theoretical works find that the evidence supporting a higher private rate of return is very little, and, given the difficulties in assessing this type of effects, there are various reasons to believe the social return to education can actually be higher than the private one.

The third and perhaps more important reason economists are concerned with education and schooling, is its impact on economic growth. Analysis of the link between education and growth started already in the sixties with cross-sectional studies linking enrolment ratios and national product.[7] In the late eighties, the attention of macroeconomists shifted toward the analysis of long-term economic growth, with a focus on the role of education and human capital that started with the crucial work of Lucas (1988).

The question has been how human capital influences economic growth. Barro (2001) states that a higher initial stock of human capital means a higher ratio of human to physical capital, and this, in turn, generates economic growth through two channels. First, human capital enhances the adoption of better technologies from more developed countries. Second, as human capital is harder to adjust than physical capital, a country that starts with a high ratio of human to physical capital tends to grow fast because it adjusts upward the quantity of physical capital. Other researchers stress the importance of quality, rather than quantity, of schooling for economic growth. Hanushek and Kimko (2000) find that scores are more important, for growth, than years of schooling. The problem when dealing with quality of schooling is always data availability and reliability. However, Barro (*ibid.*) finds that scores are a significant predictors of economic performance, especially scores in scientific subjects, but that their effect is less than that of years of schooling in magnitude. Krueger and Lindahl (2001), in their review of both micro and macro literature, also conclude that, at a cross-country level, a change in education is positively associated with economic growth, once measurement error in education is accounted for. They also find that the return to education is higher in the cross-country model with respect to the within country one, thus suggesting that omitted variables or reverse causality generate a bias at the country level, or that there are nationwide externalities to education.

Education, however, cannot be seen as the cure-all for economic development: when looking at the differences between developed and developing countries, the diffusion of education is only one of them. They differ with respect to a whole set of various matters: institutions, culture, infrastructures. It can as well be that countries that lack infrastructures and don't perform well in general might not be able to pursue effective educational

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[7] Svennilson, Edding and Elvin (1962), Harbison and Myers (1964), Bowman and Anderson (1963), McClelland (1966).

programs. If at a within country level education may be taken as exogenous, this cannot be done at a national level: cross-country differences in education cannot be taken as a cause of income differences, as opposed to a result of current income (Krueger and Lindahl, 2001). As a matter of fact, it seems that a lot of developing countries that have expanded access to schooling, educational opportunities and programs have not witnessed any particular catch-up with developed countries in terms of economic welfare (Hanushek and Woessmann, 2008) A notable exception to this statement being the performance of a few East-Asian countries, and more recently China, even though China's dramatic increase in income has preceded the expansion in education, especially with respect to higher education. But it is important to stress that the successful Asian countries have put a whole set of policy at play thought all the Eighties and the Nineties, of which massive investment in education was only a part.

Hanushek and Woessmann (2008) stress the key role of individual cognitive skills, stating that ignoring differences in cognitive skills significantly distorts the analysis of the relationship between education and economic outcomes. That, of course, raises the question of how cognitive skills are determined: are they entirely genetic in nature? Heckman (2007) in turn, stresses the role of early childhood education and environment in determining cognitive skills.

Furthermore, the role of education in acquiring both basic and technical skills cannot be overlooked. McIntosh and Vignoles (2001) use UK data to assess the impact of basic skills on private earnings, and notwithstanding the caution against the possible bias due to the difficulty of measuring basic, they find enough evidence that basic numeracy is positively associated with higher earnings, as is basic literacy, even if the effect is of a lesser magnitude.

In sum, overall the role of education in economic growth and welfare is far from being univocally assessed.

Youth and children are a critical development issue. Children are especially vulnerable to economic and social exclusion, and at the same time they represent a central turning point for the future of developing countries: education has therefore become a priority in

19

development programs, such as the Millennium Development Goals (MDG) set by the United Nations.

There are three main aspects of education that need to be taken into consideration: access to quality education (and hence, the provision of such education), school participation, and performances, (*e.g.* test scores). In most developing countries, the main focus of studies and policies is on the first two topics: school attendance, and school quality, which often translates in physical investment in schools. Of course, they cannot be entirely disentangled, as the latter is a clear pre-requisite of the former.

All over the world, enrolment in school has been increasing dramatically over the past decades, and is now universal, at least for primary school. The following graph shows the trend for the gross enrolment ratio in the World, in low and middle income countries (according to the World Bank classification) and for the two countries addressed in the rest of this work: Egypt and Uganda. As we can see, the primary enrolment is well above the 100%. Actually, we can see that in Uganda it has decreased over the last decade, thus indicating that children are going to school at the right age.[8]

This indicator, however, is a very raw measure of education and schooling, also because being enrolled in school doesn't assure continuity in school attendance, nor achievements.

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[8] The gross enrolment ratio is the ratio of all children enrolled in school, irrespective of their age, on the total number of children of the appropriate age.
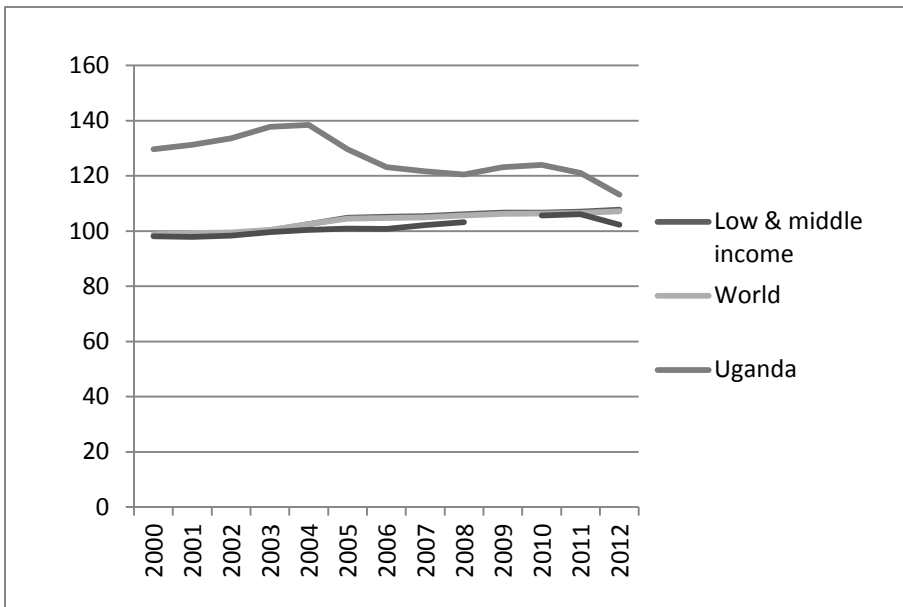
Figure 1: Gross enrolment ratio (World Bank, Millennium Indicators 2013)

A more specific measure of achieved education is the rate of primary completion. As the data are differentiated for females and males, the following graphs illustrate the trend in primary completion by gender. As we can see, the rates are well below the line of 100, and for Uganda they are below 60% (and have been decreasing in recent years, mostly for boys), while Egypt reaches almost 100%. These graphs well illustrate one of the main problems in developing countries, which is school completion. School completion is by far more important as a measure of human capital than enrolment, while the latter is a good measure for access to education.
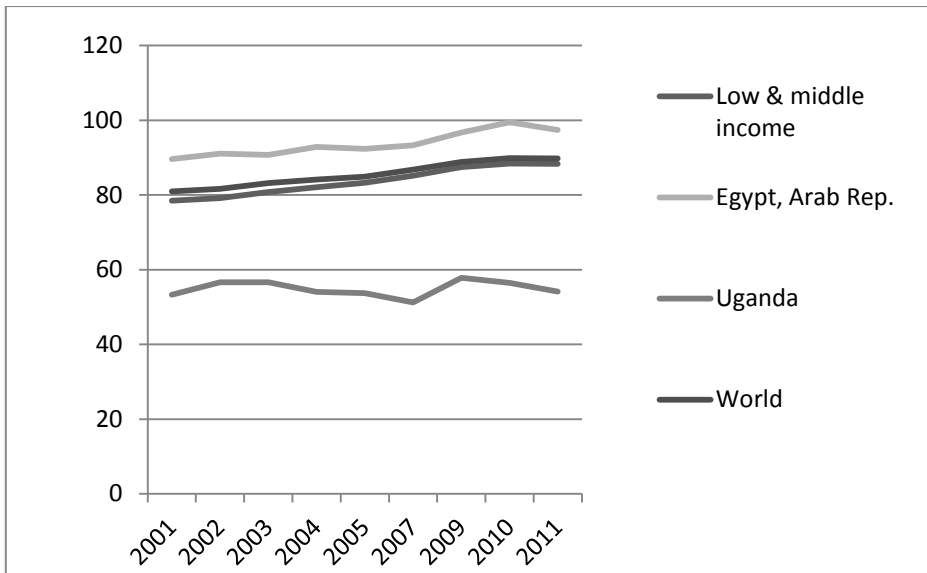
Figure 2: Primary completion rate, males (World Bank, Millennium Indicators 2013)
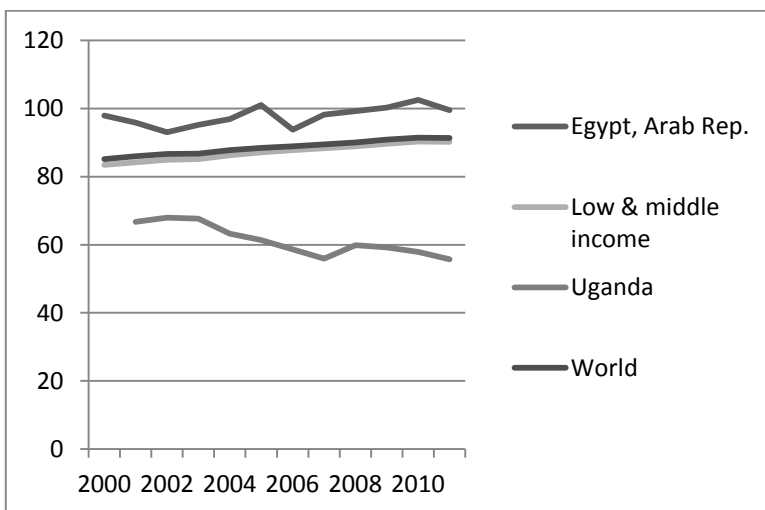
Figure 3: Primary completion rate, females (World Bank, Millennium Indicators 2013)

Another important indicator of a the human capital of a country is youth literacy rate, that is, the rate of young people (15-24) able to read and write. There are too many missing values to have a trend as for the previous indicators, but the following table gives the literacy rate of youths.

22

Countries	Literacy rate, youths 15-24 (%)
Egypt	87,5
Uganda	87,4
Low & middle income countries	87,8
World	89,4

Table 1: Literacy rate (World Bank data, 2011)

As we can see, Egypt and Uganda rates are in line with the one of low and middle income countries, while the rate is higher at a global level. These rates are, as expected, slightly lower for females than for males, but the difference is of small magnitude.

Data on school quality are more difficult to find, at a disaggregate level. The following graph shows the total expenditure in education in percentage of GDP. As we can see, a rise in expenditures has been followed by a slight decrease. We can also see that in Uganda this rate remains very low.
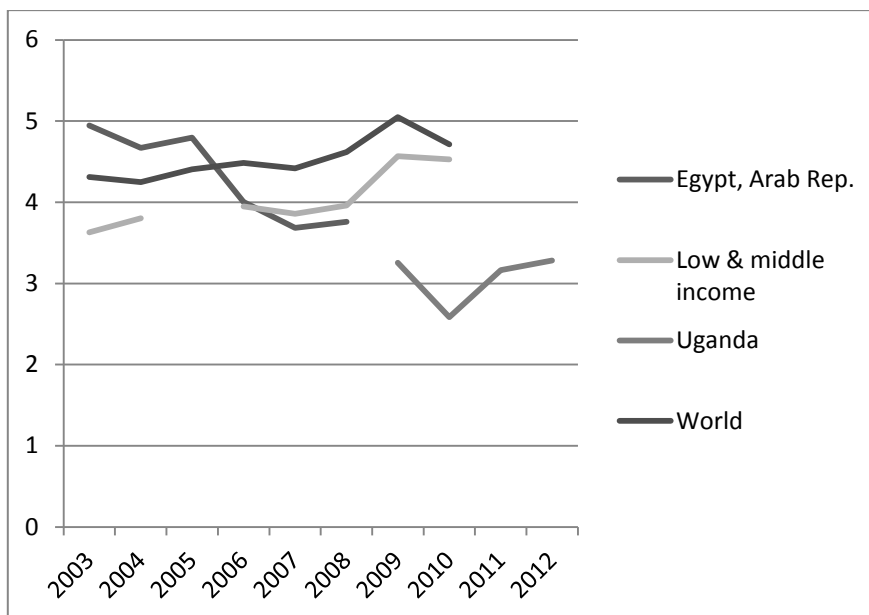
Figure 4: Total expenditure in education, % of GDP (World Bank data)

Glewwe et al. (2011) in their extensive review of empirical studies for developing countries, find that, so far, evidence from the "supply" side of the problem has been lacking, and is sometimes mixed. They find a generally positive effect of school infrastructure and learning material (such as textbooks and school furniture) among the studies they survey, and also evidence of positive effects of teachers and principals characteristics. Also, school organization, such as the ratio of pupils per teacher, has an impact on school attainments. The presence of several significantly negative results for the same variables, however, suggests caution when looking at these results. Therefore, one can conclude that emphasis should also be placed on the "demand" side, and children's participation to school (*i.e*. school attendance) is probably strongly related to family decisions and backgrounds.

Infrastructure and public investment aside, in the developing world education is faced with two major issues: the first is health, as poor health prevents children from attending school, and poor health of their guardians can mean that they lack supervision or have to care for them. The other main problem preventing effective education is child labour, both for the market and for the household needs. Child labour is a delicate subject, and a review of the literature on this topic is beyond the scope of the present work. Basu, in his fundamental paper (1999) argues that a complete ban on child labour may not be desirable, *per se* (except for the worst forms of child labour), because in very poor countries child labour is a survival strategy for many households, and that legislation on the matter should be conditional on the specific economic environment. In general, it is assumed that children's work will interfere with their schooling, but the extent of this effect is difficult to assess, especially because there are several identification and endogeneity issues in empirical works. Assaad et al. (2010) find evidence of domestic work generally reducing schooling for girls in Egypt, and evidence that work becomes detrimental when above 10 hours per week for girls, and 14 for boys (Assaad et al. 2010). Another problem in developing countries are children who neither work nor go to school, *i.e.* "idle" children, but this problem is even more difficult to tackle in empirical studies.

Having assessed the importance of education and human capital, the next question is: how human capital formed?

2. Human capital formation as a consequence of family choices

Human capital is a complex theoretical concept that is difficult to define in a uniform manner. In its most general definition, it refers to the people's personal resources. According to OECD, Human Capital is "the knowledge, skills, competencies and attributes that allow people to contribute to their personal and social well-being, as well as that of their countries".[9] People cannot be separated from their skills, health or values in the way they can be separated from their financial and physical assets. Education and training are the key factors in forming human capital, as seen in the previous section.

Gary Becker's (1975) household production theory in addition to the human capital theory directly links household resources and investments to the educational attainment of children. In Becker's analysis families have a choice between investments in human capital of each child and the number of children they have. With the increasing value of the parents' time, families do not want to have as many children and shift toward doing more for each child -greater concern about health, schooling, and so on. In order to grow "quality children", according to Becker (1995), parents have to choose how to spend their time and economic resources.

Another seminal study is that by Behrman et al. (1982) which develops a general preference model in order to analyze parental allocations of resources among their progeny and finds that parents care about their offspring's earnings inequality, therefore providing the less able of their children with more resources than what is consistent with a pure investment model. Ermisch and Francesconi, in a more recent study (Ermisch and Francesconi, 2000), deepen this household production model, analyzing the impact of family background on young people's educational attainment. They find a strong

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[9] Keeley (2007) "Human Capital, how what you know shapes your life", OECD insight.

relationship between Parents' educational attainments and their children's educational attainments. In their previous analysis, they found also that mothers with a high level of education instil the importance of education in their children and that the mother's values have a greater impact on children's values with respect to the father's education (Ermisch and Francesconi, 1997)

Other studies also emphasize the correlations that exist between family structure, parents' working time, ethnic group of origin and educational attainment and the level of education reached by the child. In particular Boggess (1998) examines the effect of family structure on high school graduation by race and gender. He finds that a widowed, divorced, or separated mother has little or no effect on the educational attainment of the child once we control for economic status. Living in a step family, instead, appears to have a persistent negative effect on high school graduation rates. Another important study which examines the effects of background and familial factors on children's educational attainments is that of De Serf (2002), who investigates the existence of educational gaps among children of different racial groups.

Björklund and Salvanes (2010) in their extensive work, review the recent empirical literature related to education and family background, with a double motivation. On one hand, there is equality of opportunity, as family background is not chosen by individuals. Hence, assessing the importance of family background in determining education is crucial from an equality (and a policy) point of view. On the other hand, the second motivation for this type of research is often the effects of family background on child development. This second argument attains more specifically to the literature of cognitive skills which refers to Heckman and is mentioned further in the present review. They find that empirical evidence suggests that, in modern societies, differences in family backgrounds can account for even 60% of inequality. The vast majority of recent research, they find, attributes this to intergenerational relationships between parental education and offspring's education.

2.1 Investment decisions

Parents' decision about whether and how much to invest in their children's human capital depends on many factors, and these decisions affect in the long run each child 's earnings prospects and general welfare. Usually research, as mentioned above, focuses on easy to observe characteristics such as gender, birth order and family composition, because the crucial variable, *i.e.* the child ability, is mostly unobservable. More recently, some works attempt to use direct measurements of a child ability such as IQ scores or cognitive tests. Ayalew (2005) examines parental investment decisions in relation to differences in innate endowments among siblings, analyzing health endowments, and finds that the return maximization is a dominant aim in educational investment decisions. Kim (2005), using IQ scores of high school juniors in Wisconsin, finds that higher ability children receive more parental transfer. All these studies, however, are undermined by endogeneity issues and identification problems difficult to overcome. IQ scores can easily be a by-product of early education, and giving more transfer can be related to higher income or a different attitude towards children, which may be related to children's ability.

As Heckman (2007, and Conti and Heckman, 2012) and the whole literature on cognitive skills and neuroscience points out, early childhood environment and familial background are crucial for the development of a child's ability. This literature emphasizes the role of early investment in children in shaping their cognitive and non-cognitive abilities, and, therefore, their educational outcomes and eventually their future outcomes in terms of wages, health and general welfare. It may well be that unobserved parents' characteristics, such as attitude or generosity (in the allocation of time and resources) towards children may have a positive influence on children's natural ability. Therefore, this kind of results should be taken with a grain of salt. Leibowitz (1974) develops a causal model of home investment in children and tests it. She tests the model and finds evidence that home investments do increase the stock of childhood human capital, even if the children are very able. The study also finds that, while education at an adult age is related to parents' education and to family size, there is no evidence of it being related to a more direct measure of home investment in early childhood.

Economists have a long-standing interest in the question of how parents allocate resources to children with different endowments, where endowments are broadly defined as genetically inherited characteristics that are predetermined prior to the human capital accumulation process and are rewarded directly or indirectly (through their interaction with human capital investments). The economic theory of intra-household resource allocation suggests that parental investment could compensate for or reinforce initial endowments. On the one hand, if parents are concerned only with maximizing the aggregate welfare of their children they might reinforce initial endowments by investing relatively more in their better-endowed children, assuming that marginal returns to investing are higher for better-endowed children than they are for lesser-endowed children (Becker and Tomes 1976). On the other hand, equity concerns might drive parents to compensate for low initial endowments by investing relatively more in their lesser-endowed children under the same assumptions about the marginal returns to investment (Behrman, Pollak, and Taubman 1982). Whether parents compensate for or reinforce initial endowments has implications for the intergenerational transmission of human capital, the long-term consequences of policies that seek to improve initial endowments, the distribution of human capital and income, and the econometric estimation of the impact of endowments on subsequent short- and long-term educational, health, and labour market outcomes.

A broad body of empirical literature has sought to determine whether parental investments compensate for or reinforce endowments (Behrman, Rosenzweig, and Taubman 1994; Griliches 1979; Pitt, Rosenzweig, and Hassan 1990; Rosenzweig and Schultz 1982; Rosenzweig and Wolpin 1988). The econometric approach of this literature has generally assumed that endowments are observable to parents but unobservable to researchers. Consequently, the literature has relied on indirect tests of whether parents compensate for or reinforce parental investment, the validity of which is contingent on functional form and other identifying assumptions.

Datar, Kilbur and Loughran (2010) address this problem, estimating how the difference in birth weight across siblings impacts specific parental investments: breast-feeding, well-baby visits, immunizations, and preschool attendance. In this work they can directly

analyze how endowments are related to parental investments in early childhood, a period of a child life time when investments have been shown to be crucial for the development of their human capital. They find that parents tend to reinforce children's endowments, privileging children with higher endowments.

Wang et al. (2009) analyze the substitution effects in parental investment in rural China, in the presence of unobserved family heterogeneity, unequal parental valuations of their investments across children, and unobserved differences in child abilities. They use data of educational and marital investments, and they find that parents tend to compensate for unequal investment in education with marital investments, and they suggest that these differences are indeed strategic decisions made by parents.

To investigates the allocation of resources within the household, some authors exploit the concept of siblings' rivalry. Siblings' rivalry is the idea that within a household there is competition among siblings for limited resources. When market constraints are binding, a child with less siblings will be, all other things being equals, better off. Literature on sibling rivalry in developing countries has traditionally focused on gender differences between siblings. The reason for that is obviously that culture is mostly male-biased, so that investment in girls will often be lower than in boys. Sibling rivalry in developing countries is documented by several works.

In this framework, Akresh at al. (2012) analyze human capital investment decisions in Burkina Faso, focusing on the role that a child's cognitive ability plays in a resource-constrained household decision. They use the concept of siblings rivalry to assess the impact of parents' knowledge of a child's natural ability on their decision to invest in their children's human capital. They find that a child who perform better at ability test score, has a higher likelihood of being enrolled in school. At the same time having siblings who have higher ability scores reduces the possibility of being enrolled in school. They use a panel with household fixed effects model, so they argue they can overcome identification problems.

Edmonds (2007) analysis for Nepal and Dammert (2010) for Guatemala and Nicaragua, find that when girls have comparative advantages in home production and the family cannot hire external work for those tasks, both boys and girls benefit from having more sisters (this outcome is very similar to the one of Garg and Morduch, 1998). Ota and Moffat (2007), in their analysis of Andhar Pradesh find that a key factor in the decision of schooling seems to be the presence of older, working sisters, while the same (older girls) are the ones worst-off within the household. They also find that boys compete only within their gender, while girls face a double competition. In general, they argue, parents tend to assign each child to a specific "task" (*i.e.* going to school, *vs.* home production, *vs.* market work).

2.2 Bargaining models and children's welfare

Most of these models assume that family acts like a unique decision maker, where children are not part of the decision-making process, and are subject to their parents' decisions. To overcome these limits of the "unitary model" household economics theory has evolved in models that consider intra-household bargaining between partners. [10]

Thomas (1990) analyzes the assumption that household income is pooled and then allocated to maximize welfare. The implication then should be that income in the hands of mothers and fathers should have the same impact. Using survey data from Brazil, he reject this hypothesis, and finds that income in the hands of the mothers has significantly larger effects on family's general health and children's survival probabilities. This result has been confirmed in further findings in empirical literature.[11]
 Echevarria and Merlo (1999) investigates the issue of gender differences in education in a bargaining model where men and women bargain over consumption, number of children, and investment in education of their children, thus treating fertility and education choices as endogenous. The implication of the model is that gender differences in education of the offspring are smaller than in a pure investment model.

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[10] For a review on the topic see Lundberg and Pollak, 1996.
[11] See Taylor and Martin (2001), mentioned later.

In their work, Bernal and Fruttero (2007) analyze the effects of public policies on parental leaves and benefits, using a general equilibrium model of marriage and divorce and simulations on US data. Their general results is that parental policies (both paid and unpaid leaves) have a positive effect on children's human capital. Rasul (2006) studies the implication of child custody arrangements, and finds that the custodial allocation decided upon by the spouses influences investment incentives, and in turn children's quality.

The findings of Foster (2002), in his study of marriage market in rural Bangladesh, support the hypothesis that marriage market structure has effects on parental desired schooling for their children. The study, however, focusing on selection before marriage, seems to be more in line with the unitary model of the household.

Cigno (2012) develops a microeconomic model in which marriage provides a commitment device that can improve efficiency in the household decision making, with respect to cohabitation: because the efficiency conditions require division of labour between childcare and market work, efficiency cannot be obtained in a non-cooperative setting, and marriage can enhance cooperation. Thus, he argues, children of married couples should be of a better quality (and therefore have more human capital, if we assume Becker's identification between quality and human capital) than children of non married ones.

2.3 *Other issues*

Another important issue regarding household in developing countries is customary traditions, such as polygyny, arranged marriages and dowry. Tertilt (2006) develops a model in which, allowing daughters to choose the husbands, even in a setting where polygyny exists, has a positive impact on a number of development issues, such as number of children per woman. Thus should result in better quality outcomes for children.

In his game-theoretical model, Cigno (2007) finds that in developing countries it may be rational for parents to invest less in their daughters' education, given that the skill premium and in general the returns in education are significantly lower than in developed countries, while is more efficient for them to invest in their daughters' dowries.

In general, both the empirical and the theoretical literature stresses the importance of family background and decisions for children's outcomes, especially concerning education decisions. The understanding of the mechanism through which this occurs is of crucial importance to better target policies aimed at increasing human capital and children's welfare. As mentioned above, much of the most recent literature stresses the importance of early childhood investment, which is strongly related to family dynamics and allocations of time and resources.

