

Internal Migration and Human Capital Accumulation Among Youth in Developing Countries

*Thesis submitted in partial fulfilment of the requirements
for the Degree of Doctor of Philosophy*

by

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Abstract

This thesis consists of a short introduction, an overview of the context and data used, three self-contained analytical chapters on migration and human capital in developing countries, and overall conclusions. The first paper documents detailed patterns of internal mobility and estimates the predictors of migration by gender and reasons for moving using a Linear Probability Model and a Multinomial Logit Model, respectively. My main finding is that young migrants are a very heterogeneous segment of the population and that “favourable selection” only holds for those who move for studies. The second paper explores the impact of internal migration on cognitive and psychosocial skills by estimating a 2-Stage Least Squares (2SLS) model, using weather shocks as instruments for migration. My key finding is that migration affects both cognitive and psychosocial skills, but these effects differ across migrants depending on their reason for moving: those that move for studies have higher cognitive and psychosocial skills than non-migrants do, whereas those that moved for family formation have lower cognitive skills than non-migrants do. Lastly, the third paper focuses on whether age at migration has an impact on cognitive and psychosocial skills. I use sibling pairs to estimate a household fixed effects-2SLS model, using weather shocks as instruments for migration. My main finding is that younger migrants perform better than older migrants, although this effect can be offset or even dominated by input responses as a result of migration. In conclusion, this thesis provides evidence of the heterogeneous character of young migrants, as well as supports the claims that migration matters for skills formation and that the earlier it takes place, the better. (269 words)

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“Caminante, son tus huellas
el camino y nada más;
Caminante, no hay camino,
se hace camino al andar.
Al andar se hace el camino,
y al volver la vista atrás
se ve la senda que nunca
se ha de volver a pisar.
Caminante, no hay camino
sino estelas en la mar.”

[Traveller, your footprints
are the only road, nothing else.
Traveller, there is no road;
you make your own path as you walk.
As you walk, you make your own road,
and when you look back
you see the path
you will never travel again.
Traveller, there is no road;
only your wake on the sea.]

Antonio Machado
"Proverbios y Cantares XXIX"
[Proverbs and Songs 29]

Contents

1. Introduction	11
2. Context and Data	17
2.1 Setting.....	17
2.2 Educational systems	21
2.3 Data.....	23
3. Patterns and Drivers of Internal Migration among Youth.....	28
3.1 Introduction.....	28
3.2 Descriptive statistics	32
3.3 Patterns of internal mobility.....	35
3.4 Drivers of migration	57
3.4.1 Predictors of migration by gender.....	61
3.4.2 Predictors of the reasons to migrate	66
3.5 Discussion.....	72
3.6 Conclusions.....	72
4. Effects of Internal Migration on Adolescents' Cognitive and Psychosocial Skills.....	74
4.1 Introduction.....	74
4.2 Conceptual framework.....	78
4.3 Empirical strategy.....	82
4.4 Descriptive statistics	87
4.4.1 Cognitive and psychosocial skills	87
4.4.2 Internal migration.....	90
4.4.3 Weather shocks	98
4.5 Results.....	100
4.5.1 Effects of average migration.....	101
4.5.2 Heterogeneous effects of migration	119
4.6 Discussion	136
4.7 Conclusions.....	137
5. Does the Effect of Internal Migration on Skills depend on the Age at Migration?.....	178
5.1 Introduction.....	178
5.2 Conceptual framework.....	181
5.3 Empirical strategy.....	187
5.4 Descriptive statistics	192

5.4.1	Siblings.....	192
5.4.2	Internal migration and age.....	192
5.4.3	Cognitive and psychosocial skills.....	199
5.4.4	Weather shocks.....	201
5.5	Results.....	201
5.6	Discussion.....	213
5.7	Conclusions.....	213
6.	Concluding Remarks.....	215
7.	References.....	217

List of Figures

Figure 2.1: Real GDP per capita, by country (in 2011 constant US Dollars).....	17
Figure 3.1: Distribution of number of moves per migrant.....	37
Figure 3.2: Share of moves and age at migration, by gender	39
Figure 5.1: Distribution of age at migration	199

List of Tables

Table 2.1: Socio-economic indicators, by country (2009-2013).....	18
Table 2.2: Education system in the study countries	22
Table 2.3: Basic education statistics per study country.....	23
Table 2.4: Young Lives sample – Older Cohort	24
Table 2.5: Young Lives sample – Younger Cohort	25
Table 3.1: Child and household characteristics of Young Lives sample (2009)	34
Table 3.2: Migration rates between rounds	35
Table 3.3: Reasons for moving, by gender	41
Table 3.4: Distance of moves per reasons for migrating	43
Table 3.5: Streams of migration, conditional on place of origin, by gender	45
Table 3.6: Share of migrants living in different households, by gender	47
Table 3.7: Share of migrants that sent or received remittances, by gender	47
Table 3.8: Employment status and reasons for moving	49
Table 3.9: Type of employment and reasons for moving.....	50
Table 3.10: Subjective well-being of migrants and non-migrants	53
Table 3.11: Migration aspirations	55
Table 3.12: Characteristics of migrants.....	59
Table 3.13: Estimates of a Linear Probability Model for the decision to migrate, by gender.....	63
Table 3.14: Marginal effects of Multinomial Logit Model for the reasons for moving.....	67
Table 4.1: Items included in the construction of 2013 psychosocial indices.....	89
Table 4.2: Distribution of migrants by reasons for migrating and streams of migration	91
Table 4.3: Enrolment and highest grade attained in 2013, by migration status.....	92
Table 4.4: Descriptive statistics of 2013 test scores, by migration status and reasons for moving.....	93
Table 4.5: Descriptive statistics of child’s time use (in number of hours), by migration status and reasons for moving.....	96
Table 4.6: Child and household characteristics of YL sample before migration (2009).....	99
Table 4.7: Effect of weather shocks on migration	103
Table 4.8: Effects of migration on skills: OLS and 2SLS	112

Table 4.9: Effects of migration on time use.....	116
Table 4.10: Effects of moving for studies on skills: OLS and 2SLS	121
Table 4.11: Effects of moving for studies on time use.....	123
Table 4.12: Effects of moving for work on skills: OLS and 2SLS	126
Table 4.13: Effects of moving for work on time use.....	128
Table 4.14: Effects of moving for family formation on skills: OLS and 2SLS.....	131
Table 4.15: Effects of moving for family formation on time use	133
Table 5.1: Migration rates in each round of Young Lives survey.....	194
Table 5.2: Streams of migration, conditional on place of origin	195
Table 5.3: Characteristics of YL sample	196
Table 5.4: Characteristics of the sibling-paired sample (2013).....	198
Table 5.5: Effect of weather shocks on migration	205
Table 5.6: Effects of migration by age on skills	208
Table 5.7: Effects of age at migration on years of schooling	212

List of Appendices

Table A.4.1: Effect of weather shocks on moving for studies in Ethiopia.....	138
Table A.4.2: Effect of weather shocks on moving for studies in India	142
Table A.4.3: Effect of weather shocks on moving for studies in Peru	146
Table A.4.4: Effect of weather shocks on moving for studies in Vietnam.....	150
Table A.4.5: Effect of weather shocks on moving for work in Ethiopia.....	154
Table A.4.6: Effect of weather shocks on moving for work in India.....	158
Table A.4.7: Effect of weather shocks on moving for work in Peru.....	162
Table A.4.8: Effect of weather shocks on moving for work in Vietnam.....	166
Table A.4.9: Effect of weather shocks on moving for family formation in India.....	170
Table A.4.10: Effect of weather shocks on moving for family formation in Vietnam	174
Table A.5.1: Effects of age at migration on time use.....	214

1. Introduction

Recently, migration has become a much-contested topic due to the implications it has for economic and social development, especially in less developed countries. However, there are two stylised facts that are generally accepted by the migration literature. First, internal migration is a very prevalent phenomenon. Based on a sample of approximately 70 countries, Bell and Charles-Edwards (2013) showed that in 2005, 12 percent of the global population were internal migrants, which means that around 763 million people were living outside their region² of birth, but within their home countries. Second, young people have a higher likelihood of migrating than older people do. Using data from 65 developing countries, Young (2013) found that most adult internal migrants had moved during their early to mid-twenties. These two facts highlight the significance of internal migration as a fundamental process of social and economic transformation, and the relevance of youth as agents of change in this process.

Therefore, understanding the causes and consequences of internal migration among young people is relevant not only because this phenomenon is prevalent, but also because youth migration is unique in that it greatly overlaps with other transitions to adulthood (Zenteno et al., 2013). In this section, I will first explain the gaps in the literature that I intend to address in this thesis, then I will present my research questions and their rationale, and finally I will highlight the contribution to knowledge that I expect to produce by addressing each of them.

Migration has long been studied by different disciplines, such as geography, demography and sociology, especially in developed countries, where good quality data were available. However, in the last six decades, economists have joined these disciplines and they are rapidly developing theoretical and empirical contributions to the study of migration. Despite this, the economic studies of youth migration in developing countries remain scant mainly due to data limitations. This thesis

² According to the author, region was usually defined as the first level administrative sub-division of each country.

addresses this gap by putting young people at the centre of its three research questions, and contributes to the economics literature on migration, while adopting a multidisciplinary approach.

In particular, this thesis builds on previous empirical work of three strands of the literature: studies on the determinants of migration, research on the causal effects of migration on educational outcomes, and economics studies on sensitive periods of human development. As far as the first one is concerned, it has long been well accepted that migrants do not represent a random sample of the general population. Todaro (1980) described them as “disproportionately young, better educated, less risk-averse, and more achievement-oriented and to have better personal contacts in destination areas”. Similarly, Chiswick (1999) described them as “more able, ambitious, aggressive, entrepreneurial, or otherwise more favourably selected than similar individuals who choose to remain in their place of origin”. Moreover, previous empirical work has documented that individuals self-select into migration, mainly on the basis of educational attainment (Agesa, 2001; Falco, 2015; Lanzona, 1998) or, more specifically, on skills (Borjas et al., 1992; Miguel & Hamory, 2009; Young, 2013). However, the direction of self-selection may be different for young people than for the overall population, since they often migrate for noneconomic reasons, such as education, family formation, and family reunion. A few recent studies provide evidence on this, such as Juarez et al. (2013) and Herrera and Sahn (2013), although there is still more cross-country evidence needed.

The second strand of the migration literature that this thesis speaks to is the one related to the impact of migration on educational outcomes, in particular skills. Previous work has looked at the effect of migration on schooling (Acosta, 2011; Cox Edwards & Ureta, 2003; Ferrone & Gianelli, 2015; Hanson & Woodruff, 2003; Mansuri, 2006; McKenzie & Rapoport, 2011; Yang, 2008). Nonetheless, these studies mainly focus on the effect of remittances (international migration) on the remaining residents in the places of origin, and do not study cognitive skills explicitly, but only educational attainment – which assumes that one year of schooling produces the same amount of skills over time (Hanushek, 2008). Less is known about the effect of migration

on the individual's skills, which may be ambiguous as migrants are exposed to different stimuli due to a change in their environment and these may alter their skills in different directions. Moreover, much less – if nothing – is known on the impact of migration on psychosocial skills. In this regard, there is very sparse evidence from developed countries, such as Toney et al. (1985) in the US, Ek et al. (2008) and Jokela et al. (2008) in Finland, Jokela (2009) in the US, and Caliendo et al. (2016) in Germany – although they mainly document associations.

Finally, a third group of studies that this work is related to is the one that looks at the role of sensitive and critical periods in skills formation. Although the developmental sciences have extensively documented the existence of sensitive periods of development in different species (Knudsen, 2004; Knudsen et al., 2006; Newport, 1990; Suomi, 1997), economists have just included them in models of skills formation relatively recently. The pioneering work of Cunha et al. (2006), Cunha and Heckman (2007), and Heckman (2008) has triggered a new wave of research on this topic, arguing for the existence of sensitive periods at earlier ages of life.

Turning to the objectives of this research, this is an integrated thesis organised in three papers that address three different research questions, as follows:

1. How do life course transitions to adulthood relate to patterns and drivers of internal migration in developing countries?
2. What are the effects of internal migration on youth's cognitive and psychosocial skills in developing countries?
3. Does the effect of internal migration on skills depend on the age at migration in developing countries?

The first paper produces comparative international evidence – of countries from three geographical regions (Africa, Asia, and Latin America) – on systematic differences in characteristics across young migrants. Specifically, I document detailed patterns of internal mobility and I estimate the predictors of migration by gender and reasons for moving, using a Linear Probability Model and a Multinomial Logistic Model, respectively. This study aims at

contributing to the literature on selection into migration with a special focus on youth, which is when most migration happens. Furthermore, it also speaks to the strand of the economics literature devoted to explain differences in labour productivity across sectors and areas (Gollin et al., 2014; Hamory et al., 2017; Lagakos & Waugh, 2013), since they look at selection as a factor that may potentially explain these gaps. My key finding is that young migrants are a very heterogeneous segment of the population and it would be a mistake to label them as one single group since life-course decisions made during the transition to adulthood shape their migration patterns. This implies that “favourable self-selection” (Chiswick, 1999) in observable characteristics only holds for one sub-group of migrants: those that move for studies, who are on average better educated than non-migrants.

The second paper has three main objectives: i) it seeks to explain the impact of migration on adolescents’ cognitive and psychosocial skills; ii) it investigates whether there are heterogeneous treatment effects of migration by estimating its impact across migrants moving for different reasons; and iii) it examines the effects of migration on the time use of young people as a potential mechanism that may explain the impact of migration on skills. In order to do this, I develop a framework – new to the migration literature – based on Glewwe and Miguel (2008) that delineates the potential channels through which migration may affect skills. As part of my empirical strategy, I use weather shocks as instruments for migration in a Two-Step Least Squares (2SLS) estimation.

Thus, this study aims at contributing to two different strands of the literature. First, it speaks to the studies mentioned above that look at the causal effect of migration on skills. Second, it builds on the work related to human capital formation, largely developed by Cunha and Heckman (2007) and Heckman (2008). Therefore, using this setup, I propose that migration can be seen under a new light: as a mechanism through which individuals alter their environments and investments and, through these, modify their skills. My key finding is that migration affects both cognitive and psychosocial skills, but these effects differ across migrants depending on their reason for moving:

those that move for studies have higher cognitive skills than non-migrants and also higher psychosocial skills, whereas those that moved for family formation have lower cognitive skills than non-migrants. Between these two groups, there are those that moved for work, for whom the impact of migration is mixed. This shows that although, in principle, migration should bring returns to the migrant, this is not always the case when it comes to young people.

Lastly, the third paper has two main goals: i) it tests whether age at migration affects the impact of migration on cognitive and psychosocial skills among children and adolescents; and ii) it looks at school attainment as a potential mechanism that can elucidate the impact of age at migration on skills. In order to accomplish this, I develop a conceptual framework based on Todd and Wolpin (2003) in which I consider that migration is an input in the production function of skills and its effect may vary with age. As part of my empirical strategy, I use sibling pairs to estimate a Fixed Effects – 2SLS model, using weather shocks as instruments for migration. Thus, this study aims at contributing to the economics literature on sensitive and critical periods of human development extensively discussed in Cunha et al. (2006), Cunha and Heckman (2007), and Heckman (2008). Specifically, based on my findings, I argue that migration is better undertaken earlier than later.

In order to tackle my three research questions, I draw on Young Lives (YL) data, a rich longitudinal study that follows two cohorts – that originally constituted a total of 12,000 children – in Ethiopia, India (Andhra Pradesh and Telangana), Peru, and Vietnam. Children from the older cohort were born in 1994-95 and were tracked since they were approximately 8 years old, whereas children in the younger cohort were born in 2000-01 and were traced since they were around 1 year old. For the first and second papers, I used data from the older cohort, whereas for the third paper, I used data from the younger cohort. YL collects information on a wide range of outcomes over time, including migration and educational outcomes, which allows me to use different statistical models to address the research questions posited above.

In conclusion, this thesis provides evidence of the heterogeneous character of young migrants, which is relevant to understand both its drivers and effects. It also highlights the importance of youth migration as a mechanism to shape skills, both cognitive and psychosocial. However, its total effect is ambiguous since some inputs may increase while others may decrease as a result of migration. Finally, this thesis also provides suggestive evidence that age at migration matters in such a way that moving earlier is better than later. To summarise in Heckman's words: "Remediation is possible, though its timing is crucial".

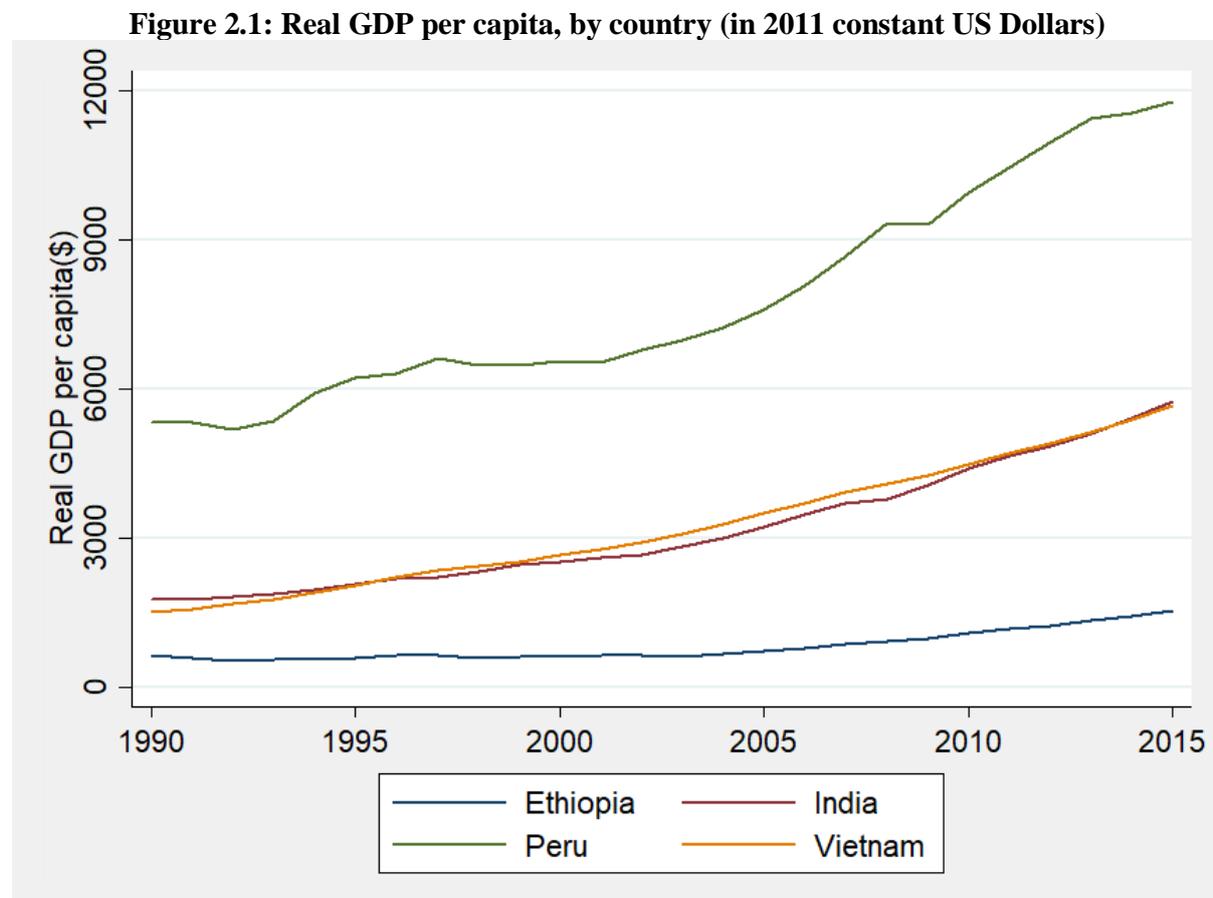
The remainder of the thesis is organised as follows: chapter 2 presents a brief description of the context and the data used in the three papers of the thesis; chapter 3 looks at the patterns and drivers of youth migration; chapter 4 analyses the impact of migration on skills; chapter 5 assesses whether age at migration has an impact on skills; and chapter 6 concludes and discusses policy implications and future avenues for further research.

2. Context and Data

This chapter depicts the background of the study countries within the analysed period, as well as a description of the data used throughout this thesis.

2.1 Setting

Between 2009 and 2013, Ethiopia, India, Peru, and Vietnam showed different stages of development (see Figure 2.1), but very high paces of growth despite a general slowdown in the world's economy.



Source: World Bank (2018b).

Table 2.1: Socio-economic indicators, by country (2009-2013)

	2009	2010	2011	2012	2013	2009-2013
<i>Ethiopia</i>						
GDP growth (annual %)	8.8	12.6	11.2	8.6	10.6	10.4
Population growth (annual %)	2.6	2.6	2.6	2.6	2.5	2.6
Urban population (% of total)	16.9	17.3	17.7	18.2	18.6	17.7
Life expectancy at birth (years)	60.4	61.3	62.1	62.8	63.4	62.0
Improved sanitation facilities, urban (% of urban population with access)	25.5	25.7	26.0	26.3	26.6	26.0
Improved sanitation facilities, rural (% of rural population with access)	19.4	20.9	22.3	23.8	25.3	22.3
Access to electricity, urban (% of urban population)	N.A.	100	N.A.	100	N.A.	N.A.
Access to electricity, rural (% of rural population)	N.A.	4.8	N.A.	7.6	N.A.	N.A.
<i>India</i>						
GDP growth (annual %)	8.5	10.3	6.6	5.6	6.6	7.5
Population growth (annual %)	1.4	1.4	1.3	1.3	1.3	1.3
Urban population (% of total)	30.6	30.9	31.3	31.6	32.0	31.3
Life expectancy at birth (years)	66.1	66.5	66.9	67.3	67.7	66.9
Improved sanitation facilities, urban (% of urban population with access)	59.7	60.3	60.8	61.4	62.0	60.8
Improved sanitation facilities, rural (% of rural population with access)	23.5	24.5	25.5	26.5	27.5	25.5
Access to electricity, urban (% of urban population)	N.A.	93.1	N.A.	98.2	N.A.	N.A.
Access to electricity, rural (% of rural population)	N.A.	66.9	N.A.	69.7	N.A.	N.A.
<i>Peru</i>						
GDP growth (annual %)	1.1	8.3	6.3	6.1	5.9	5.5
Population growth (annual %)	1.2	1.3	1.3	1.3	1.3	1.3
Urban population (% of total)	76.6	76.9	77.3	77.6	78.0	77.3
Life expectancy at birth (years)	73.4	73.6	73.8	74.1	74.3	73.9
Improved sanitation facilities, urban (% of urban population with access)	79.6	80.1	80.5	81.0	81.5	80.5
Improved sanitation facilities, rural (% of rural population with access)	43.7	45.3	46.9	48.5	50.0	46.9
Access to electricity, urban (% of urban population)	N.A.	92.7	N.A.	98.3	N.A.	N.A.
Access to electricity, rural (% of rural population)	N.A.	59.5	N.A.	72.9	N.A.	N.A.
<i>Vietnam</i>						
GDP growth (annual %)	5.4	6.4	6.2	5.2	5.4	5.7
Population growth (annual %)	1.1	1.0	1.1	1.1	1.1	1.1
Urban population (% of total)	29.8	30.4	31.0	31.7	32.3	31.0
Life expectancy at birth (years)	74.8	75.0	75.2	75.3	75.5	75.2
Improved sanitation facilities, urban (% of urban population with access)	87.3	88.5	89.6	90.8	92.0	89.6
Improved sanitation facilities, rural (% of rural population with access)	59.9	61.6	63.2	64.8	66.4	63.2
Access to electricity, urban (% of urban population)	N.A.	98.5	N.A.	100.0	N.A.	N.A.

Access to electricity, rural (% of rural population)	N.A.	94.9	N.A.	97.7	N.A.	N.A.
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Source: World Bank (2018b).

Note: N.A. stands for Not Available.

Ethiopia

During the study period, Ethiopia experienced the highest real GDP growth rate of the four countries, which could be attributed to a stable macroeconomic environment, further liberalisation of the economy, and an increase in the growth rate of non-agricultural sectors, mainly construction, and services (National Planning Commission, 2015). In terms of human development, the life expectancy at birth increased from 60 to 63 years between 2009 and 2013 (World Bank, 2018b). Still, Ethiopia is mainly a rural economy: the share of urban population was on average 17.7% – although with an upward trend–, which is considerably below the Sub-Saharan region average of 37% (African Development Bank, 2016). As shown in Table 2.1, the difference in access to basic services between urban and rural areas is shrinking, although there are still major gaps to be addressed, such as the case of access to electricity (World Bank, 2018b). These inequalities between urban and rural areas could represent key push and pull factors that may drive migration, especially from rural areas to cities.

India (Andhra Pradesh and Telangana)

Despite being affected by the international financial crisis, India managed to keep growing at an annual rate of 7.5% (World Bank, 2018b), which was mainly due to a rise in domestic demand, particularly in investment in infrastructure (Planning Commission Government of India, 2011). As seen in Table 2.1, the life expectancy at birth also increased during this period, although the gaps in access to basic services between urban and rural populations almost remained unchanged between 2009 and 2013.

For the purpose of this study, I will only focus on the states of Andhra Pradesh and Telangana. Before the bifurcation of Andhra Pradesh (AP) into these two states in 2014, AP was

one of the relatively fastest growing states in India (Planning Commission Government of India, 2011). Between 2004-05 and 2013-14, the relative importance of services as the main sector contributing to the state's GDP increased at the expense of a decrease in the share of agriculture (Government of Andhra Pradesh, 2014). AP is one of the states that has developed sector-specific policies that led to the formation of industrial clusters in sectors such as information technology, pharmaceuticals, among others. It is no surprise then that the share of urban population has been increasing in the last decade and is now as high as that of the average of the country (29.6% in 2011 compared to 24.2% in 2001) (Government of Andhra Pradesh, 2014). However, there are still spatial disparities across the state, although not as acute as in the rest of the country: in 2009-10, the gap between urban and rural poverty³ in AP (17.7% and 22.8%, respectively) was less than half of the analogous gap at the national level (20.9% and 33.8%, respectively) (Government of Andhra Pradesh, 2014).

Peru

Although Peru is the country with the highest GDP per capita in the sample and the highest share of urban population, it has shown the lowest GDP growth rate of the four countries (annual GDP growth rate of 5.5%) (World Bank, 2018b). This is mainly due to the fact that the Peruvian economy was highly exposed to external shocks as the share of GDP based on mineral and oil extraction was as high as that of manufacturing – although this has changed in the recent years as the share of services has been increasing (Instituto Nacional de Estadística e Informática, 2017a). Despite this deceleration of the economy, Peru managed to reduce poverty⁴ in 10 percentage points between 2009 and 2013 (World Bank, 2018b). However, as seen in Table 2.1, the gaps in access to basic services between urban and rural areas still remain very high (World Bank, 2018b), and may generate important incentives to migrate.

³ Poverty is defined as the percentage of people living below the poverty line, according to the Tendulkar Committee report (Government of Andhra Pradesh, 2014).

⁴ Poverty is defined as the poverty headcount ratio at the national poverty line (World Bank, 2018b).

Vietnam

As seen in Figure 2.1, Vietnam showed a similar level of economic development as India – in terms of GDP per capita –, but with a slower economic growth pace (GDP growth rate of 5.7% per year) and a slightly lower population growth (1.1% of annual population growth rate between 2009 and 2013) (World Bank, 2018b). During the analysed period, most of Vietnam’s GDP growth was led by manufacturing products, such as machinery and textiles (Abbott et al., 2015). Despite having an average urban population of only 31% (similar to India), Vietnam’s life expectancy at birth was 75 years on average between 2009 and 2013 (World Bank, 2018b), which is nearly 10 years greater than in 1990 (Organisation for Economic Cooperation and Development, 2014). However, as seen in Table 2.1, large disparities between urban and rural areas are still observed in terms of access to basic services – specifically, sanitation facilities.

In sum, the four countries in the sample have experienced high economic growth during the analysed period. This greater dynamism of the economy normally brings along high rates of migration (Sabot, 1987; Taylor & Martin, 2001), especially of young people. In this sense, youth is a critical age in which individuals acquire both cognitive and non-cognitive skills through exposure to new environments, such as higher education or through formal training received at work.

2.2 Educational systems

This section presents a brief description of the educational systems in each of the study countries in order to depict the different settings at which this study takes place. This is important to understand the different incentives that potential migrants may have to decide when to migrate.

In three of the four countries, the length of basic education, including preschool, is 15 years, whereas in Peru it is only 14 years – see Table 2.2. Nonetheless, the starting point varies: in Ethiopia, the preschool year starts one year after it does in India, Peru, and Vietnam. Therefore, the

total amount of basic education also ends one year later than in the other three countries. The division of basic education into different phases is most accentuated in India, where both Primary and Secondary are split into lower and upper stages. On the contrary, Peru is the country that does not have any division regarding these. Moreover, in Ethiopia education is compulsory until Grade 8. Similarly, in India it is mandatory until the age of 14 (Grade 8). In Peru, since 1996 education is compulsory for children up to age 16, which includes Preschool, Primary, and Secondary levels. In Vietnam, mandatory education used to go up to Grade 5, but in 2005 this changed and at the moment it goes up to Grade 9 (World Education News and Reviews, 2019).⁵

Table 2.2: Education system in the study countries

Age (Years)	Level			
	Ethiopia	India*	Peru	Vietnam
1				
2				
3		Preschool	Preschool	Preschool
4	Preschool			
5				
6		Lower Primary	Primary	Elementary
7	Elementary			
8				
9				
10				
11		Upper Primary		Lower Secondary
12			Secondary	
13				
14		Secondary		
15	General			Upper Secondary
16	Secondary	Upper Secondary		
17	Upper Secondary			
18				

Source: World Education News and Reviews (2019)

*Note: India refers specifically to the states of Andhra Pradesh and Telangana.

In three of the four countries, pupils should sit for general exams at the end of some levels of education in order to test whether they are able to continue to the next level. In Ethiopia, there is the Elementary School Leaving Certificate Examination after Grade 8, the Ethiopian General

⁵ According to UNESCO Institute for Statistics (2019), the current number of compulsory years of schooling in Vietnam is 10 instead of 9.

Secondary Education Certificate Examination after Grade 10, and the Ethiopian Higher Education Entrance Certificate Examination after Grade 12. Similarly, in India there is the Year 10 Certificate, which comes after Secondary Education and the Year 12 Certificate after completion of Upper Secondary Education. In Vietnam, there is only the Secondary School Graduation Examination, which takes place after Grade 12. Finally, in Peru there is no general examination at any point of basic education.

However, looking at the actual rates of educational attainment gives us a more accurate view of the educational systems. Table 2.3 shows the share of population above 25 with no schooling. It ranges from 5 in Peru to 75 in Ethiopia. Although the net enrolment ratio in primary education in all countries is high (85 and above), the graduation rates from secondary education are also sparse: they range from 9 in Ethiopia to 85 in Peru. This pattern is also evidenced in the mean years of schooling.

Table 2.3: Basic education statistics per study country

	Ethiopia	India	Peru	Vietnam
Share of population above 25 with no schooling	0.75	0.41	0.05	0.07
Net enrolment ratio in primary education	0.85	0.92	0.97	0.98
Gross graduation ratio from upper secondary education	0.09	0.33	0.85	0.54
Mean years of schooling	2.0	5.3	9.2	8.1

Source: UNESCO Institute for Statistics (2019)

2.3 Data

The data used in this study are drawn from the Young Lives (YL) survey, which includes information on a sample of individuals from Ethiopia, India (Andhra Pradesh and Telangana), Peru, and Vietnam from childhood through early adulthood. In particular, the YL quantitative data include extensive information at the individual, household, and community level on two cohorts through 4 rounds between 2002 and 2013. The first and second papers of this thesis use data from children of the older cohort – born in 1994-95 –, whereas the third paper uses data from children of the younger cohort – born in 2000-01. Tables 2.4 and 2.5 show the average age per round of

children from the older and younger cohorts, respectively. In this thesis, I will mainly focus on data from rounds 3 and 4 of the survey.

Table 2.4: Young Lives sample – Older Cohort

	Age of Index Child	Ethiopia	India	Peru	Vietnam
Round 1 (2002)	8	1,000	1,008	714	1,000
Round 2 (2006)	12	979	994	685	990
Round 3 (2009)	15	974	977	678	976
Round 4 (2013)	19	908	952	619	887
In Rounds 3 and 4		905	951	615	882
Attrition between R3 and R4		6.8%	2.6%	8.7%	9.1%
Attrition due to emigration		5.2%	0.4%	1.8%	0.6%

Source: Young Lives Rounds 1 to 4.

Note: This table shows the number of children interviewed (i.e. number of child questionnaires administered in each round). Attrition rates include deaths.

Unlike working with census data, using survey data on migrants allows me to detect migration trends in depth and more accurately as they are collected at more frequent and regular intervals. This is especially important among youth since they are highly mobile (Beegle & Poulin, 2012). In the case of YL, the time elapsing between rounds 3 and 4 is sufficiently short to allow collection of accurate information about the history of individual movements between surveys. Furthermore, the variety of information collected in YL survey allows to probe specific migration questions with other sections in order to minimise measurement error.

Other panel surveys, such as Kagera Health and Development Survey in Tanzania, Indonesian Family Life Survey in Indonesia, Malaysia Labour Flexibility Survey in Malaysia, and Matlab Health and Socio-Economic Survey in Bangladesh, may also include relevant information for investigating internal migration because they follow both original and split households and are nationally representative. Nevertheless, these datasets do not focus on poor youth, who are the group of focus of this study.

Table 2.5: Young Lives sample – Younger Cohort

	Age of Index Child	Ethiopia		India		Peru		Vietnam	
		Index Children	Siblings						
Round 1 (2002)	1	1,999	N.A.	2,011	N.A.	2,052	N.A.	2,000	N.A.
Round 2 (2006)	5	1,912	N.A.	1,950	N.A.	1,963	N.A.	1,970	N.A.
Round 3 (2009)	8	1,885	1,552	1,931	N.A.	1,943	576	1,961	1,155
Round 4 (2013)	12	1,873	1,541	1,915	1,651	1,902	799	1,932	981
In Rounds 3 and 4		1,868	1,513	1,912	N.A.	1,884	555	1,924	981
Attrition between rounds 3 and 4		0.6%		0.8%		2.1%		1.5%	

Source: Young Lives Rounds 1 to 4.

Note: The age of the index child is measured in years. These sample sizes include index children and their siblings irrespective of whether they have data on cognitive and psychosocial scores. The number of siblings was calculated taking into account the siblings ID assigned to them in each round.

This is the main reason why YL is better suited for my analysis: although its samples were not designed to be nationally representative (except for Peru), they cover the diversity of children in each study country. Loosely speaking, the YL survey is representative of poor youth. The sampling methodology consisted on a multi-stage sampling procedure: the first stage consisted in selecting 20 sentinel sites⁶ according to a set of pro-poor criteria⁷ that ensured to account for each country's ethnic and geographic diversity, as well as urban and rural differences. The second stage consisted in randomly choosing households within a sentinel site conditional on having a child of the required age. This multi-stage pro-poor sampling design had the specific objective of collecting comprehensive information on the characteristics, environments, and outcomes of poor children across four different countries over different stages of their life course (Escobal & Flores, 2008; Kumra, 2008; Nguyen, 2008; Outes-Leon & Sanchez, 2008).