3. Theoretical models of schooling and human capital formation

The present paragraph reviews the most representative theories and models of schooling and human capital formation developed over the past decades. As illustrated in the previous sections, from Becker and Mincer on the analysis of the demand for education has always been derived from the analysis of private economic returns to educations, namely individual earnings. In particular, Mincer (1970, 1974) developed a function for estimating individual returns to education which remains, to these days, the pillar of all the literature in the field. This section presents first the conceptual framework used by Hanushek and Woessmann, then the model for developing countries developed by Glewwe for empirical purpose, and third the work of Heckman on capabilities. This works summarize the main theoretical approaches and findings in the literature of human capital formation so far.

3.1 Hanushek and Woessmann model

Hanushek and Woessmann (2008) effectively summarize and unify the theoretical framework for human capital formation. They start from individual earnings (y), that are a function of a person's human capital (H), which they treat as a one-dimensional index. Thus, the first relevant equation is that of individual earnings:

(1) $$y = \gamma H + \varepsilon$$

The stochastic term, ε, represents idiosyncratic earnings differences and is orthogonal to H.

This model is very abstract and simple, and aims at capturing the essence of earnings' differences. It has been refined in many ways over time, mostly to take into consideration the underlying behaviour of individuals in terms of their investments in skills.[12] This model is the central core of most empirical research on wage differentials and individual productivity.

Individual skills (*H*) are determined by a range of factors, as family inputs (*F*), individual ability (*A*) and all other relevant factors (*X*), such as labour market experience, individual health, and the like. Quantity and quality of inputs provided by school are reunited in the function *Q(S)*, where *S* is school quantity and *Q* the quality function that transforms *S*.[13] Then the function of *H* is:

(2)
$$H = \lambda F + \phi Q(S) + \delta A + \alpha X + \nu$$

Mostly, all empirical studies use the concept of human capital (*H*) as a latent variable, using school attainments (*Q(S)*) in its place, and then dealing in some way with the complications arising from not completely measuring H or its determinants in equation (2). Hanushek and Woessmann (*ibid.*) propose an alternative approach, based on direct measurement of cognitive skills.

Test score measures of cognitive skills are standardized assessments of numeracy and literacy. If these measures, *C*, could capture completely the variations in *H*, then equation (1) could be estimated directly with *C*, and the estimation of parameter γ would be unbiased. But, of course, test scores are not complete measures of *H*. Instead the achievement test measures, *C*, can be thought of as error prone measures of *H*, as shown in the following equation:

(3)
$$C = H + \mu$$

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[12] See, for example: Ben-Porath (1967), Heckman (1976), Cunha et al. (2010).
[13] The model is similar to that by Glewwe, reviewed afterwards in this section.

Then, with classical measurement errors, if we substitute C for H in equation (1) we would have an estimate of γ biased toward zero[14]. Then, if we estimate both S and C to capture the effects of both quantity of schooling and cognitive skills, the coefficient on S in the same estimated equation would be biased upward, even if S has no independent effect on earnings over and above its relationship with C[15]. This model would imply that the coefficient γ on C would be a lower bound on the impact of human capital on incomes. As we see, we are always dealing with biased estimations, no matter the way used to define human capital.

The most common development in empirical research, however, is the use of school attainment as a measure of human capital for estimating individual returns to schooling. The crucial point has generally been how to obtain an unbiased estimate of γ (or a transformation of γ) under various considerations of other factors that might influence earnings and skills. The more influential model has been that of Mincer (1970, 1974), mentioned above, who developed the famous "mincerian earnings equation":

$$(4) \qquad\qquad y = b_0 + b_1 S + b_2 Z + b_3 Z^2 + b_4 W + \varepsilon$$

Where Z is labour market experience and W a vector of other factors affecting incomes (y). Significant attention has been given to the ability bias arising from the correlation of school attainment with individual ability (A) and from other selection effects (Card, 1999). Various estimates of the earnings model have added test scores to the Mincerian equation, in order to explicitly control for ability.

Nonetheless, there are at least two complications with these models, The first is that schooling is only a partial factor influencing cognitive skills and human capital formation. The second is that the majority of applications of the Mincerian model assume that school quality is either constant or can be directly captured adding measures of school quality in the estimation equation.

The importance of non-school influences on cognitive skills has been well documented. If the vector W in the earnings model includes the other relevant influences on human capital

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[14] Because the error term in 3 would capture some of the effects of γ.
[15] Because if they're positively correlated C would "pull up" the estimation of S.

from equation (2), the estimate of b_1 would be only $\gamma\phi$, if the school quality is constant. As it is difficult to have additional information on the determinants of skills outside the school, the estimation of b_1 will always be biased.

The second issue concerns variations in school quality: if school quality is not constant, one can assume $Q(S)$ to be production function, as simple as:

$$(5) \qquad\qquad Q(S) = qS$$

where time in school, S, is modified by a quality index, q. If the variations in q are small, this is not an issue for estimation. But this is clearly not the case in, f.e., an international context.

Another important issue arises because human capital includes important elements of non-cognitive skills. Those skills, if not precisely defined, include a variety of interpersonal dimensions, including communications ability, team work skills, and, in general, what are commonly called "social skills". Several authors, like Bowles and Gintis (1976, and Bowles, Gintis and Osborne, 2001) and more recently Heckman (Heckman et al., 2006) have argued that non-cognitive skills are very important for the understanding of earnings differentials.

Including non-cognitive skills N, human capital is now determined by:

$$(6) \qquad\qquad H = C + N + \mu$$

In this way, we can then re-write the general form of equation (2) to describe the underlying determinants of C and N. This also suggests a modification to the mincerian equation that includes C. Nonetheless, the impact of the schooling coefficient, b_1, would still be biased by the influence of N which is unobservable.

In conclusion, the review of the conceptual framework performed by Hanushek and Woessmann, emphasizes the role of direct measures of cognitive skills to better understand the link between human capital and economic returns, but doesn't provide a solution to the intrinsic bias of such estimates, due to the nature of human capital as a conceptual

construct, and therefore subject to all the problems of such theoretical constructions and latent variables.

3.2 Glewwe's Model

As mentioned before, the model by Hanushek and Woessmann is derived from the model developed by Glewwe (2002). Glewwe's model is particularly useful for studying schooling choices in developing countries, because it explicitly take into account the quality of school, which is more likely to vary in a developing country. Also, school quality is likely to be a major issue in developing countries as well, as mentioned in the first section. For these reasons, Glewwe's model is the reference model for the majority of empirical studies concerning developing countries.

The model, as most household models, assumes that a child's parents maximize an utility function, subject to constraints. The arguments of the utility function are consumption of goods and services (including leisure) at different points in time during the life-cycle, and each child's year of schooling and learning. So, parents draw utility from their children's education. This hypothesis can be derived either from the assumption of parental altruism, or from the assumption that education is an investment for the parents: in his model, Glewwe assumes that when the child works, part of the earnings is given to the parents, so, if education increases earnings, parents will give more education the child.

The utility function, on which parents base their choice whether to send their children to school or not, is therefore the following:

(6)
$$U = C_1 + \delta C_2 + \sigma A$$

where C_1 and C_2 are respectively present and future consumption, while A is the child cognitive skills. δ is a discount factor for future consumption and σ indicates parental tastes for educated children.

Children's education can increase parent's utility in two ways: indirectly through parents' consumption, which is a function of years of schooling and children's income, directly

36

through σA. In fact, present and future consumption are represented through the following equations:

(7)
$$C = Y_1 - pS + (1 - S)kY_c$$

(8)
$$C = Y_2 + kY_c$$

In those equations Y_1, Y_2 and Y_c are respectively parental income in period 1, in period 2 and child's income when he is working. While p represents the price of schooling and k the fraction of child income given to the parents. Finally, S is the time spent in schooling, while 1-S is the time spent working. A simple product shows how cognitive skills are acquired by the child:

(9)
$$A = \alpha f(Q)g(S)$$

The term α represent the "learning efficiency" of the child, and includes innate (genetically inherited) ability, child motivation, and parental motivation and capacity to help children with their schoolwork. Q is school quality and S is years of schooling. Child cognitive skills are directly linked with child income as follows:

(10)
$$Y_c = \pi A$$

where π is productivity of cognitive skills in the labour market. Starting from the first equation, and performing various substitutions, we get the parental utility function:

(11) $$U = Y_1 - pS + \delta Y_2 + [(1 - S + \delta)k\pi + \sigma]\alpha f(Q)g(S)$$

The model continues considering two cases, one where school quality is exogenous and therefore S is the only choice variable, and the other one where the parents also choose school quality.

In the first case the optimal years of schooling, S^*, are an increasing function of: child learning efficiency (α), school quality (Q) and the relative weight parents give to future parental tastes for schooling (σ). S^* are instead a decreasing function of the price of schooling (p). Finally, the effect of k and p on S^* is ambiguous.

In the second case, the parents also choose the quality of the school. The assumption that higher quality implies higher price of schooling is represented as follows:

(12) $$P = p_0 Q$$

Where p_0 is the base price of schooling.

Assuming that $f(Q) = Q^\beta$ and $g(S) = S^\gamma$, then the optimal values of S and Q are:

(13) $$S^* = (\gamma - \beta)(1 + \delta + \sigma/k\pi)/(1 + \gamma - \beta)$$

(14) $$Q^* = (\alpha\beta k\pi/p_0)(\gamma - \beta)^{\gamma-1}[(1 - \delta + \sigma/k\pi)/(1 + \gamma - \beta)]^\gamma$$

Optimal years of schooling, S^*, are positively affected by δ (the relative weight parents give to future consumption) and σ (parental tastes for schooling) while school quality increases with the previous two parameters and with α (learning efficiency). School quality is also negatively affected by p (price of schooling).

Beyond these considerations, there are less direct and intuitive results that emerge from a more careful analysis. Firstly, if the quality of the school is exogenous and we control for parental tastes for schooling, it is not certain that parents who give greater weight to future consumption will send their children to school for more years. Secondly, an increase in returns of cognitive skills does not necessarily correspond to an increase in the number of years of schooling, because it rises the opportunity cost of an additional year of school.

Finally, when school quality is also a choice variable, the years of schooling and school quality are alternative inputs in the production of cognitive skills. The best parental response to an increase in the base price of schooling may be to adjust school quality, holding years of schooling constant.

The application of this model to the econometric analysis allows us to discuss about several issues concerning the estimation of the impact of school characteristics on cognitive skills. The function for the child skill s is the following:

(15)
$$A = \mu_0 + \mu_1 S + \mu_2 \alpha + \mu_3 Q + \varepsilon$$

Decomposing the multi-dimensional variables Q and α it becomes:

(16)
$$A = \mu_0 + \mu_1 S + \rho_1 \alpha_1 + \cdots + \rho_m \alpha_m + \tau_1 Q_1 + \cdots \tau_n Q_n + \varepsilon$$

The terms μ, ρ, τ and ε represent, respectively, the unknown parameters to be estimated and the measurement error in A (it could reflect also omitted variables, or measurement error pertaining to α, Q, and S). The index n represents distinct school characteristics that affect learning, while the index m represents the factors that affect learning efficiency. Some school characteristics are difficult to observe and several datasets that collect information about schooling in developing countries have only a small number of school quality variables.

Some examples of features linked to Q are, as mentioned in the first section, teachers' characteristics and school leaders' management skills. Regarding the components of learning efficiency some of these are easy to observe like, for example, parents' education, while others, as child innate ability and motivation and parents' willingness and capacity to help their children with schoolwork, are more difficult to observe and measure. Due to these difficulties in observing these factors, it is possible that the obtained estimates are biased. There is in fact the possibility that the residual term ε is correlated with the other independent variables. When school quality is exogenous, S is positively correlated with α and that will lead to biased estimates of the school-quality parameters. Moreover, school quality is likely to be endogenous. According to Glewwe, even in rural areas of developing countries parents may be able to influence school quality. They can directly alter the quality of local schools through parent-teacher associations (PTA) or indirectly sending their children to non-local schools or migrating to areas with better schools. In all these cases,

when parents can alter school quality overestimation or underestimation are possible. Instrumental variables are a way to solve this problem and to obtain consistent parameter estimates (one possible instrument for years of schooling is the price of schooling, which should affect learning only by affecting years of schooling).

3.3 Heckman's model of investment in human capabilities

One of the most recent development in this literature is the one by Heckman (2007) who, drawing from the literature of neuroscience, argues that early childhood well-being is fundamental for the formation of human capital. He develops a model of investment in human capabilities.

Starting from the assumption that individuals possess a vector of capabilities, at each age, that includes: pure cognitive abilities, non-cognitive abilities, and health stocks. All capabilities are produced by investment, environment, and genes. All capabilities are used in the labour market differently, thus possibly contributing to earnings.

The capability formation process is governed by a multistage technology. Each stage corresponds to a period in the lifecycle of a child, and inputs or investments at each stage produce outputs at the next stage. Qualitatively different inputs can be used at different stages and the technologies can be different, at different stages of the child development. The outputs at each stage are the changes in capability at that stage.

The capabilities produced at one stage enhance the capabilities attained at later stages, in a process of "self-productivity". The idea is that capabilities are self-reinforcing and have positive effects on one another. A second key feature of capability formation according to Heckman, is "dynamic complementarity", which means that a type of capability produced at one stage raises the productivity of investment in another type of capability at a later stage.

Heckman's model starts assuming that altruistic parents invest in their children.[16]

I_t represents parental investments in child capabilities when the child is *t* years old, and *t=1, 2, ... T*

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[16] Not assuming altruism means the model has to find an endogenous reason for parents to invest in children.

The output of the investment is a skill vector, and the parent is assumed to have full control over the investment process. Heckman's model also assumes that h, parental capabilities, is constant over time. It may be that if it changes over time, investments in children change accordingly

At conception, the child receives a pool of initial genetic and environmental conditions, θ_1. Then we have parental capabilities, h, which are in turn the products of their own parents' investments and genes. Then, at each stage t, there is a vector of capabilities, θ_t, and the technology of capability production is[17]:

$$\theta_{t+1} = f_t(h, \theta_t, I_t) \tag{17}$$

Substituting for θ_t, θ_{t-1},...,repeatedly, the stock of capabilities at stage $t+1$ is then a function of all past investments:

$$\theta_{t+1} = m_t(h, \theta_1, I_1, ... I_t) \qquad t = 1, ... T \tag{18}$$

This function gives dynamic complementarity if:

$$\frac{\partial^2 f_t(h, \theta_t, I_t)}{\partial \theta_t \partial I'_t} > 0 \tag{19}$$

i.e. when the stocks of capabilities acquired up to period t (θ_t) make I_t more productive. This explains, according to Heckman, why returns to educational investments are higher at later stages of a child's life for more able, more healthy and more motivated children (those with higher θ_t). We have self- productivity if

$$\frac{\partial f_t(h, \theta_t, I_t)}{\partial \theta_t} > 0 \tag{20}$$

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[17] F_t is assumed to be strictly increasing and concave in I_t, and twice differentiable in all its arguments.

i.e. when higher levels of capabilities in one period create higher levels of capabilities in the next[18].

The joint effect of these two properties can explain the higher productivity of public intervention to sustain disadvantaged young children, with respect to intervention to sustain adolescents who come from disadvantaged backgrounds[19].

In general, this model of capabilities production technology gives a theoretical background for policy aimed at investing more in early childhood. It stresses the importance of environmental conditions in early childhood and the importance of intervention at early stages of life. It can also be seen as an additional theoretical motive for investing in the general improvement of the population and its living conditions. For example, even if investing in adult education may not have a point for their personal returns in a developing country, it can highly improve the outcomes of their children. For the same reasons, investing in female education can be seen as an investment in children's capabilities. In this event parental capabilities, *h*, would vary over time, requiring an extension of this model.

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[18] F_t is the function that produces capabilities for the next period, *t+1*.
[19] Heckman's analysis then proceeds to explain more in details the analytical properties of the production function, but this is beyond the scope of this paragraph.

4. Family mobility and its effect on human capital formation

Mobility can take different forms and have different causes, and thus entail different effects on children's lives. Mobility may mean migration, of one or both parents or the whole family, it can mean moving from one village to another, from one region to another in the same country, or it can mean to leave the country they were born in. In any case, it is a major event in one person's life, and even a greater one in children's lives, as children are more vulnerable, emotionally and practically. Mobility occurs for various reasons: search for work, marriage, education, natural events or man-made calamity such as war or civil strife. In the latter case, it can be a traumatic event that affects children's lives and outcomes in a very deep way.

The common factor in all the types of mobility is that children rarely have a say in this kind of decision: they have no other choice than to comply with it, and follow their families.

4.1 The decision to move

Standard economic theory assumes that the decision to move is taken at the individual level. In the household context, however, moving is not and individual decision, as its benefits and costs are likely to involve other members of the household. If we consider a non-unitary model of the household (see section 2) then the decision to move will be the result of a bargaining process of the two decision-makers in the household (namely, the couple). The first theoretical model in this respect is the one by Mincer (1978).

He starts by explicitly recognizing that it is the "net family gain" rather than the personal one, to motivate the family decision to move.[20] In a one-person household, move takes place when

$$(21) \qquad\qquad G_i = R_i - C_i > 0$$

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[20] Of course, the distinction disappears in the family consist in a one-person household.

where G_i is the individual gain from moving, R_i are returns and C_i are costs. In a household with n individuals, move takes place if $G_f = R_f - C_f > 0$ where $G_f = \sum_i^n G_i$ and the same for R_f and C_f.

As obvious, families tend to move less than single individuals. The economic reason is that, as household size increase, families' returns from mobility increase less than the total costs. Although it is possible that there are some economies of scale in moving, it is well possible that the diseconornies can outweigh them. Empirical research (Long 1975) confirms the negative effect of the presence of children on family mobility. One source of "immobility" in the presence of children is their schooling. Residential choices of the family are often influenced by the possibility to access schools which the parents prefer, both in term of price and quality.. Once children are attending such schools, the costs of residential mobility increase. Long's research, indeed, shows that the presence of school-age children is the key factor inhibiting families from moving, rather than family size. For the same reason, the prospective schooling of children may as well be a causal factor for accelerating mobility when the children are still of preschool age.

Mincer doesn't address this problem theoretically: instead, he focuses on two actors, in the family, who are indeed the actors making all the decisions. So, net family gain from moving is $G_f = G_1 + G_2$

where 1 and 2 are the subscripts for husband and wife. In order for the family to move, G_f must be positive. If G_1 and G_2 have the same sings, than there is no problem, because each one of the spouses will have the same preferences. If the signs of G_1 and G_2 differ, then the key point becomes the absolute value of the net loss of the "tied mover" or the "tied stayer"[21]. In both cases, the tied partner is one whose absolute value of loss (gain) is less than the absolute value of gain (loss) of the other partner. Mincer then illustrates a possible distribution of tied movers and stayers, and analyzes the factors that reduce or enhance the probability of moving for a family. The general findings of Mincer's model are that having a family (as is somewhat obvious) reduces the probability of moving. This effect is especially bigger in a two-earner family, where the G_i are likely to have different signs, family dissolution is therefore more probable if both spouses work. Also, he finds that the

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[21] "tied mover/stayer" are the terms originally used by Mincer in his work (1978)

initial (and expected) comparative advantages of family members in market and household activities tend to be reinforced by family mobility decisions.

Expanding his analysis, Mincer looks at migration ties and he states that gains from migration need not be of opposite signs to create family ties. If there are multiple destinations, ties exist so long as there are discrepancies between actual and maximum potential gains from migration, as measured by a general formulation:

(22)
$$T = (G_1^{max} - G_1) - (G_2^{max} - G_2)$$

Where G_i^{max} is the maximal gain from moving. If there is only one possible destination, because the move will favour only, for example, spouse 1, then $G_1^{max} = G_1$ and $G_1^{max} = 0$ and $T = -G_2$. In this case, T can be seen as a negative externality of moving, for the family.

Empirical studies find that family ties are actually a major deterrent for family mobility, as childless couples and those with only pre-school aged children are the most likely to move (Nivalainen, 2004), and it is true that the most important pull factor is, in general, the husband career, while the wife become a "tied" mover, often becoming unemployed or underemployed, or exiting the labour force[22].

However, Mincer model doesn't consider explicitly children's utility (children's welfare) in the family decision of moving. It is assumed to be comprised in family welfare, G_f. But since children don't usually have a say in the decision making process, we must assume that children's welfare is included in parents' utility function.

Here I try to set up the some simple assumptions that could serve as benchmark to develop the model.

The usual utility function[23] including children's utility, on a one-period time and for each parent, should be of the type:

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[22] These results are in line with earlier literature, see for example the results from Sandell (1977) and Spitze (1984). Different results are found in Cooke and Bailey (1996), who finds a positive effect of family migration on women's employment, in the United States

[23] See, for example, Cigno (2012)

$$(23) \qquad\qquad U_i = U(a_i) + \beta n U_c$$

Where a_i is consumption of parent i, n is the number of children, and U_c is each child utility function. Assuming that parents are altruistic and that children's utility is:

$$(24) \qquad\qquad U_c = v(c, G_c)$$

Where c is child consumption (of goods and other resources, as f.e. parents' time) and G_c are the net gains from moving. The parents then should maximize their own private utility, including their children's ones.

This formulation also assumes that children are local public goods, *i.e.* both parents derive the same utility from their children's welfare, this is the equivalent of implicitly assuming assortative mating. Parents, however, could as well have different preferences for their children's welfare, of evaluate it differently, which would cause more complication in the decision process and the maximization of family welfare. Furthermore, parents could evaluate children's gains from moving incorrectly, because they don't have direct information.[24] The decision of moving may entail negative externalities for children, which cannot be anticipated by parents. The same results may also apply to the decision of staying, but this cannot be explored by empirical analysis, as it is difficult to have information on people previous intentions. Also, the effects of such decision may be observed only further in time.

Another important point is that Mincer's model assumes that the decision to move is relevant to the family because the whole family needs to move. Even the decision of a single member, however, can affect the whole family, especially when the member leaving the household is an adult, and namely one of the parents. Thus, the same mechanisms could apply.

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[24] Because they may lack information on their chidren's preferences, and/or because they are experience goods.

4.2 Empirical evidence of the effects of family mobility

The empirical literature has studied the effects of family mobility on children's and adolescents' welfare mostly in the fields of psychology and health, and mostly for developed countries. The same can be said for the literature addressing the problems of children living with only one parent, as it is a field related to research on divorce, which is far more common in developed countries.

There is research evidence that frequent residential mobility during childhood can have adverse consequences for adolescent functioning and development, but evidence is still somewhat mixed. In the last decade, studies have shown that family mobility has significant effects on various adolescent behaviours, such as lower educational attainments (Pribesh and Downey, 1999), higher rate of school dropout (Teachman, Paasch & Carver, 1996) and risky behavior like drug and alcohol use (Hoffman and Johnson, 1998) or premature and promiscuous sex (South, Haynie and Bose, 2005), that often results in a higher risk of teen pregnancy (Sucoff and Upchurch, 1998).

Scanlon and Devine (2001) review the relevant literature, mainly in the field of sociology, which finds mostly negative correlation between moving and children's welfare. At the same time, they argue that household moves are not inherently problematic, and that the outcomes depends on many factors. Moreover, they stress the fact that moving away from poverty and degraded environment is, indeed, desirable.

However, there is an extensive body of literature finding a significant relationship between residential mobility and decreased academic performance.[25] Both in terms of test scores[26] and students' grade point average[27]. There are studies contradicting these findings, or suggesting that the effects are weaker (f.e. Alexander *et al.*, 1996). They argue that mobility studies fail to take into account pre-existing differences between movers and non-movers and to control for significant moderating variables. Goebel (1978) finds that high rates of mobility in pre-school years don't affect negatively academic performance in later years. Moves, however, seem to be correlated with grades retention (which is correlated with school's dropout), as found in Simpson and Fowler (1994) and Wood *et al.* (1993).

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[25] Temple and Reynolds (1999), Tucker, Marx and Long (1998).
[26] Audette, Algozzine and Warden (1993), Shuler (1990).
[27] Simmons et al. (1987).

Other factors must be taken into account when measuring the effects of mobility on children's educational outcomes. Tucker, Marx and Long (1998) find a significant interaction between mobility and family structure. They find that moderate levels of mobility have no measurable effects on school performance if children live with both of their biological parents. They suggest that what is more distressful for a child is the disruption of family structure, rather than moving *per se*.

Mobility can act also as an amplifier of the family economic and social distress, as usually moving and relocating occurs mostly among the poorest and disadvantaged portion of society (Nichols and Gault, 1999). In this case, the effects on children's welfare could be even bigger.

One recent empirical study contradicting the majority of results relative to educational outcomes is that of Hango (2006), who analyzes the 1986 Canadian General Social Survey, for individuals aged 25 and above. He suggests that, in the long run, residential mobility in childhood is beneficial for later educational attainment, because he finds that those who moved between birth and the age of 15 are more likely to graduate from high school than those who remained in the same community.

Jelleyman and Spencer (2008) conduct a systematic review of the studies relating mobility during childhood and health effects. They find that high rates of mobility are associated with increased behavioural problems during childhood and adolescence, but there is only limited evidence supporting a causal relationship between the two. They also find evidence that interactions at a neighbourhood level can be relevant, exacerbating or buffering the impact of moving.

Insum, evidence is mixed, with a slightly higher propensity toward a negative influence of moving to be taken cautiously, possibly very much dependent on the specific context analyzed.

So far, the focus of this review has been on the general concept of mobility. In fact the term "mobility" has a more general meaning, and therefore it has been preferred here to "migration". One can think of migration as a special case of mobility, as migration can differ from general mobility in at least three respects. First, in the last decades, with the increased mobility of populations all over the world, the meaning of "migration" has almost

entirely overlapped with the term "international migration", and in particular with migration occurring from poor to rich countries, usually south-north migration. Second, migration is more often associated with the individual move of only one member of the family, rather than with the move of the entire family. Third, mobility can refer to a temporary move, while migration is usually associated with a more permanent decision (though there are examples of temporary migration, as is often the migration of oil workers from North Africa to the Gulf countries).

The next sections will illustrate the main findings concerning the effects of migration on children's outcomes.

4.3 Migration and human capital: remittances

The literature on migration has been increasing considerably over the last decades. The main focus in economics, beside the effects on the labour market of the receiving countries, has been on the effects of remittances from migrants to their families of origin. In particular, emphasis has been placed on the effects of remittances on children's schooling.

A number of papers aim at establishing the causal impact of remittances on human development outcomes, through the relaxation of the household budget constraint. There is a general agreement that remittances flows have a significant positive impact on child school attendance and literacy.

Yang (2008) examines the effects of international remittances in the Philippines, using the East Asian Crisis as an exogenous shock to migrants' incomes, and finds that remittances have a positive effects on school attendance and, at the same time, a negative effect on child labour. These findings seem to be rather robust because this study, exploiting the geographic dispersion of migrants from the Philippines, uses an exogenous variation in their incomes. This way, it is possible to analyze how origin households are responding to remittance receipts and transitory income shocks. Lopez-Cordova (2005) finds the same results on school attendance and literacy in Mexico. Edwards and Ureta (2003) find that, in El Salvador, children from families that receive remittances are less likely to drop out of school. Adams (2005) analyzes data from Guatemala, and finds that remittances receiving households spend more on education than on consumption. One contrary study is the one of

Adams et al. (2008) which finds that in Ghana households do not spend more, at the margin, on educational investments.

Focusing on the distinction between internal and international migration, Giannelli and Binci (2013), using panel data from Vietnam, find evidence supporting a stronger impact of domestic versus international remittances on increasing schooling and reducing child labour.

There are several critiques that can be made to this strand of literature. First, there is the problem of migrants self selection, which makes it difficult to establish a causal link between remittances and children's education. Migration is in its nature a self selective process: not everyone desires to migrate, and not everyone can translate the desire to migrate into actual migration. Therefore, all studies on migration suffer from some kind of selection bias. If the unobservable characteristics that have influence on the migration decision also affect the decision to invest in children's schooling (and that may as well be the case), than estimates are biased. Bryant (2005) suggests that children in migrant households have a higher probability to attend better quality private schools. Therefore, researcher should find a way to deal with this issue. The increasing availability of panel data in recent years makes it easier to deal with it. The second point is that most of this literature deals only with school quantity but, as mentioned above, school quality, and the quality of the whole process of learning is crucial, as pointed out by Coronel and Unterreiner (2005). The third point to stress is that results may vary due to external context factors: as mentioned above, if a country lacks basic infrastructures, or, if the household receiving remittances are very close, or under, the line of poverty, remittances are probably more likely used for basic consumption and needs.

Overall, the findings show that remittances are associated with an increase in child schooling.

In particular, the above mentioned work of Lopez-Cordova (2005) finds evidence supporting the view that international remittances tend to lead to improved development outcomes, at an aggregate level. This study uses a cross-section from Mexico municipalities, and shows that a rise in the fraction of international remittances-receiving households in an area is associated with better educational outcomes. These findings are

strong, because instruments[28] were used to address the endogeneity problems, so that the study can establish a causal link.

A part of the literature also focuses on the role of women in the use of remittances. Taylor and Martin (2001) show that remittances are associated with a change in social hierarchy, with the women whose husband migrated becoming a new class of money lenders, and so improving their social status. They also find evidence that women spend relatively more on their children's welfare. Furthermore, there is the influence of remittances (or, more precisely, the influence of migration) on social and cultural norms (Levitt, 1998).

Another effect of remittances found by the empirical literature is the increase in girls' education. Mansuri (2006) finds large positive effects of temporary economic migration on educational attainment, especially for girls. Hanson and Woodruff (2003), using data from Mexico[29] and using instrument for household migration decisions with an interaction term between historical state migration and household characteristics, find that migration to the US is associated with an increase in girls' schooling.

The study of McKenzie and Rapoport (2006) also uses Mexico as a case study, and also uses historical data as instruments for endogenous variables. Using an ordered model[30] to take into account different effects on different levels of education, they find a negative effect on school attainments of boys and girls in their teenage years (16-18 years for girls and 12-18 for boys). They also find that the effects of migration are nonlinear and differ for different levels of schooling.

4.4 Migration and human capital: brain drain and brain gain

Another important issue in the relationship between human capital accumulation and migration is the effects that the prospect of migration can have on the decision of accumulating human capital made by people who do not migrate themselves. This effect can go in opposite ways. The effect of the so-called "brain gain" states that potential

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[28] Historical migrations rates and distance from the US border were use as instruments.
[29] Mexico is often studied due to U.S. interest in Mexican migration and data availability.
[30] IV- Censored Ordered Probit.

migration can be a motivational effect that induces an increase in educational attainments. Stark et al. (1997) develop a model under which a the positive probability of employment in a different country raises the level of human capital in the home country. While some workers migrate, "taking along" the accumulated human capital (a form of brain drain), other workers stay in the home country with more human capital than they would have formed in the absence of the possibility of migration, thus raising the country general level of human capital. The effect can go the opposite way if the prospect of migration is one of earning higher incomes without additional education (the so called "brain drain"). Fan and Stark (2007) analyzes both the negative and the positive impact of migration by skilled individuals. Their work shows that, in the short run, international migration can result in 'educated unemployment' and over-education in developing countries, as well as a brain drain from these countries. However, using a dynamic framework, it then shows that the positive externality effect of the formation of human capital economic-wide prevails. For this reason, they suggest that a relaxation in migration policy in both the current period and the preceding period can facilitate 'take-off' of a developing country. Nonetheless, it seems that the incentive channel is predominant over the "drain" problem (Clemens, 2009). On the other hand, a point of major concern for developing countries is the drain of highly skilled and qualified workers, for example medical staff or teachers, because of their investment in technical formation and education, and the impossibility to collect the returns of such investments.

The work by De Haas et al (2008) is a critical review of the relationship between migration and human development. It states that the degree to which migrants and remittances can contribute to development in their home countries is limited, therefore it would be naive to think that migration could remove the constraints to development by itself.

4.5 Migration and the family "left-behind"

A second strand of literature, following the analysis of the effects of remittances, has started to analyze the effects on the family left behind, especially women and children.
The literature on women left-behind finds mixed results. The study by Binzel and Assaad (2011) on Egypt finds evidence that women left behind from migrant husbands lower their

supply in the labour market for wage-work, especially in urban areas. At the same time, women in rural areas increase their participation in family, unpaid activities. Their evidence suggests that this labour supply response to male migration is driven by the need to replace the migrant man, rather than by a relaxation of the household constraints due to remittances inflows. The implications are that, in such case, there is no gain in social status and empowerment for women. Their results are similar to the ones by Mendola and Carletto (2012). In their paper on the effects of migration on the domestic labour market in Albania, they find that the male dominated Albanian migration reshapes labour market supply in different ways for men and women: it increases the probability of unpaid work for women, and of self-employment for men. In another recent study on women in Egypt, Elbadawy and Roushdy (2010) find that empowerment of left behind women is controversial: it seems to be more due to the husband's absence than to a real empowerment and improving in status. It is possible that the results are very context-specific in their nature.

When looking at children's outcomes, the underlying idea is that parental migration can entail negative outcomes for children left behind by one or both parents. The absence of parents may entail a psychological cost, and change the decision making power within the household. If a household member leaves, intra-household duties and responsibilities change and children may be asked to take on their parent's duties (especially young males), and thus they may spend less time in school-related activities. Moreover, if one parent is absent, part of the parental effort of sending children to school and monitoring them is missing, while the remaining parent could be loaded with extra duties. Consequently, parental absence can result in school's dropouts or in repeated grades. Parents' absence may also require that children (especially older children) substitute their missing parent in household or agricultural tasks, so neglecting their schooling. Furthermore, we have to consider the disruptive effects on family structure that can lead to leadership changes. In a traditional settings, fathers supervise children education, but if they are missing, it is likely that the decision power shifts to older men in the household, less educated and less prone to understand the value and importance of human capital, especially for girls (Ginther and Pollak, 2004).

In their study on children left behind in Albania, Giannelli and Mangiavacchi (2010) find evidence that father's absence negatively influences children's schooling in the long term,

increasing the probability of dropping out and delaying school progression. They also find that the impact is worse for girls than for boys, implying that parents migration can reduce gender equality and women empowerment in the long term.

The evidence in this regard, however, is somewhat mixed: recent studies on Mexico by Francisca Antman find no compelling evidence of this type of negative effects. Antman (2011a), using a difference-in-difference analysis technique to address endogeneity, finds evidence that household where a father migrated to the U.S. are more likely to spend more on girls than on boys, and that this effect drops once the father returns. But she finds no evidence of a detrimental effect on education. In another study (Antman, 2011b) there is evidence of a reduction in school hours and increase in work hours for boys aged 12-15 years old, but only in the short run. In the most recent work (Antman, 2012) she uses variation in siblings' age at the time of parental migration to address the endogeneity issue, and finds that the father's migration has a positive impact on young girls' schooling, especially if the father migrates when they are younger, while it has no impact on boys' schooling.

In a more general approach, the prolonged separation of children from their parents can have several detrimental effects. These effects are studied mostly in the field of psychology, but can, nonetheless, give a supporting framework for an economic analysis. Most studies find negative outcomes and risky behavioural patterns in adolescents who were separated from their parents, similar to the ones found for mobility.[31]

A study investigating the effect of parental absenteeism in South Africa (De Wet, 2013) finds that adolescents are forced to forgo schooling and seek employment. Similar results are found among orphans in sub-Saharan Africa (Coneus and Mühlenweg, 2011), finding that orphans are disadvantaged with respect to non-orphans even in the same household.

This results suggest that the absence of parents entails specific criticalities that need to be assessed in their own respect.

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[31] Suarez-Orozco (2001), Cortes (2008).

4.6 Migrant children

The last topic concerning migration and children's outcomes is the analysis of migrant children.

Apart from children who migrate in order to seek improved access to social services, migration often tends to have an adverse effect on migrant children, who face a number of obstacles in accessing quality schooling. Landau and Segatti (2009) find that this is the case for South Africa. And this is particularly the case for children migrating along, or illegally, or fleeing situation of conflict and violence. Even in this regard, however, results may be context specific.

Harttgen and Klasen (2009) find positive effects of migration on education attainment in most surveyed countries. Hashim (2005), analyzing survey responses in Ghana, illustrates how migration can expand the opportunities for studying and apprenticeship for migrant children. This may be particularly relevant for Africa, where there are often structural obstacles in the access to education.

In general, outcomes vary according to the destination, the age and the presence or the absence of parents.

5. Conclusions

The aim of this review was to present the findings of three strands of literature (migration, human capital and family decision mechanisms) in the same conceptual framework, in order to provide a more comprehensive benchmark to approach further research in these areas, and especially in the field concerning the effects of mobility on educational outcomes. As mobility and children's education are both family decisions, and mobility can affect education itself, then it seems logical to analyze the two phenomena trying to take into account a broader framework and trying to assess the existing links. In this respect, the household economics framework serves as a theoretical background to construct the empirical analysis to address the effects of mobility on children's outcomes.

As stated in the introduction, in the present work mobility will refer to an internal and temporary move, possibly of the whole family. The term "migration" will be referred to international individual migration from developing countries to developed ones.

Decisions and processes of mobility and migration are difficult to tackle and analyze, because of their intrinsic nature: problems of endogeneity and self selection are usual when addressing empirical analysis of this phenomena. While the literature on migration is not new (it all goes back to the model of Harris and Todaro, in 1970), the recent work has focused more on the effects of the left-behind and in general on the effects of mobility on the most vulnerable members of the household. While the literature enquiring the effects of remittances seems to agree on a general positive effect on children's educational outcomes (thus confirming the hypothesis of budget constrained households), empirical evidence on the effects of parental migration *per se* is mixed. A plausible explanation here is that results are strongly context specific. This is why more empirical research is needed in this area.

References

Acemoglu D and J. Angrist, 2001 "How Large are Human-Capital Externalities? Evidence from Compulsory-Schooling Laws" in *NBER Macroeconomics Annual 2000*, Volume 15 (2001), MIT Press

Adams Jr, R., A. Cuecuecha and J. Page, 2008 *Remittances, consumption and investment in Ghana* World Bank Policy Research Working Paper Series, No. 4515

Adams Jr. R., 2005 *Remittances, household expenditure and investment in Guatemala* World Bank policy research working paper No. 3532

Akresh R. et al, 2010 *Child Ability and Household Human Capital Investment Decisions in Burkina Faso* IZA Discussion Paper No. 5326

Alexander K.L., D.R. Entwisle et al., 1996 "Children in motion: School transfers and elementary school performance" *Journal of Educational Research*, vol. 90(1), pp. 3-12

Antman F.M., 2011a "The intergenerational effects of paternal migration on schooling and work: What can we learn from children's time allocations?" *Journal of Development Economics*, vol. 96 (2), pp. 200-208

Antman F.M., 2011b "International Migration and Gender Discrimination among Children Left Behind" *American Economic Review*, vol. 101(3), pp. 645-49

Antman F.M., 2012 "Gender, Educational Attainment, and the Impact of Parental Migration on Children Left Behind" *Journal of Population Economics*, vol. 25(4), pp. 1187-1214

Assaad R., D. Levison and N. Zibani, 2010 "The Effect of Domestic Work on Girls' Schooling: Evidence from Egypt" *Feminist Economics*, vol. 16(1), pp. 79-128

Audette R., R. Algozzine and M. Warden, 1993 "Mobility and school achievement" *Psychological Reports*, vol. 72, pp. 701-702

Ayalew T., 2005 "Parental Preference, Heterogeneity, and Human Capital Inequality" *Economic Development and Cultural Change*, vol. 53(2), pp. 381-407

Barro R. J., 2001 "Human Capital and Growth" *American Economic Review*, vol. 91(2), pp. 12-17

Basu K., 1999 "Child Labor: Cause, Consequence, and Cure, with Remarks on International Labor Standards" *Journal of Economic Literature*, vol. 37(3), pp. 1083-1119

Becker G. S. 1964 *Human Capital: A Theoretical and Empirical Analysis* National Bureau of Economic Research, New York

Becker G.S., 1975 *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education* Columbia University Press for NBER, New York

Becker G. S. and N. Tomes, 1976 "Child Endowments and the Quantity and Quality of Children" *Journal of Political Economy*, vol. 84(4), pp. S143-62

Behrman J. R., M. R. Rosenzweig and P. Taubman, 1994 "Endowments and the Allocation of Schooling in the Family and in the Marriage Market: The Twins Experiment" *Journal of Political Economy*, vol. 102(6), pp. 1131-74

Behrman J. R., R.A. Pollak and P. Taubman, 1982 "Parental Preferences and Provision for Progeny" *Journal of Political Economy*, vol. 90(1), pp. 52-73

Ben-Porath Y., 1967 "The Production of Human Capital and the Life Cycle of Earnings" *The Journal of Political Economy*, vol. 75(4/1), pp. 352-365

Bernal R. and A. Fruttero, 2008 "Parental leave policies, intra-household time allocations and children's human capital" *Journal of Population Economics*, Springer, vol. 21(4), pp. 779-825

Binzel C., and R. Assaad, 2011 "Egyptian Men working abroad: Labor Supply Responses by the Women Left Behind" *Labour Economics*, vol. 18, pp. 98-114

Björklund A. and K. G. Salvanes, 2011 "Education and Family Background: Mechanisms and Policies" in *Handbook of the Economics of Education*, Elsevier

Boggess S., 1998 "Family Structure, Economic Status, and Educational Attainment", *Journal of Population Economics*, vol. 11(2), pp. 205-222

Bowles S. and H. Gintis, 1976 *Schooling in Capitalist America: Educational Reform and the Contradictions of Economic Life* Basic Books, New York

Bowles S., H. Gintis and M. Osborne, 2001 "The determinants of Earnings: a behavioral approach" *Journal of Economic Literature*, vol. 39(4), pp. 1137-76.

Brandt L., A. Siow and H. Wang, 2009 *Substitution effects in parental investments* IZA Discussion Papers, No. 4431

Bryant J., 2005 *Children of International Migrants in Indonesia, Thailand, and the Philippines: A review of evidence and policies* Innocenti Working Paper 2005-05, UNICEF Innocenti Research Centre, Florence

Card D., 1999 "The Causal Effect of Education on Earnings" in *Handbook of Labour Economics* vol. 3a, pp. 1801-63, edited by O. Ashenfelter and D. Card, Elsevier Science

Ciccone A. and G. Peri, 2006 "Identifying Human-Capital Externalities: Theory with Applications" *Review of Economic Studies*, vol. 73(2), pp. 381-412

Cigno A., 2007 *A Theoretical Analysis of the Effects of Legislation on Marriage, Fertility, Domestic Division of Labour, and the Education of Children* CESifo Working Paper Series No. 2143, CESifo Group Munich

Cigno A., 2012 "Marriage as a commitment device" *Review of Economics of the Household*, vol. 10(2), pp 193-213

Clemens M. A., 2009 *Skill Flow: A fundamental reconsideration of skilled-worker mobility and development* Development Research Paper (HDRP) 2009/08, UNDP

Coneus K., A. M. Mühlenweg and H. Stichnoth, 2011 "Orphans at risk in sub-Saharan Africa: evidence on educational and health outcomes" *Review of Economics of the Household*, 1-22

Conti G and Heckman J.J, 2012 *The Economics of Child Well-Being* IZA Discussion Paper No. 6930

Cooke T. J., Bailey A. J., 1996 "Family Migration and the Employment of Married Woman and Men" *Economic Geography*, vol. 72(1), pp. 38-48

Coronel, E. and F. Unterreiner, 2005 *Social Impact of Remittances on Children's Rights. The Philippines case* UNICEF, Manila

Cortes R., 2008 *Children and Women Left Behind in labour sending countries: an appraisal of social risks* United Nations Children's Fund (UNICEF), Policy, Advocacy and Knowledge Management Section, Division of Policy and Practice, New York

Cunha F., J. J. Heckman and S. M. Schennach, 2010 "Estimating the Technology of Cognitive and Noncognitive Skill Formation" *Econometrica*, vol. 78(3), pp. 883-931

Dammert A. C., 2010 "Siblings, Child Labor, and Schooling in Nicaragua and Guatemala" *Journal of Population Economics*, vol. 23(1), pp. 199–224.

De Haas H., 2009 *Mobility and Human Development* Human Development Research Paper (HDRP) Series 2009/01, UNDP

De Serf M., 2002 *The effects of Family, Social and background Factors on Children's Educational Attainment* Honors Projects, Paper 8

De Wet N., 2013 "Parent absenteeism and adolescent work in South Africa: An analysis of the levels and determinants of adolescents who work 10 or more hours a week" *African Population Studies*, vol. 27(1), pp. 70-78

Echevarria C. and A. Merlo, 1999 "Gender Differences in Education in a Dynamic Household Bargaining Model" *International Economic Review*, vol. 40(2), pp. 265-86

Edmonds E., 2007 *Selection into Worst Forms of Child Labor: Child Domestics, Porters and Ragpickers in Nepal* Working Papers No. 1011, eSocialSciences

Edwards A. C. and M. Ureta, 2003 "International migration, remittances, and schooling: evidence from El Salvador" *Journal of Development economics*, vol. 72(2), pp. 429-461

Elbadawy A. and R. Roushdy, 2010 *Impact of international Male Migration on Women Status. The Case of Egypt* Mimeo presented at International Conference on *Women and Youth in Arab Development*, Cairo

Ermish J. and M. Francesconi, 2000 "Family matters: Impacts of family Background on Educational Attainments" *Economica*, vol. 68, pp.138-156

Fan C. S. and O. Stark, 2007 "The brain drain, 'educated unemployment', human capital formation, and economic betterment" *Economics of Transition*, vol. 15(4), pp. 629-660

Foster A. D., 2002 *Marriage-Market Selection and Human Capital Allocations in Rural Bangladesh* Unpublished manuscript, Department of Economics, University of Pennsylvania

Garg A. and J. Morduch, 1998 "Sibling rivalry and the gender gap: Evidence from child health outcomes in Ghana" *Journal of Population Economics*, vol. 11(4), pp. 471-493

Giannelli G.C. and M. Binci, 2013 "Internal vs. International Migration: Impacts of Remittances on Child Well-Being in Vietnam" forthcoming in *Journal of Development Studies*

Giannelli G.C. and L. Mangiavacchi, 2010 "Children's Schooling and Parental Migration: Empirical Evidence on the `Left-behind' Generation in Albania" *Labour*, vol. 24, pp. 76-92

Ginther D. K. and R. A. Pollak, 2004 "Family structure and children's educational outcomes: blended families, stylized facts, and descriptive regressions" *Demography*, vol. 41(4), pp. 671–696

Glaeser E., G. Ponzetto and A. Shleifer, 2007 "Why does democracy need education?" *Journal of Economic Growth*, vol. 12(2), pp. 77-99

Glewwe P., 2002 "Schools and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes" *Journal of Economic Literature*, vol. 40(2), pp. 436-482

Glewwe P. W., E. A. Hanushek, S. D. Humpage and R. Ravina, 2011 *School Resources and Educational Outcomes in Developing Countries: A Review of the Literature from 1990 to 2010* NBER Working Papers 17554, National Bureau of Economic Research, Inc.

Goebel B., 1978 "Mobility and education" *American Secondary Education*, vol.8(4), pp. 11–15

Griliches Z., 1979 "Sibling Models and Data in Economics: Beginnings of a Survey" *Journal of Political Economy*, 87(5/2), pp. 37-64

Hango D. W., 2006 "The Long-term effect of Childhood Residential Mobility on Educational Attainment" *The Sociological Quarterly*, vol. 47(4), pp. 631-664

Hanson G. and Ch. Woodruff, 2003 *Emigration and Educational Attainment in Mexico* Working Paper, University of California-San Diego

Hanushek E. A. and Ludger Woessmann, 2008 "The Role of Cognitive Skills in Economic Development" *Journal of Economic Literature*, vol. 46(3), pp. 607-68

Harmon C., H.Oosterbeek, and Walker, I., 2003 "The Returns to Education: Microeconomics" *Journal of Economic Surveys*, vol 17, pp. 115–156

Harttgen K.and S. Klasen, 2009 *Well-being of migrant children and migrant youth in Europe* Ibero-America Institute for Economic Research

Hashim I. M., 2005 *Exploring the linkages between children'0s independent migration and education: evidence from Ghana* Development Research Centre on Migration, Globalisation and Poverty, University of Sussex

Heckman J. J., 1976 "A Life-Cycle Model of Earnings, Learning, and Consumption" *Journal of Political Economy*, vol. 84(4), pp. 11-44

Heckman J. J., 2007 *The Economics, Technology and Neuroscience of Human Capability Formation* NBER Working Papers 13195, National Bureau of Economic Research, Inc.

Heckman J. J., J. Stixrud and S. Urzua, 2006 "The Effects of Cognitive and Noncognitive Abilities on the Labor Market Outcomes and Social Behavior" *Journal of Labor Economics*, vol. 24(3), pp. 411-82

Hoffman J.P. and R. A. Johnson, 1998 "A national portrait of family structure and adolescent drug use" *Journal of Marriage and the Family*, vol. 60, pp. 633–645

Jelleyman T., and N. Spencer, 2008 "Residential mobility in childhood and health outcomes: a systematic review" *Journal of Epidemiology and Community Health*, vol. 62(7), pp. 584-592

Keeley B., 2007 *Human Capital, how what you know shapes your life*, OECD insight

Kim H., 2005 *Parental Investment Between Children With Different Abilities* Unpublished manuscript, University of Wisconsin, Madison, Department of Economics

Kimko D. D. and E. A. Hanushek, 2000 "Schooling, Labor-Force Quality, and the Growth of Nations" *American Economic Review*, vol. 90(5), pp. 1184-1208

Krueger A. B.and M. Lindahl, 2001 "Education for Growth: Why and for Whom?" *Journal of Economic Literature*, vol. 39(4), pp. 1101-1136

Landau L.B. and A. W. K. Segatti, 2009 *Human development Impacts of migration: South Africa Case Study* Human Development Research Paper 2009/05, UNDP

Lange F. and R. Topel, 2006 "The Social Value of Education and Human Capital" in *The Handbook of Economics of Education*, vol. 1, pp. 459-509, edited by E. Hanushek and F. Welch, Elsevier.

Leibowitz A., 1974 "Home Investments in Children" NBER Chapters in *Marriage, Family, Human Capital, and Fertility*, pp. 111-135 National Bureau of Economic Research, Inc.