Moreover, one of the major advantages of the YL data is its longitudinal nature, as it tracks the index children since early ages over a long period of time,⁸ and thus it allows one to study how an individual's history relates to different migration aspects. In comparison with similar surveys, as shown in Outes-Leon and Dercon (2008), YL has a low level of attrition. For the older cohort, it varied between 3 and 9 between rounds 3 and 4 (see Table 2.4), and it was mainly driven by the 'untraceable' children, those who were not found and could not be tracked because their key contacts did not know where they lived. However, in Ethiopia, attrition between these two rounds was mainly explained by the share of children who emigrated (5) – mainly to the Gulf countries. Therefore, it must be noted that the migration rates presented in this study, especially for Ethiopia, do not represent overall mobility, but only internal migration – as it was intended in this paper in

⁶ A sentinel site corresponds to a district in Peru and a sub-district in Ethiopia (kebele), India (mandal), and Vietnam (commune).

⁷ This purposeful sampling is deemed to represent a particular segment of the population (in this case, poor young individuals) and is expected to show early signs of the impact of trends that affect them. It must be noted that in the case of Peru, the Older Cohort sample is smaller and mainly urban due to resource constraints (Escobal et al., 2003).

⁸ The tracking rule in Ethiopia, Peru and Vietnam is to follow the index child as long as the child lives within the country. In the case of India, the rule is to follow children within the limits of Andhra Pradesh and Telangana and to neighbouring states.

the first place. For the younger cohort, attrition varied between 0.6 and 2.1 , which is particularly low (see Table 2.5).

3. Patterns and Drivers of Internal Migration among Youth

Abstract

Migrants are primarily young people. However, during the transition to adulthood, young people also make important choices regarding education, labour force participation, and family formation. Using a unique panel dataset on youth born in 1994-95 in Ethiopia, India, Peru, and Vietnam, this paper investigates how life course transitions to adulthood relate to patterns and predictors of internal migration in low- and middle-income countries. First, I document patterns on prevalence, frequency, timing, reasons and streams of migration, employment at destination, subjective well-being, and migration aspirations. Second, I describe the factors associated with young men and women's decision to migrate, and with their reasons for migrating. Results suggest that the average characteristics of migrants that move for studies are similar across countries: the more educated are more likely to move for studies, and gender is also a strong predictor of migration for this reason. Nonetheless, the profile of the average migrant that moved for work varies across countries. Lastly, females who are more deprived are more likely to move for family formation. In sum, migrants are a heterogeneous group as there are systematic differences in the characteristics among them depending on their reasons for moving.

3.1 Introduction

There is general consensus in the literature on migration that migrants are primarily young people (Lee, 1966; Lloyd, 2005). Based on migration patterns during the seventies, Todaro (1980) suggested that migrants are "disproportionately young, better educated, less risk-averse, and more achievement-oriented and have better personal contacts in destination areas". More recently, using Demographic Household Surveys from 65 developing countries, Young (2013) provided sound evidence that most migrants between 25 to 49 years old moved in their early to mid-twenties.

Different theories provide distinct explanations for this stylised fact. According to the human capital model of migration led by Sjaastad (1962), migration is seen as an individual investment and, thus, the sooner the migrant moves, the greater the benefits of migrating. Furthermore, Stark and Bloom (1985) argued that migration decisions are often made jointly by the migrant and by a group of non-migrants, generally the family, in order to mitigate income risks. In this context, the children of a family become potential candidates for migrating, which would lower the average age of migrants.

However, during late adolescence the decision to migrate becomes more complex as young people are also experiencing biological, cognitive, psychosocial and interpersonal changes that will shape their future as adults (Rice & Dolgin, 2011). Moreover, transitions to adulthood⁹ are characterised by decision-making about education, labour force participation, and family formation, which are closely linked to the decision to move. Kley (2011) explains that the intention to migrate relies on the perception that accomplishing important life goals may be more achievable in a different place than the current one. Therefore, I hypothesize that migration decision-making would be highly influenced by life-course events, such as the transition to adulthood. Understanding this is important because not only youth migration is prevalent, but also because its patterns and drivers are very different from those of other age groups as youth migration greatly overlaps with other transitions to adulthood (Zenteno et al., 2013).

For this reason, youth migration has lately elicited increasing interest from the policy viewpoint (UNICEF, 2014; United Nations, 2013b). Borjas et al. (1992) already pointed that since young people have not yet accumulated significant job- and location- specific human capital, they are especially responsive to economic incentives for migration. Nevertheless, little is known about the migration of youths¹⁰ in the context of transition to adulthood since existing research on the causes and consequences of migration mainly focuses on male adults (Curran et al., 2006). This paper addresses this gap by investigating how life course transitions to adulthood relate to patterns and predictors of internal migration in low- and middle-income countries. In order to do this, I draw on data from the older cohort of Young Lives, a unique longitudinal study on young people born in 1994-95 in Ethiopia, India (Andhra Pradesh and Telangana), Peru, and Vietnam. Young Lives' quantitative survey contains extensive information at the individual, household, and community level of both migrants and non-migrants from ages 8 to 19, which allows me to study how an

⁹ Throughout this paper, I will use the term “transitions to adulthood” as a heuristic device to capture the fuzzy shift from childhood to adulthood, during which young people take on new roles and responsibilities and make important choices. For a discussion on the suitability of this term applied to the context of developing countries, see Morrow (2013).

¹⁰ I use the United Nation's definition of 'youth' as individuals between the ages of 15 and 24 years (United Nations).

individual's history relates to different migration aspects.

Given the remarkable richness of the data, the goal of this paper is not to identify causality of any sort, but to describe the major empirical regularities in a systematic way. In particular, the aim of this paper is threefold. First, I document detailed patterns of internal mobility (before and after the move) among young people and their differences across contexts. Specifically, I report patterns on prevalence, frequency, timing, reasons and streams of migration, as well as employment status, subjective well-being, and migration aspirations at destination. Second, using a Linear Probability Model I describe the factors associated with young men and women's decision to migrate. Third, using a Multinomial Logit Model I estimate the correlates associated with the reasons for migrating. In doing so, I account for demographic and socioeconomic characteristics, including past youth's educational aspirations and their caregivers' as key predictors of later migration.

Thus, this paper builds on the work by Juarez et al. (2013), who put together a series of studies on the transitions to adulthood and youth migration in developing countries. Using both quantitative and qualitative methods, these studies document patterns on international and internal mobility among young people. Similarly, Herrera and Sahn (2013) described the determinants of youth migration in Senegal. They found that the socioeconomic factors associated with the decision to migrate are heterogeneous by gender, and that childhood characteristics predict migration later in life.

This study also contributes to the literature that investigates selection into migration (Borjas et al., 1992; Lanzona, 1998; Miguel & Hamory, 2009; Young, 2013), by providing international evidence that "favourable self-selection" (Chiswick, 1999; Todaro, 1980) in observable characteristics is not systematic across young migrants. In fact, it only holds for those that move for studies. Furthermore, it also speaks to the strand of the economics literature devoted to explain differences in labour productivity across sectors and areas (Gollin et al., 2014; Hamory et al., 2017; Lagakos & Waugh, 2013), since they look at selection as a factor that may potentially explain these

gaps.

Overall, I find that migrants in the Young Lives sample are highly mobile, and the data show that between the age period of 15 and 19 years, they were permanently on the move following primarily life cycle patterns rather than one-goal permanent moves. I find that the main reason for moving is for studying, although in India, marriage is the most prevalent reason among girls. In all countries, migrants moved at an age that is just above school-completion age. Migration streams differ per country: rural-urban moves prevail in Ethiopia and Vietnam, urban-urban in Peru, and rural-rural in India. I also find that in all countries, except for Ethiopia, migrants reported having better opportunities for work than non-migrants did, although they also reported having worse quality of environment and less support from neighbours and friends than stayers did. Finally, results suggest that the main reason for not being willing to move is family attachment, whereas job search is the main reason for being willing to move.

Regarding the predictors of migration, I find that the region where young people live has gender-specific effects on the decision to migrate in all countries, except for Peru where it has a similar effect in the two groups. Except for India, poorer youths are more likely to migrate. Household size is a predictor of girls' migration in all countries, except for Peru. In fact, differences in characteristics between migrants and non-migrants by gender are very weak in Peru.

Regarding the factors associated with the reasons for moving, I find that there is great heterogeneity among young migrants: the average migrant that moves for studies is systematically different from those that move for work and for family formation. The average characteristics of migrants that move for studies are very similar across countries: being more educated is associated with a higher probability of moving for studies. Nonetheless, the profile of the average migrant that moved for work is very different: except for Peru, young people living in relatively poorer households are more likely to move for this reason. Lastly, relatively poorer girls are more likely to move for family formation in India and Vietnam.

Providing evidence that migrants differ systematically in observable characteristics

according to their reasons for moving is of paramount importance to understand what the effects of migration are among youth – although this goes beyond the scope of this paper, but will be further developed in the next chapter. More importantly, this will put us in a better position to propose more effective policies that target young migrants' well-being in developing countries.

This paper is organised as follows: section 3.2 presents descriptive statistics; section 3.3 shows the patterns of internal migration; section 3.4 describes the factors associated with the decision to migrate and with the reasons for moving; section 3.5 presents a discussion of results; and, finally, section 3.6 summarises the conclusions of the study.

3.2 Descriptive statistics

Generally, migration is defined as "a move from one migration defining area to another (or a move of some specified minimum distance) that was made during a given migration interval and that involved a change of [usual place of] residence" (United Nations, 1970). *Migration defining area* is the administrative unit taken as reference such that anyone who changes their usual residence across the boundary of such unit is considered a migrant (Lucas, 2000). *Migration interval* is defined as the period of time within which migration may occur. It could be definite, such as the intercensal period, or indefinite, such as the lifetime of the population alive at a given date (United Nations, 1970). *Usual place of residence* is defined as the place where someone lived (slept and ate) for a minimum amount of time at one time (Lucas, 2000).

Following United Nations (1970) and Lucas (2000) and given the available Young Lives data, I define migration as any domestic move outside the "locality" of residence for at least 3 months,¹¹ that was made between rounds 3 (2009) and 4 (2013) – a period during which individuals in the sample were between 15 and 19 years old. *Locality* is defined as the smallest geographical administrative unit and varies by country: it is a kebele in Ethiopia, a village/ward in India, a district

¹¹ This time frame aims to exclude pendular migration – i.e. short absences from the community of origin (Skeldon, 1977).

in Peru, and a commune in Vietnam. Moreover, consistent with the above definition, the sample is restricted to individuals who participated in both the 2009 and 2013 surveys.¹²

Table 3.1 presents the general characteristics of children and households in the sample at the initial point of the migration period considered (2009). The gender composition in all countries is overall balanced. Regarding birth order, Vietnam is also the country with the highest share of first-born children. India and Vietnam are the countries with the largest proportion of children living with both parents, whereas Ethiopia and Peru have the largest proportion of children living with only one of the parents. Regarding community characteristics, the share of households living in urban areas varies across countries, with Peru having the highest share, which may be a natural consequence of the fact that the original sample in Peru (in 2002) was mainly urban. Young people – at age 15 years – were involved in different activities: most of them were enrolled in school – which is expected given their age –, and between 35 and 50 were employed,¹³ mainly in agricultural activities. This table also shows that Peru is the country where children and their caregivers have the highest educational aspirations in terms of expected years of schooling.

¹² Therefore, although the full Young Lives sample size is 3,722 children, in this paper I restrict it to 3,353 young people.

¹³ This figure excludes household work, child care and care for elders.

Table 3.1: Child and household characteristics of Young Lives sample (2009)

	Ethiopia			India			Peru			Vietnam		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Male	0.54	0.50	905	0.49	0.50	951	0.53	0.50	615	0.48	0.50	882
Age of YL Child (in months)	179.81	3.64	905	179.18	4.13	951	178.72	4.63	615	180.45	3.84	882
First born	0.19	0.39	905	0.28	0.45	951	0.32	0.47	615	0.37	0.48	882
Living with both parents	0.60	0.49	905	0.85	0.36	951	0.67	0.47	615	0.88	0.32	882
Living with one of the parents	0.28	0.45	905	0.12	0.33	951	0.27	0.44	615	0.09	0.29	882
Father's years of schooling	4.33	3.85	905	4.73	5.05	951	9.24	4.65	615	8.01	5.04	882
Caregiver's years of schooling	2.91	3.53	905	2.93	4.29	951	7.44	4.27	615	6.84	4.21	882
Wealth index	0.35	0.17	905	0.52	0.17	951	0.59	0.18	615	0.62	0.19	882
Owns land (in hectares)	0.79	0.86	905	1.67	21.25	951	2.57	26.05	615	0.64	3.36	882
Owns livestock	0.71	0.45	905	0.43	0.50	951	0.63	0.48	615	0.40	0.49	882
Number of siblings	4.02	2.21	905	1.89	1.11	951	1.96	1.36	615	1.81	1.23	882
Urban	0.42	0.49	905	0.25	0.43	951	0.77	0.42	615	0.19	0.39	882
Currently enrolled	0.90	0.31	905	0.77	0.42	951	0.93	0.25	615	0.78	0.42	882
Highest grade attained	5.50	2.10	905	8.09	1.86	951	7.71	1.38	615	8.24	1.45	882
Employed in the last 12 months	0.43	0.50	905	0.38	0.48	951	0.50	0.50	615	0.35	0.48	882
Work in agricultural act.	0.57	0.50	390	0.65	0.48	357	0.44	0.50	308	0.75	0.44	307
Self-employed in non-agri. act.	0.14	0.35	390	0.07	0.26	357	0.32	0.47	308	0.21	0.40	307
Wage-employed in non-agri. act.	0.12	0.33	390	0.27	0.45	357	0.22	0.42	308	0.17	0.38	307
YL Child's educational aspirations	14.60	2.94	905	14.59	2.32	951	15.41	1.85	615	14.48	2.96	882
Caregiver's educational aspirations	14.97	2.27	905	13.32	3.54	951	15.26	1.79	615	13.99	1.23	882
Received transfers from Gov/NGO	0.28	0.45	905	0.92	0.28	951	0.41	0.49	615	0.39	0.49	882
Received transfers from other households	0.26	0.44	905	0.09	0.29	951	0.40	0.49	615	0.36	0.48	882
Received earnings from assets and savings	0.12	0.32	905	0.25	0.43	951	0.09	0.29	615	0.07	0.25	882
Received credit in the last 12 months	0.35	0.48	905	0.81	0.39	951	0.33	0.47	615	0.60	0.49	882

Source: Young Lives Round 3.

3.3 Patterns of internal mobility

In this section, I will focus on the descriptive evidence of youth migration in the four study countries. This is important because it sheds light on different aspects of migration that are not usually observed among young people.

Prevalence

Table 3.2 shows the prevalence of migration in the Young Lives sample under different definitions. Between 28 and 51 of the sample has ever moved between the first and fourth rounds of the survey. Most of the moves took place between rounds 3 and 4, when these children entered adolescence. It must be noted that the definition used for the remainder of the paper is the one described in the previous section – corresponding to the fifth row of Table 3.2. Between a third and a half of the sample has migrated at least once between 2009 and 2013, being India and Vietnam the countries with the highest share of migrants.

Table 3.2: Migration rates between rounds

	Ethiopia	India	Peru	Vietnam
Ever moved in any round	0.28	0.46	0.51	0.42
Moved between R1 and R2	0.03	0.04	0.23	0.02
Moved between R2 and R3	0.07	0.02	0.19	0.01
Moved between R3 and R4*	0.23	0.43	0.32	0.40
Moved between R3 and R4**	0.33	0.50	0.33	0.49
N	905	951	615	882

Source: Young Lives Rounds 1 to 4.

* This rate defines migration as a change in the locality of residence at the time of the survey in rounds 3 and 4, irrespective of whether the individual moved *between* rounds.

** This rate defines migration as *any* change in the locality of residence that took place between rounds 3 and 4 and for which the migrant stayed in the destination place at least 3 months.

These migration rates are relatively high in comparison to the available national figures, partly due to different definitions of migration defining area, usual place of residence, and migration interval. According to the Ethiopian National Labour Force Survey (NLFS), the migration rate among youth aged 15 to 19 in 2013 was of 13%. However, it must be noted that the NLFS defines the usual place of residence as a stay of a minimum of 6 months. The migration rate in India is also higher than the rate of 34% reported by Rajan (2013) based on individuals aged 15 to 29 using the 2001 Census.¹⁴ This census also defines the usual place of residence as a minimum stay of 6 months, and the migration interval considered for this figure is defined by the place of last residence. The migration rate in Peru is also higher than the 4.5% reported by Yamada (2012) despite that the latter figure includes a migration interval of 5 years; nonetheless, it includes all the population. Similarly, the migration rate in Vietnam is considerably higher than the rates of 3.6% and 2.9% of intra-provincial and inter-provincial rates, respectively, reported by Nguyen Anh (2005) for the population aged 5 and above.