Levitt P., 1998 "Social remittances: migration driven local-level forms of cultural diffusion" *International migration review*, 926-948

Long L.H., 1975 "Does Migration Interfere with Children's Progress at School?" *Sociology of Education*, vol. 48 (3), pp. 369-381

Lopez-Cordova E., 2005 "Globalization, Migration and Development: the role of Mexican Migrant Remittances" *Economia*, vol. 6, pp. 217 -256

Loughran D., A. Datar and M. R. Kilburn, 2008 "The Interactive Effect of Birth Weight and Common Parental Investment on Child Test Scores" *Review of Economics of the Household*, vol. 6, pp. 223-242

Lucas R. E., 1988 "On the Mechanics of Economic Development" *Journal of Monetary Economics*, vol. 22, pp. 3–42

Mansuri G., 2006 *Migration, school attainment, and child labor: evidence from rural Pakistan* World Bank Policy Research Working Paper, No. 3945

McIntosh S. and A. Vignoles, 2001 "Measuring and Assessing the Impact of Basic Skills on Labour Market Outcomes" *Oxford Economic Papers*, Oxford University Press, vol. 53(3), pp. 453-81

Mendola M. and C. Carletto, 2012 "International migration and gender differentials in the home labor market: Evidence from Albania" *Labour Economics*, vol. 19 (6), pp. 870–880

Mincer J., 1970 "The Distribution of labor incomes: A survey with special reference to the Human Capital Approach" *Journal of Economic Literature*, vol. 8(1), pp. 1-26

Mincer J., 1974 *Schooling, Experience, and Earnings* Columbia University Press for the National Bureau of Economic Research, New York

Mincer J., 1978 "Family Migration Decisions" *Journal of Political Economy*, vol. 68(5), pp. 749-773

Moretti E., 2004 "Estimating the Social Return to Higher Education: Evidence From Longitudinal and Repeated Cross-Sectional Data" *Journal of Econometrics,* vol. 121(1-2), pp. 175-212

Nichols L. and B. Gault, 1999 *Is Welfare Reform Causing Homelessness Among Families? Research and Policy Issues* Presented at the annual meeting of the Society for the Study of Social Problems, Chicago, IL, August 1999

Nivalainen S., 2004 "Determinants of Family Migration: Short Moves vs. Long Moves" *Journal of Population Economics* vol. 17(1), pp. 157-175

Ota M. and P. Moffatt, 2007 "The within-household schooling decision: a study of children in rural Andhra Pradesh" *Journal of Population Economics*, vol. 20(1), pp. 223-239

Pitt M. M, M. R. Rosenzweig and H. Md. Nazmul, 1990 "Productivity, Health, and Inequality in the Intra-household Distribution of Food in Low-Income Countries" *American Economic Review*, vol. 80(5), pp. 1139-56

Pribesh S. and D. B. Downey, 1999 "Why are residential and school moves associated with poor school performance?" *Demography*, vol. 36, pp. 521-534

Psacharopoulos G. and H. A. Patrinos, 2004. "Returns to investment in education: a further update" *Education Economics*, vol. 12(2), pp. 111-134

Rasul I., 2006 "The Economics of Child Custody" *Economica*, vol. 73(289), pp. 1-25

Rosenzweig M. R. and K. I. Wolpin, 1988 "Migration selectivity and the effects of public programs" *Journal of Public Economics*, vol. 37(3), pp. 265-289

Rosenzweig M. R. and T. P. Schultz, 1982 "The Behavior of Mothers as Inputs to Child Health: The Determinants of Birth Weight, Gestation, and Rate of Fetal Growth" NBER Chapters in *Economic Aspects of Health*, pp. 53-92 National Bureau of Economic Research, Inc.

Sandell S. H., 1977 "Women and the economics of family migration" *Review of Economics and Statistics*, vol. 59, pp. 406-14

Scanlon E. and K. Devine, 2001 "Residential Mobility and Youth Well-Being: Research, Policy, and Practice Issues" *Journal of Sociology and Social Welfare*, vol. 28(1), pp. 119-138

Schuler D.B., 1990 "Effects of family mobility on student achievement" *ERS Spectrum*, vol. 8, pp. 17–24

Schultz T. W., 1963 *The Economic Value of Education* Columbia University Press, New York

Simmons R.G., R. Burgeson, S. Carlton-Ford and D.A. Blyth, 1987 "The Impact of Cumulative Change in Early Adolescence" *Child Development* vol. 58(5), pp. 1220—1234

Simpson G.A. and M.G. Fowler, 1994 "Geographic mobility and children's emotional/behavioral adjustment and school functioning" *Pediatrics*, vol. 93(2), pp. 303-309

South S. J., D. L. Hayne and S. Bose, 2005 "Residential Mobility and the onset of Adolescent Sexual Activity" *Journal of Marriage and Family*, vol. 67, pp. 499-514.

Spence M., 1973 "Job Market Signaling" *The Quarterly Journal of Economics*, Vol. 87(3), pp. 355-374

Spitze G., 1984 "The effect of family migration on wives' employment: how long does it last?" *Social Science Quarterly*, vol. 65, pp. 21-36

Stark O., C. Helmenstein and A. Prskawetz, 1998 "Human capital depletion, human capital formation, and migration: a blessing or a 'curse'?" *Economics Letters*, vol. 60(3), pp. 363-367

Suarez-Orozco C. and M. Suarez-Orozco, 2001 *Children of Immigration* Hardvard University Press, Cambridge MA

Sucoff C. A and D. M. Upchurch, 1998 "Neighborhood context and the risk of childbearing among metropolitan-area Black adolescents" *American Sociological Review*, vol. 63, pp. 571-585

Taylor J. E. and P. L. Martin, 2001 "Human capital: migration and rural population change" in *Handbook of agricultural economics*, vol. 1, pp. 457-511

Teachman C. J., K. Paasch and K. Carver, 1996 "Social capital and dropping out of school early" *Journal of Marriage and Family*, vol. 58, pp. 773-783

Temple J. A., and A. J. Reynolds, 1999 "School mobility and achievement: Longitudinal results from an urban cohort" *Journal of School Psychology*, vol. 37(4), pp. 355-377

Tertilt M., 2006 "Polygyny, Women's Rights, and Development" *Journal of the European Economic Association*, Vol. 4, No. 2/3, Papers and Proceedings of the *Twentieth Annual Congress of the European Economic Association*, pp. 523-530

Thomas D., 1990 "Intra-Household Resource Allocation: An Inferential Approach" *Journal of Human Resources*, University of Wisconsin Press, vol. 25(4), pp. 635-664

Tucker C. J., J. Marx and L. Long, 1998 "'Moving On': Residential Mobility and Children's School Lives" *Sociology of Education*, vol. 71(2), pp. 111—129

Wolfe B. L., J. R. Behrman and D. M. Blau, 1982 "The impact of demographic changes on income distribution in a developing country" *Journal of Development Economics*, Volume 11(3), pp. 355-377

Wood D., N. Halfon et al., 1993 "Impact of family relocation on children's growth, development, school function, and behavior" *Journal of the American Medical Association*, vol. 270(11), pp. 1334-1338

Yang D., 2008 "International Migration, Remittances and Household Investment: Evidence from Philippine Migrants' Exchange Rate Shocks" *The Economic Journal*, vol. 118(528), pp. 591-630

Chapter 3
The Effect of Father's Absence on Children's Education: Evidence from Egypt

Abstract. This paper aims at exploring the effect of father's absence on children's educational attainment in Egypt. When a parent is missing, children are often required to provide extra help in the household, and there is an obvious lack of supervision on their school attendance. So far, empirical evidence for some countries, especially those with high migration rates, has shown a negative effect of parental absence on children's education. Using data drawn from the Egypt Labour Market Panel Survey of 1998 and 2006, I estimate both a generalized ordered probit with random effects and a ordered logit fixed effects for all educational levels. The results confirm the negative effect of father's absence for children's educational attainments, especially at lower educational grades.

Introduction

The aim of this study is to assess the effect of parental absence on children's educational outcomes. This research focuses on the absence of the father, because absent mothers are very few.

This work stems from the two strands of literature on education and human capital and on children's well-being. A lot has been written about education and children's outcomes: since Mincer (1976) and Becker (1975) works, education has become a central issue in development policies and growth theory, becoming a key feature in the Millennium Development Goals defined by the UN.

Studies about children well-being in single-parent families in western countries typically deal with divorce related topics, and the findings are usually mixed (Pong et al., 2003). The issue is even more crucial for developing countries, because when a parent is missing, children are often requested to substitute for them, and take on extra work load in the household. Thus, school attendance and outcomes may be compromised. Typically, studies on this subject in developing countries are related to the literature on migration.

The rationale for studying the absence of fathers in the Egyptian context also lies in the fact that Egypt has a long tradition of male outmigration, both to Europe and to Gulf countries[32] and therefore fathers are more likely to be absent from the household with respect to other countries. Assessing the effect of the absent of a parent can therefore indirectly contribute to the debate on the effects of parents' migration on the welfare of children left behind.

In a more general framework, fathers (or parents) leaving the household is a form of family mobility. The decision to move made by the father, whatever the reason for it, can affect children's lives. In that respect, this analysis contributes to assessing the effects of parents' decisions about mobility on their children.

Data for this study were derived from the Egypt Panel Market Labor Survey, carried out by the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS) and the

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[32] In 2010 Egyptian migrants were roughly 3.7 million (World Bank).

Economic Research Forum (ERF)[33]. The results of a generalized random effects ordered probit model show that father's absence has a negative effect on children's school outcomes, especially at lower grades. As a robustness check, a fixed effects ordered logit model is also estimated, to control for individual effects. The results are less robust, but the effect of father's absence remains.

The work is organized as follows: section 1 presents the conceptual framework behind the analysis, while section 2 provides an overview on Egypt. Section 3 presents the empirical model and the data, section 4 presents and discusses the results and section 5 concludes.

1. Conceptual framework

The literature on the economics of education and human capital dates back to the 1960s, and it covers various economic aspects: from economic growth to signalling problems. From the seminal works of Becker (1964, 1975) and Mincer (1974) education has become a broad and important topic in the economic literature, and especially in development theories and studies. It was Becker who, in 1964, developed the human capital approach that shifted the economic analysis of education from a consumption approach to an investment one. Human capital has became the core of the economics of education.

More recently, education has became a central issue in development studies: universal enrolment in primary school is the second goal in the Millennium Development Goals agenda of the United Nations. In particular, Glewwe (2002) proposes a model for schooling decision in developing countries: in his model, parents choose their children education, given the quality of school and the skills the children learn (that are related with their future salary - see Mincer, 1970 and 1974). Thus, it is possible to derive schooling choice models that contain elements of both demand and supply. This work focuses on the demand-side of the educational outcomes, investigating the effects of household characteristics on children's education.

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[33] The source of the data is the Economic Research Forum, Egypt Labour Market Panel Surveys, 1998 and 2006 online databases.

Education, on the other hand, is also a part of a child well-being: UNICEF (2007) considers educational achievements as the third dimension of children's well-being. In recent years, there has been an increasing number of economic studies about children's well-being, as children have become a growing topic of research interest. Also, the well being of children raised in single-parent family has been a research topic in Western countries, related to the literature on the effects of divorce and the increasing rate of children born outside the wedlock.

While the effect of being raised in a single-parent family may not be so detrimental, especially if public policies equalize resources (Pong et al., 2003) between single and two-parents families, in developing countries it may be an entirely different story. De Wet (2010) finds that parental absenteeism in South Africa results in adolescents being forced to forgo schooling and seek employment. Similar results are found among orphans in sub-Saharan Africa (Coneus and Mühlenweg, 2011), showing that orphans are disadvantaged with respect to non-orphans even in the same household.

In this framework, the absence of parents may entail a psychological cost, and change the decision making power within the household. If a household member leaves, intra-household duties and responsibilities change: children may be asked to take on their parent duties (especially young males), and thus they may spend less time in school-related activities. Moreover, if one parent is absent, part of the parental effort of sending children to school and monitoring them is missing, while the remaining parent could be loaded with extra duties. Consequently, parental absence can result in dropouts or repeating grades. Parents absence may require that children (especially older children) substitute their missing parent in household or agricultural tasks, so neglecting their schooling. Furthermore, we have to consider the disruptive effects on family structure that can lead to leadership changes. In a traditional settings, fathers supervise children's education, but if they are missing, it is likely that the decision power shifts to older men in the household, less educated and less prone to understand the value and importance of human capital, especially for girls (Ginther and Pollak, 2004). In their study on children left behind in Albania, Giannelli and Mangiavacchi (2010) find evidence that father's absence negatively influences children's schooling in the long term, increasing the probability of dropping out

and delaying school progression. They also find that the impact is worse for girls than for boys, implying that parents migration can reduce gender equality and women's empowerment in the long term. Contrary to these findings, Antman (2012) finds, for Mexico, that girls are more likely to go to school if the father is missing. Overall, evidence on this topic is likely to be strongly dependent on the context, therefore more research is needed.

2. The case for Egypt

The interest in Egypt comes firstly from its belonging to the Middle East and North Africa (MENA) region, which makes it relevant for Europe, especially for the neighbouring southern Europe and countries.

Egypt is a lower-middle income country according to the World Bank classification. In 2012 the GNI per capita was 2,980 in current US dollars[34] with a growth rate that went abruptly from 7.2% in 2008 to 1.8% in 2011, during the international economic crisis, and was 2.2% in 2012. Life expectancy was 71 years, and with respect to the human development, Egypt ranked 113 for its HDI[35] in 2011.

In recent years Egypt, as other countries in the region, has come to the international attention for the break of civil strife and protests against governments. Egypt is one of the countries that has experienced one of the strongest turmoil, which has entailed a series of consequences still at play. A political analysis of the uprising of the Egyptian population is clearly beyond the scope here, but the turmoil of the region all had one common factor, the "youth bulge". A large part of the population is made of young people fuelled by the past high fertility rate, together with a reduction in infant and children's mortality. In this respect, Egypt has possibly the largest population of the region[36] with a growth rate that could bring it to over 100 millions around 2030.[37] The "youth bulge" might represent an asset for the economy, if young people are fully employed and fertility rates decrease, so

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[34] Atlas method. It was 6,450 $ in PPP (World Bank).
[35] The HDI was 0,644 (UNDP).
[36] Over 84.5 million people in 2013 (UN Population Division).
[37] UN Population Division projections, 2012 revision.

that the dependency ratio[38] can diminish. However, if youth unemployment is high and fertility rates don't decline, than these countries face a "demographic bomb". In Egypt, the dependency ratio was over 58% in 2012 (World Bank), and unemployment was 12.7% for the total workforce in 2012, while youth's unemployment[39], in 2010, was 14.10% for males and 54.1% for females. Even if it has been declining over the past years, it is still worrisome, especially since the decline in the fertility rate seems to have stopped in the past years (the total fertility rate was still 2.7 children per women in 2012).

In this context, attention to education seems even more crucial for policy.

Education in Egypt has become a priority in the government agenda only in relatively recent years.

Since the 90s, the Egyptian government has acknowledged the importance of education as a mean toward progress and economic growth, and it has developed a radical reform of the education system.[40] More recently, the reforms planned for 2000-2005 included, among other things: (i) developing education infrastructure, (ii) developing high and middle schools to meet the needs of the labour market (iii) increasing the use of information technology in schools and universities (iv) establishing a national system for measuring education quality.

Despite these ambitious goals, education in Egypt still faces several problems, of which the most compelling are effectively reaching rural and poor areas, and improving equity in access to education, especially among women and girls. The latter would lead to the generalizing of compulsory education which is also one of the Millennium Goals to achieve within 2015.

Egypt has certainly made progress over the last ten years, as the overall gross enrolment ratio for primary school is 109%.[41] However, as shown in table 3.1, universal primary education yet is still far from being achieved. [42]

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[38] The ratio of the non-working age population to the working age population.
[39] People aged 15-24.
[40] World Data on Education, 2006-07, UNESCO.
[41] World Bank, 2011.

Table 2.1: Net enrolment ratio in primary school.

	2000	2009
Overall	89.1	95.4
Boys	91.7	97.0
Girls	86.4	93.8

Source: UN - Statistic Division 2011 (estimates)

Moreover, not all the children who start primary school are able to finish it: there is still a 4% of school drops-outs who do not complete primary education (Egypt official data). More importantly the ratio of girls on boys in primary and secondary education is still below parity, at the 96% level. Clearly Egypt has still a long way to go before accomplishing a real equity in access to primary education, and even more so for secondary and tertiary education.

Education in Egypt relies on constitutional principles that: (i) state education as a right, and state the primary cycle as mandatory; (ii) guarantee free education in all State institutions; (iii) recognize the principles of equity and equality in education (the latter deriving from other general principles).

After the 2001 reform, the Egyptian education system is structured with a nursery school from 3 to 5 years of age, then a mandatory primary school, from 6 to 11 years of age. Then, there is the preparatory school (general or vocational) from 12 to 14 years of age, which is also mandatory.

Primary and preparatory school constitutes the basic education, compulsory for all children: it is a 9 years cycle, from 6 to 15, and covers the 6 years primary education cycle and the 3 years preparatory cycle. At the end of the preparatory school, successful pupils are awarded a basic education completion certificate.

After the basic education cycle, education proceeds in secondary schools. Secondary education lasts three years, and can be general or vocational. Technical education in

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[42] Gross enrolment ratios are an imperfect measure, as they measure all people enrolled in school, regardless of age.

commerce, agriculture or industry is offered in a 3 years or 5 years program. Higher education can be accessed by everyone who holds a General Secondary Certificate, or by students who completed technical education with high grades.

In Egypt religious schools (*Al Azhar* schools) are rather diffused: they follow the general direction for teaching periods and cycles, but give more emphasis to Islamic studies. In general, private institutions are acknowledged by the State, proven that they fulfil the general education standards.

The second reason why Egypt is an interesting country to study the effects of parental absenteeism, is the long standing history of outmigration from the country. Even if this work doesn't deal directly with migration, parental absence is clearly linked with migration.

Egypt has been a country of emigration from the beginning of the second half of the XX century, but until the 70s migration was strongly controlled by the government. In the 70s, governments adopted an "open door" policy that gave way to a large flow of migrants, especially toward the Gulf and other Arab countries, where skilled and unskilled labour force was needed. The oil boom in the late Seventies was followed by a peak in migration, reached in 1979. The migration flows were so large in those years, that Egypt experienced a shortage of labour in agricultural and construction sectors, pushing up real wages (Wickham, 2002).

Migration flows to Gulf states continued steadily until the late Eighties, when the First Gulf War forced Egyptian migrants to come back, and in the 90s, when Egyptian workers were replaced in those countries by large flows of Asian migrants.

Nowadays Egypt is one of the Middle-east and North Africa countries with more emigrants abroad. Most of them are in the Gulf region, but an increasing share is moving toward Europe. At the best estimates from bilateral statistics, in 2010 there were 3.7 million Egyptians living abroad (World Bank), over 2.2 million living in Arab states and Gulf countries (over 1 million in Saudi Arabia), and about 200 thousand in the European area (including Switzerland, Norway and Finland).

From the Egypt labour Market Survey of 2006 it is possible to estimate that 3.8 million Egyptians lived in a migrant household, that is to say 4.8% of the households. That percentage is lower than the 9.9% of 1988, though part of the decline is to ascribe to the above mentioned steady increase in population.

One characteristic of Egyptian migration is its temporary and male nature: it is mostly young men that leave shortly before or after marriage, to provide the necessary money to sustain their new families. Typically, these young men migrate to Gulf states, where they work in oil wells for one or two years, and then they go back to Egypt.

This large number of migrants generates large remittances flows: Egypt is among the top ten remittances recipients, and the first in the MENA region: remittances constituted in 2006 5% of national GDP.

From the ELMPS 2006 data, we can see that the 4.54% of the individuals lived in a migrant household, *i.e.* they reported having a household member living or working abroad.

Table 2.2: Migrant Household

Migrant	Frequency	Percentage
Yes	1,686	4.54
No	35,454	95.46
Total	37,140	100.00

Source: ELMPS 2006

3 Empirical strategy

Data for this study were derived from the Egypt Labor Market Panel Survey of 1998 and 2006, which is the first panel study of this scale ever carried out in Egypt[43]. The panel follows a nationally representative sample of 4,816 households visited in 1998, plus split households between the two rounds, plus a refreshed sample of 2,500 household, for a total of 8,349 households. In the panel sample used in this paper consists of the 4,816 households that did not split from 1998. The ELMPS06 is the first panel study of the scale carried out in Egypt.

The ELMPS contains detailed information on several issues: mainly employment, unemployment and underemployment. It collects data on job characteristics, mobility, earnings, and, in the 2006 wave, on migration and remittances. It also contains data on household characteristics and education.

The 2006 wave features a lot more information than the previous one: detailed information on migration, on female employment and education were collected in this wave. Unfortunately, only a small part of this vast amount of data is compatible with the 1998 survey. The panel thus focuses on a relatively narrower set of issues. Since this study is concerned with the effects of parents' absence on children's schooling, the analysis focuses on individuals that were 6 to 17 years old in 1998 so that the same individuals range from 13 to 24 years of age in the 2006 wave. The total sample is made of 4,253 individuals wich amount to 8,506 observations in the two panel years.

In 1998, more than 90% of the children in the sample were in school, and more than 94% considering only children in primary (and mandatory) school (see table 3.1)

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[43] Economic Ressarch Forum, online databases.

Table 3.1: Currently in School (1998)

All children	Frequency	Percent
Yes	3,829	90.12
No	420	9.88
Total	4,249[44]	100.00
Less than 11yrs old		
Yes	1,622	94.08
No	102	5.92
Total	1,724	100.00

Source: ELMPS 1998 and 2006

That being the case, the "currently studying" binary variable does not seem to fit our purpose: moreover, since we're following up these individuals to their twenties, when many of them have naturally left school, it does not seem useful to use this variable for the 2006 wave. Instead, it seems more suitable to use a factor variable for educational attainments. There several variables for educational attainments in the ELMPS, the simplest one, with 6 classes of achievements, is used in the analysis: illiterate, read&write, less than intermediate, intermediate, above intermediate, university. For the sake of simplicity, we also created a 3 category variable was also created: 1 for children not having completed the primary (illiterate or only 'read&write'), 2 for intermediate or less than intermediate levels, and 3 for the above levels of education.

The distributions for 1998 and 2006 are presented in table 3.2.

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[44] Discrepancies due to a few missing values in the specific variables

Table 3.2 : Educational attainments, children aged 6-17

	1998		
	Frequency	Percent	Cumulative
Incomplete primary	2,162	50.83	50.83
Intermediate	2,090	49.14	99.98
Above	1	0.02	100.00
Total	4,253	100.00	
	2006		
Incomplete primary	511	12.02	12.02
Intermediate	3,324	78.16	90.17
Above	418	9.83	100.00
Total	4,253	100.00	

Source: ELMPS 1998 and 2006

From an even distribution between less than primary and intermediate, in 2006 to a clear concentration at the intermediate level is observed. It can therefore be concluded that most of the children in 1998 completed primary education, but the majority did not go above an intermediate level and only a few achieved a level of education above the intermediate one.

For the father's absence, a dummy variable derived from whether the child's father lives in the same household was created. All individuals of six years old and more where asked this question. The focus is on the father, because there are rather few cases of absent mothers. Unfortunately, there is no information either on fathers' destination or on their motivation for leaving. It is only known whether they are missing from the household. More precisely, the question asks if the father actually lives in the same household as the respondent or not. [45]

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[45] Question 0113: "Does the individual's father live in the same household?"

The observations in 1998 are 477, while they are almost double in 2006 (see table 3.3). One could object that the reason for this is that children, growing up, moved from their parents' house. However, here only individuals that did not split from original household are kept, therefore this objection doesn't apply.

Table 3.3: Father lives in the same house, 1998 and 2006

	Frequency	Percent
1998		
Yes	3,772	88.77
No	477	11.23
Total	4,249	100.00
2006		
Yes	3,435	80.77
No	818	19.23
Total	4253	

Source: ELMPS 1998 and 2006

Other covariates controls are sex, since it is well known that girls have a lower schooling in developing countries than boys, household size, since the more siblings there are, the less is the schooling each of them is likely to receive, a dummy variable that takes value 1 if the subject is son or daughter of the head of the household, 0 otherwise, and five regional dummies. Table 3.4 shows the summary statistics for these covariates.

Table 3.4: Covariates descriptive statistics

Covariates	Observations	Mean	St. Deviation
Sex (1 is female)	8506	0.4315	0.495
Age	8506	14.921	4.708
Rural	8506	0.340	0.489
Child of the head of HH	8506	0.941	0.235
Father absent	8506	0.152	0.359
Ever married	8506	0.014	0.116
Area of residence:			
Cairo	8506	0.129	0.335
Urban lower	8506	0.156	0.363
Urban upper	8506	0.189	0.392
Rural lower	8506	0.215	0.411
Rural upper	8506	0.183	0.387

Source: ELMPS 1998 and 2006

3.1 The Model

To analyze the impact of the covariates on the independent variable (education), I chose to use both a Random Effects Generalized Ordered Probit model and a Orderd Logit model with fixed effects are used[46]. This choice was due to the need of verifying whether the results were sensitive to the choice of fixed or random effects.

The model is built on a latent regression as the binomial probit model:

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[46] Ordered probit and logit models are used to analyze responses with an ordinal dependent variable, such as opinion surveys, attainments (as in this case), tests scores and the like. In such cases it is not possible to use multinomial logit or probit, as they would fail to take into account the ordinal nature of the dependent variable. On the other hand, ordinary regression would treat the difference between each outcome in the same way (Greene, 2008).

$$(1) \qquad\qquad\qquad y^* = x'\beta + \varepsilon$$

where y^* is unobserved. What is observed instead is:

$$(2) \qquad\qquad\qquad y = 0 \; if \; y^* \leq 0$$

$$y = 0 \; if \; 0 \leq y^* \leq \mu_1$$

$$y = J \; if \; \mu_{J-1} \leq y^*$$

The assumption is that ε is normally distributed across observations, and its mean and variance are normalized to zero and one, respectively.

Ordered probit and logit measure the probability of each of the outcomes in the ordinal dependent variable, by simply assuming that the higher the score is, the better is the result.[47] The most intuitive way to interpret the parameters of the generalized model (Williams, 2006) is to look at each sets of coefficients as "contrasting" the other categories. Hence, positive coefficients indicate that higher values on the explanatory variable make it more likely that the respondent will be in a higher category of Y than the current one, while negative coefficients indicate that higher values on the explanatory variable increases the likelihood of being in the current or a lower category.

Generalized Ordered Probit allows us to release some assumptions. In particular, we can release the assumption that the marginal probability effects on the dependent variable are the same across each score ("parallel regression assumption"), and assume instead that the parameters are outcome-specific. What we have is a series of parameters for each outcome of the dependent variable. The parallel regression assumption is often violated in ordered probit models, that is why generalized ordered probit provides an alternative when such

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[47] As usual in probit and logit models, the marginal effects of the regressor on the probabilities, are not equal to the coefficients, but to the probabilities derivatives of each outcome with respect to the regressors. Interpreting the coefficients of the ordered probit model is, therefore, not simple.

constraint is violated[48]. Due to the nature of the Maximum Likelihood function, the fixed effects model cannot be generalized, and it is estimated with a logistic function, rather than with a normal one.

4 Results

When looking at the coefficients, one should bear in mind how to interpret them: the first column contrasts results against the second category and the third, the second column contrasts the second and first category against the third. Therefore, a positive coefficient means that the higher the variable is, the higher the probability that the respondent would be in a higher category. On the contrary, negative coefficients mean it is more likely for the respondent to be in that category or in a lower one.

4.1 Random Effects G.O.P. estimates

Table 4.1 presents the results for all model specifications: three or six categories dependent variables, and with or without regional dummies. As expected, the size of the household has a negative effect, as does living in rural areas. Being son or daughter of the head of the household has, on the contrary, a positive effect, but significant only in the six categories specifications. In line with other literature findings (see, *e.g.*, Giannelli and Mangiavacchi 2010), the absence of the father has a negative and significant effect on children's educational attainments, in all model specifications. Being a girl seems to hold a negative effect only in the six categories specification as expected, given the fact the primary enrolment for girls is quite high in Egypt. It seems that, at lower levels of education, there are not significant differences between boys and girls. On the other hand, the coefficient for being a girl becomes positive and significant at higher levels of education. The explanation for this result could be simply a sort of 'self-selection', which means that once girls are

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[48] However, one must be careful in using this model as it may involve some problems (f.e. negative probabilities), especially with small samples and complicated models.

allowed to go to school, they stay there and may have better outcomes than boys (indeed, this is a result observed where there is no gender bias in education, as in developed countries).

The negative effect of having ever been married is another result worth stressing. Although not a surprising one, its persistence in all specifications confirms that family duties early in life have a detrimental effect on educational outcomes.

Five macro-regional dummy variables were also added to control for regional effects. In this case the rural variable has been removed, as it is collinear with the regional variables.[49] Adding regional variables does not seem to change anything in the sign and significance of the coefficients, though. The rural residence has a negative effect on schooling, especially in Upper Egypt as expected, as Upper Egypt is the poorest region in the country. The sign and significance of the other explanatory variables remain pretty much the same as in the previous model. Results are shown in columns 3 and 4 of Table 5.1. The results for the six-categories education variable are in columns 2 and 4 of Table 4.1.[50]

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[49] Regional dummies are: Cairo region, Alexandria region, Urban Lower Egypt, Urban Lower Egypt, Rural Upper and Rural Lower. Lower Egypt is in general more wealthy than Upper Egypt. The baseline for the regional variables is the Cairo region (being the richest among the six).

[50] There are a number of missing observations, since there are missing observations for the education variable. However they are not systematic, and do not change the results.

Table 4.1: Random Effects Generalized Orderd Probit

	(1)	(2)	(3)	(4)
	3-Categories	6-Categories	3-Cat. With regions	6- Cat. With
Equation 1				
Father absent	-0.322***	-0.368***	-0.319***	-0.353***
	(0.0629)	(0.0819)	(0.0630)	(0.0829)
Child of Head of HH	0.174	0.359**	0.163	0.353**
	(0.0893)	(0.116)	(0.0895)	(0.117)
Household size	-0.0394***	-0.0571***	-0.0348***	-0.0538***
	(0.00926)	(0.0116)	(0.00953)	(0.0124)
Female	0.0580	-0.177**	0.0570	-0.180**
	(0.0421)	(0.0594)	(0.0422)	(0.0594)
Age	0.245***	0.155***	0.245***	0.156***
	(0.00727)	(0.00725)	(0.00729)	(0.00734)
Ever married	-1.843***	-1.326***	-1.840***	-1.313***
	(0.160)	(0.174)	(0.160)	(0.174)
Rural	-0.312***	-0.478***		
	(0.0443)	(0.0606)		
Alexandria			-0.0190	0.0700
			(0.0845)	(0.126)
Urban Lower			0.0765	-0.000506
			(0.0807)	(0.117)
Urban Upper			-0.0171	0.0297
			(0.0778)	(0.108)
Rural Lower			-0.225**	-0.262*
			(0.0755)	(0.105)
Rural Upper			-0.401***	-0.639***
			(0.0795)	(0.104)
Constant term	-2.586***	-0.164	-2.617***	-0.225
	(0.147)	(0.183)	(0.156)	(0.198)

Equation 2

Father absent	-0.267[*]	-0.406[***]	-0.259[*]	-0.406[***]
	(0.106)	(0.0759)	(0.107)	(0.0766)
Child of Head of HH	-0.0198	0.184	-0.0240	0.165
	(0.205)	(0.110)	(0.206)	(0.110)
Household size	-0.0852[***]	-0.0719[***]	-0.0752[***]	-0.0698[***]
	(0.0221)	(0.0111)	(0.0228)	(0.0116)
Female	0.418[***]	0.00857	0.416[***]	0.0136
	(0.0821)	(0.0539)	(0.0824)	(0.0541)
Age	0.441[***]	0.213[***]	0.442[***]	0.214[***]
	(0.0213)	(0.00762)	(0.0213)	(0.00769)
Ever married	-0.996[***]	-1.531[***]	-1.000[***]	-1.545[***]
	(0.265)	(0.170)	(0.267)	(0.170)
Rural	-0.483[***]	-0.372[***]		
	(0.0924)	(0.0555)		
Alexandria			-0.138	0.0468
			(0.141)	(0.108)
Urban Lower			0.0842	0.112
			(0.131)	(0.102)
Urban Upper			-0.142	0.0685
			(0.135)	(0.0981)
Rural Lower			-0.450[**]	-0.177
			(0.139)	(0.0939)
Rural Upper			-0.675[***]	-0.474[***]
			(0.164)	(0.0958)
Constant term	-9.944[***]	-1.420[***]	-9.971[***]	-1.498[***]
	(0.526)	(0.179)	(0.534)	(0.192)

Equation 3		
Father absent	-0.479***	-0.496***
	(0.0824)	(0.0832)
Child of Head of HH	-0.128	-0.148
	(0.137)	(0.138)
Household size	-0.0794***	-0.0766***
	(0.0137)	(0.0142)
Female	0.405***	0.414***
	(0.0598)	(0.0601)
Age	0.545***	0.546***
	(0.0129)	(0.0129)
Ever married	-1.577***	-1.596***
	(0.169)	(0.169)
Rural	-0.310***	
	(0.0634)	
Alexandria		-0.229*
		(0.113)
Urban Lower		0.163
		(0.105)
Urban Upper		0.0776
		(0.103)
Rural Lower		-0.212*
		(0.101)
Rural Upper		-0.390***
		(0.108)
Constant term	-9.546***	-9.583***
	(0.286)	(0.297)

Equation 4		
Father absent	-0.290*	-0.288*
	(0.119)	(0.120)
Child of Head of HH	-0.0106	-0.0417
	(0.230)	(0.231)
Household size	-0.101***	-0.0901***
	(0.0248)	(0.0257)
Female	0.485***	0.475***
	(0.0911)	(0.0918)
Age	0.529***	0.529***
	(0.0237)	(0.0238)
Ever married	-1.052***	-1.060***
	(0.300)	(0.302)
Rural	-0.555***	
	(0.103)	
Alexandria		-0.0969
		(0.159)
Urban Lower		0.139
		(0.147)
Urban Upper		-0.110
		(0.152)
Rural Lower		-0.447**
		(0.154)
Rural Upper		-0.797***
		(0.186)
Constant term	-11.83***	-11.85***
	(0.583)	(0.594)

Equation 5				
Father absent		-0.269*		-0.252
		(0.129)		(0.132)
Child of Head of HH		0.177		0.209
		(0.263)		(0.264)
Household size		-0.117***		-0.102***
		(0.0277)		(0.0286)
Female		0.393***		0.387***
		(0.0975)		(0.0995)
Age		0.613***		0.623***
		(0.0285)		(0.0294)
Ever married		-0.736*		-0.740*
		(0.342)		(0.344)
Rural		-0.449***		
		(0.110)		
Alexandria				-0.342
				(0.177)
Urban Lower				0.00259
				(0.158)
Urban Upper				-0.232
				(0.163)
Rural Lower				-0.500**
				(0.164)
Rural Upper				-0.670***
				(0.198)
Constant term		-14.11***		-14.30***
		(0.712)		(0.747)
N	8506	7126	8506	7126
R^2				
adj. R^2				

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As can be seen, the variable of interest, the absence of the father has negative and significant coefficients in all the equations, except for column 4 where it is not significant anymore. However, it is not strange that the effect looses significance at higher levels of education, since when children get older, parents influence (on them) is more likely to diminish.

Looking at these results, it can be concluded that the presence of the father has an important role in children's the educational outcomes.

4.2 Fixed effects ordered logit estimates

As mentioned before, the problem in using a RE estimate is that they depend on the assumption of the individual effects being normally distributed.

On the other hand, the problem with fixed effects ordered estimators is that they are difficult to estimate, and they can raise several reliability issues. In the literature, several estimators for a fixed effect ordered logit can be found, while an ordered probit estimator with fixed effects is not available due to the specific form of the probit likelihood function. Baetschmann et al. (2011) provides an exhaustive review of such estimators.

The more frequently used estimators for fixed effects ordered logit are the Chamberlain (1980) estimator, the Das and Van Soest two-step estimation (1999) , and the Ferrer-i-Carbonell and Frijters (2004) estimator. In their review, Baetschmann et al. (2011) also propose an alternative estimator, derived from Das and Van Soest work, that they call *"Blow Up and Cluster"*, or BUC estimator. They find this last estimator to outperform the Ferrer-i-Carbonell and Frijters estimator. Table 4.2 reports the results for both these estimators, where they are compared with the results of a random effects ordered probit.[51]

As we can see from columns 1 and 2, the absence of the father is still significantly negative, although at a lower level of confidence. Also, marriage remains negative and significant, while the other covariates loose significance (except for age): this is clearly due to the fact that fixed effects are controlled for. The fixed effects model captures all individual

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[51] Not generalized, contrary to the previous one.

characteristics in the fixed part of the error term, thus taking away explanatory power from other covariates. Proof is that in column 3, the RE model specification, household size and female remain significant, as they were before.

Table 4.2: Ferrer-i-Carbonell Frijters, BUC and Ordered Probit estimates

	(1)	(2)	(3)
	FCF[52]	BUC[53]	REProbit
Father absent	-0.584*	-0.585*	-0.300***
	(0.259)	(0.243)	(0.0565)
Child of the head of HH	-0.485	-0.486	0.156
	(0.436)	(0.460)	(0.0858)
Household size	0.0566	0.0570	-0.0661***
	(0.0445)	(0.0379)	(0.00860)
Female	-0.275	-0.275	0.131***
	(1.222)	(0.317)	(0.0393)
Age	0.432***	0.433***	0.264***
	(0.0150)	(0.0153)	(0.00693)
Ever Married	-2.068***	-2.069***	-1.826***
	(0.541)	(0.510)	(0.154)
Cut 1			

[52] Ferrer-i-Carbonell and Frijters estimator

[53] Baetchmann estimator

constant			2.811^{***}
			(0.141)

Cut 2			
constant			6.599^{***}
			(0.200)

rho			
constant			0.330^{***}
			(0.0269)

N	4626	4632	8506
R^2			
adj. R^2			

Standard errors in parentheses * $p < 0.05,$ ** $p < 0.01,$ *** $p < 0.001$

4.3 Clustered logit esitmates

The last test of sensitivity of the results can be done using a clustered logistic regression and using the cross-section data, with lagged variables. Using a clustered regression at household level is equivalent to control for "family fixed effect", using differences within household (see Antman 2012). As a result, there are fewer observations, so results must be looked at with caution. In particular, here the lagged variable of the father having been away in 1998, when the children were younger, is introduced. The dependent variables in this model are the dummies for having completed primary school, or above.

The results are presented in table 4.3, where the A specification uses the current value for the "Ever married" covariate, while the specification B uses a lagged variable, that is having been married in 1998.

Columns 3 and 4 show that being married has a strong negative effect on higher education, while it has no significant effect in specification 2, that is primary level of education with lagged marital status, and it has a positive and significant (at 10% level) effect in specification 1. In this last case we may think of a "reverse causality" problem: since the marital status is not lagged, it may be that, after completing at least primary school, people decide to marry.

Given the use of a clustered analysis, there is no need to control for family wealth and welfare, as it is included in the clustering process.

Table 4.3 Clustered logit regression

	(1) Primary A	(2) Primary B	(3) Above A	(4) Above B
Father absent in 1998	-21.60***	-21.49***	34.32***	35.46***
	(0.741)	(0.767)	(1.646)	(1.650)
Female	-0.320*	-0.267	0.639	0.646
	(0.154)	(0.154)	(0.343)	(0.345)
Age	-0.324***	-0.305***	0.782***	0.783***
	(0.0309)	(0.0296)	(0.0817)	(0.0825)
Ever married in 2006	1.152*		-4.786***	
	(0.467)		(0.820)	
Child of the head	1.158	1.162	18.79***	19.42***
	(0.783)	(0.793)	(1.036)	(1.037)
Ever married in 1998		0.101		-32.29***
		(1.562)		(1.074)
N	1394	1394	730	730

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5 Conclusions

Children's welfare can be severely compromised by the absence of one (or both) parents: children can be pressured to take on adults duties, to substitute for their missing parent, therefore spending less time in school and end up having worst results or dropping out of the educational system. Evidence of this phenomenon was found in Albania (Giannelli and Mangiavacchi, 2010) and the present findings confirm it: father's absence has a clear negative influence on children's education. The use of panel data makes it possible to control, to some extent, for unobservable individual characteristics, and we can consider these findings more reliable with respect to those derived from cross-sectional data. Still, more research is needed in this area.

What is clear, is that parents' absence has a negative effect on children's education, and this entails a long term negative effects on human capital accumulation. Given the importance of human capital investment for development, this is a key issue for developing countries, especially for those with high migration rates.

References

Assaad R., D. Levison and H.A. Dang, 2010 "How much work is to much? Effects of child work hours on schooling. The case of Egypt, in *Child Labor and the Transition Between School and Work*, pp. 53 – 98, IZA

Assaad R., D. Levison and N. Zibani, 2010 "The Effect of Domestic Work on Girls Schooling: Evidence from Egypt" *Feminist Economics*, vol. 16(1), pp. 79 - 12

Baetschmann G., K. Staub and R. Winkelmann, 2011 *Consistent Estimation of the Fixed Effects Ordered Logit Model* IZA Discussion Papers No. 5443

Barsoum G., 2007 *Egypt labor market panel survey 2006: report on methodology and data collection,* Economic Research Forum, Cairo.

Binzel C. And R. Assaad, 2011 "Egyptian Men working abroad: Labor Supply Responses by the Women Left Behind" *Labour Economics*, vol. 18, 98-114

Calero C., A. S. Bedi and R. Sparrow, 2009 "Remittances, liquidity constraints and human capital investments in Ecuador" *World Development*, vol. 37(6), pp. 1143 - 1154

Chamberlain G.,1980 "Analysis of covariance with qualitative data" *Review of Economic Studies*, vol. 47, pp. 225-238

Del Boca D., 2003 "Mothers, fathers and children after divorce: The role of institutions" *Journal of Population Economics*, vol. 16(3), pp. 399 - 422

Das M. and A. van Soest,1999 "A panel data model for subjective information on household income growth" *Journal of Economic Behavior & Organization*, vol 40, pp.409-426

Elbadawy A. and R. Roushdy, 2010 *Impact of international Male Migration on Women Status. The Case of Egypt* Mimeo presented at International Conference on *Women and Youth in Arab Development*, Cairo.

Ferrer-i-Carbonell A. and P. Frijters, 2004 "How important is methodology for the estimates of the determinants of happiness?" *Economic Journal*, vol. 114, pp. 641-659

Giannelli G. and L. Mangiavacchi, 2010 "Children's Schooling and Parental Migration: Empirical Evidence on the `Left-behind' Generation in Albania" *Labour*, vol. 24, pp. 76-92

González-König G. And Q. Wodon, 2007, *Remittances, schooling, and child labor*, Mimeo presented at IZA conference.

Greene W.H., 2008, *Econometric Analysis 6th Ed*., Prentice Hall

Mansuri G., 2006 *Migration, School Attainment and Child Labor: Evidence from Rural Pakistan*, Policy Research Working Paper, The World Bank.

UNESCO, World Data on Education 6th Edition, 2006-07

Wickham C. R., 2002 *Mobilizing Islam: Religion, Activism and Social Change in Egypt* Columbia University Press, New York.

Williams R., 2006 "Generalized Ordered Logit/ Partial Proportional Odds Models for Ordinal Dependent Variables" *The Stata Journal*, vol. 6(1), pp. 58-82

Chapter 4
The Effect of Family Mobility on Children's Educational Outcomes.
The Case of Uganda.

Abstract. The present work tries to establish the connection between family mobility decisions and educational outcomes: family mobility is a household-level decision that has potentially disruptive effect of children's lives, and thus on their outcomes. Using data from the three waves of the Uganda National Panel Survey, school attendance for children aged 6 to 15 is analyzed in relation to household characteristics and two mobility variables, with an household average model with fixed effects. Results for school attendance are mixed, but they are in line with the literature: if children move, possibly to access better areas, the effect of mobility is positive, while the opposite applies when adults move, thus confirming the detrimental effects of adults' absence. Results for school completion instead are not significant with respect to mobility. As a robustness check, additional estimates are presented for health and child labour, and also for the probability of children to be "idle". Results are significant only for the last one, with mobility variables having the opposite effects with respect to schooling.

In general, family mobility seems to benefit children if they are the ones who move, while the mobility of adults, also controlling for remittances, confirms the negative effects found in the literature.

Introduction

This study aims to understand the relationship between family mobility (including all types of residence change) and children's educational outcomes in terms of enrolment and completion of first grade and elementary school. School completion is taken into consideration as in developing countries dropout rates are usually very high. Education is a major issue for developing economies, and especially for African countries, where lack of infrastructures, institutional frailty and lack of government funds take a severe toll on reaching a universal and effective education. Yet, education is a key element of human capital formation, and thus of economic growth itself.

The present work tries to establish the connection between family mobility decisions and children's educational outcomes: family mobility is a household-level decision that has potentially disruptive effect of children's lives, and thus on their outcomes.

Mobility, in this respect, is a particular kind of family decision, which can affects children's outcomes in different ways. In a context as the one of Uganda, we can expect mixed evidence, depending on what effect prevails: if the adults are the ones moving, than substitution effect is probably more important and overall effect on children education will be negative, but if children are moving in order to escape danger or to reach areas with better services, then the effect should be positive. Literature regarding children's mobility is found mostly for developed countries, and the findings are usually of a negative effects of childhood mobility on children's outcomes (see, f.e., Pribesh and Downey, 1999; Teachman, Paasch & Carver, 1996). On the other hand, studies on developing countries focus mostly on the effects of the international migration of parents on children. The evidence is mixed, with some authors (Antman, 2012) find no evidence of a negative effect on children left behind, while others find indeed a negative effect on children's schooling (Giannelli, Mangiavacchi 2010). It is quite possible that results in this respect are very context-specific, and more research is needed on the subject.

Using data drawn from the Uganda National Panel Survey (UNPS), conducted in collaboration with the Living Standards Measurement Study (LSMS) program of the World Bank, the study investigates this relationship. All the three waves (2005, 2009, 2010) of the panel have been used, and school attendance for children aged 6 to 15 is analyzed in relation to household characteristics and two mobility variables. Because the two last waves are very close in time, variability is strongly reduced, the choice has therefore been to estimate an household average model with fixed effects. Mobility is accounted for at the household level with tow dummy variables: one if a child in the household has moved in the past five years, and one if an adult has moved. Schooling is investigated in terms of school attendance and completion. Additional results are shown for children's health and child labour, as these issues are strongly related to education. The use of panel data allows to overcome the identification problem usually found when dealing with this type of issue, as people who decide to move may differ from the ones who don't in ways that data cannot address, thus self-selecting. The use of longitudinal data prevents this problem, at least in part. This work adds to the literature in using newly available data, and investigating a country seldom studied in this aspect. Also, it adds in the investigation of past mobility, which is a different concept from current migration (and absence) of family members: the use of a retrospective mobility variable, added to the use of fixed effects panel data, makes the results more relevant.

Evidence shows that family mobility has a composite effect: if adults move, this has a negative impact on school attendance, while if children move, this has a positive effect. These results are not unexpected, as the major reason for moving is to reach areas with better services and opportunities, and also away from areas disrupted by civil violence. When adults move from the household, on the other hand, this has a detrimental effect, probably due to the lack of supervision and the substitution effect in household chores. These results are robust to different specifications.

The paper is organized at follows: section 1 present the conceptual framework and the literature strand this study is part of. Section 2 presents the reason for Uganda as a case study. Section 3 presents the empirical models, while section 4 presents the data. Section 5

presents the results of education, and section 6 shows additional results on health and child labour. Section 7 concludes.

1. Conceptual framework

Mobility and migration are not perfect synonyms, even if their definition can easily overlap. Usually, migration refers to a permanent change of residence, with an emphasis on the international one, of one and or more household members. Mobility, instead, encompasses a more general definition of moving, and we could say that migration is a special case of mobility. Also, underlying the definition of migration is the notion of decision and choice, while mobility could not be a choice, in certain situations. While the literature on migration is very well established and widespread, the literature on the more general notion of "moving" is lacking, especially in economics, but, given that the two terms can, at least in part, be synonyms, the conceptual framework regarding migration also applies to this study.

Migration decisions are usually treated, in economics, as individual optimization choices. The reference model for development economics is the Harris – Todaro one, that analyzes the choice of migration from rural to urban areas as an individual choice over the expected value of wages in a two sector economy (Harris, Todaro, 1970). More in general, the human capital model of migration (Sjaastad, 1962) treats migration as an investment, that has returns in the feature. This model consider a potential migration a parson that evaluates the future streams of benefits and costs (discounted over time) of living in any one of a set of geographical areas, and migrates if the area with highest net benefit is not the current place of residence (Cooke and Bailey, 1996).

Mincer, in his work on family migration decisions (1978), analyzes the decisions of a two-member family (husband and wife) considering the combination of each component's gains and losses, and he argues that net family gain motivates migration, rather than net personal benefit. He also points out why family ties can reduce family mobility and family stability, and that the spouses can have different benefits from moving (or no benefit at all), and one

of them may end up being a "tied mover" or a "tied stayer", thus, he argues, family ties act like negative externalities on one of the two spouses. Empirical studies find that family ties are actually a major deterrent for family mobility, as childless couples and those with only pre-school aged children are the most likely to move (Nivalainen, 2004), and it is true that the most important pull factor is, in general, the husband career, while the wife becomes a "tied" mover, often becoming unemployed or underemployed, or exiting the labour force. These results were in line with earlier literature, as, for example, the results from Sandell (1977) and Spitze (1984) who find that migrating wife often experience negative effects on their labour market outcomes. Different results are found in Cooke and Bailey (1996), that finds a positive effect of family migration on women's employment in the United States.

On the other end, there is research evidence that frequent residential mobility during childhood can have adverse consequences for adolescent behaviour and development. In the last decade, some studies have shown that family mobility has significant effects on various adolescent behaviours, such as lower educational attainments (Pribesh and Downey, 1999), higher rate of school dropout (Teachman, Paasch & Carver, 1996) and risky behavior like drug and alcohol abuse (Hoffman and Johnson, 1998) or premature and promiscuous sex (South, Haynie and Bose, 2005), that often results in a higher risk of teen pregnancy (Sucoff and Upchurch, 2001). As migration is, in fact, mobility, we should expect the same kind of results in studies about migration.

Literature regarding migration finds evidence of negative outcomes for children left behind by one or both parents: the absence of parents may entail a psychological cost, and change the decision making process within the household. If a household member leaves, intra-household duties and responsibilities change, and children may be asked to take on their parents' duties. Thus they may spend less time in school-related activities. Moreover, if one parent is absent, part of the parental effort of sending children to school and monitoring them is missing, while the remaining parent could be loaded with extra duties. Consequently, parental absence can result in school dropouts or grades repetition. Parents' absence may require that children (especially older children) substitute their missing parent in household or agricultural tasks, this way neglecting their schooling. Furthermore, we have to consider the disruptive effects on family structure that can lead to leadership

99

changes. In a traditional settings, fathers supervise children's education, but if they are missing, it is likely that the decision power shifts to older men in the household, less educated and less prone to understand the value and importance of human capital, especially for girls (Ginther and Pollak, 2004). In their study on children left behind in Albania, Giannelli and Mangiavacchi (2010) find evidence that father's absence negatively influences children's schooling in the long term, increasing the probability of dropping out and delaying school progression. They also find that the impact is worse for girls than for boys, implying that parents' migration can reduce gender equality and women's empowerment in the long term. This result is in contrast with the one found by Antman (2012) for Mexican migrants in the U.S., where fathers' migration results in additional education for girls.