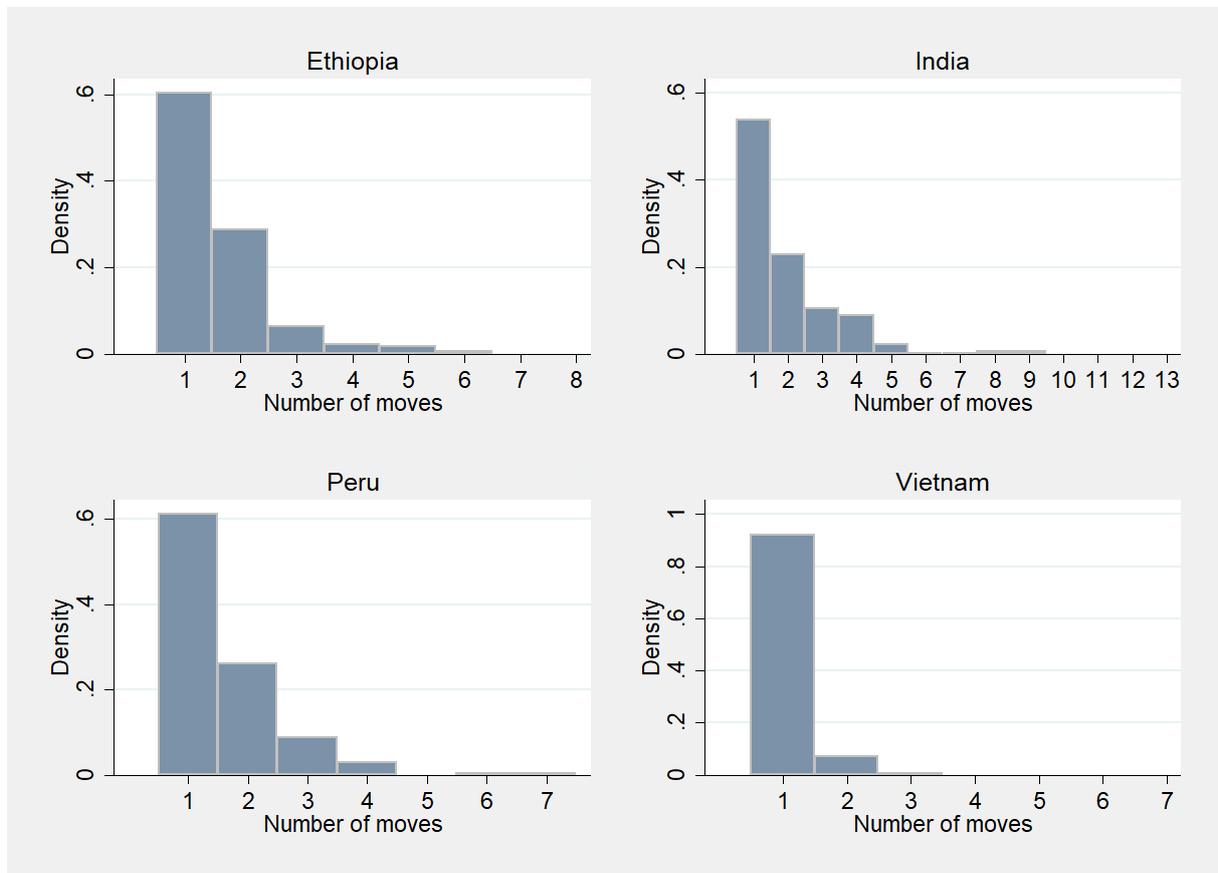
Frequency

Figure 3.1 presents the distribution of the number of moves per migrant. Around half of migrants in three of the four countries moved more than once. On one hand, this may be indicative of return or seasonal migration, especially considering that India is the country with the highest frequency of migration. This could be related to the common practice that children in India, particularly in rural areas, move to hostels in order to attend school (Crivello et al., 2012) and/or that poor families in rural areas often move during the lean season to work for six to eight months and then return to their villages (Smita, 2008). On the other hand, this fact may suggest there is sequential migration. According to Pessino (1991), a migrant observes the outcome of having moved and sequentially decides to stay, return, or move again. She found that individuals in Peru move first from poorer areas and then they move from the relatively richer areas. It may also be the

¹⁴ For limitations of official data on migration in India, refer to Deshingkar (2010).

case that each country follows a different pattern; however, based on these migration histories only, it is not possible to disentangle whether these moves constitute return, circular, or sequential migration.

Figure 3.1: Distribution of number of moves per migrant



Source: Young Lives Round 4.

Note: This figure was calculated as the number of moves divided by the total number of migrants.

Timing

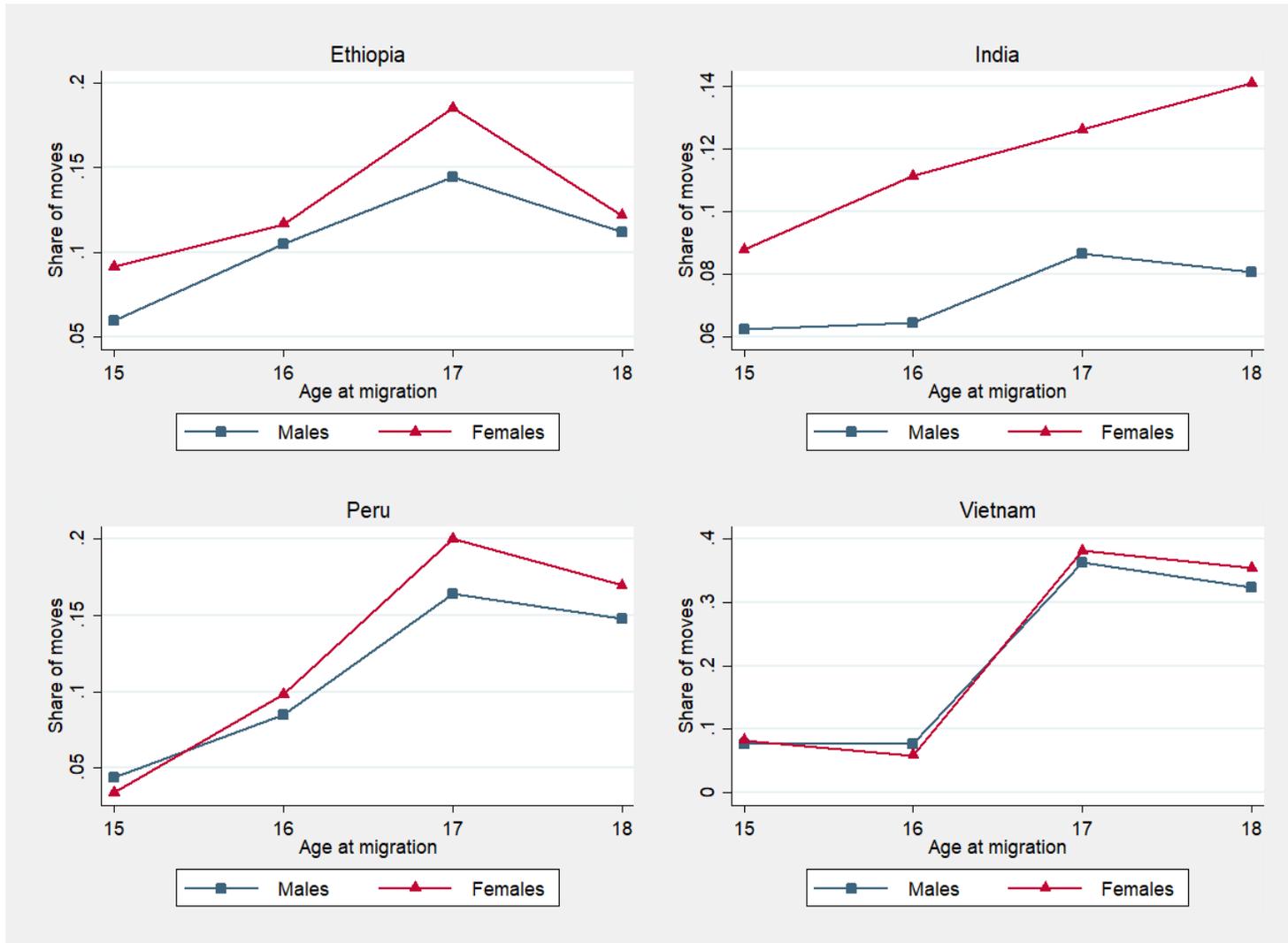
It is expected that migration depends on the stages of the life cycle of the individual and will greatly vary by gender (Herrera & Sahn, 2013; Hughes, 2019). In order to document patterns related to the timing of the moves, I calculate the age of the movers at the time when each movement

occurred – for all moves reported.¹⁵ Figure 3.2 summarises the timing of the moves by gender.¹⁶ Except for Vietnam, girls are more mobile than boys are, being India the country where this pattern is most marked, and both boys and girls moved frequently during school-age years. Except for girls in India, the number of moves peaked at the age of 17, which is the age at which they generally finish school. This finding provides evidence that young people migrate very often even before having finished school, which is key to understand educational performance. In this line, McKenzie and Rapoport (2011) argue that 16- to 18-year-old males that live in a migrant household in rural Mexico are more likely to move later on, which in turn is associated with a lower likelihood of school participation.

¹⁵ A caveat related to the calculation of the age at migration is that the Young Lives survey only collected information on the year of the move, and therefore I imputed the day and month. Thus, I estimated the average age in the year of the move in the following way: for the moves that took place between the years of the survey, I calculated the age at the beginning of the year reported and the age at the end, and then obtained the average of the two. If the year reported is the same as the year of administration of round 3 (2009) survey, I took the average of the age one day after the interview (minimum age) and the age at the end of 2009 (maximum age). If the year reported is the same as the year of administration of round 4 (2013) survey, then I took the average of the age at the beginning of 2013 (minimum age) and the age one day before the date of interview (maximum age). With this procedure, I ensure that the date used to estimate the average age of the migrants is consistent with the dates of administration of the survey.

¹⁶ Given the timing of the survey administration in both rounds, not all children were 14 and 19 years old. Thus, I removed these values from Figure 2 as they would show misleading trends.

Figure 3.2: Share of moves and age at migration, by gender



Source: Young Lives Round 4.

Note: Share of moves is defined as the number of moves at a given age divided by the total number of moves in the sample.

Reasons

We have seen that a non-negligible share of the sample has moved more than once – as shown in Figure 3.1. In order to present the characteristics of the movement, I defined as “relevant move” the last move (most recent one) reported in the migration history section of the questionnaire. The reasons for moving were grouped as follows: i) to study; ii) to work - includes those who found a job, look for work, lost their job and were posted on a job; iii) for family formation – includes marriage, cohabiting, following a spouse/partner and for pregnancy/birth; iv) to follow/join family – includes following relatives (excluding spouse/partner), and visiting/staying with friends/family; v) other.

Migration is a gendered process in that the motivations behind it vary between men and women (Richter & Taylor, 2008). In the case of young people, the decision to migrate may greatly vary between boys and girls not only because transitions to adulthood differ by gender (Morrow, 2013), but also because parents may have different incentives for encouraging migration between them (World Bank, 2007). Table 3.3 summarises the reasons of the last move,¹⁷ by gender. Overall, the main reason for moving in all countries is study-related, although the shares vary across countries: in India and Vietnam, approximately half of the moves are education-related, whereas in Ethiopia and Peru, these represent around one third. In the case of Peru, 17% of the moves correspond to various reasons grouped under *Other*, being “looking for better housing” the most prevalent reason among these.

¹⁷ These shares do not change dramatically when the reasons for migrating are analysed for all moves reported – instead of the last move. In fact, they are very similar across all groups, except for males in Ethiopia and Peru, for whom the most prevalent reason among all moves is work-related, while the most important reason of the last move is education-related.

Table 3.3: Reasons for moving, by gender

	Ethiopia			India			Peru			Vietnam		
	Female	Male	Overall	Female	Male	Overall	Female	Male	Overall	Female	Male	Overall
To study	0.42	0.32	0.37	0.33	0.57	0.45	0.38	0.37	0.38	0.56	0.52	0.54
To work	0.12	0.26	0.19	0.09	0.32	0.20	0.22	0.27	0.25	0.20	0.40	0.28
For marriage/birth	0.12	0.00	0.06	0.50	0.00	0.26	0.13	0.00	0.07	0.18	0.01	0.11
To follow/join family	0.26	0.31	0.29	0.03	0.04	0.04	0.11	0.17	0.14	0.02	0.00	0.01
Other	0.07	0.10	0.09	0.05	0.05	0.05	0.15	0.19	0.17	0.04	0.07	0.05
N	153	156	309	245	228	473	98	102	200	255	179	434

Source: Young Lives Round 4.

Note: Each cell shows the probability of each row conditional on each column. For example, the probability of moving for studies conditional on being a female in Ethiopia is 0.42. Therefore, the sum of the cells under each column is 1.

However, several differences emerge by gender. Females in Ethiopia moved mainly to study, while males moved both to study and to follow/join family. Regarding this last category, it is worth noting that 28% of the children in Ethiopia were living with only one of their parents in 2009 (as shown in Table 3.1). These facts are consistent with the National Labour Force Survey, which reports that the most prevalent reason for moving between 15 and 19 year olds is to move along with family (33%) (Central Statistical Agency, 2014). Although early marriage is very prevalent in Ethiopia (Boyden et al., 2012), only a few moves were marriage-related.¹⁸ In India, most males moved to study, while females moved mainly for marriage. This is consistent with Rajan (2013), who found that the most prevalent reason for moving among youth aged 15 to 19 in India is marriage (28%). In particular, Rosenzweig and Stark (1989) point out that migration in India is mainly "a marital phenomenon", particularly for women as they practice patrilocal patterns of social organisation. However, it is still worth noting that 33% of female migrants in India moved to study. In Peru and Vietnam, the main reason for migration for both boys and girls is education-related, followed by work-related moves.

Distance

Table 3.4 shows the distance of moves by reason for migrating. In Ethiopia, most migrants move within region; in India, they move within state; in Peru, migrants move mainly to a neighbouring region; and in Vietnam, they move outside the province. However, when looking at the share of migrants moving for different reasons, we observe that those who move for marriage tend to migrate to closer localities, unlike those moving for studies or for work.

¹⁸ In the Young Lives sample, only 6% of the young people in Ethiopia at age 19 reported to be married or cohabiting.

Table 3.4: Distance of moves per reasons for migrating

	Study	Work	Family formation	Follow family	Other	Total
Ethiopia						
Outside kebele within woreda	0.08	0.01	0.03	0.04	0.01	0.18
Outside woreda within region	0.16	0.11	0.03	0.15	0.05	0.49
Outside the region	0.14	0.08	0.00	0.09	0.02	0.33
N						302
India						
Outside locality within mandal	0.03	0.00	0.04	0.01	0.01	0.09
Outside mandal within district	0.16	0.04	0.14	0.02	0.01	0.37
Outside district within state	0.24	0.09	0.06	0.00	0.03	0.42
Neighbouring state	0.01	0.06	0.01	0.00	0.01	0.09
Non-neighbouring state	0.00	0.01	0.01	0.00	0.00	0.03
N						472
Peru						
Outside district within province	0.08	0.05	0.03	0.05	0.07	0.26
Outside province within region	0.10	0.02	0.02	0.01	0.02	0.17
Neighbouring region	0.11	0.07	0.01	0.04	0.06	0.27
Non-neighbouring region	0.10	0.12	0.01	0.05	0.03	0.31
N						203
Vietnam						
Outside commune within district	0.00	0.01	0.05	0.00	0.02	0.08
Outside district within province	0.12	0.06	0.04	0.00	0.02	0.24
Outside province	0.42	0.20	0.03	0.01	0.02	0.68
N						432

Source: Young Lives Round 4.

Note: Each cell shows the probability of the corresponding row *and* column. For example, the probability of moving for studies outside the kebele but within the woreda is 0.08. Therefore the sum of all these probabilities for each country is 1. The last column shows the share of migrants moving to localities of different distances, and the sum of the cells in this column is also 1.

Streams

Within the internal migration literature, rural-urban migration has been a major source of interest for researchers and concern for policymakers. Urban population pressures on infrastructure, efficiency of labour use and effects of migration on poverty are just some examples of why rural-urban migration rates are important and, hence, have attracted most of the attention of theoretical and empirical literature on internal migration. However, this is not the most frequent type of movement in developing countries, but rather rural-rural migration is more prevalent. Nonetheless, due mainly to data limitations, empirical evidence on intra-rural movement is relatively scarce (Lucas, 1997).

The definitions of urban and rural vary across countries and were assigned as follows: the

place of destination was categorised as urban or rural according to the type of locality reported in the mobility history section of the questionnaire. In Ethiopia, rural includes small towns, whereas urban includes Addis Ababa and woreda, zonal and regional centres. In India, rural includes villages and mandal headquarters,¹⁹ while urban includes towns, district and state capitals, and cities. In Peru, urban and rural were defined on a case-by-case basis according to Instituto Nacional de Estadística e Informática (2017b). In Vietnam, rural includes rural communes, while urban includes urban communes and towns. Similarly, the place of origin was categorised following the same criteria only for those individuals that reported more than one move; in the case of individuals that moved only once, I assigned the type of locality reported in round 3.

Table 3.5 shows that in terms of spatial mobility, there are less gender disparities in all countries, except for India, where girls moved mainly from rural to rural areas – again consistent with Rosenzweig and Stark (1989) –, whereas males moved from urban to urban areas. In Ethiopia and Vietnam, rural-urban and urban-urban moves are more frequent among boys and girls, which resembles the pattern presented in Deshingkar and Grimm (2005). In Peru, males and females moved mainly from urban to urban areas, which is generally consistent with the fact that the sample was primarily concentrated in cities in 2009 (see Table 3.1).

¹⁹ This was a good approximation, given that most of the mandal headquarters in the Indian sample are rural.

Table 3.5: Streams of migration, conditional on place of origin, by gender

	Ethiopia			India			Peru			Vietnam		
	Female	Male	Overall	Female	Male	Overall	Female	Male	Overall	Female	Male	Overall
Rural-Rural	0.38	0.32	0.36	0.75	0.51	0.65	0.09	0.37	0.25	0.24	0.19	0.22
Rural-Urban	0.62	0.68	0.64	0.25	0.49	0.35	0.91	0.63	0.75	0.76	0.81	0.78
Urban-Rural	0.32	0.36	0.34	0.28	0.14	0.19	0.13	0.14	0.14	0.13	0.14	0.14
Urban-Urban	0.68	0.64	0.66	0.72	0.86	0.81	0.87	0.86	0.86	0.87	0.86	0.86
N	153	156	309	245	228	473	98	106	204	255	179	434

Source: Young Lives Rounds 3 and 4.

Note: Each cell shows the probability of each row conditional on each column. For example, the probability of moving to a rural area conditional on being a female living in a rural area in Ethiopia is 0.38. Therefore, the sum of the two cells corresponding to each type of move is 1.

Individual vs. Household move

Much of the literature on the determinants of migration has debated whether it is an individual or a household strategy. This question is especially relevant during transition to adulthood as not all young migrants are already economically independent individuals moving in search of a better future (McKenzie, 2008). They may move solo or with the household, and if they move alone, they may or may not send remittances to their previous household – in some cases, they may instead receive support from them. All these factors affect the impact that migration will have on the migrant’s well-being (UNESCO & UNICEF, 2012).

Given that the Young Lives study did not collect this information as part of the mobility history, I defined individual migration as the situation where the migrant lives in 2013 in a different household²⁰ than that of 2009. In order to calculate the share of individual migrants, I classify them into three groups in 2009 and 2013: i) living with at least one of the parents, ii) living with the primary caregiver (if different from biological parents), or iii) living with someone different from the biological parents or the primary caregiver. If the migrant’s status changes between 2009 and 2013, I categorise this as an independent move; otherwise, it is a household move.²¹

Table 3.6 shows that in all countries, except for Peru, most migrants moved with the household, although there are gender disparities, especially in India, where the share of females that moved individually is considerably higher than the proportion of males that did so. This is consistent with the fact that most Indian girls moved for marriage. Furthermore, Table 3.7 suggests that migrants are not fully detached from their previous households.²² In all countries, except for Ethiopia, more than half of them received remittances²³ from their previous caregivers. In Ethiopia,

²⁰ Young Lives uses the United Nations’ definition of household, namely “a group of individuals who live under the same roof or within the same compound/homestead/stand, share food from a common source at least once a day, and contribute to or share in a common resource pool” (United Nations, 1989).

²¹ This procedure has an important caveat: it overlooks circular migration, and therefore, may overestimate the share of household migration. For example, if the migrant lived with her parents in 2009 and then she moved back and forth so that in 2013 she lives again with her parents, this would not be counted as individual migration, but rather as household migration.

²² The sample sizes in Tables 3.6 and 3.7 are different because the latter includes only those migrants that did *not* live with their previous caregiver in 2013 (provided that the caregiver was alive).

²³ Remittances are defined as any support, help or gift in cash or in kind *given* to the migrant by her previous

although this proportion is slightly smaller (46%), it is still larger than the share of migrants that sent any remittances to their previous caregivers (17%). I also investigated the receipt and sending of remittances by reason for migrating and found no systematic pattern, except for India, where most of the migrants that received remittances from their previous households are girls that moved for marriage.

Table 3.6: Share of migrants living in different households, by gender

	Ethiopia		India		Peru		Vietnam	
	Mean	N	Mean	N	Mean	N	Mean	N
Female	0.41	152	0.54	245	0.50	98	0.21	254
Male	0.25	155	0.01	228	0.37	106	0.04	178
Overall	0.33	307	0.29	473	0.43	204	0.14	432

Source: Young Lives Round 4.

Note: This table shows the number of migrants that live in 2013 in a different household than in 2009 divided by the total number of migrants.

Table 3.7: Share of migrants that sent or received remittances, by gender

	Ethiopia		India		Peru		Vietnam	
	Mean	N	Mean	N	Mean	N	Mean	N
Female								
Sent	0.12	90	0.10	134	0.35	52	0.32	151
Received	0.50	90	0.50	134	0.62	52	0.69	154
Male								
Sent	0.25	59	0.30	27	0.41	54	0.33	95
Received	0.41	59	0.48	27	0.59	54	0.56	96
Overall								
Sent	0.17	149	0.14	161	0.38	106	0.33	246
Received	0.46	149	0.50	161	0.60	106	0.64	250

Source: Young Lives Round 4.

Note: The sample size in this table only includes migrants who were not living with their primary caregiver in 2013, provided that they were alive.

Employment at destination

We have seen that transitions to adulthood are greatly reflected on the migrants' motivations to move. However, migration also affects these transitions in the sense that it places

primary caregiver or any of her household members during the last 12 months. They also include any support, help or gift in cash or in kind *sent* by the migrant to her previous primary caregiver or any of her household members during the last 12 months.

young migrants into a new environment where either more or less choices are available, exposing them to new ideas and living standards that affect their expectations and shape their behaviour.

In order to account for this, I present in Table 3.8 the descriptive statistics of what migrants are doing after they migrated, by reasons for moving. Except for Vietnam, most migrants are only working, which may be explained by the fact that, in this sample, young people that moved for other reasons than studying are more likely to be working. This should not be surprising, considering that at age 15, between a third and a half of the youths was already working, mainly in agricultural activities – see Table 3.1.

In all countries, the vast share of those that moved for work is exclusively working and those that moved for studying are only studying, although in the case of Peru, a significant share is both studying and working. Except for Ethiopia, the majority of those that moved for family formation are only working – although in India the share of those not studying nor working is also very high. Among those that moved to follow or join family, they are mostly working only. Finally, among those that moved for other reasons in India and Peru, most of them are only working, whereas in Ethiopia and Vietnam, they are evenly split between those who only study and those who only work. Regarding the type of employment that migrants are engaged in, Table 3.9 shows that those who moved for work are mainly wage-employed in non-agricultural activities, and except for Peru, those who moved for studying and for marriage work mainly in agriculture-related activities.

These results show that youth's trajectories are intertwined with each other. This is consistent with qualitative studies that argue that transitions to adulthood in poor households are not linear since the sequencing of traditional markers of adulthood is diverse and disordered (Chuta & Morrow, 2015).

Table 3.8: Employment status and reasons for moving

	Non-migrants	To study	To work	For family formation	To follow / join family	Other	Total
Ethiopia							
Neither studying nor working	0.09	0.01	0.10	0.56	0.20	0.19	0.10
Only studying	0.30	0.73	0.02	0.11	0.11	0.35	0.32
Only working	0.26	0.08	0.82	0.28	0.59	0.31	0.30
Both studying and working	0.35	0.18	0.07	0.06	0.10	0.15	0.28
N	603	115	60	18	83	26	905
India							
Neither studying nor working	0.15	0.04	0.06	0.47	0.11	0.17	0.16
Only studying	0.33	0.65	0.03	0.04	0.22	0.08	0.33
Only working	0.37	0.05	0.89	0.49	0.50	0.63	0.38
Both studying and working	0.14	0.25	0.01	0.00	0.17	0.13	0.14
N	478	213	94	123	17	24	950
Peru							
Neither studying nor working	0.17	0.04	0.12	0.23	0.14	0.21	0.15
Only studying	0.27	0.44	0.00	0.00	0.11	0.06	0.24
Only working	0.31	0.15	0.72	0.77	0.61	0.50	0.35
Both studying and working	0.25	0.37	0.16	0.00	0.14	0.24	0.25
N	412	75	50	13	28	34	612
Vietnam							
Neither studying nor working	0.11	0.02	0.14	0.33	0.00	0.05	0.10
Only studying	0.20	0.72	0.00	0.00	0.17	0.41	0.30
Only working	0.53	0.03	0.86	0.67	0.83	0.41	0.45
Both studying and working	0.16	0.23	0.00	0.00	0.00	0.14	0.15
N	450	236	119	49	6	22	882

Source: Young Lives Round 4.

Note: Each cell shows the probability of the corresponding row *and* column. For example, the probability of being a non-migrant neither studying nor working is 0.09. Therefore the sum of all these probabilities for each country is 1. The last column shows the share of young people with different employment status, and the sum of the cells in this column is also 1.

Table 3.9: Type of employment and reasons for moving

	Non-migrants	To study	To work	For marriage / birth	To follow / join family	Other	Total
Ethiopia							
Agriculture-related work	0.52	0.44	0.19	0.70	0.39	0.27	0.47
Self-Employed (Non-Agriculture)	0.22	0.22	0.33	0.30	0.22	0.33	0.23
Wage-Employed (Non-Agriculture)	0.26	0.34	0.48	0.00	0.39	0.4	0.30
N	473	64	58	10	72	15	692
India							
Agriculture-related work	0.59	0.79	0.18	0.73	0.58	0.72	0.57
Self-Employed (Non-Agriculture)	0.14	0.11	0.05	0.09	0.08	0.06	0.11
Wage-Employed (Non-Agriculture)	0.27	0.10	0.78	0.18	0.33	0.22	0.32
N	249	63	85	56	12	18	483
Peru							
Agriculture-related work	0.17	0.17	0.17	0.30	0.32	0.10	0.18
Self-Employed (Non-Agriculture)	0.10	0.04	0.07	0.10	0.00	0.13	0.09
Wage-Employed (Non-Agriculture)	0.72	0.79	0.76	0.60	0.68	0.77	0.73
N	287	48	46	10	25	30	446
Vietnam							
Agriculture-related work	0.36	0.45	0.18	0.54	0.00	0.00	0.34
Self-Employed (Non-Agriculture)	0.16	0.14	0.03	0.18	0.00	0.29	0.13
Wage-Employed (Non-Agriculture)	0.49	0.41	0.80	0.28	1.00	0.71	0.52
N	369	150	118	39	6	17	699

Source: Young Lives Round 4.

Note: The sample in this table only includes *employed* young people. Each cell shows the probability of the corresponding row *and* column. For example, the probability of being a non-migrant doing agricultural work is 0.52. Therefore the sum of all these probabilities for each country is 1. The last column shows the share of young people working in different types of activities, and the sum of the cells in this column is also 1.

Subjective well-being

It is difficult to define what a successful transition to adulthood is, especially in developing countries. With the aim of encouraging governments to promote policies that facilitate smooth transitions to adulthood, Lloyd (2005) proposes a broad definition, in which she includes “a sense of well-being”. This may be understood as general life satisfaction (life as a whole) or in domain terms (in specific areas such as work, health, etc.) (Diener & Lucas, 1999). This is particularly relevant for migrants as they have to face trade-offs between the push and pull factors of their places of origin and destination. Although they have changed their environments searching for better opportunities with a primary focus on one aspect – such as work, education or family formation, as seen in Table 3.3 –, it may well be the case that they also have to assume certain costs – such as psychic costs resulting from less access to social networks (Schwartz, 1973).

In order to explore this in more detail, I compare the change in subjective well-being between 2009 and 2013 among migrants and non-migrants across a range of dimensions that characterise their current and previous location. This measure was captured using a nine-step ladder that characterises a given dimension of subjective well-being for a given place and time.²⁴ The change in subjective well-being was calculated as the difference between the final and initial value of the position in the ladder reported.

Table 3.10 presents the results separately for migrants and non-migrants, together with tests for statistical significance of the difference between the two groups. Migrants in all countries reported having a smaller increase in support from neighbours and friends than non-migrants between their locations in rounds 3 and 4. In fact, in Peru and Vietnam, migrants were actually worse in 2013 than in 2009 in this respect. Except for India, migrants also had a lower increase in support from the government, not-for-profit organisations and local associations – in Vietnam, this

²⁴ The protocol for asking this question is as follows. The enumerator asked the child: “There are nine steps in this ladder. Suppose the ninth step at the very top, represents the best possible life for you, and the bottom represents the worst possible life for you. Where on the ladder do you feel you personally stand at the present time?” This question was asked for the locality where the child was living in round 3 (2009) and the locality in round 4 (2013), regardless of whether they had moved.

actually decreased between the two points in time. In all countries, except for Ethiopia, migrants reported having a larger increase in opportunities for work and access to health services than non-migrants, whereas only migrants in Peru and Vietnam reported having an increased access to education than stayers. In all countries, except for Ethiopia, migrants reported having a smaller increase in quality of environment than non-migrants. Moreover, in Peru and Vietnam, the latter aspect of subjective well-being did not improve, but actually worsened between 2009 and 2013.

Table 3.10: Changes in subjective well-being of migrants and non-migrants

	Non-migrants		Migrants		P-value of Equality
	Mean	N	Mean	N	
Ethiopia					
Opportunities for education	1.61	596	1.48	307	0.3283
Opportunities for work	1.39	591	1.35	305	0.7801
Access to health services	1.82	595	1.77	307	0.6886
Quality of housing	1.56	596	1.79	309	0.0731
Quality of living environment	1.25	596	1.12	308	0.3560
Support from neighbours/friends	0.90	596	0.26	306	0.0000
Support from GOV/NGOs/Local Assoc.	0.92	591	0.39	299	0.0003
Food availability	1.15	596	0.92	308	0.0792
India					
Opportunities for education	0.98	478	1.10	473	0.3159
Opportunities for work	1.04	478	1.26	473	0.0479
Wealth/Income	1.09	478	1.13	473	0.7490
Access to health services	0.92	478	1.35	473	0.0001
Quality of housing	1.04	478	1.10	473	0.6184
Quality of environment	0.43	478	0.20	473	0.0374
Support from neighbours	0.45	478	0.22	473	0.0152
Support from friends	0.74	478	0.44	473	0.0054
Support from government	0.74	478	0.71	473	0.7337
Support from NGOs/Local Assoc.	0.49	478	0.53	473	0.6507
Peru					
Opportunities for education	0.99	408	1.33	204	0.0430
Opportunities for work	0.92	406	1.99	204	0.0000
Living costs	0.49	408	0.47	204	0.9197
Access to health services	0.90	408	1.28	203	0.0370
Quality of housing	1.47	409	1.20	204	0.1192
Quality of environment	0.18	409	-0.73	204	0.0000
Support from friends/neighbours	0.40	408	-0.55	202	0.0000
Support from government/NGOs/Local Assoc.	0.67	401	0.20	198	0.0030
Vietnam					
Opportunities for education	0.18	439	0.65	432	0.0001
Opportunities for work	0.89	441	1.55	430	0.0000
Income/Assets	0.87	441	1.08	426	0.0408
Access to health services	0.73	445	1.24	434	0.0000
Quality of housing	0.61	445	0.43	434	0.0828
Quality of environment	0.15	442	-0.19	433	0.0013
Support from neighbours	0.16	445	-0.93	429	0.0000
Support from friends	0.41	445	0.04	433	0.0001
Support from government	0.28	433	0.11	409	0.0458
Support from NGOs/Local Assoc.	0.19	428	-0.01	407	0.0028
Food availability	0.51	446	0.25	432	0.0109

Source: Young Lives Round 4.

Note: The last column shows the p-value of equality of means between migrants and non-migrants.

Migration aspirations

Seen either as an individual or a household strategy, migration is expected to bring benefits to the migrant. However, as seen in the previous subsection, it is a process that comes along with costs, which may be high enough for some individuals that they may actually represent barriers for migrating.

In this subsection, I explore the preferences and constraints for future migration among migrants and non-migrants, and I test for the statistical significance of the difference between these two groups. Table 3.11 shows the results for all countries. Only in Vietnam, the difference between the shares of migrants and non-migrants that would be willing to move in the next 10 years is statistically significant: 51% of migrants are willing to move versus only 29% of non-migrants are willing to do so. In all countries, the most prevalent reasons reported to back their decision for either willing or not willing to move are the same: both migrants and non-migrants that prefer not to move do so because their family is in their place of residence, while those that prefer to move do so because they would be willing to work somewhere else.

Although migrants and stayers may seem to have similar aspirations regarding future migration, the distribution of these preferences does differ between them. In all countries, the share of migrants who are not willing to move because they are working at their place of residence is at least twice as the share of non-migrants who think so. In Ethiopia, the share of stayers who would not like to move because they have property in their place of residence is statistically significantly higher than that of migrants. In Peru and Vietnam, the share of non-migrants who are not willing to move because they have family there is higher than that of migrants.

There are also differences among migrants and stayers who are willing to move. In Ethiopia and Vietnam, the share of non-migrants who would be willing to move to study is at least twice as that of migrants who reported so. In all countries, except for Vietnam, the share of migrants who are willing to move to work is statistically significantly higher than that of stayers – in Vietnam, these shares are almost the same.

Table 3.11: Migration aspirations

	Non-migrants		Migrants		P-value of Equality
	Mean	N	Mean	N	
Ethiopia					
Would like to move in next 10 years	0.68	596	0.67	308	0.6718
<i>Reasons for not willing to move</i>					
Studying here	0.17	189	0.14	103	0.3918
Working here	0.08	189	0.21	103	0.0009
Family here	0.47	189	0.42	103	0.3825
Property here	0.06	189	0.00	103	0.0125
Happy here	0.07	189	0.14	103	0.0869
Other	0.14	189	0.10	103	0.2628
<i>Reasons for willing to move</i>					
To study	0.34	405	0.17	205	0.0000
To work	0.54	405	0.72	205	0.0000
To follow/join family	0.03	405	0.03	205	0.8815
To broaden horizons	0.00	405	0.00	205	0.4773
Other	0.09	405	0.08	205	0.8842
<i>Preferred destination place</i>					
Within the country - Rural	0.05	404	0.08	201	0.1200
Within the country - Urban	0.34	404	0.38	201	0.3462
Outside the country	0.12	404	0.25	201	0.0001
Do not know	0.48	404	0.28	201	0.0000
India					
Would like to move in next 10 years	0.66	457	0.62	460	0.2440
<i>Reasons for not willing to move</i>					
Studying here	0.01	155	0.01	173	0.5002
Working here	0.10	155	0.20	173	0.0133
Family here	0.47	155	0.51	173	0.4332
Property here	0.23	155	0.16	173	0.1088
Happy here	0.09	155	0.08	173	0.7619
Other	0.09	155	0.03	173	0.0356
<i>Reasons for willing to move</i>					
To study	0.29	296	0.30	285	0.8389
To work	0.42	296	0.53	285	0.0074
For marriage/birth	0.09	296	0.06	285	0.1612
To follow/join family	0.02	296	0.04	285	0.2994
To broaden horizons	0.02	296	0.02	285	0.6057
Other	0.15	296	0.06	285	0.0002
<i>Preferred destination place</i>					
Within the country - Rural	0.08	300	0.09	284	0.5176
Within the country - Urban	0.41	300	0.51	284	0.0147
Outside the country	0.05	300	0.04	284	0.3784
Do not know	0.46	300	0.36	284	0.0135

	Non-migrants		Migrants		P-value of Equality
	Mean	N	Mean	N	
Peru					
Would like to move in next 10 years	0.75	411	0.75	204	0.8819
<i>Reasons for not willing to move</i>					
Studying here	0.07	101	0.22	49	0.0059
Working here	0.03	101	0.12	49	0.0249
Family here	0.58	101	0.39	49	0.0239
Property here	0.03	101	0.08	49	0.1594
Happy here	0.15	101	0.10	49	0.4357
Other	0.14	101	0.08	49	0.3171
<i>Reasons for willing to move</i>					
To study	0.18	307	0.17	153	0.7425
To work	0.27	307	0.39	153	0.0097
To follow/join family	0.03	307	0.09	153	0.0073
To broaden horizons	0.23	307	0.18	153	0.2025
Other	0.28	307	0.17	153	0.0077
<i>Preferred destination place</i>					
Within the country	0.58	308	0.58	154	0.9470
Outside the country	0.21	308	0.25	154	0.3857
Do not know	0.21	308	0.18	154	0.4092
Vietnam					
Would like to move in next 10 years	0.29	429	0.51	401	0.0000
<i>Reasons for not willing to move</i>					
Studying here	0.02	305	0.04	196	0.1617
Working here	0.06	305	0.12	196	0.0078
Family here	0.73	305	0.63	196	0.0197
Property here	0.05	305	0.03	196	0.3124
Happy here	0.08	305	0.12	196	0.0783
Other	0.07	305	0.05	196	0.4198
<i>Reasons for willing to move</i>					
To study	0.10	122	0.03	204	0.0168
To work	0.56	122	0.60	204	0.4205
To follow/join family	0.02	122	0.20	204	0.0000
To broaden horizons	0.07	122	0.00	204	0.0012
Other	0.25	122	0.16	204	0.0315
<i>Preferred destination place</i>					
Within the country - Rural	0.11	122	0.26	201	0.0006
Within the country - Urban	0.43	122	0.47	201	0.5055
Outside the country	0.07	122	0.02	201	0.0354
Do not know	0.39	122	0.24	201	0.0043

Source: Young Lives Round 4.