The other strand of literature in the background of this study is the one related to human capital formation and, in general, to children's well-fare and well-being. Human capital formation, especially in its form of educational outcomes, has become an increasingly major topic in economics, as growth theories have assessed its role in economic growth. Education has become a central issue in development policies, becoming a key feature in the Millennium Development Goals defined by the UN. Education, however, is not the only component of human capital: health is also recognized as a fundamental component influencing individual human capital, and in a more general sense, everything that contributes to the acquisitions of skills could be included (as, *e.g.*, natural ability, though it is difficult to measure). What appears clear, though, is that family background plays a key role in shaping adults' future skills and abilities, and therefore professional capacity. All empirical works on education find that people educational achievement is correlated with their family socio-economic status, and most of the theoretical ones try to explain why this happens: from Becker (1964, 1975) on, several scholars have tried to explain how family decisions about resource allocation to children are made. In developing countries, a major problem is often the "supply-side" of education, *i.e.* physical infrastructure and personnel. Studies that tackle the supply side of the problem are needed, however it is usually more difficult to obtain reliable and comprehensive data[54] on the educational system at a micro level, while micro-data on households and individuals are usually collected by national

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[54] One of the main problem is often the number and the skills of teachers, which are difficult to assess.

surveys. The UNPS contains also a community level questionnaire, with questions about the presence and characteristics of different kind of public services and buildings, among which schools: including the latter in the model, however, did not result in any significant evidence, and such variables were therefore eliminated from the final specifications.

2. The case for Uganda

The choice of Uganda as a case study is justified by at least two motivations: the country geo-economical position, and the country complex society.

First, Uganda is a part of Sub-Saharan Africa, an area whose economy still lags behind, at risk of becoming a "periphery's periphery": even if poverty has been reducing in the last years,[55] GDP per capita is still lower than the overall Sub-Saharan area, and Uganda ranks 161st in the Human Development Index ranking, better than other countries in the same area, but still very low. Regarding education, gross enrolment ratios have increased in the past years well above one-hundred percent[56] and falling back in 2011[57], a year of "normalization" in school enrolment. Life expectancy is of 58 years: slightly above then the area average, but still well below the average for low-income countries. Also, at the beginning of the 21st century Uganda was praised as one of the World Bank's "model pupils" in economic stability and in reducing poverty: Uganda was the first country to have a full PRSP[58] program approved by both the World Bank and the IMF commissions, but the results were more disappointing than expected. On one side, the structural reforms started in the Nineties took their toll on the population: the widespread liberalization and privatization of the agricultural market let to a worsening of the life conditions for a great part of the population, which still survives on agriculture and herding. On the other side, the fragile social and institutional context prevented the programs to act in the best way, especially the programmed government decentralization.

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[55] 24,5% in 2009, headcount ratio (World Bank)
[56] This is normal for the gross ratios, as they consider all children, regardless of age.
[57] Enrolment ration in 2011 was 113% (World Bank)
[58] Poverty Reduction Strategy Papers

The second motivation lies in the fact that Uganda has a very fractured society. Among Sub-Saharan countries, Uganda is probably one of the most divided, with ethnic, linguistic and religious divisions deeply rooted in colonial history: there are 53 officially recognized ethnic groups. Similar economic disparities apply to the North and the West-South region of the country, the latter usually the wealthier. Civil strife is disrupting the country form its independence in 1962 and is still going on in the northern region since the 80s, due to the activities of three different armed groups: the *Lord's Resistance Army*, the *West Nile Bank Front (WNBF)* and the *Allied Democratic Forces (ADF)*: at the end of the nineties, it was estimated that between 800,000 and 1,000,000 people were killed in state terror, ethnic motivated violence and civil strife. It is also estimated that around one million refugees were displaced from their homes over the years. This leads to an increased internal mobility, which is often forced by external pressure. Unfortunately, it was not possible to address this problems in the present work, as data on civil strife and violence at the household level present many missing values. It is of course much more difficult to tackle households and individuals that suffered displacement, but further research on this topic is certainly due.

Another feature of Uganda is that international migration is a rather rare phenomenon, and more so international migration toward non-African countries: on a population of about 36 million people, the biggest community of migrants from Uganda was in Kenya and counted roughly over 500,000 people in 2010.[59] This problematic country thus offers an opportunity to study mobility issues at a household level.

Uganda educational system is divided in seven years of primary education, followed by six years of secondary education, which are in turn divided in four years of lower-secondary and two years of upper secondary. After secondary, there are three to five years of tertiary education. Completing primary education is crucial to access secondary, as only children who have passed the primary examination can access any kind of secondary. Following the British model (Uganda former colonial ruler), at the end of the four years of lower secondary students undertake Ordinary-level exams (O-level). While after the two years of upper secondary there are the Advanced-level exams (A-level). An alternative to lower

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[59] International Organization for Migration and World Bank (2010)

secondary education is provided by three-years technical schools. Also, graduated from lower secondary can enrol in Technical Institutes.

This system has stayed much the same since the 60s, but in 1997 Uganda undertook a major reform program under the name "Universal Primary Education" (UPE) which aimed to eliminate the cost of primary education, with the goal of ensuring up to four children per family went to school. The program was a crucial political point, and therefore was implemented relatively fast. The first result of the program was a dramatic increase in enrolment, especially for girls. Deininger (2001) in his work evaluating the program, finds that UPE reduced drastically the income constraint for school attendance[60] and highlights this as a proof that such programs are effective in poor countries where even a small tuition fee is an obstacle to school attendance. At the same time, a part of the program was devoted to dissemination, awareness building and decentralization at the local level. This has led to very good results in improved school attendance. On the downside, probably because of the fast pace of the program, quality of school didn't increase at the same rate. Especially the students/teacher ratios increased sharply, and in 1999 about one quarter of the students failed the final examination in primary school. In general, the program can be considered a success, but the flaws in the program must be considered carefully, especially since, fifteen years later, the general situation doesn't seem to have improved as expected.

3. The estimation strategy

The econometric analysis should verify the impact of family mobility on children's schooling, both on school enrolment and on school completion. The use of panel data ensures a control for unobserved factors and self-selection, which are known issues when dealing with both educational outcomes and mobility: education is influenced by natural ability, an unobserved and unobservable factor, while families with a higher propensity for moving may be, in fact, different from other families in a way that affects both moving and education, thus creating a self-selection problem: this is indeed the case when studying migration.

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[60] The results of the present work confirm this results, whit expenditure quintiles only partially significant.

The basic model at the individual level is the following:

$$(1) \qquad y_{ijt} = \beta_0 + \beta X_{ijt} + \gamma M_{ijt} + \delta Z_{jt} + u_{ij} + \eta_j + \epsilon_{ijt}$$

Outcome y of individual i of household j, at time t, is determined by individual characteristics X, the mobility variable at the individual level M, and household characteristics Z. The outcome here will always a dummy variable, both for school attendance and school completion. Together with the individual fixed effect u_{ij}, a household fixed effect, η_j, is also introduced. Households' attitude toward education can vary across households in ways that cannot be captured by the explicative variables, because they are either missing (*i.e.* the dataset lacks a specific variable) or unobservable/immeasurable.

The problem with this model, beside the difficulty to tackle both individual and household fixed effects over time, is that, as mentioned in the introduction, the second and third wave of the panel are very close in time, and variability in outcomes is therefore very low, as the dependent variable is a dummy and not a continuous one.

To overcome these problems, the strategy is to estimate a household-level model, as follows:

$$(2) \qquad \bar{y}_{jt} = \beta_0 + \beta \bar{X}_{jt} + \gamma \bar{M}_{jt} + \delta Z_{jt} + \eta_j + \epsilon_{jt}$$

In this model, individual characteristics are substituted with household averages of the same characteristic, so that the outcome y is actually the average school attendance (or completion) of children 6 -15 in household j. It can also be interpreted as the household-specific rate of enrolment, or as the probability for a child aged 6 to 15 in household j to be enrolled in school at time t.

This model allows to take into account household effects (using a fixed effects specification), and solves the problem of variability: this model is indeed defined and

overall significant. The model is estimated through a linear probability model with fixed effects.

Since the dependent variable is continuous but truncated both to the left and the right (it is number between 0 and 1), as a substitute analysis the model is also estimated using a two-side censoring model for panel data[61], which is useful when the dependent variable is a fraction, as it is in this case. The two-side censoring model is based, as censoring model in general, on the idea of a latent variable *y** which conditions the observed variable *y*, so that we have:

(3)
$$y^* = x^{'}\beta + \epsilon$$

We observe:

(4)
$$y = \begin{cases} L \ if \ y^* < L \\ y^* \ if \ L \leq \ y^* \leq U \\ U \ if \ y^* > U \end{cases}$$

Where *L* and *U* are the lower and upper limits (0 and 1, respectively).

Another way to estimate equation (1) is to treat the data as hierarchical with a multilevel model, according to which observations over time are nested in individuals, and individuals are nested in household. To account for both individual and household fixed effects over time, the choice is to estimate a mixed model with random intercepts for individuals and households, which capture the effects of u_{ij} and η_j. The levels are as follows:

i= 1, ... J level 3, households

i= 1, ... I$_j$ level 2, individuals within household

t=1, ...T$_{ij}$ level 1, observations over time within individual

Thus, we can go back to the initial individual model in equation (1) and rewrite it as:

(5)
$$y_{ijt} = [fixed \ part] + u_{ij} + \eta_j + \epsilon_{ijt}$$

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[61] Alan, Honoré et al., 2011, *Estimation of Panel Data Regression Models with Two-Sided Censoring or Truncation*.

Since these models are very demanding both in terms of computing effort and assumptions, the choice of the covariates in the fixed part has to be parsimonious. Conceptually, the "household averages" model is to be considered an equivalent, so that the multilevel model should be regarded as a further robustness check for the results.

4. Data and variables

The data for this study were derived from the three waves of the Uganda National Panel Survey, collected in 2005-06, 2009-10 and 2010-11. The survey is a part of the World Bank's Living Standard Measurement Study program. The last two waves are close in time because they are also part of the Agricultural Census program of the World Bank, and therefore they have to tackle each season's agricultural production.

The three waves collect data from a national representative sample, and each one has the following number of observations:

Table 4.1 Sample description

Years	Number of Households	Number of individuals
2005-06	3,058	16,759
2009-10	2,919	18,734
2010-11	2,530	19,205

Due to sample attrition between panel waves, the final sample consist of 10044 individuals in 2391 households.

The survey collects plenty of information regarding individual and households characteristics: socio-demographic, education, activity and consumption data. There is also a section devoted to migration and mobility history of the household where household members are asked questions about previous places of residence and length of stay in the current place of residence.

The problem related to this section of the questionnaire (section 3) is that it changes slightly in the second and third waves, with respect to the first: to obtain a homogeneous variable through the three waves, the key mobility variable is a dummy that takes value of 1 if the individual changed place of residence in the last five years.

The dependent variables are the following dummies: school attendance at the time of the interview, for all children aged 6 to 15 years, completion of first grade for children aged 7 to 15, and completion of elementary school for all children aged 11 to 15. The distribution of these variables is presented in table 4.2.

Table 4.2 Distribution of dependent and mobility variables.

	2005-06		2009-10		2010-11	
Moved in the last 5 years (children 6-	**absolute**	**%**	**absolute**	**%**	**absolute**	**%**
Yes	183	5.88	334	9.52	248	6.97
No	2,931	94.12	3,174	90.48	3,311	93.03
Moved in the last 5 years (adult >15):	**absolute**	**%**	**absolute**	**%**	**absolute**	**%**
Yes	695	14.96	441	7.99	364	5.89
No	3,950	85.04	5,078	92.01	5,814	94.11
Dependent variables						
Attending school (children 6-15)	**absolute**	**%**	**absolute**	**%**	**absolute**	**%**
Yes	2,732	87.73	3,089	86.28	2,850	80.08
No	382	12.27	491	13.72	709	19.92
Completed 1st grade (children 7-15)	**absolute**	**%**	**absolute**	**%**	**absolute**	**%**
Yes	2,138	83.58	2,541	86.37	2,359	86.13
No	420	16.42	401	13.63	380	13.87
Completed Primary School (children	**absolute**	**%**	**absolute**	**%**	**absolute**	**%**
Yes	258	11.92	267	11.01	241	10.72
No	1,907	88.08	2,157	88.99	2,008	89.28

As we can see, if school attendance is generally widespread among young children, problems arise with the completion of elementary school. This phenomenon is well known

in developing countries, and it is partially due to the delay in enrolment and to grades repetition. However, for the most part, it's due to children leaving school before completing the entire cycle. This, in turn, may be due to different causes: for example, as children grow up, their contribution to the family becomes more important, but it could also be a problem of the educational system: fewer teachers able to teach in higher grades, higher fees etc. Usually, it is a combination of different problems, both from the "demand side" (i.e. households) and the "supply side" (i.e. the educational system in the country): here the focus will be mainly on the demand side, trying to establish a correlation between household and individual characteristics and school outcomes. As mentioned before, supply-side variables were left out of the final specifications because they were not significant.

Since the analysis is conducted at the household level, and the control variables are mostly household variables, the dependent variables are transformed into the household average rates of school outcomes[62]. This also solves the problem of the individual specification models: because the last two waves are very close in time, and because the "yes" (*i.e.* the 1 values) observations in the mobility variable are few for the children age group, the power of the individual fixed effect model, which relies on difference among different years, is very low. Using household level observations allows us to overcome this problem, and allows us to use all the household in the panel. Furthermore, a fixed effect household model has the advantage to capture household-specific effects, which are crucial, given that children schooling is a family decision rather than an individual one. But it has, of course, the downside of losing child-specific information. With these caveats in mind, a household level model seems to be the best choice[63].

First of all, we have to define the new dependent variables, which are defined as follows, for each household -i:

$$Schooling_i = \sum_{j=1}^{J} y_j / J$$

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[62] As the variables are dummies, their average rates can also be interpreted as probabilities.
[63] See Giannelli and Binci as an exemple

Where J is the total number of children aged 6-15 in the household, and $y_{ij} = 1$ if child j goes to school, 0 otherwise. The same method is used for all the three schooling variables, changing the denominator J as the age range changes. Also, this is how all the other control dummy variables at the household level are constructed, always changing J according to the type of variable: basically, they are household averages of individual level variables.

Consequently, the schooling variables can take three range of values:

- *Schooling = 1* if $y_{ij} = 1$ for all *j*
- *0 < Schooling < 1* if $y_{ij} = 1$ for at least one *j*
- *Schooling = 0* if $y_{ij} = 0$ for all *j*

The base for the averages on schooling are: children aged 6 -15 for school attendance, children aged 7-15 for the completion of the first grade, and children aged 11-15 for primary school completion.

A crucial point of the model is to define the mobility variables at the household level. This step poses a conceptual question, as mobility can be defined in different ways, and there are several ways to proxy this variable. The solution that brings together the available data and the conceptual meaning, is to use a sort of "tag variable" at the household level that tags the household as "mover" [64], instead of an average which poses construction problems as, for example, the base for the average to be used, since one could argue whether to use all the members of the household, or only adults or children. Another interesting feature of addressing mobility in this way is that this type of variable tackles mobility in a retrospective way: the question about previous mobility is asked at the time of the interview, to each individual that is present at the time, *i.e.* individuals that have come back to their family and household (not in the same place, but within the same household). The variable doesn't address family members currently living elsewhere, so this variable is the most close to an assessment of the household past mobility, which is the crucial point of this work. The mobility variables are therefore two dummy variables: the first one takes value 1 if at least one adult member of the household (aged 16 and above) moved in the

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[64] The question is the number 9 in section 3 in the 2005-06 questionnaire: "Have you ever lived elsewhere since 2001?" and the number 15 in section 3 in the last two waves: "How many years have you been living here?" transformed in a dummy with value 1 if the answer was <5 for compatibility reasons.

previous five years, and 0 otherwise. The second one takes value 1 if at least on child moved in the previous five years, and 0 otherwise. At first glance they could be almost perfectly correlated, for example if adults and children move together, but they are not: correlation between the two variables is 0.29, which can be regarded, in fact, as low. This tells us that adults and children don't often move together. Also, as the two variables are used simultaneously in the models, each controls for the other.

Other control variables are described in the following table, along with their descriptive statistics (mean and standard deviation).

Table 4.3 Dependent and control variables, descriptive statistics.

Dependent and control Variables	Mean			St. Dev.		
	2005-06	2009-10	2010-11	2005-06	2009-10	2010-11
Dependent variables, household rates:						
School attendance	.534	.482	.306	.286	.265	.218
First grade completion	.635	.685	.686	.268	.247	.239
Primary completion	.124	.211	.222	.237	.277	.288
Mobility variables:						
Moved child	.095	.186	.189	.293	.389	.392
Moved Adult	.285	.235	.227	.452	.424	.419

Control variables:

Child age	9.628	9.858	9.907	2.336	2.252	2.22
Child age squared	98.156	102.246	103.061	45.385	44.579	44.755
Child gender (1 is female)	.347	.33	.355	.276	. 257	.220
N. of under 6	1.030	.986	1.013	.998	.993	1.010
N. of adult	2.782	3.388	3.931	1.649	1.975	2.387
N. of children 6-15	2.040	2.322	2.461	1.741	1.771	1.826
Age of head	42.434	46.364	46.999	14.828	14.714	14.653
Adults' disabilities	.071	.335	.393	.149	.236	.233
First expenditure quintile	.199	.188	.215	.399	.390	.411
Second expenditure quintile	.206	.204	.206	.404	.403	.404
Third expenditure quintile	.212	.204	.199	.409	.403	.399
Fourth expenditure quintile	.198	.188	.195	.399	.391	.396
Fifth expenditure quintile	.184	.193	.183	.388	.394	.387
Remittances log[65]	-.257	-.360	-.361	.546	.512	.512
Education of adult women	.297	.287	.268	.420	.398	.377
H. Head education: secondary	.249	.239	.261	.432	.427	.439
H. Head education: primary	.159	.151	.167	.366	.358	.374
H. Head education: less than primary	.406	.421	.418	.491	.494	.493
H. Head education: no education.	.185	.189	.153	.389	.392	.36

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[65] The natural logarithm of remittances includes both the value of local and international remittances (which are quite few), and is adjusted do address the problem of having logarithmic values of an initial 0 value.

Expenditures quintiles were calculated using the questionnaire section on household expenditures, and were divided by the square roots of the number of household members, to obtain per capita expenditures[66]. The average education of adult women is the probability of adult women in the household of having at least completed elementary school, and it is constructed in the same way as the previous averages. Average adults' disabilities is calculated scaling the number of reported disabilities[67] from adults in the household on the total number of adults.

One puzzling feature of these data is the unbalanced gender distribution in children: only about the 35 percent are female. It could be due to a higher mortality rate for infant and young girls, but the data don't seem to support this explanation, and mortality rates are actually higher for boys.[68] It can therefore be a problem due to underreporting and sample attrition.

5. Results for education

5.1 School attendance

Table 5.1 shows the results of the linear probability model of the average school attendance of children aged 6-15 in the household.
As we can see, the mobility variable for children has a positive and highly significant effect in all specifications, while the mobility of adults has a negative effect, although a slightly less significant one. These results show that there is not a negative externality in the choice of moving, when the ones who move are the children. Moving benefits children, possibly because they move in areas with better services. Making their children move could also account for a different attitude of parents toward education, if they decide to make them

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[66]This is alternative to equivalence scale methods, that requires distinction between type of expenditures. In order to minimize the missing values and use all available data, this method was preferred to equivalence scales. See OECD

[67] Section 6 in the 2005-06 questionnaire, and 7 in 2009-10 and 2010-11. Adults are all people aged 16 and above.

[68] Infant mortality rate is 70 for male and 59 for females. Under 5 mortality rate is 114 for boys and 98 for girls (DHS 2011, rates are in 1,000)

move in order to access better schools (or just to access school in general). On the contrary, when the decision to move involves only adults, this has negative effects on children's left behind school attendance. As mentioned before, the two more probable causes of this result are that children substitute, in household chores and possibly work, for missing adults and that there is a lack of supervision when adults are missing. Also, the decision power may shift to older members of the household who don't place a priority value to education. These results concerning adults' mobility are in line with previous results and findings in literature, while results on in general report negative outcomes for migrant children, but are more focused on international migrating children.

The other significant covariates have the expected signs, except for gender: being female, in average, seems to have a slightly positive effect on school attendance. The same result is found in other east-African countries, and evidence in therefore confirmed. At the same time, the specific result could be the effect of a slight selection bias, given the skewed gender distribution in the sample. This effect, though, only holds for general attendance not for completing primary or first grade, for which there is no significant difference between boys and girls.

The number of children aged 6 to 15 in the household has a negative effect, showing that there is a competition for household resources: when there are many children, not all of them gets the opportunity to go to school. This could also be an effect of the above mentioned UPE reform, which made a goal to guarantee access to primary education up to four children per family.

The education of the head of the household doesn't have any significant effect, while the average education of adult women has a positive and significant one: this result is also in line with previous literature, which finds that mothers' education is more important in predicting children's schooling outcomes. The lack of significance of the household head's level of education should not be surprising in a country where the general level of education is very low and, as a consequence, there are few observations of household heads having finished primary school. The only significant result, is, indeed, found for the low level of education, which means some primary. So, household whose head had at least some education are more likely to send children to school. It can be that the effect of the education of adults on children's school attendance is indeed a discontinuous one, with the

most part of the effect deployed in having some education with respect to having none.

Another interesting result is the negative sign of the rate of adult disability in the household: this result strengthens the evidence that children actively substitute their parents in household and family duties, such as assistance to disables and elderly.

Household or general work is not included as a covariate because of endogeneity issues: children don't go to school because they work, but they also work because they don't go to school. Given the difficulty of disentangling this matter, and the fact that it could invalidate the model, children's work is left out of these specifications. Separate results for child labour are found in section 6.

Table 5.1- Household rate of school attendance - linear probability model.

Children 6-15

	Model A	Model B	Model C	Model D
Av. Age of children	0.132^{***}	0.128^{***}	0.134^{***}	0.134^{***}
	(0.0148)	(0.0147)	(0.0147)	(0.0147)
Av. Age of children sq.	-0.00589^{***}	-0.00576^{***}	-0.00596^{***}	-0.00596^{***}
	(0.000744)	(0.000739)	(0.000739)	(0.000739)
Child Gender	0.0486^{*}	0.0542^{*}	0.0457^{*}	0.0479^{*}
	(0.0214)	(0.0213)	(0.0213)	(0.0213)
Age of head	0.000164	0.000488	0.0000614	
	(0.000840)	(0.000836)	(0.000834)	
N. children 0-5	0.00250	0.00500	0.0128^{*}	0.0125^{*}
	(0.00529)	(0.00527)	(0.00544)	(0.00547)
N. children 6-15	-0.0771^{***}	-0.0799^{***}	-0.0777^{***}	-0.0780^{***}
	(0.00407)	(0.00407)	(0.00404)	(0.00406)
2nd Expenditures Quintile	0.0267^{*}	0.0290^{*}	0.0241^{*}	0.0234
	(0.0121)	(0.0120)	(0.0120)	(0.0120)
3rd Expenditures Quintile	0.0192	0.0225	0.0179	0.0171
	(0.0130)	(0.0130)	(0.0129)	(0.0130)
4th Expenditures Quintile	0.0514^{***}	0.0559^{***}	0.0477^{***}	0.0472^{***}
	(0.0144)	(0.0143)	(0.0143)	(0.0143)

5th Expenditures Quintile	0.0253	0.0343*	0.0223	0.0229
	(0.0170)	(0.0170)	(0.0169)	(0.0169)
Log of Remittances	0.00898	0.00769	0.0103	0.00999
	(0.00830)	(0.00825)	(0.00824)	(0.00825)
At least 1 Moved child	0.0397***	0.0384***	0.0376***	0.0351**
	(0.0114)	(0.0113)	(0.0113)	(0.0113)
At least 1 Moved adult	-0.0260*	-0.0162	-0.0306**	-0.0309**
	(0.0105)	(0.0105)	(0.0104)	(0.0104)
Women's Education	0.0616***	0.0606***	0.0422*	0.0337
	(0.0170)	(0.0169)	(0.0171)	(0.0175)
Wave 2005-06	0.212***	0.182***	0.156***	0.151***
	(0.00882)	(0.00982)	(0.0119)	(0.0112)
Wave 2009-10	0.165***	0.153***	0.155***	0.151***
	(0.00711)	(0.00731)	(0.00720)	(0.00724)
N. adults		-0.0219***		
		(0.00332)		
Av. disability			-0.179***	-0.181***
			(0.0260)	(0.0263)
Head low ed.				0.00184
				(0.0182)
Head primary ed.				-0.0132
				(0.0233)
Head sec. ed.				-0.0290
				(0.0259)
Constant term	-0.237**	-0.134	-0.169*	-0.151*
	(0.0808)	(0.0818)	(0.0809)	(0.0725)
N^{69}	5208	5208	5207	5159
R^2	0.323	0.332	0.332	0.329
adj. R^2	-0.097	-0.083	-0.082	-0.095

Standard errors in parentheses* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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[69] Number of observations is the number of households. The number may vary in different specifications due to missing values in the covariates.

Table 5.2 shows the results for the two-side censoring model, which confirms the previous results, except for disability: because of the low values of the variable, due to relatively fewer observations, this particular specification could not be run with this model. Everything else remains the same, thus confirming the findings of the linear probability model.