Note: The last column shows the p-value of equality of means between migrants and non-migrants.

Among those that are willing to move, there are differences regarding the preferred place of destination. On one hand, most non-migrants in Ethiopia and India do not know where they would go, whereas in Peru they would go somewhere within the country,²⁵ and in Vietnam they would go to an urban locality. On the other hand, most migrants in Ethiopia, India, and Vietnam would go to urban areas, and in Peru they would move within the country. Finally, in Ethiopia, the share of movers that are willing to emigrate outside the country is twice higher than that of stayers, whereas in Vietnam, this figure is inverted.

In this section, we have seen the patterns of different aspects of migration and their relation with some key transitions to adulthood. The next section describes who these migrants are in terms of their average characteristics at the individual, household, and community levels.

3.4 Drivers of migration

It is well established that migrants do not constitute a random sample of the general population (Lucas, 1997). Movers differ systematically from stayers for reasons other than their migration status. Understanding the self-selection of migrants is vital to assess the effects of migration on a young person's welfare. In this section, I analyse a set of characteristics at the individual, household, and locality levels in order to estimate a migration decision regression by gender and by reasons for moving.

The first set of predictors relates to individual characteristics of the young person: gender, ethnicity, age (in months), and birth order. The second set of predictors consists of household characteristics, which include caregiver's education, household's wealth, land and livestock ownership, and the number of siblings. The third set of predictors relates to community characteristics, such as the type of locality and the region where the young person lived in 2009. It is likely that the incidence of migration varies across these groups (McKenzie & Sasin, 2007).

²⁵ Unlike in the other countries, in Peru it was only possible to disaggregate the categories of preferred destination place into "Within the country", "Outside the country", and "Do not know" due to data limitations.

The fourth set of predictors relates to the child's education (highest grade attained) and to the educational aspirations of both the child and the caregiver, that is, the ideal number of years of schooling that the child and the caregiver, respectively, would like the child to attain.²⁶ There is a growing literature around the role of aspirations as predictors of later outcomes (Favara, 2016; Serneels & Dercon, 2014; Singh & Espinoza Revollo, 2016). In the case of young people, the transition to adulthood is very much shaped by previous experiences and events during childhood and earlier adolescence, as well as by "what lies ahead" (Lloyd, 2005). Czaika and Vothknecht (2014) found that migrants in Indonesia reported strikingly higher levels of aspirations for the future than non-migrants, while Crivello (2011) argued that bundled aspirations about migration and education among youth might shape their willingness to migrate.

Lastly, when looking at the factors associated with the decision to migrate by gender, I include a fifth set of predictors that consists of indicator variables that capture access to credit and transfers from the government and NGOs, from other households, and from assets and savings. The rationale for including these variables relies on the literature of the New Economics of Labour Migration, according to which migration is a household strategy aimed at diversifying income and coping with risks in absence of insurance markets (Stark & Bloom, 1985). Therefore, these characteristics may be relevant in determining the probability of migrating.

²⁶ These were collected when the child was 15 years old, except for India, where they were collected when the child was 12 years old.

Table 3.12: Characteristics of migrants

	Non-migrants		Migrants		P-value of Equality
	Mean	N	Mean	N	
Ethiopia					
Male	0.55	596	0.50	309	0.1777
Age of YL Child in months	179.79	596	179.84	309	0.8510
First born	0.20	596	0.18	309	0.4333
Living with both parents	0.60	596	0.60	309	0.9905
Living with one of the parents	0.29	596	0.26	309	0.2946
Father's years of schooling	4.63	596	3.76	309	0.0012
Caregiver's years of schooling	3.09	596	2.56	309	0.0334
Wealth index	0.36	596	0.33	309	0.0033
Owens land (in hectares)	1.31	596	0.79	309	0.4046
Owens livestock	0.68	596	0.77	309	0.0043
Number of siblings	3.99	603	4.1	302	0.4694
Urban	0.47	596	0.32	309	0.0000
Enrolled at educational institution	0.89	596	0.90	309	0.5779
Highest grade attained	5.27	596	5.96	309	0.0000
Employed in the last 12 months	0.43	596	0.43	309	0.9819
Work in agricultural act.	0.54	257	0.63	133	0.0865
Self-employed in non-agri. act.	0.16	257	0.12	133	0.3467
Wage-employed in non-agri. act.	0.15	257	0.07	133	0.0165
YL Child's educational aspirations	14.57	596	14.65	309	0.6856
Caregiver's educational aspirations	15	596	14.91	309	0.5482
Received transfers from Gov/NGO	0.28	596	0.29	309	0.7268
Received transfers from other households	0.26	596	0.28	309	0.5896
Received earnings from assets and savings	0.12	596	0.10	309	0.2888
Received credit in the last 12 months	0.39	596	0.28	309	0.0018
India					
Male	0.50	478	0.48	473	0.6711
Age of YL Child in months	179.28	478	179.08	473	0.4648
First born	0.27	478	0.28	473	0.7510
Living with both parents	0.84	478	0.85	473	0.5741
Living with one of the parents	0.14	478	0.11	473	0.1559
Father's years of schooling	5.04	478	4.41	473	0.0546
Caregiver's years of schooling	3.16	478	2.69	473	0.0883
Wealth index	0.55	478	0.50	473	0.0000
Owens land (in hectares)	1.19	478	2.15	473	0.4872
Owens livestock	0.36	478	0.51	473	0.0000
Number of siblings	1.87	479	1.91	472	0.5943
Urban	0.37	478	0.12	473	0.0000
Enrolled at educational institution	0.79	478	0.75	473	0.1378
Highest grade attained	8.11	478	8.07	473	0.7467
Employed in the last 12 months	0.34	478	0.41	473	0.0195
Work in agricultural act.	0.62	162	0.68	195	0.2408
Self-employed in non-agri. act.	0.09	162	0.06	195	0.1913
Wage-employed in non-agri. act.	0.27	162	0.27	195	0.9968
YL Child's educational aspirations	14.64	478	14.53	473	0.4670
Caregiver's educational aspirations	13.58	478	13.07	473	0.0271
Received transfers from Gov/NGO	0.91	478	0.92	473	0.7617
Received transfers from other households	0.08	478	0.10	473	0.2923
Received earnings from assets and savings	0.26	478	0.23	473	0.1806
Received credit in the last 12 months	0.78	478	0.84	473	0.0199

	Non-migrants		Migrants		P-value of Equality
	Mean	N	Mean	N	
Peru					
Male	0.53	411	0.52	204	0.7573
Age of YL Child in months	178.59	411	178.97	204	0.3396
First born	0.35	411	0.27	204	0.0577
Living with both parents	0.67	411	0.68	204	0.8066
Living with one of the parents	0.29	411	0.22	204	0.0787
Father's years of schooling	9.62	411	8.48	204	0.0040
Caregiver's years of schooling	7.93	411	6.46	204	0.0001
Wealth index	0.62	411	0.51	204	0.0000
Owns land (in hectares)	2.61	411	2.47	204	0.9500
Owns livestock	0.55	411	0.77	204	0.0000
Number of siblings	1.94	412	2.01	203	0.5458
Urban	0.84	411	0.64	204	0.0000
Enrolled at educational institution	0.94	411	0.91	204	0.1677
Highest grade attained	7.81	411	7.51	204	0.0109
Employed in the last 12 months	0.46	411	0.57	204	0.011
Work in agricultural act.	0.31	191	0.67	117	0.0000
Self-employed in non-agri. act.	0.39	191	0.21	117	0.0011
Wage-employed in non-agri. act.	0.26	191	0.16	117	0.0534
YL Child's educational aspirations	15.46	411	15.30	204	0.3103
Caregiver's educational aspirations	15.31	411	15.14	204	0.2698
Received transfers from Gov/NGO	0.41	411	0.4	204	0.8268
Received transfers from other households	0.40	411	0.39	204	0.7801
Received earnings from assets and savings	0.09	411	0.09	204	0.8208
Received credit in the last 12 months	0.37	411	0.25	204	0.0030
Vietnam					
Male	0.54	448	0.41	434	0.0002
Age of YL Child in months	180.32	448	180.58	434	0.3257
First born	0.35	448	0.38	434	0.5245
Living with both parents	0.89	448	0.87	434	0.4249
Living with one of the parents	0.10	448	0.09	434	0.7547
Father's years of schooling	7.88	448	8.15	434	0.4338
Caregiver's years of schooling	6.59	448	7.11	434	0.0687
Wealth index	0.64	448	0.60	434	0.0010
Owns land (in hectares)	0.66	448	0.62	434	0.8618
Owns livestock	0.33	448	0.48	434	0.0000
Number of siblings	1.86	450	1.75	432	0.1689
Urban	0.30	448	0.08	434	0.0000
Enrolled at educational institution	0.77	448	0.78	434	0.6353
Highest grade attained	8.07	448	8.42	434	0.0003
Employed in the last 12 months	0.35	448	0.35	434	0.8806
Work in agricultural act.	0.75	157	0.74	150	0.8163
Self-employed in non-agri. act.	0.20	157	0.21	150	0.9510
Wage-employed in non-agri. act.	0.13	157	0.22	150	0.0319
YL Child's educational aspirations	14.15	448	14.82	434	0.0008
Caregiver's educational aspirations	13.92	448	14.07	434	0.0759
Received transfers from Gov/NGO	0.41	448	0.36	434	0.1190
Received transfers from other households	0.39	448	0.33	434	0.1077
Received earnings from assets and savings	0.08	448	0.06	434	0.4240
Received credit in the last 12 months	0.58	448	0.62	434	0.1608

Source: Young Lives Round 4.

Note: The last column shows the p-value of equality of means between migrants and non-migrants.

Table 3.12 shows the mean characteristics of migrants and non-migrants, together with tests for statistical significance of the difference between the two groups. Characteristics vary in each country, although a common feature for all of them is that migrants come mainly from relatively poorer,²⁷ rural households. Except for Vietnam, migrants have less educated caregivers than non-migrants; nonetheless, migrants in Ethiopia and Vietnam are more educated than stayers are. In Ethiopia and Peru, migrants were more likely to work in agricultural activities than stayers were (before migration). In Vietnam, migrants are predominantly females and have caregivers not only with higher education, but also with higher educational aspirations compared to non-migrants, whereas the opposite holds for India. Migrants are less likely to come from households receiving credit in Ethiopia and Peru, whereas the opposite is the case for India.

3.4.1 Predictors of migration by gender

In order to test whether the drivers of migration are gender-specific, I estimated a Linear Probability Model on the decision to migrate separately for young men and women using the following specification:

$$M_{it} = \alpha_0 + \alpha'_1 X_{it-1} + \alpha'_2 H_{it-1} + \alpha'_3 L_{it-1} + \alpha'_4 E_{it-1} + \alpha'_5 T_{it-1} + \varepsilon_{it} \quad (1)$$

where M_{it} is a binary variable that takes the value of 1 if the individual migrated between time $t - 1$ and t (between the ages of 15 and 19 years, respectively); X_{it-1} is a vector of individual characteristics at time $t - 1$; H_{it-1} is a vector of parental and household characteristics at time $t - 1$; L_{it-1} is a vector of location characteristics at time $t - 1$; E_{it-1} is a vector including child's education and educational aspirations, and caregiver's aspirations at time $t - 1$; T_{it-1} is a vector of indicator variables on whether the household received transfers from different sources at time $t - 1$; ε_{it} is the error term, and α_j where $j = 1, \dots, 5$ are vectors of parameters.²⁸ Standard errors

²⁷ By poorer I mean households with lower wealth index. The wealth index ranges from 0 to 1 and is calculated as the average of three sub-indices: i) Housing Quality Index, which assesses the number of rooms in the house and the material of the walls, roof and floor; ii) Consumer Durable Index, which assesses whether the household owns a TV, a radio, a refrigerator, a bike, a motorbike, a car, a telephone, a mobile phone, and a fan; iii) Services Index, which assesses if the household has access to electricity, drinking water, toilet and cooking fuel.

²⁸ For conciseness, I present in Table 3.13 neither the ethnicity nor the region covariates, although I do control for

are clustered at the community level in order to account for potential correlation among unobserved components of outcomes from observations corresponding to children living in the same community (Abadie et al., 2017).

Table 3.13 presents the results together with tests of statistical significance of the difference in the coefficients of regressors between females in column (1) and males in column (2). In Ethiopia, living in a rural area and having more years of education predicts the decision to migrate among both boys and girls. However, livestock ownership has a differentiated effect on the probability of migration: assuming everything else constant, girls that live in households that own livestock are more likely to move than those who do not. This may be related to the fact that girls in Ethiopia move mainly for education and, therefore, their households need to own assets to afford the time they will be studying. This is consistent with Ezra (2000), who points that leaving home for education purposes is considered prestigious as not everyone can afford it. In addition, Ezra and Kiros (2001) suggest that it is not access to land but access to livestock what determines household wealth in Ethiopia since the relative importance of land has diminished due to the current land-tenure system.

Similarly, being first born and the number of siblings have different predictive power for each group: girls with fewer siblings and that are not first born are more likely to migrate, presumably because they may not have the responsibility to look after their siblings. Having received a credit in the last year has significant predictive power for the boys' decision to migrate as it decreases it in 11 percentage points. This finding goes in line with "the new economics of labour migration" as it suggests that those who are better able to self-insure are less likely to migrate.

them in all specifications.

Table 3.13: Estimates of a Linear Probability Model for the decision to migrate, by gender

	Ethiopia			India			Peru			Vietnam		
	(1) Female	(2) Male	(3) P-value	(4) Female	(5) Male	(6) P-value	(7) Female	(8) Male	(9) P-value	(10) Female	(11) Male	(12) P-value
Age in R3 (months)	0.007 (0.005)	0.009* (0.005)	0.8245	0.010* (0.006)	-0.014*** (0.005)	0.0003	0.003 (0.008)	0.008 (0.007)	0.6567	0.020*** (0.007)	-0.002 (0.007)	0.0173
First born	-0.115* (0.062)	0.032 (0.042)	0.0328	0.023 (0.041)	0.001 (0.054)	0.7367	-0.074 (0.063)	-0.028 (0.049)	0.5833	-0.001 (0.047)	-0.032 (0.048)	0.6702
Caregiver's years of schooling	-0.004 (0.006)	0.015** (0.006)	0.0179	0.000 (0.006)	0.017*** (0.006)	0.0514	0.010 (0.009)	-0.007 (0.006)	0.0854	0.016* (0.008)	0.009 (0.008)	0.4506
Household's wealth	0.294* (0.172)	-0.093 (0.166)	0.1069	-0.014 (0.160)	0.105 (0.209)	0.6365	-0.477*** (0.161)	-0.323 (0.210)	0.5083	-0.369* (0.202)	-0.438** (0.191)	0.7531
Own land (hectares)	-0.044 (0.038)	-0.027 (0.032)	0.7799	0.000 (0.000)	0.022 (0.016)	0.1513	-0.001** (0.000)	0.002 (0.003)	0.4756	-0.003** (0.001)	0.033 (0.030)	0.2129
Own livestock	0.189*** (0.063)	-0.050 (0.069)	0.0230	0.003 (0.054)	0.036 (0.056)	0.6798	0.152** (0.059)	-0.006 (0.066)	0.0847	0.055 (0.063)	0.119* (0.069)	0.4268
Urban	-0.213** (0.080)	-0.221** (0.107)	0.9465	-0.344*** (0.065)	-0.385*** (0.065)	0.6219	0.011 (0.108)	-0.135 (0.092)	0.1854	0.237*** (0.083)	-0.121 (0.196)	0.0874
Highest grade completed by child	0.055*** (0.018)	0.051*** (0.013)	0.8041	-0.006 (0.013)	0.037** (0.017)	0.0333	-0.003 (0.031)	-0.004 (0.029)	0.9738	0.057*** (0.020)	0.018 (0.017)	0.1758
YL Child's educational aspirations	-0.003 (0.011)	-0.009 (0.008)	0.6322	0.005 (0.010)	0.001 (0.013)	0.8210	-0.004 (0.014)	-0.017 (0.017)	0.3970	0.002 (0.009)	0.024*** (0.008)	0.0683
Caregiver's educational aspirations	-0.009 (0.009)	-0.002 (0.013)	0.6513	-0.008 (0.007)	-0.013 (0.009)	0.6612	0.004 (0.026)	0.015 (0.017)	0.7243	0.019 (0.015)	0.001 (0.014)	0.3054
Number of siblings	-0.028** (0.012)	0.011 (0.015)	0.0171	0.025 (0.019)	-0.017 (0.025)	0.2024	-0.034 (0.021)	-0.019 (0.021)	0.6335	0.006 (0.021)	-0.036 (0.028)	0.1429
Received transfers from Gov/NGO	0.002 (0.067)	0.036 (0.046)	0.6550	-0.110 (0.095)	0.005 (0.083)	0.3632	-0.020 (0.053)	-0.036 (0.062)	0.8201	0.020 (0.045)	-0.049 (0.048)	0.3154
Received transfers from other hh	0.009 (0.058)	0.084 (0.052)	0.2758	0.139* (0.076)	-0.023 (0.070)	0.1539	0.017 (0.057)	0.005 (0.058)	0.8864	-0.096** (0.047)	-0.020 (0.040)	0.2417
Received earnings from assets/savings	0.021 (0.080)	-0.078 (0.050)	0.2637	-0.010 (0.051)	-0.031 (0.066)	0.8079	-0.024 (0.085)	0.202** (0.100)	0.0328	-0.015 (0.097)	-0.044 (0.096)	0.8013

Received credit in the last 12 months	-0.051 (0.041)	-0.113*** (0.038)	0.2058	0.031 (0.065)	-0.065 (0.058)	0.2355	-0.032 (0.066)	-0.052 (0.065)	0.7951	0.029 (0.046)	-0.035 (0.037)	0.3121
Constant	-0.986 (1.025)	-1.446 (0.904)		-1.076 (1.063)	3.035*** (0.972)		-0.104 (1.422)	-0.702 (1.239)		-4.353*** (1.246)	0.491 (1.384)	
Observations	420	485		486	465		290	325		463	419	
R-squared	0.156	0.236		0.139	0.127		0.122	0.187		0.239	0.165	

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Columns (3), (6), (9), and (12) show the p-value for equality of means between the equations in the two preceding columns.

All specifications include ethnicity and region as controls.

In India, the only common predictor of the decision to migrate between boys and girls is whether they live in an urban area. For both groups, it has a negative effect: for boys, it decreases the probability of migrating in 39 percentage points, whereas for girls it decreases it in 34 percentage points. Other predictors in India have gender-specific effects: age has a positive effect in the girls' probability of migrating, whereas it has a negative effect for boys. This may be partly explained by the fact that girls in India tend to move for marriage, and age and marriage are positively correlated in the sample (Singh & Espinoza Revollo, 2016). Similarly, the child's and caregiver's education have a significant positive effect on the boys' likelihood of moving, whereas they have no significant effect on the girls'. This is consistent with the fact that boys in India move mainly for studies. Girls from larger households are more likely to move. Living in Rayalaseema, in comparison to living in Telangana, decreases the boys' probability of migrating in 12 percentage points, whereas it increases the girls' likelihood of migration in 12 percentage points. Finally, transfers-related controls are only significant for girls: having received transfers from other households increases their likelihood of moving in 14 percentage points. This is suggestive evidence of a transfer being received by the girl's family before migrating for family formation possibly to be able to afford the dowry or any wedding-related expense.

In Peru, differences in characteristics between migrants and non-migrants by gender are weak. Unlike girls, boys receiving earnings from assets and savings are more likely to move than those who did not receive these transfers. Given that both males and females move for both studies and work, these results may be indicative of the different sources used to fund migration in Peru.

In Vietnam, both boys and girls that live in relatively poorer households and that belong to the Kinh ethnicity, relatively to the H'mong, are more likely to migrate. However, gender disparities emerge when it comes to age, location and education: older, better-educated girls living in urban areas and those whose caregivers are better educated are more likely to move. According to Table 3.3, most girls in Vietnam moved for education, which may explain why these are important predictors of mobility. Similarly, girls living in the regions of Northern Uplands, Red

River Delta, Phu Yen, and Mekong River Delta regions are more prone to migrate than those living in Da Nang. This goes in line with the fact that most girls moved from a rural to an urban area, according to Table 3.5. In the case of boys, younger boys that own livestock and with higher educational aspirations are more likely to move.

3.4.2 Predictors of the reasons to migrate

The literature on migration selectivity has often overlooked the motivations for migration (De Jong & Fawcett, 1981). However, given the heterogeneity in the reasons for migrating shown in Table 3.3, it is also useful to understand the differences in characteristics between movers and stayers depending on their reasons for migrating. In order to account for this, I estimate jointly the decision to migrate and the reason for migrating using a Multinomial Logit model as follows:

$$\ln \left[\frac{p[R_{it}=1,2,3,4]}{p[R_{it}=0]} \right] = \beta_0 + \beta'_1 X_{it-1} + \beta'_2 H_{it-1} + \beta'_3 L_{it-1} + \beta'_4 E_{it-1} + \beta'_5 T_{it-1} + \mu_{it} \quad (2)$$

where R_{it} is a categorical variable that takes the value of 0 if the child did not migrate (the base category), 1 if the child migrated to study between time $t - 1$ and t (between age 15 and 19 years, respectively), 2 if the child migrated to work, 3 if the child migrated for family reasons²⁹, and 4 if the child migrated for other reason. μ_{it} is the error term, and β_j where $j = 1, \dots, 5$ are vectors of parameters.³⁰

²⁹ In the case of Ethiopia and Peru, this reason corresponds to the category “Moved to follow/join family”, whereas in the case of India, it corresponds to the category “Moved for family formation” instead due to a higher prevalence of this reason for migration. In the case of Vietnam, this group corresponds to the combination of both reasons together with “Others” category due to little variation in the latter; however, the most prevalent reason in this group is “Moved for family formation”. Hereafter, this category will be interpreted as the latter.

³⁰ For conciseness, I present in Table 3.14 neither the ethnicity nor the region covariates, although I do control for them in all specifications.

Table 3.14: Marginal effects of Multinomial Logit Model for the reasons for moving

	Moved for studies			
	(1) Ethiopia	(2) India	(3) Peru	(4) Vietnam
Male	-0.042 (0.023)	0.082** (0.025)	-0.010 (0.025)	-0.049 (0.027)
Age in R3 (months)	0.004 (0.002)	-0.005 (0.003)	-0.002 (0.002)	0.002 (0.004)
First born	-0.045* (0.021)	0.031 (0.032)	-0.082*** (0.023)	-0.021 (0.020)
Caregiver's years of schooling	0.001 (0.004)	0.013*** (0.003)	-0.000 (0.004)	0.014* (0.006)
Household's wealth	0.034 (0.078)	0.217* (0.105)	-0.016 (0.092)	0.143 (0.113)
Own land (hectares)	0.021 (0.019)	0.003 (0.002)	-0.000 (0.000)	0.011** (0.003)
Own livestock	0.011 (0.027)	0.071* (0.029)	0.082** (0.027)	0.055 (0.048)
Urban	-0.075* (0.037)	-0.200*** (0.032)	-0.033 (0.039)	0.121 (0.200)
Highest grade completed by child	0.050*** (0.010)	0.027*** (0.008)	0.039* (0.016)	0.129*** (0.026)
YL Child's educational aspirations	0.011 (0.007)	0.009 (0.008)	0.014 (0.020)	0.043*** (0.009)
Caregiver's educational aspirations	-0.002 (0.005)	0.027*** (0.006)	0.010 (0.009)	0.031 (0.026)
Number of movers	115	213	75	236
Observations	905	951	612	882

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

All specifications include ethnicity and region as controls.

	Moved for work			
	(5) Ethiopia	(6) India	(7) Peru	(8) Vietnam
Male	0.041*	0.135***	0.009	0.048*
	(0.019)	(0.025)	(0.019)	(0.023)
Age in R3 (months)	-0.001	0.002	0.001	0.003
	(0.002)	(0.002)	(0.002)	(0.002)
First born	0.023	-0.034	0.017	-0.003
	(0.019)	(0.019)	(0.026)	(0.017)
Caregiver's years of schooling	-0.001	-0.003	-0.003	-0.004
	(0.004)	(0.004)	(0.004)	(0.003)
Household's wealth	0.009	-0.122*	-0.116	-0.457***
	(0.080)	(0.059)	(0.087)	(0.097)
Own land (hectares)	-0.036*	-0.003	-0.000	-0.007
	(0.017)	(0.007)	(0.000)	(0.012)
Own livestock	0.040	-0.047*	0.050*	0.057*
	(0.022)	(0.022)	(0.024)	(0.023)
Urban	-0.040	-0.079***	-0.014	0.048
	(0.029)	(0.021)	(0.028)	(0.108)
Highest grade completed by YL Child	0.003	-0.000	-0.006	-0.018
	(0.004)	(0.005)	(0.008)	(0.011)
YL Child's educational aspirations	-0.003	-0.005	-0.014	-0.012***
	(0.002)	(0.004)	(0.010)	(0.004)
Caregiver's educational aspirations	-0.003	-0.011***	0.016	0.001
	(0.003)	(0.003)	(0.010)	(0.007)
Number of movers	60	94	50	119
Observations	905	951	612	882

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
All specifications include ethnicity and region as controls.

	Moved for family reasons			
	(9) Ethiopia	(10) India	(11) Peru	(12) Vietnam
Male	0.008 (0.023)	-0.229*** (0.018)	0.006 (0.014)	-0.103*** (0.022)
Age in R3 (months)	0.003 (0.003)	0.004 (0.002)	0.000 (0.002)	0.002 (0.002)
First born	0.028 (0.020)	0.009 (0.017)	0.023 (0.017)	0.024 (0.022)
Caregiver's years of schooling	0.004 (0.003)	-0.006 (0.003)	0.003 (0.002)	-0.002 (0.003)
Household's wealth	0.025 (0.067)	-0.034 (0.067)	-0.155** (0.056)	-0.104 (0.081)
Own land (hectares)	-0.014 (0.015)	-0.001 (0.002)	-0.000 (0.001)	-0.002 (0.002)
Own livestock	0.016 (0.021)	0.015 (0.018)	0.006 (0.023)	-0.045** (0.017)
Urban	-0.030 (0.026)	-0.048 (0.029)	0.002 (0.021)	-0.233*** (0.009)
Highest grade completed by child	0.002 (0.006)	-0.012* (0.005)	-0.012* (0.006)	-0.014* (0.006)
YL Child's educational aspirations	-0.007* (0.003)	-0.003 (0.003)	-0.002 (0.005)	-0.006 (0.003)
Caregiver's educational aspirations	0.005 (0.005)	-0.009*** (0.003)	-0.003 (0.005)	-0.001 (0.008)
Number of movers	83	123	28	77
Observations	905	951	612	882

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

All specifications include ethnicity and region as controls.

Moving for family reasons include moving to follow family (Ethiopia and Peru) and moving for family formation (India and Vietnam).

In Multinomial Logit models, the estimated coefficients do not reflect the partial effects of each regressor on the dependent variable. Instead, marginal effects averaged over individuals are a better indicator of this (Cameron & Trivedi, 2005). Table 3.14 shows the average marginal effects of the model for each country. I find that in all countries being more educated is associated with a higher probability of moving for studies. This is an expected result since – considering the patterns on timing presented in the previous section – it suggests that as the children complete secondary school, they are more likely to continue studying higher education. However, it is very likely that due to a lack of supply of higher education institutions in their place of residence, especially in rural areas, they would have had to move. This is consistent with evidence provided by Dustmann

and Okatenko (2014), who finds that contentment with local public services is negatively associated with the likelihood of migration.

In India, boys are more likely to move to study, which is consistent with the results presented in Table 3.3. In Ethiopia and Peru, being first born is associated with a lower probability of migrating for studies. This goes in line with Ejrnaes and Portner (2004), who estimated a model of intra-household allocation with endogenous fertility with data from the Philippines and they found that earlier-born children received less education than their last-born siblings did. In India and Vietnam, the caregiver plays an important role. In the former, the caregiver's years of schooling and her educational aspirations for the child are associated with a greater likelihood of moving to study. In the latter, the caregiver's education and the child's educational aspirations are positively correlated with the probability of migrating for this reason. Overall, the average characteristics of migrants that move for studies are very similar across countries.

Nonetheless, the profile of the average migrant that moved for work is different. Columns (5) to (8) in Table 3.14 show that, except for Peru, boys are more prone to move for work and young people living in relatively more deprived households are more likely to move for this category. The latter is consistent with empirical evidence from developing countries (Mendola, 2008; Phan & Coxhead, 2010). Similarly, the child's educational aspirations are negatively correlated with the likelihood of moving for this reason, although only in Vietnam this is statistically significant. In India, the caregiver's aspirations are also negatively associated with the probability of migrating for work. In both India and Vietnam, young people living in relatively poorer households are more likely to move for this category.

Finally, columns (9) and (12) in Table 3.14 show the characteristics of migrants that moved for family reasons. Gender plays an important role in India and Vietnam: girls are 23 and 10 percentage points more likely to move for marriage than boys, respectively. This is consistent with Rosenzweig and Stark (1989), who points out that the main reason for migrating in India is marriage, especially among girls, as it is the result of an implicit inter-household arrangement

aimed at smoothing consumption in the presence of spatially covariant risks. Similarly, Coxhead et al. (2016) point that the second most important reason for migrating is for marriage, and they find that moving for non-work reasons is mainly carried out by young girls living in rural areas.

Other covariates generally correlated with household wealth are also significant: in India, child's education and caregiver's aspirations are negatively associated with the probability of migrating for family formation, while in Vietnam, young people living in rural areas that do not own livestock and are less educated are more likely to do so. The former is consistent with Singh and Espinoza Revollo (2016), who found that child's education and teenage marriage in India are strongly negatively correlated as parents often see higher education and marriage as substitutes. The latter is consistent with Coxhead et al. (2016) as mentioned above, as well as Guilmoto and De Loenzien (2014). These patterns provide evidence of an important stylised fact about gender equality and migration: young girls are not only more likely to move for marriage, but they are also less likely to move for studies and for work. This implies that the potential channels through which they could build on their human capital – through education or on-the-job training – have only a narrow chance of happening.

In sum, these findings speak directly to the literature on selection of migrants as they show that not all young migrants self-select in the same direction. A similar insight was suggested by Chiswick (1999), who proposed a human capital model of the decision to migrate, from which he inferred that the favourable selectivity of migrants would be less intense for the case of noneconomic immigrants, such as tied movers and refugees. However, my findings are more nuanced, in that they suggest that in the case of young people, economic migrants do not seem to be systematically positively self-selected (in terms of education). In fact, the only sub-group of migrants that is positively self-selected are those that move for education. Finally, choices made during the transition to adulthood shape youth's migration patterns and, therefore, migrants are a very heterogeneous group as there are systematic differences in the characteristics among them depending on their reasons for moving.

3.5 Discussion

In this paper, I use data from the Young Lives study to document patterns and drivers of internal migration among youth in Ethiopia, India, Peru, and Vietnam. The analysis suggests that young migrants are a very heterogeneous segment of the population and it would be a mistake to label them as one single group. Life-course decisions made during the transition to adulthood shape their migration patterns; therefore, young people move for a variety of reasons that go beyond the economic-related ones, follow different streams apart from rural-urban moves, and show many other patterns described in this study that confirm that young migrants constitute a diverse group.

As mentioned above, during the studied age range, young people make important choices regarding education, labour force participation, and family formation, which are closely linked to the decision to migrate. As a result, I found systematic differences in observable characteristics depending on young people's reasons for moving. Better-educated youth are more likely to move for studies, whereas relatively poorer ones are more likely to move for work. In India and Vietnam, girls and those that are relatively more deprived are more likely to move for family formation.

It must be noted that the results presented in this article can only be extrapolated to the population of poor young people in each study country. Still, rather than a limitation, this could be seen as a strength of the paper in that it sheds light on a group that is generally marginalised and excluded from most analyses.

3.6 Conclusions

Overall, it is important to document the patterns and determinants of youth migration because they provide a better insight on the migration process in different contexts between late adolescence and early adulthood. Migrants in the Young Lives sample are highly mobile and the data show that between 2009 and 2013, they were permanently on the move following primarily life cycle patterns rather than one-goal permanent moves.

The evidence provided in this study is of paramount importance to understand how young people self-select into migration based on individual, household, and locality characteristics. This constitutes an important input to understand what the effects of migration are among youth – although this goes beyond the scope of this paper. More importantly, this will put us in a better position to propose more effective policies that target young migrants' well-being in developing countries.

4. Effects of Internal Migration on Adolescents' Cognitive and Psychosocial Skills

Abstract

Youth migration can be seen as a mechanism through which young people alter their environments and investments, facilitating the modification of skills. Although we know from previous work that individuals select themselves spatially mainly on the basis of skills, little is known about whether there is upskilling or deskilling (relative to non-migrants) as a result of migration. This paper addresses this gap by drawing on data from Young Lives, a unique longitudinal study on young people born in 1994-95 in Ethiopia, India, Peru, and Vietnam. I estimate the causal effect of migration during adolescence on a set of cognitive (Mathematics and Reading) and psychosocial (Agency, Pride, Self-Efficacy, and Self-Esteem) skills by Two-Stage Least Squares using weather shocks as instruments for migration. I find that migration has a significant effect both on cognitive and psychosocial skills. However, these effects are heterogeneous and depend on the child's reasons for moving. Finally, I also examined the effects of migration on adolescents' time use as a potential mechanism through which migration may affect skills, and I conclude that they can only partly explain the results obtained.