Table 5.2 – Household rate of school attendance - two side censoring model

Children 6-15

	Model A	Model B	Model C
Av. Age of children	0.152***	0.149***	0.151***
	(0.0282)	(0.0276)	(0.0282)
Av. Age of children sq.	-0.00666***	-0.00662***	-0.00659***
	(0.00139)	(0.00135)	(0.00139)
Child Gender	0.0778	0.0793	0.0810
	(0.0420)	(0.0412)	(0.0421)
Age of head	0.000515	0.000857	
	(0.00110)	(0.00104)	
N. children 0-5	-0.00244	0.000702	-0.00314
	(0.00636)	(0.00644)	(0.00643)
N. children 6-15	-0.0909***	-0.0958***	-0.0912***
	(0.00546)	(0.00568)	(0.00551)
2nd Expenditures Quintile	0.0215	0.0231	0.0211
	(0.0151)	(0.0150)	(0.0151)
3rd Expenditures Quintile	0.00876	0.0122	0.00739
	(0.0162)	(0.0161)	(0.0162)
4th Expenditures Quintile	0.0427*	0.0469**	0.0414*
	(0.0170)	(0.0170)	(0.0169)
5th Expenditures Quintile	0.00970	0.0203	0.0116
	(0.0196)	(0.0196)	(0.0194)
Log of Remittances	0.00588	0.00507	0.00532

	(0.00974)	(0.00981)	(0.00978)
At least 1 Moved child	0.0451***	0.0443***	0.0427***
	(0.0127)	(0.0127)	(0.0129)
At least 1 Moved adult	-0.0317**	-0.0224	-0.0323**
	(0.0115)	(0.0116)	(0.0117)
Women's Education	0.0814***	0.0807***	0.0729***
	(0.0190)	(0.0187)	(0.0194)
Wave 2005-06	0.256***	0.223***	0.249***
	(0.0111)	(0.0125)	(0.00960)
Wave 2009-10	0.196***	0.182***	0.190***
	(0.00780)	(0.00820)	(0.00772)
N. adults			
Av. disability		-0.0242***	
		(0.00412)	
Head low ed.			-0.00862
			(0.0210)
Head primary ed.			-0.0210
			(0.0250)
Head sec. ed.			-0.0350
			(0.0296)
N	5208	5208	5160

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.2 First grade and primary completion.

Tables 5.3 and 5.4 show the results for first grade and primary completion. As we can see, many covariates loose significance, among which the mobility variable: there is no evidence of any mobility effect on completing either the first grade or primary school. This results seems to validate the hypothesis of parents moving children to reach better services area, so that they may enrol them in school. On the other hand, moving doesn't have a negative effect, either: there is no evidence of any sort of disruptive effect of children

completing school.[70] In fact, as it is often the case in many low income countries, it is possible that the problem in completing school is much more due to a low school quality, with schools lacking infrastructure and qualified staff.

As before, the presence of children aged 6 to 15 in the household keeps a negative effect, confirming that competition over the household resources is a major obstacle in children education.

Table 5.3 shows the results for completing first grade, and table 5.4 for primary school.

Table 5.3 – Household rate of completion of first grade - linear probability model

Children 7-15

	Model A	Model B
Av. Age of children	-0.0691**	-0.0694**
	(0.0221)	(0.0222)
Av. Age of children sq.	0.00338**	0.00340**
	(0.00105)	(0.00105)
Child Gender	0.0423	0.0413
	(0.0243)	(0.0243)
Age of head	-0.00979	-0.0115
	(0.0113)	(0.0114)
N. children 0-5	-0.00497	-0.00272
	(0.0106)	(0.0107)
N. children 6-15	0.000202	
	(0.000886)	
2nd Expenditures Quintile	0.00000390	-0.000560
	(0.00531)	(0.00534)
3rd Expenditures Quintile	-0.0709***	-0.0710***
	(0.00401)	(0.00405)
4th Expenditures Quintile	-0.00388	-0.00315
	(0.0123)	(0.0123)

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[70] As the Two-side censoring model confirms the findings of the linear probability model, it will be left out from now on.

5th Expenditures Quintile	0.0135	0.0142
	(0.0133)	(0.0133)
Log of Remittances	0.0000688	0.00212
	(0.0145)	(0.0146)
At least 1 Moved child	0.0111	0.0113
	(0.0172)	(0.0172)
At least 1 Moved adult	-0.00154	-0.00150
	(0.00833)	(0.00839)
Women's Education	0.0322	0.0358[*]
	(0.0172)	(0.0176)
Wave 2005-06	-0.0763[***]	-0.0766[***]
	(0.00906)	(0.00809)
Wave 2009-10	-0.0102	-0.00884
	(0.00704)	(0.00711)
N. adults		0.0359
		(0.0184)
Av. disability		0.0218
		(0.0235)
Head low ed.		0.0250
		(0.0263)
Head primary ed.	1.217[***]	1.201[***]
	(0.121)	(0.114)
N	4497	4470
R²	0.180	0.182
adj. *R²*	-0.397	-0.401

Standard errors in parentheses[*] $p < 0.05$, [**] $p < 0.01$, [***] $p < 0.001$

In the next table, results are similar as the previous ones: no significant effect of mobility, either positive nor negative, for both adults and children. Again, the number of children in the household has a negative effect on completing primary school.

The difference from the previous results is that the average education of adult women in the

household is now highly significant and positive: in line with literature findings, we see here that women education plays a crucial role not only in school enrolment, but also in school completion. Investing in girls and women education its confirmed to be one of the most important and effective policy to undertake to improve overall education and reach the Millennium Development Goals on education.

Table 5.4 – Household rate of completion of Primary school - linear probability model

Children 11-15

	Model A	Model B
Av. Age of children	-0.106**	-0.107**
	(0.0362)	(0.0362)
Av. Age of children sq.	0.00476**	0.00480**
	(0.00164)	(0.00164)
Child Gender	0.0269	0.0290
	(0.0322)	(0.0321)
Age of head	-0.000871	
	(0.00111)	
N. children 0-5	0.00139	0.00199
	(0.00660)	(0.00659)
N. children 6-15	-0.0255***	-0.0257***
	(0.00491)	(0.00491)
2nd Expenditures Quintile	-0.00161	-0.00182
	(0.0153)	(0.0153)
3rd Expenditures Quintile	0.0189	0.0177
	(0.0164)	(0.0164)
4th Expenditures Quintile	0.0209	0.0207
	(0.0177)	(0.0177)
5th Expenditures Quintile	0.0340	0.0331
	(0.0207)	(0.0207)
Log of Remittances	0.000629	0.00232
	(0.0101)	(0.0101)

At least 1 Moved child	0.00563	0.00653
	(0.0137)	(0.0136)
At least 1 Moved adult	0.0212	0.0200
	(0.0130)	(0.0129)
Women's Education	0.144***	0.138***
	(0.0211)	(0.0213)
Wave 2005-06	-0.153***	-0.147***
	(0.0115)	(0.0100)
Wave 2009-10	-0.0295***	-0.0257**
	(0.00840)	(0.00839)
N. adults		0.00615
		(0.0211)
Av. disability		0.0381
		(0.0215)
Head low ed.		0.0337
		(0.0241)
Head primary ed.	0.869***	0.801***
	(0.203)	(0.196)
N	3602	3604
R^2	0.163	0.167
adj. *R^2*	-0.535	-0.529

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The last table (table 5.5) presents the results from the estimation of the multilevel model: as explained before, the covariates are fewer than in the previous models. Still, the effects of children's mobility is confirmed to be significantly positive, while adults mobility lost its importance. It should be reminded that the model estimated with the mixed procedure is an individual one, no more an household averages one. The first column shows the results of a mixed logit model, while the second the results of a mixed linear model.

Table 5.5 - Mixed model with 3 levels, schooling

	ML logit	Mixed linear
Female	0.198	0.0143
	(0.121)	(0.00860)
Age	2.560***	0.210***
	(0.199)	(0.0111)
Age sq.	-0.113***	-0.00919***
	(0.00927)	(0.000531)
N. children 0-5 in the H	-0.559***	-0.0454***
	(0.157)	(0.0128)
At least 1 moved child	0.750***	0.0449***
	(0.188)	(0.0119)
At least 1 moved adult	-0.0277	-0.00230
	(0.154)	(0.0108)
2009	-0.157	-0.0128
	(0.108)	(0.00758)
Constant term	-10.33***	-0.247***
	(0.893)	(0.0557)
Lev 1 cons	0.363	-1.873
	(4.077)	(4.141)
Lev 2 cons	0.256	-3.273
	(5.041)	(68.03)
Sigma e		-1.285***
		(0.0167)
N	6240	6240

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

These results seem to point in the direction of parents making indeed a rational decision when moving their children, probably to have access to education. In this context, the possibility to overcome infrastructural problems seems to prevail over the possible disruptive effect of moving. At the same time, adults moving seems to have either no effect or, when it does, a negative one, thus confirming previous findings.

6. Additional results for health and child labour

Education is only a part of the general formation of human capital. As argued by many researchers in recent years, it could as well be the smallest part of the process. One important factor of human capital is health, as health conditions affect the possibility for a child to obtain education, and to participate in the normal activities that contribute to the formation of skills and abilities[71].

The other phenomenon endangering human capital formation, especially in developing countries is child labour[72]. Unfortunately, while the subject of a broad literature, the causes and consequences of child labour are difficult to assess, as the definition itself of "labour" can be questionable in many regards. Furthermore, child labour is difficult to tackle in surveys, as it is often labour in the household of the family farm or business, and therefore often it is not recorded as labour, because it is not regarded as such by family members. Nonetheless, surveys are becoming ever more precise to overcome this difficulties, and data are now more reliable. In the UNPS there are several questions regarding household members' activities, detailed in hours per week, and divided in both domestic and market (paid or not) activities.

UNICEF defines child labour as follows:

"*A child is considered to be involved in child labour activities under the following classification: (a) children 5 to 11 years of age that during the week preceding the survey did at least one hour of economic activity or at least 28 hours of domestic work, and (b) children 12 to 14 years of age that during the week preceding the survey did at least 14 hours of economic activity or at least 42 hours of economic activity and domestic work combined.*"

Allowing for a bit more of leeway, here children (aged 6-15) are defined as engaged in labour if they did more 20 hours combined of housework or market work (paid or unpaid).

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[71] See Becker (2007).
[72] See, for all, Basu and Van (1998).

It is a more loose definition than the one by UNICEF, and it has been chosen in order to be more inclusive or children's activities.

As both child labour and health presents problem of endogeneity when analyzed together with schooling, the analysis have been done separately.

Table 6.1 shows the results for the health variable. The dependent variable is the probability for a child, aged 6 to 15, to have been injured or ill in the moth previous to the survey. Controls variable are the same as in the schooling model. Mobility doesn't seem to have any significant effect on the child's health. As we can see, being female has a negative effect on health, as it increase the probability of being ill or injured. Surprisingly, the number of children in school age range has a positive effect on health (i.e. a negative one on the dependent variable), it could be an effect due to increased rate of survival: healthier children have a higher probability of surviving to school age. The positive effect of remittances log could be due to an endogeneity problem, if remittances are sent to help the family in need. The same can be said for the expenditures quintiles. In general, is difficult to establish a causal link for health, as reverse causality is always looming over the results, so they are to be taken with a caution.

Table 6.1:Household rate of illness/injury - Linear probability model
Children 6-15

	Model A	Model B	Model C	Model D
Av. Age of children	-0.0785***	-0.0790***	-0.0795***	-0.0814***
	(0.0166)	(0.0167)	(0.0166)	(0.0166)
Av. Age of children sq.	0.00357***	0.00358***	0.00363***	0.00372***
	(0.000837)	(0.000838)	(0.000833)	(0.000835)
Child Gender	0.100***	0.101***	0.103***	0.106***
	(0.0244)	(0.0244)	(0.0243)	(0.0242)
Age of head	-0.000516	-0.000482	-0.000379	
	(0.000966)	(0.000968)	(0.000961)	
N. children 0-5	0.0129*	0.0132*	0.00325	0.00341
	(0.00595)	(0.00596)	(0.00614)	(0.00615)
N. children 6-15	-0.0319***	-0.0322***	-0.0313***	-0.0310***
	(0.00456)	(0.00459)	(0.00454)	(0.00455)
2nd Expenditures Quintile	0.0334*	0.0336*	0.0352**	0.0348*

	(1)	(2)	(3)	(4)
	(0.0136)	(0.0136)	(0.0135)	(0.0135)
3rd Expenditures Quintile	0.0249	0.0252	0.0252	0.0249
	(0.0147)	(0.0147)	(0.0147)	(0.0147)
4th Expenditures Quintile	0.0315	0.0320*	0.0340*	0.0331*
	(0.0162)	(0.0163)	(0.0162)	(0.0162)
5th Expenditures Quintile	0.0358	0.0367	0.0368	0.0352
	(0.0192)	(0.0192)	(0.0191)	(0.0191)
Log of Remittances	0.0269**	0.0267**	0.0255**	0.0257**
	(0.00935)	(0.00936)	(0.00931)	(0.00931)
At least 1 Moved child	0.0106	0.0105	0.0124	0.0120
	(0.0127)	(0.0127)	(0.0126)	(0.0126)
At least 1 Moved adult	-0.0210	-0.0201	-0.0165	-0.0163
	(0.0118)	(0.0119)	(0.0117)	(0.0117)
Women's Education	-0.00955	-0.00972	0.00690	0.00809
	(0.0191)	(0.0191)	(0.0192)	(0.0195)
Wave 2005-06	0.0228*	0.0199	0.0763***	0.0785***
	(0.00997)	(0.0112)	(0.0135)	(0.0127)
Wave 2009-10	0.0366***	0.0353***	0.0462***	0.0464***
	(0.00800)	(0.00829)	(0.00813)	(0.00813)
N. adults		-0.00217		
		(0.00376)		
Av. disability			0.173***	0.173***
			(0.0298)	(0.0298)
Head low ed.				-0.0275
				(0.0187)
Head primary ed.				-0.00224
				(0.0189)
Head sec. ed.				-0.00142
				(0.0220)
Constant term	0.683***	0.693***	0.617***	0.630***
	(0.0914)	(0.0931)	(0.0917)	(0.0816)
N	5226	5226	5225	5228
R²	0.072	0.072	0.082	0.083
adj. *R²*	-0.511	-0.511	-0.495	-0.494

Standard errors in parentheses *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

The same kind of caveat applies to the results for child labour, displayed in table 6.2. As we can see, there are almost no significant results, and, more strikingly they do not mirror to the ones found for schooling. The conclusion could be that in the specific context schooling and child labour are not substitutes. It could also be that in very poor context children don't even work, as there is nothing or little to work on. It is interesting to note that the average rate of disabilities in adults makes it less likely for a child to work, meaning that probably children are preferred to look after family members. Also, the number of adults reduces the probability of working, which in turn points toward a substitution effect in duties between children and parents.

As suggested in the above paragraph, one of the main problems in poor developing countries is not only child labour, but children not doing actually anything: neither working, nor attending school. Because the results discussed above pointed in that direction, estimation have been made also for the average probability at the household level, for a child aged 6 to 15, to be "idle", *i.e.* to neither work nor go to school. Table 6.3 shows the results for these estimations.

The number of younger siblings and children living in the same household decreases the probability of being idle, validating to some extent the general assumptions that older children usually care for younger ones, or that they substitute their parents (usually the mother) in household chores while they care for the youngest children. Opposite and complementary to the previous result, average disability rate in household adults increase the probability of being idle. And the same kind of opposition and complementarities with schooling can be found for women education.

As for mobility results, we can find the mirrored results: moving adults results in an increased probability of neither attending school nor working, while the opposite is true for children having moved. Also, while for school expenditure quintiles where less significant, here they are all significantly negative.

Table 6.2 – Household rate of child labour - Linear probability model
Children 6-15

	Model A	Model B	Model C	Model D
Av. Age of children	-0.0581[***]	-0.0662[***]	-0.0578[***]	-0.0570[***]
	(0.0118)	(0.0114)	(0.0117)	(0.0117)
Av. Age of children sq.	0.00322[***]	0.00345[***]	0.00320[***]	0.00315[***]
	(0.000592)	(0.000571)	(0.000586)	(0.000587)
Child Gender	-0.000323	0.00948	-0.00294	-0.00218
	(0.0170)	(0.0165)	(0.0169)	(0.0168)
Age of head	-0.000488	0.000138	-0.000597	
	(0.000670)	(0.000648)	(0.000664)	
N. children 0-5	-0.00831[*]	-0.00379	0.000708	0.000560
	(0.00418)	(0.00404)	(0.00430)	(0.00429)
N. children 6-15	-0.00267	-0.00775[*]	-0.00333	-0.00329
	(0.00324)	(0.00314)	(0.00321)	(0.00321)
2nd Expenditures Quintile	0.0208[*]	0.0251[**]	0.0186	0.0190[*]
	(0.00964)	(0.00930)	(0.00955)	(0.00955)
3rd Expenditures Quintile	0.0105	0.0165	0.00962	0.0102
	(0.0104)	(0.0100)	(0.0103)	(0.0103)
4th Expenditures Quintile	0.00628	0.0146	0.00324	0.00328
	(0.0115)	(0.0111)	(0.0114)	(0.0114)
5th Expenditures Quintile	0.00211	0.0183	0.000350	-0.000550
	(0.0135)	(0.0131)	(0.0134)	(0.0134)
Log of Remittances	-0.00162	-0.00409	-0.000572	-0.000441
	(0.00661)	(0.00637)	(0.00655)	(0.00654)
At least 1 Moved child	-0.000735	-0.00301	-0.00288	-0.00312
	(0.00899)	(0.00867)	(0.00891)	(0.00889)
At least 1 Moved adult	0.00236	0.0204[*]	-0.00246	-0.00213
	(0.00830)	(0.00809)	(0.00824)	(0.00825)
Women's Education	0.0389[**]	0.0359[**]	0.0225	0.0214
	(0.0134)	(0.0129)	(0.0134)	(0.0136)
Wave 2005-06	0.0586[***]	0.00465	0.00686	0.00981

	(0.00701)	(0.00758)	(0.00941)	(0.00884)
Wave 2009-10	-0.0219***	-0.0451***	-0.0314***	-0.0310***
	(0.00565)	(0.00564)	(0.00571)	(0.00571)
N. adults		-0.0404***		
		(0.00257)		
Av. disability			-0.168***	-0.166***
			(0.0205)	(0.0205)
Head low ed.				0.0240
				(0.0128)
Head primary ed.				0.00163
				(0.0133)
Head sec. ed.				-0.00789
				(0.0153)
Constant term	0.570***	0.759***	0.636***	0.586***
	(0.0642)	(0.0631)	(0.0641)	(0.0571)
N	5295	5295	5294	5297
R^2	0.074	0.139	0.092	0.093
adj. R^2	-0.499	-0.394	-0.470	-0.469

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In general, results for idle children are consistent with the ones for school attendance, while the ones for child labour are not. Even with all the caveats on the estimation problems, we can conclude that the main issue opposing children's schooling is not children labour, but instead children doing nothing. These findings are consistent with the literature.[73]

Also, there is a confirmation of the previous results on moving: when adults move from the household, children's human capital may be at risk, while if they are the ones moving, they are better off. This is due probably to the fact that children are made to move by their parents or guardians to areas where they have better access to services and are less exposed to dangers and struggle.

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[73] See Biggeri, Guarcello, Lyon and Rosati (2003)

Table 6.3 – Household rate of idle children - Linear probability model

	Model A	Model B	Model C	Model D
Av. Age of children	-0.228***	-0.227***	-0.229***	-0.232***
	(0.0178)	(0.0178)	(0.0176)	(0.0173)
Av. Age of children sq.	0.00968***	0.00966***	0.00973***	0.00988***
	(0.000896)	(0.000896)	(0.000886)	(0.000873)
Child Gender	-0.00846	-0.00922	-0.00391	-0.00678
	(0.0258)	(0.0259)	(0.0255)	(0.0251)
Age of head	-0.00123	-0.00127	-0.00105	
	(0.00101)	(0.00101)	(0.001000)	
N. children 0-5	-0.00132	-0.00166	-0.0168*	-0.0155*
	(0.00637)	(0.00638)	(0.00652)	(0.00646)
N. children 6-15	0.0435***	0.0439***	0.0446***	0.0440***
	(0.00490)	(0.00493)	(0.00484)	(0.00480)
2ⁿᵈ Expenditures Quintile	-0.0411**	-0.0415**	-0.0371**	-0.0373**
	(0.0145)	(0.0145)	(0.0143)	(0.0141)
3ʳᵈ Expenditures Quintile	-0.0540***	-0.0544***	-0.0519***	-0.0523***
	(0.0157)	(0.0157)	(0.0155)	(0.0153)
4ᵗʰ Expenditures Quintile	-0.0937***	-0.0944***	-0.0881***	-0.0885***
	(0.0173)	(0.0174)	(0.0171)	(0.0169)
5ᵗʰ Expenditures Quintile	-0.0875***	-0.0887***	-0.0835***	-0.0839***
	(0.0205)	(0.0206)	(0.0203)	(0.0200)
Log of Remittances	-0.0107	-0.0105	-0.0128	-0.0112
	(0.01000)	(0.01000)	(0.00988)	(0.00975)
At least 1 Moved child	-0.0618***	-0.0616***	-0.0584***	-0.0528***
	(0.0137)	(0.0137)	(0.0135)	(0.0133)
At least 1 Moved adult	0.0221	0.0208	0.0297*	0.0333**
	(0.0126)	(0.0127)	(0.0125)	(0.0123)
Women's Education	-0.0751***	-0.0750***	-0.0461*	-0.0233
	(0.0204)	(0.0204)	(0.0204)	(0.0206)
Wave 2005-06	-0.0925***	-0.0885***	-0.00592	0.00198

	(1)	(2)	(3)	(4)
	(0.0106)	(0.0119)	(0.0142)	(0.0133)
Wave 2009-10	-0.0437***	-0.0420***	-0.0281**	-0.0199*
	(0.00856)	(0.00886)	(0.00863)	(0.00855)
N. adults		0.00300		
		(0.00402)		
Av. disability			0.280***	0.264***
			(0.0311)	(0.0311)
Head low ed.				0.0145
				(0.0215)
Head primary ed.				0.0239
				(0.0276)
Head sec. ed.				0.0324
				(0.0306)
Constant term	1.515***	1.501***	1.405***	1.344***
	(0.0973)	(0.0992)	(0.0970)	(0.0856)
N	5208	5208	5207	5159
R^2	0.127	0.127	0.148	0.146
adj. R^2	-0.414	-0.414	-0.380	-0.393

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Author's elaboration on UNPS data

7. Conclusions

The present work sought to examine the relationship between family mobility and children's schooling, since the formation of human capital and mobility are both crucial issues for development. To this end, Uganda was chosen as a case study, and the analysis was carried out using data from the three waves of the Uganda National Panel Survey. Household mobility was represented by two dummy variables, one for the mobility of children, one for the mobility of adults. School attendance for children aged 6 to 15 was analyzed in relation to household characteristics, using an household average model with fixed effects, estimated both with linear probability and two-censoring model (the latter

didn't give significantly different results, though). Estimation results shows that children who moved in the five years prior to the survey had a better chance to attend school, while children whose parents had moved had a lower probability of attending school. The same kind of estimates were repeated also for the completion of the first grade of primary school and for the completion of all primary school, but no significant evidence was found for mobility. As further robustness check, the analysis was also done using a mixed technique, which allows for both individual and household-specific effects. Results were confirmed. It seems that for developing countries, the crucial issue is the re-allocation of time, chores and supervision inside the household.

As human capital formation also depends on different factors other than schooling, models were also estimated for health and child labour. No significant result was found, and for child labour the results were somewhat puzzling in that no factor seemed relevant. Other than estimation problems, this could be due to the fact that in poor countries children who don't attend school often don't work, either. To test this hypothesis, a last estimation was run on the probability for a child to be "idle", i.e. to neither work nor to attend school, and the results mirrored the ones found for schooling. Mobility has the opposite effect: children moving decrease the probability of being idle, while the reverse is true for adults moving.

In general, we can say that even if the results of the present work are mixed, they are in line with the previous literature for developing countries: if children move, possibly to access better areas, the effect of mobility is positive, while the opposite applies when adults move. When adults are missing from the household, even if for a limited period of time, the effects on children's school attendance are detrimental.

This work adds to the literature in that it addresses both adults' and children's mobility, whose effects were never been studied together. Also, it adds in the investigation of a past mobility, which is a different concept from current migration (and absence) of family members: the use of a retrospective mobility variable, added to the use of fixed effects panel data, makes the results more relevant, since schooling choices have long-term consequences. Finally, it adds to the literature in using newly available data, and investigating a country seldom studied in this aspect.

Further research investigating the effects of mobility on children's welfare and human capital formation is of course needed, as the results are possibly very much context-specific.

References

Akresh R., P. Verwimp and T. Bundervoet, 2011 "Civil War, Crop Failure, and Child Stunting in Rwanda" *Economic Development and Cultural Change*, vol. 59(4), pp. 777-810

Antman F., 2012 "Gender, Educational Attainment, and the Impact of Parental Migration on Children Left Behind" *Journal of Population Economics*, vol. 25(4), pp. 1187-1214

Basu K. and P. H. Van, 1998 "The Economics of Child Labor" *American Economic Review*, vol. 88(3), pp. 412-27

Becker G. S., 1964, *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, Columbia University Press, New York

Becker G.S., 1975 *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education* Columbia University Press for NBER, New York

Becker G.S., 2007 "Health as human capital: synthesis and extensions" *Oxford Economic Papers* vol. 59 (3), pp. 379-410

Biggeri M., L. Guarcello, S. Lyon and F. Rosati, 2003 *The puzzle of "idle" children: neither in school nor performing economic activity. Evidence from six countries*, Understanding Children's Work (UCW) Project (ILO, UNICEF and WB)

Björklund A. and K. G. Salvanes, 2010 *Education and Family background: mechanisms and policies*, IZA Discussion Paper No. 5002

Calero C., A.S. Bedi and R. Sparrow, 2009 "Remittances, liquidity constraints and human capital investments in Ecuador" *World Development*, vol. 37(6), pp. 1143 - 1154

Conti G. and J.J. Heckman, 2012 *The Economics of Child Well-Being* IZA Discussion Paper No.6930

Cooke T. J. and A. J. Bailey, 1996 "Family Migration and the Employment of Married Woman and Men" *Economic Geography*, vol. 72(1), pp. 38-48

Del Boca D., 2003 "Mothers, fathers and children after divorce: The role of institutions"

Journal of Population Economics, vol. 16(3), pp. 399 - 422

Deininger K., 2003 "Does the cost of schooling affect enrollment by the poor? Universal primary education in Uganda" *Economics of Education Review*, vol. 22, pp. 291-305

Giannelli G. and L. Mangiavacchi, 2010 "Children's Schooling and Parental Migration: Empirical Evidence on the `Left-behind' Generation in Albania" *Labour*, vol. 24, pp. 76-92

Giannelli G.C. and M. Binci, 2013 "Internal vs. International Migration: Impacts of Remittances on Child Well-Being in Vietnam" forthcoming in *Journal of Development Studies*

Heckman J. J., 2007 *The Economics, Technology and Neuroscience of Human Capability Formation* NBER Working Papers 13195, National Bureau of Economic Research, Inc.

Harris J. R. And M. P. Todaro, 1970 "Migration, unemployment and development: a two-sector analysis" *The American Economic Review*, vol. 60, pp. 126-142

Mincer J., 1978 "Family Migration Decisions" *Journal of Political Economy*, vol. 68(5), pp. 749-773

Nivalainen S., 2004 "Determinants of Family Migration: Short Moves vs. Long Moves" *Journal of Population Economics*, vol. 17(1), pp. 157-175

Pribesh S. and D. B. Downey, 1999 "Why are residential and school moves associated with poor school performance?" *Demography*, vol. 36, pp. 521-534

Sandell S. H., 1977 "Women and the economics of family migration" *Review of Economics and Statistics*, vol. 59, pp. 406-14

Sjaastad L.A., 1962 "The costs and returns oh human migration" *Journal of Political Economy*, vol. 70, pp. 80-93

South S. J., D. L. Hayne, S. Bose, 2005 "Residential Mobility and the onset of Adolescent Sexual Activity" *Journal of Marriage and Family*, vol. 67, pp. 499-514

Spitze G., 1984 "The effect of family migration on wives' employment: how long does it

last?" *Social Science Quarterly*, vol. 65, pp. 21-36

Sucoff C. A. And D. M. Upchurch, 1998 "Neighbourhood context and the risk of childbearing among metropolitan-area Black adolescents" *American Sociological Review*, Vol. 63, pp. 571-585

Teachman C. J., K. Paasch and K. Carver, 1996 "Social capital and dropping out of school early" *Journal of Marriage and Family*, vol. 58, pp. 773-783

Verwimp P., J. van Bavel, 2005 "Child Survival and Fertility of Refugees in Rwanda" *European Journal of Population*, vol. 21, pp. 271-290

Bibliography

Acemoglu D and J. Angrist, 2001 "How Large are Human-Capital Externalities? Evidence from Compulsory-Schooling Laws" in *NBER Macroeconomics Annual 2000*, Volume 15 (2001), MIT Press

Adams Jr, R., A. Cuecuecha and J. Page, 2008 *Remittances, consumption and investment in Ghana* World Bank Policy Research Working Paper Series, No. 4515

Adams Jr. R., 2005 *Remittances, household expenditure and investment in Guatemala* World Bank Policy Research Working Paper No. 3532

Akresh R. et al, 2010 *Child Ability and Household Human Capital Investment Decisions in Burkina Faso* IZA Discussion Paper No. 5326

Akresh R., P. Verwimp and T. Bundervoet, 2011 "Civil War, Crop Failure, and Child Stunting in Rwanda" *Economic Development and Cultural Change*, vol. 59(4), pp. 777-810

Alexander K.L., D.R. Entwisle et al., 1996 "Children in motion: School transfers and elementary school performance" Journal of Educational Research, vol. 90(1), pp. 3-12

Antman F.M., 2011a "The intergenerational effects of paternal migration on schooling and work: What can we learn from children's time allocations?" *Journal of Development Economics*, vol. 96 (2), pp. 200-208

Antman F.M., 2011b "International Migration and Gender Discrimination among Children Left Behind" American Economic Review, vol. 101(3), pp. 645-49

Antman F.M., 2012 "Gender, Educational Attainment, and the Impact of Parental Migration on Children Left Behind" *Journal of Population Economics*, vol. 25(4), pp. 1187-1214

Assaad R., D. Levison and H.A. Dang, 2010 "How much work is too much? Effects of child work hours on schooling. The case of Egypt" in *Child Labor and the Transition Between School and Work*, pp. 53 – 98, IZA

Assaad R., D. Levison and N. Zibani, 2010 "The Effect of Domestic Work on Girls Schooling: Evidence from Egypt" *Feminist Economics*, vol. 16(1), pp. 79 - 12

Audette R., R. Algozzine and M. Warden, 1993 "Mobility and school achievement" *Psychological Reports*, vol. 72, pp. 701-702

Ayalew T., 2005 "Parental Preference, Heterogeneity, and Human Capital Inequality" *Economic Development and Cultural Change*, vol. 53(2), pp. 381-407

Baetschmann G., K. Staub and R. Winkelmann, 2011 *Consistent Estimation of the Fixed Effects Ordered Logit Model* IZA Discussion Papers No. 5443

Barro R. J., 2001 "Human Capital and Growth" *American Economic Review*, vol. 91(2), pp. 12-17

Barsoum G., 2007 *Egypt labor market panel survey 2006: report on methodology and data collection,* Economic Research Forum, Cairo.

Basu K. and P. H. Van, 1998 "The Economics of Child Labor" *American Economic Review*, vol. 88(3), pp. 412-27

Basu K., 1999 "Child Labor: Cause, Consequence, and Cure, with Remarks on International Labor Standards" *Journal of Economic Literature*, vol. 37(3), pp. 1083-1119

Becker G. S. and N. Tomes, 1976 "Child Endowments and the Quantity and Quality of Children" *Journal of Political Economy*, vol. 84(4), pp. S143-62

Becker G. S., 1964 *Human Capital: A Theoretical and Empirical Analysis* National Bureau of Economic Research, New York

Becker G.S., 1975 *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education* Columbia University Press for NBER, New York

Becker G.S., 2007 "Health as human capital: synthesis and extensions" *Oxford Economic Papers* vol. 59 (3), pp. 379-410

Behrman J. R., M. R. Rosenzweig and P. Taubman, 1994 "Endowments and the Allocation of Schooling in the Family and in the Marriage Market: The Twins Experiment" *Journal of Political Economy*, vol. 102(6), pp. 1131-74

Behrman J. R., R.A. Pollak and P. Taubman, 1982 "Parental Preferences and Provision for Progeny" *Journal of Political Economy*, vol. 90(1), pp. 52-73

Ben-Porath Y., 1967 "The Production of Human Capital and the Life Cycle of Earnings" *The Journal of Political Economy*, vol. 75(4/1), pp. 352-365

Bernal R. and A. Fruttero, 2008 "Parental leave policies, intra-household time allocations and children's human capital" *Journal of Population Economics*, Springer, vol. 21(4), pp. 779-825

Biggeri M., L. Guarcello, S. Lyon and F. Rosati, 2003 *The puzzle of "idle" children: neither in school nor performing economic activity. Evidence from six countries*, Understanding Children's Work (UCW) Project (ILO, UNICEF and WB)

Binzel C., and R. Assaad, 2011 "Egyptian Men working abroad: Labor Supply Responses by the Women Left Behind" *Labour Economics*, vol. 18, pp. 98-114

Björklund A. and K. G. Salvanes, 2011 "Education and Family Background: Mechanisms and Policies" in *Handbook of the Economics of Education*, Elsevier

Boggess S., 1998 "Family Structure, Economic Status, and Educational Attainment", *Journal of Population Economics*, vol. 11(2), pp. 205-222

Bowles S. and H. Gintis, 1976 *Schooling in Capitalist America: Educational Reform and the Contradictions of Economic Life* Basic Books, New York

Bowles S., H. Gintis and M. Osborne, 2001 "The determinants of Earnings: a behavioral approach" *Journal of Economic Literature*, vol. 39(4), pp. 1137-76.

Brandt L., A. Siow and H. Wang, 2009 *Substitution effects in parental investments* IZA Discussion Papers, No. 4431

Bryant J., 2005 *Children of International Migrants in Indonesia, Thailand, and the Philippines: A review of evidence and policies* Innocenti Working Paper 2005-05, UNICEF Innocenti Research Centre, Florence

Calero C., A. S. Bedi and R. Sparrow, 2009 "Remittances, liquidity constraints and human capital investments in Ecuador" *World Development*, vol. 37(6), pp. 1143 - 1154

Card D., 1999 "The Causal Effect of Education on Earnings" in *Handbook of Labour Economics* vol. 3a, pp. 1801-63, edited by O. Ashenfelter and D. Card, Elsevier Science

Chamberlain G.,1980 "Analysis of covariance with qualitative data" *Review of Economic Studies*, vol. 47, pp. 225-238

Ciccone A. and G. Peri, 2006 "Identifying Human-Capital Externalities: Theory with Applications" *Review of Economic Studies*, vol. 73(2), pp. 381-412

Cigno A., 2007 *A Theoretical Analysis of the Effects of Legislation on Marriage, Fertility, Domestic Division of Labour, and the Education of Children* CESifo Working Paper Series No. 2143, CESifo Group Munich

Cigno A., 2012 "Marriage as a commitment device" *Review of Economics of the Household*, vol. 10(2), pp 193-213

Clemens M. A., 2009 *Skill Flow: A fundamental reconsideration of skilled-worker mobility and development* Human Development Research Paper (HDRP) 2009/08, UNDP

Coneus K., A. M. Mühlenweg and H. Stichnoth, 2011 "Orphans at risk in sub-Saharan Africa: evidence on educational and health outcomes" *Review of Economics of the Household*, 1-22

Conti G. and J.J. Heckman, 2012 *The Economics of Child Well-Being* IZA Discussion Paper No.6930

Cooke T. J., Bailey A. J., 1996 "Family Migration and the Employment of Married Woman and Men" *Economic Geography*, vol. 72(1), pp. 38-48

Coronel, E. and F. Unterreiner, 2005 *Social Impact of Remittances on Children's Rights. The Philippines case* UNICEF, Manila

Cortes R., 2008 *Children and Women Left Behind in labour sending countries: an appraisal of social risks* United Nations Children's Fund (UNICEF), Policy, Advocacy and Knowledge Management Section, Division of Policy and Practice, New York

Cunha F., J. J. Heckman and S. M. Schennach, 2010 "Estimating the Technology of Cognitive and Noncognitive Skill Formation" *Econometrica*, vol. 78(3), pp. 883-931

Dammert A. C., 2010 "Siblings, Child Labor, and Schooling in Nicaragua and Guatemala" *Journal of Population Economics*, vol. 23(1), pp. 199–224.

Das M. and A. van Soest,1999 "A panel data model for subjective information on household income growth" *Journal of Economic Behavior & Organization*, vol 40, pp.409-426

De Haas H., 2009 *Mobility and Human Development* Human Development Research Paper (HDRP) Series 2009/01, UNDP

De Serf M., 2002 *The effects of Family, Social and background Factors on Children's Educational Attainment* Honors Projects, Paper 8

De Wet N., 2013 "Parent absenteeism and adolescent work in South Africa: An analysis of the levels and determinants of adolescents who work 10 or more hours a week" *African Population Studies*, vol. 27(1), pp. 70-78

Deininger K., 2003 "Does the cost of schooling affect enrollment by the poor? Universal primary education in Uganda" *Economics of Education Review*, vol. 22, pp. 291-305

Del Boca D., 2003 "Mothers, fathers and children after divorce: The role of institutions" *Journal of Population Economics*, vol. 16(3), pp. 399 - 422

Echevarria C. and A. Merlo, 1999 "Gender Differences in Education in a Dynamic Household Bargaining Model" *International Economic Review*, vol. 40(2), pp. 265-86

Edmonds E., 2007 *Selection into Worst Forms of Child Labor: Child Domestics, Porters and Ragpickers in Nepal* Working Papers No. 1011, eSocialSciences

Edwards A. C. and M. Ureta, 2003 "International migration, remittances, and schooling: evidence from El Salvador" *Journal of Development economics*, vol. 72(2), pp. 429-461

Elbadawy A. and R. Roushdy, 2010 *Impact of international Male Migration on Women Status. The Case of Egypt* Mimeo presented at International Conference on *Women and Youth in Arab Development*, Cairo

Ermish J. and M. Francesconi, 2000 "Family matters: Impacts of family Background on Educational Attainments" *Economica*, vol. 68, pp.138-156

Fan C. S. and O. Stark, 2007 "The brain drain, 'educated unemployment', human capital formation, and economic betterment" *Economics of Transition*, vol. 15(4), pp. 629-660

Ferrer-i-Carbonell A. and P. Frijters, 2004 "How important is methodology for the estimates of the determinants of happiness?"*Economic Journal*, vol 114, pp. 641-659

Foster A. D., 2002 *Marriage-Market Selection and Human Capital Allocations in Rural Bangladesh* Unpublished manuscript, Department of Economics, University of Pennsylvania

Garg A. and J. Morduch, 1998 "Sibling rivalry and the gender gap: Evidence from child health outcomes in Ghana" *Journal of Population Economics*, vol. 11(4), pp. 471-493

Giannelli G.C. and L. Mangiavacchi, 2010 "Children's Schooling and Parental Migration: Empirical Evidence on the `Left-behind' Generation in Albania" *Labour*, vol. 24, pp. 76-92

Giannelli G.C. and M. Binci, 2013 "Internal vs. International Migration: Impacts of Remittances on Child Well-Being in Vietnam" forthcoming in *Journal of Development Studies*

Ginther D. K. and R. A. Pollak, 2004 "Family structure and children's educational outcomes: blended families, stylized facts, and descriptive regressions" *Demography*, vol. 41(4), pp. 671–696

Glaeser E., G. Ponzetto and A. Shleifer, 2007 "Why does democracy need education?" *Journal of Economic Growth*, vol. 12(2), pp. 77-99

Glewwe P. W., 2002 "Schools and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes" *Journal of Economic Literature*, vol. 40(2), pp. 436-482

Glewwe P. W., E. A. Hanushek, S. D. Humpage and R. Ravina, 2011 *School Resources and Educational Outcomes in Developing Countries: A Review of the Literature from 1990 to 2010* NBER Working Papers 17554, National Bureau of Economic Research, Inc.

Goebel B., 1978 "Mobility and education" *American Secondary Education*, vol.8(4), pp. 11–15

González-König G. And Q. Wodon, 2007, *Remittances, schooling, and child labor*, Mimeo presented at IZA conference.

Greene W.H., 2008, *Econometric Analysis 6th Ed.*, Prentice Hall

Griliches Z., 1979 "Sibling Models and Data in Economics: Beginnings of a Survey" *Journal of Political Economy*, 87(5/2), pp. 37-64

Hango D. W., 2006 "The Long-term effect of Childhood Residential Mobility on Educational Attainment" *The Sociological Quarterly*, vol. 47(4), pp. 631-664

Hanson G. and Ch. Woodruff, 2003 *Emigration and Educational Attainment in Mexico* Working Paper, University of California-San Diego

Hanushek E. A. and Ludger Woessmann, 2008 "The Role of Cognitive Skills in Economic Development" *Journal of Economic Literature*, vol. 46(3), pp. 607-68

Harmon C., H. Oosterbeek, and I. Walker, 2003 "The Returns to Education: Microeconomics" *Journal of Economic Surveys*, vol 17, pp. 115–156

Harris J. R. and M. P. Todaro, 1970 "Migration, unemployment and development: a two-sector analysis" *The American Economic Review*, vol. 60, pp. 126-142

Harttgen K .and S. Klasen, 2009 *Well-being of migrant children and migrant youth in Europe* Ibero-America Institute for Economic Research

Hashim I. M., 2005 *Exploring the linkages between children'0s independent migration and education: evidence from Ghana* Development Research Centre on Migration, Globalisation and Poverty, University of Sussex

Heckman J. J., 1976 "A Life-Cycle Model of Earnings, Learning, and Consumption" *Journal of Political Economy*, vol. 84(4), pp. 11-44

Heckman J. J., 2007 *The Economics, Technology and Neuroscience of Human Capability Formation* NBER Working Papers 13195, National Bureau of Economic Research, Inc.

Heckman J. J., J. Stixrud and S. Urzua, 2006 "The Effects of Cognitive and Noncognitive Abilities on the Labor Market Outcomes and Social Behavior" *Journal of Labor Economics*, vol. 24(3), pp. 411-82

Hoffman J.P. and R. A. Johnson, 1998 "A national portrait of family structure and adolescent drug use" *Journal of Marriage and the Family*, vol. 60, pp. 633–645

Jelleyman T., and N. Spencer, 2008 "Residential mobility in childhood and health outcomes: a systematic review" *Journal of Epidemiology and Community Health*, vol. 62(7), pp. 584-592

Keeley B., 2007 *Human Capital, how what you know shapes your life*, OECD insight

Kim H., 2005 *Parental Investment Between Children With Different Abilities* Unpublished manuscript, University of Wisconsin, Madison, Department of Economics

Kimko D. D. and E. A. Hanushek, 2000 "Schooling, Labor-Force Quality, and the Growth of Nations" *American Economic Review*, vol. 90(5), pp. 1184-1208

Klemp M., C. Minnis, P. Wallis and J. Weisdorf, 2012 *Family Investment Strategies in Pre‐modern Societies: Human Capital, Migration, and Birth Order in Seventeenth and Eighteenth Century England* European Historical Economics Society (EHES) Working Paper No. 18, June 2012

Konseiga A., 2007 "Household Migration Decisions as Survival Strategy: The Case of Burkina Faso" *Journal of African Economies*, vol. 16(2), pp. 198-233

Krueger A. B. and M. Lindahl, 2001 "Education for Growth: Why and for Whom?" *Journal of Economic Literature*, vol. 39(4), pp. 1101-1136

Landau L.B. and A. W. K. Segatti, 2009 *Human development Impacts of migration: South Africa Case Study* Human Development Research Paper 2009/05, UNDP

Lange F. and R. Topel, 2006 "The Social Value of Education and Human Capital" in *The Handbook of Economics of Education*, vol. 1, pp. 459-509, edited by E. Hanushek and F. Welch, Elsevier.

Leibowitz A., 1974 "Home Investments in Children" NBER Chapters in *Marriage, Family, Human Capital, and Fertility*, pp. 111-135 National Bureau of Economic Research, Inc.

Levitt P., 1998 "Social remittances: migration driven local-level forms of cultural diffusion" *International migration review*, 926-948

Long L.H., 1975 "Does Migration Interfere with Children's Progress at School?" *Sociology of Education*, vol. 48 (3), pp. 369-381

Lopez-Cordova E., 2005 "Globalization, Migration and Development: the role of Mexican Migrant Remittances" *Economia*, vol. 6, pp. 217 -256

Loughran D., A. Datar and M. R. Kilburn, 2008 "The Interactive Effect of Birth Weight and Common Parental Investment on Child Test Scores" *Review of Economics of the Household*, vol. 6, pp. 223-242

Lucas R. E., 1988 "On the Mechanics of Economic Development" *Journal of Monetary Economics*, vol. 22, pp. 3–42

Mansuri G., 2006 *Migration, School Attainment and Child Labor: Evidence from Rural Pakistan*, Policy Research Working Paper, The World Bank.

McIntosh S. and A. Vignoles, 2001 "Measuring and Assessing the Impact of Basic Skills on Labour Market Outcomes" *Oxford Economic Papers*, Oxford University Press, vol. 53(3), pp. 453-81

Mendola M. and C. Carletto, 2012 "International migration and gender differentials in the home labor market: Evidence from Albania" *Labour Economics*, vol. 19 (6), pp. 870–880

Mincer J., 1970 "The Distribution of labor incomes: A survey with special reference to the Human Capital Approach" *Journal of Economic Literature*, vol. 8(1), pp. 1-26

Mincer J., 1974 *Schooling, Experience, and Earnings* Columbia University Press for the National Bureau of Economic Research, New York

Mincer J., 1978 "Family Migration Decisions" *Journal of Political Economy*, vol. 68(5), pp. 749-773

Moretti E., 2004 "Estimating the Social Return to Higher Education: Evidence From Longitudinal and Repeated Cross-Sectional Data" *Journal of Econometrics,* vol. 121(1-2), pp. 175-212

Nichols L. and B. Gault, 1999 *Is Welfare Reform Causing Homelessness Among Families? Research and Policy Issues* Presented at the annual meeting of the Society for the Study of Social Problems, Chicago, IL, August 1999

Nivalainen S., 2004 "Determinants of Family Migration: Short Moves vs. Long Moves" *Journal of Population Economics* vol. 17(1), pp. 157-175

Ota M. and P. Moffatt, 2007 "The within-household schooling decision: a study of children in rural Andhra Pradesh" *Journal of Population Economics*, vol. 20(1), pp. 223-239

Pitt M. M., M. R. Rosenzweig and H. Md. Nazmul, 1990 "Productivity, Health, and Inequality in the Intra-household Distribution of Food in Low-Income Countries" *American Economic Review*, vol. 80(5), pp. 1139-56

Pribesh S. And D. B. Downey, 1999 "Why are residential and school moves associated with poor school performance?" *Demography*, vol. 36, pp. 521-534

Psacharopoulos G. and H. A. Patrinos, 2004. "Returns to investment in education: a further update" *Education Economics*, vol. 12(2), pp. 111-134

Rasul I., 2006 "The Economics of Child Custody" *Economica*, vol. 73(289), pp. 1-25

Rosenzweig M. R. and K. I. Wolpin, 1988 "Migration selectivity and the effects of public programs" *Journal of Public Economics*, vol. 37(3), pp. 265-289

Rosenzweig M. R. and T. P. Schultz, 1982 "The Behavior of Mothers as Inputs to Child Health: The Determinants of Birth Weight, Gestation, and Rate of Fetal Growth" NBER Chapters in *Economic Aspects of Health*, pp. 53-92 National Bureau of Economic Research, Inc.

Sandell S. H., 1977 "Women and the economics of family migration" *Review of Economics and Statistics*, vol. 59, pp. 406-14

Scanlon E. and K. Devine, 2001 "Residential Mobility and Youth Well-Being: Research, Policy, and Practice Issues" *Journal of Sociology and Social Welfare*, vol. 28(1), pp. 119-138

Schuler D.B., 1990 "Effects of family mobility on student achievement" *ERS Spectrum*, vol. 8, pp. 17–24

Schultz T. W., 1963 *The Economic Value of Education* Columbia University Press, New York

Simmons R.G., R. Burgeson, S. Carlton-Ford and D.A. Blyth, 1987 "The Impact of Cumulative Change in Early Adolescence" *Child Development* vol. 58(5), pp. 1220—1234

Simpson G.A. and M.G. Fowler, 1994 "Geographic mobility and children's emotional/behavioral adjustment and school functioning" *Pediatrics*, vol. 93(2), pp. 303-309

Sjaastad L.A., 1962 "The costs and returns oh human migration" *Journal of Political Economy*, vol. 70, pp. 80-93

South S. J., D. L. Hayne and S. Bose, 2005 "Residential Mobility and the onset of Adolescent Sexual Activity" *Journal of Marriage and Family*, vol. 67, pp. 499-514.

Spence M., 1973 "Job Market Signaling" *The Quarterly Journal of Economics*, Vol. 87(3), pp. 355-374

Spitze G., 1984 "The effect of family migration on wives' employment: how long does it last?" *Social Science Quarterly*, vol. 65, pp. 21-36

Stark O., C. Helmenstein and A. Prskawetz, 1998 "Human capital depletion, human capital formation, and migration: a blessing or a 'curse'?" *Economics Letters*, vol. 60(3), pp. 363-367

Suarez-Orozco C. and M. Suarez-Orozco, 2001 *Children of Immigration* Hardvard University Press, Cambridge MA

Sucoff C. A. And D. M. Upchurch, 1998 "Neighbourhood context and the risk of childbearing among metropolitan-area Black adolescents" *American Sociological Review*, Vol. 63, pp. 571-585

Taylor J. E. and P. L. Martin, 2001 "Human capital: migration and rural population change" in *Handbook of agricultural economics*, vol. 1, pp. 457-511

Teachman C. J., K. Paasch and K. Carver, 1996 "Social capital and dropping out of school early" *Journal of Marriage and Family*, vol. 58, pp. 773-783

Temple J. A., and A. J. Reynolds, 1999 "School mobility and achievement: Longitudinal results from an urban cohort" *Journal of School Psychology*, vol. 37(4), pp. 355-377

Tertilt M., 2006 "Polygyny, Women's Rights, and Development" *Journal of the European Economic Association*, vol. 4, No. 2/3, pp. 523-530

Thomas D., 1990 "Intra-Household Resource Allocation: An Inferential Approach" *Journal of Human Resources*, University of Wisconsin Press, vol. 25(4), pp. 635-664

Tucker C. J., J. Marx and L. Long, 1998 "'Moving On': Residential Mobility and Children's School Lives" *Sociology of Education*, vol. 71(2), pp. 111—129

UNESCO, World Data on Education 6th Edition, 2006-07

Verwimp P., J. van Bavel, 2005 "Child Survival and Fertility of Refugees in Rwanda" *European Journal of Population*, vol. 21, pp. 271-290

Wickham C. R., 2002 *Mobilizing Islam: Religion, Activism and Social Change in Egypt* Columbia University Press, New York.

Williams R., 2006 "Generalized Ordered Logit/ Partial Proportional Odds Models for Ordinal Dependent Variables" *The Stata Journal*, vol. 6(1), pp. 58-82

Wolfe B. L., J. R. Behrman and D. M. Blau, 1982 "The impact of demographic changes on income distribution in a developing country" *Journal of Development Economics*, Volume 11(3), pp. 355-377

Wood D., N. Halfon et al., 1993 "Impact of family relocation on children's growth, development, school function, and behavior" *Journal of the American Medical Association*, vol. 270(11), pp. 1334-1338

Yang D., 2008 "International Migration, Remittances and Household Investment: Evidence from Philippine Migrants' Exchange Rate Shocks" *The Economic Journal*, vol. 118(528), pp. 591-630