4.1 Introduction

A large number of empirical studies document that both cognitive and non-cognitive skills are important predictors of socioeconomic success (Cunha & Heckman, 2007). Moreover, they do not have only a genetic component, but are also sensitive to investments and environmental influences (Rutter, 2006), which mainly come from the family, school and workplace (CAF, 2017). Recent evidence highlights the importance of adolescence as a sensitive period during which rapid growth, learning, adaptation and brain maturation takes place (Dahl et al., 2018). In this context, youth migration can be seen under a new approach: as a mechanism through which individuals alter their environments and investments and, thus, modify their skills, both cognitive and psychosocial.³¹ In the particular case of young people, migration is often intertwined with important life transitions, such as education, employment and marriage (Franco Gavonel, 2017). These diverse trajectories affect both the level and productivity of investments in human capital, which in the end shape the effects of migration on skills.

³¹ This interpretation of migration is not limited to individuals moving for education only, as they may also develop skills through migration for work (e.g. through on-the-job training) and even for marriage. For a discussion of migration as an investment in human capital, see Blaug (1976).

Seeing migration under this light is important because of the policy implications that it could have on income inequality. Cunha and Heckman (2008) provide evidence – from the US context – that almost half of the inequality in the present value of the lifetime earnings is due to factors determined by age 18. Moreover, it is also true that most migrants move during their early to mid-twenties (Young, 2013). Therefore, if migration does act as a mechanism that facilitates the development of skills during late adolescence, it could be a helpful device to alleviate future income inequalities. It must be noted, however, that, as the evidence in this article suggests, this will largely depend on the reasons for moving.

Internal migration has been widely studied as a central issue of labour economics in developing countries. Primarily based on the conceptual framework developed by Roy (1951), previous work conclude that individuals select themselves spatially mainly on the basis of skills (Borjas et al., 1992; Gollin et al., 2014; Hamory et al., 2017; Lagakos & Waugh, 2013; Miguel & Hamory, 2009; Young, 2013). However, little is known about the impact of migration on skills, mainly due to data limitations. Most empirical studies focus on the effects of migration on earnings (Borjas et al., 1992; Laszlo & Santor, 2004; Tunali, 2000) and on income or consumption (Beegle et al., 2011; Bryan et al., 2014; De Brauw et al., 2017; Garlick et al., 2016; Wineman & Jayne, 2016). The latter studies show that migration has a positive effect on income or consumption, whereas the former show mixed results. A potential explanation for this is that the effect of migration on skills is actually inconclusive and, therefore, this is reflected in an ambiguous impact on wages. This paper addresses this gap by identifying the causal effects of migration on cognitive and psychosocial skills of adolescents.

In particular, this paper contributes to three strands of literature. First, it speaks to the studies looking at the impact of migration on educational outcomes. Previous work has looked at the effect of migration on educational attainment (Acosta, 2011; Cox Edwards & Ureta, 2003; Ferrone & Gianelli, 2015; Hanson & Woodruff, 2003; Mansuri, 2006; McKenzie & Rapoport, 2011; Rapoport & Docquier, 2006; Yang, 2008). Nevertheless, this work mainly focuses on the

effect of remittances (international migration) on the remaining residents in the place of origin, and it does not look explicitly at skills (output), but at schooling (input). Unlike them, this paper focuses on the effect of internal migration during adolescence on skills.

Second, this research builds on studies related to human capital formation, largely developed by Cunha and Heckman (2007) and Heckman (2008). In order to do this, I develop a simple framework – new to the migration literature – based on Glewwe and Miguel (2008) that delineates the potential channels through which migration may affect skills.

A third strand of the literature that this paper also relates to is the one looking at the relationship between weather variation and migration. In the last decade, there has been a growing body of literature dedicated to study the effect of environmental change (either long-term climate change or short-term weather variation) on migration (Black et al., 2011; Bohra-Mishra et al., 2014; Cattaneo & Peri, 2016; Falco et al., 2018; Gray & Mueller, 2012; Gray & Wise, 2016; Marchiori et al., 2012; Thiede et al., 2016). However, less is known about how this affects youth migration in particular. For example, Baez et al. (2017) find that younger people in Northern Latin America and the Caribbean are more likely to migrate in response to droughts. However, we cannot assert that this is the case in other regions, unless we look at comparable measures of weather variation and definitions of migration. This paper accounts for this by providing evidence of the impact of weather anomalies on the decision to migrate among adolescents in four developing countries located in different regions.

With this in mind, the purpose of this study is threefold. First, it provides international evidence of the impact of migration on adolescents' cognitive (Mathematics and Reading) and psychosocial (Agency, Pride, Self-Efficacy, and Self-Esteem) skills. In order to do this, I draw on data from Young Lives, a unique longitudinal study on young people born in 1994-95 in Ethiopia, India (Andhra Pradesh and Telangana), Peru, and Vietnam. Since migration is a choice that may be influenced by unobserved characteristics affecting skills, I estimate the impact of migration by Two-Stage Least Squares (2SLS) using weather shocks as instruments for migration. Second, this

paper investigates whether there are heterogeneous treatment effects of migration by estimating its impact across migrants that moved for studies, work, and family formation. Third, this paper examines the effects of migration on adolescents' time use as a potential mechanism that may explain the findings.

To my knowledge, this is the first study that documents the causal effect of internal migration on both cognitive and psychosocial skills among adolescents in developing countries. In fact, this nuanced approach to the analysis of migration effects by reasons for migrating is a contribution of this paper since this dimension is usually overlooked (De Jong & Fawcett, 1981), although very relevant for young people. Moreover, the richness of the Young Lives data is very suitable for this analysis since it focuses on young people in developing countries. As far as I am aware, the only two datasets that also include information on children's background, skills and time use are the US Child Development Supplement – a subsample of the Panel Study for Income Dynamics – and the Longitudinal Study of Australian Children, both in developed countries.

Although I find evidence of selection on cognitive skills – migrants and non-migrants systematically differ on initial levels of achievement –, migration has mixed effects on them. In India and Vietnam, migration has a negative impact on them, although in Peru, it has a positive effect. Conversely, I find that there is no selection on psychosocial skills, but I find positive effects on them in Ethiopia and Vietnam. However, average measures of the impact of youth migration on skills mask considerable heterogeneity in responses from different types of migration. When migrants are disaggregated by their reasons for moving, I find that those who move for studies have higher cognitive skills (except for Vietnam, where these effects are negative) and higher psychosocial skills (in Vietnam and India) than non-migrants do. On the contrary, those that moved for family formation (for marriage or to give birth) show lower cognitive skills than non-migrants do. Between these two groups of migrants, there are those that moved for work, for whom the impact of migration is mixed. This shows that although, in principle, migration should bring returns to the labour migrant, this is not always the case.

In order to explain these results, I examined the impact of migration on the adolescent's time allocation. Although I get coherent results, they do not fully explain all the effects found across countries, which suggests that there may be other unobserved inputs that are affected by migration and that modify the level of skills. This finding is consistent with the conceptual framework presented here, according to which migration affects skills mainly by altering the level and productivity of investments, although the size and direction of these effects remain ambiguous as some inputs may increase, but others may decrease as a result of migration. The results obtained also suggest that there may be different technologies of cognitive and psychosocial skills as the patterns they follow, both in terms of selection and impact, diverge.

The remainder of the paper proceeds as follows: section 4.2 presents a general framework that briefly outlines the relationship between skills and migration; section 4.3 describes the empirical strategy used to identify the causal impact of migration on skills; section 4.4 presents descriptive statistics; section 4.5 describes the results obtained; section 4.6 presents a discussion; and lastly, section 4.7 presents the conclusions of the study.

4.2 Conceptual framework

This section presents a framework that illustrates the relationship between migration and skills relevant to this study. This framework is an adaptation of the one proposed by Glewwe and Miguel (2008). The key departure from the latter is that it incorporates migration as the variable of interest, which allows delineating the channels through which migration affects skills. The novelty of the framework is that it postulates that migration affects skills by changing the inputs to the skills production function, such as investments and environmental conditions, as well as by affecting the productivity of these inputs. By highlighting which elements are excluded from the conditional demand, this framework also guides the specification and identification of the empirical model presented in section 4.

I assume there are two time periods: period 1 accounts for the time before the decision to

migrate is being made and period 2 for the one after that. Consider an economic model in which the household derives utility from consumption and child's human capital, thus maximising the following utility function over the two periods:³²

$$U = U[C_1, C_2, M_2, S_1^C, S_2^C, S_1^P, S_2^P; \sigma, \gamma_2] \quad (1)$$

where C_1 and C_2 are household consumption of an aggregate consumption good in periods 1 and 2, respectively; M_2 denotes whether the adolescent migrates at the beginning of period 2; S_1^C and S_2^C stand for cognitive skills in periods 1 and 2, respectively; S_1^P and S_2^P stand for psychosocial skills in periods 1 and 2, respectively; σ is a parameter for parental preferences that are fixed over time; and γ_2 is a parameter for migration-specific preferences, which reflect the non-monetary opportunity cost of migrating and the disutility arising from psychic costs. Regarding the former, unanticipated shocks in the place of origin may alter the opportunity cost of moving (or not moving). Regarding the latter, subjective attachment to their location of origin as a result of the departure from family and friends may generate disutility to the migrant (Schwartz, 1973; Sjaastad, 1962). The underlying assumption in equation (1) is that migration is a good³³ that depends on these migration-specific preferences and its monetary cost (P_m).

Assuming that parents can borrow and lend over time at an interest rate r and assuming that they know future prices, the household budget constraint is:

$$W_0 = P_{c,1} * C_1 + P_{l,1} * I_1 + (P_{m,2} * M_2 + P_{c,2} * C_2 + P_{l,2} * I_2)/(1 + r) \quad (2)$$

where W_0 is the initial household income; $P_{c,1}$ and $P_{c,2}$ are the prices of an aggregate consumption good in times 1 and 2, respectively; and $P_{l,1}$ and $P_{l,2}$ are the prices of investments in periods 1 and 2, respectively.

The last constraint faced by the household is the technological constraint reflected by the following value-added production functions for cognitive and psychosocial skills in period 2:

³² It is assumed that the decision for the adolescent to migrate is made by the household collectively (Stark & Bloom, 1985).

³³ Bryan *et al.* (2014) argue that migration can be seen as an experience good since its characteristics can only be observed upon consumption.

$$S_2^v = S_P^v[S_1^v, I_2; M_2, SH_2] \quad (3)$$

where v stands for the production function of cognitive or psychosocial skills. For simplicity, I assume that only two elements of the cognitive and psychosocial skills production functions differ: the nature of technology (S_P^v) and the stock of skills in period 1 (S_1^v). The term S_1^v summarises all the influences of skills that have been realised up to that period, including child ability (Todd & Wolpin, 2003). I_2 stands for investments in the child's skills production function at the end of period 2,³⁴ which includes parental stimulation, schooling, training, among others (Almlund et al., 2011). It is assumed that M_2 is a factor affecting the productivity of inputs. For instance, migration may decrease the productivity of home environment and parental stimulation in the skills production function in such way that one hour of parental supervision may have different effects on skills, depending on whether the child lives with or away from the parents. SH_2 is a vector of exogenous period-specific productivity shifters in time 2 that excludes migration, such as parental education and school quality, and it is assumed that migration may also influence them. For example, migration may affect the child's social interactions at school, which in turn affect the productivity of other school inputs. Thus, equation (3) assumes that migration influences the productivity of inputs both directly and indirectly (by affecting SH_2).

Maximising the household utility in equation (1) subject to the constraints in equations (2) and (3) gives the following reduced form demand for inputs as a function of all exogenous variables:

$$I_2^{v*} = I_D^v[P_{c,1}, P_{c,2}, P_{I,1}, P_{I,2}, P_{m,2}, SH_1, SH_2, W_0, r, \sigma, \alpha, \gamma_2] \quad (4)$$

where α is the child's innate ability, which is assumed to be the same for cognitive and psychosocial skills. Equation (4) assumes that all prices are the same in the reduced form demand for cognitive and psychosocial skills, so that the only element that differs between the two is the functional form (I_D^v).

³⁴ Note that I do not assume cross-productivity, i.e. that the stock of cognitive skills in period $t - 1$ will also determine psychosocial skills in period t and vice versa (Cunha & Heckman, 2007).

Following Pollak (1969), some goods may be considered as preallocated or fixed in the short run. In this case, the reduced form demands of non-preallocated goods can be expressed as conditional demands, namely functions of the quantity of the preallocated good, all exogenous variables (excluding the price of the preallocated good and its exogenous determinants) and income (excluding the expenditure on the preallocated good). Assuming a sequential decision-making where the migration decision is taken before the determination of investments in period 2, migration can be treated as fixed at the time of the investment decision-making in this period.³⁵ A similar case can be argued for lagged skills as they are also determined prior to the second period. Therefore, considering that migration and lagged skills are both taken as fixed at their utility-maximising levels when investments in period 2 are set, we get the following conditional demand for investments in period 2:

$$I_2^{v*} = I_{CD}^v [S_1^{v*}, M_2^*, P_{c,1}, W_0^{CD}, r, \sigma] \quad (5)$$

where W_0^{CD} is the income net of expenditure on investments in period 1 and on migration, thus $W_0^{CD} = W_0 - P_{I,1} * I_1^* - P_{m,2} * M_2^*$. Based on Pollak (1969), the latter implies that expenditure on migration is realised at the beginning of time 2 – together with the migration decision. Equation (5) assumes that conditional on migration and lagged skills, the realised levels of $P_{I,1}$ and $P_{m,2}$ are also fixed. Therefore, it excludes both terms from the new budget constraint (W_0^{CD}), as well as SH_1 and α , which are subsumed in S_1^{v*} , and $P_{c,2}$, $P_{I,2}$, SH_2 , and γ_2 , which are fixed through the choice of location in period 2.

Equation (5) implies that migration affects the level of investments in period 2 through two channels. First, it affects them directly. For example, migration may lead to a change in school with different level of school inputs or to access to higher education or apprenticeship. Second, migration influences I_2^{v*} indirectly by affecting prices of investments and other goods in period 2 ($P_{I,2}$ and $P_{c,2}$) through the choice of location – therefore, affecting the level of investments.

³⁵ This assumption is likely to hold as migration occurs between rounds of the survey, while the test scores and psychosocial data are administered afterwards.

Inserting this conditional demand for investments in the production function for v skills in equation (3) yields the demand for skills conditional on the level of skills in the previous period and the migration decision as follows:

$$S_2^{v*} = S_p^v[S_1^{v*}, I_2^{v*}; M_2^*, SH_2] = S_{CD}^v[S_1^{v*}, M_2^*, P_{c,1}, W_0^{CD}, r, \sigma] \quad (6)$$

where the optimal level of skills is a function of the optimal level of migration, lagged skills and investments. Equation (6) expresses the total effect of migration on skills through all the channels discussed above.

In sum, this framework postulates that migration affects skills in two ways: first, as seen in equation (5), it determines the level of inputs both directly and indirectly (by affecting prices). Second, as shown in equation (3), it affects the productivity of investments both directly and indirectly (by affecting elements that affect the productivity of inputs). As a result, the total effect of migration on skills is ambiguous, since the level and productivity of some investments may increase whereas those of others may decrease as a result of migration.

4.3 Empirical strategy

Based on the conceptual framework presented above, the empirical analogue of equation (6) is as follows:

$$S_{it} = \beta_0 + \beta_1 M_{it} + \beta_2 S_{it-1} + \beta_3' X_{it-1} + \beta_4' H_{it-1} + \beta_5' L_{it-1} + \varepsilon_{it} \quad (7)$$

where S_{it} is a variable for cognitive or psychosocial skills of individual i in period t (at age 19); M_{it} is a binary variable that takes the value of 1 if the individual migrates at the beginning of period t ; S_{it-1} is the same measure of skill as the one used as dependent variable, but assessed in period $t - 1$; X_{it-1} is a vector of individual characteristics at time $t - 1$ that includes gender, ethnicity, age (in months) and birth order; H_{it-1} is a vector of parental and household characteristics at time $t - 1$ that includes father's and caregiver's years of schooling and household wealth; L_{it-1} is a vector of location characteristics at time $t - 1$ that includes the region and whether the locality is urban; ε_{it} is an error term; β_0 , β_1 , and β_2 are parameters; and β_3 , β_4 , and β_5 are coefficient vectors.

Equation (7) only includes controls from period $t - 1$ in order to keep open the channels through which migration may affect skills. Standard errors were clustered at the community level in order to account for correlation of unobserved components of outcomes among observations corresponding to adolescents living in the same community (Abadie et al., 2017).

Comparing equations (6) and (7) sheds light on the potential endogeneity arising from omitted variables and on the sources of exogenous variation in migration that will be exploited in order to obtain a consistent estimate of β_1 , the coefficient of interest. I will first discuss the former. The vectors X_{it-1} , H_{it-1} , and L_{it-1} aim to control for the exogenous variables in equation (6). However, these covariates cannot fully control for parental preferences (σ) or net income (W_0^{CD}) as they do not include a proxy for expenditure on lagged skills and migration. Thus, the error term in equation (7) is expected to contain parental preferences and expenditure in lagged skills and migration. These elements are correlated with both the decision to migrate and the lagged skills, creating endogeneity in the estimation of the coefficients of these variables.

In order to address the endogeneity of migration, I estimate equation (7) by 2SLS using as instruments elements that affect M_2^* , but that are excluded from equation (6). One element that complies with this is the monetary cost of migration, but given that I can only control for initial income (W_0) rather than net income (W_0^{CD}), it would not be appropriate to use it as an instrument (Glewwe & Miguel, 2008). Nevertheless, there is another element that is excluded both from the conditional demand in equation (6) and from the error term in equation (7): the migration-specific preferences. As a proxy for γ_2 , I use weather shocks at the place of origin, which impact the decision to migrate, but are not correlated with the error term. I also include their quadratic form, since I assume that the relationship between weather variation and migration is non-monotonic given that recent evidence finds a non-linear relationship between weather variation and agricultural and non-agricultural productivity (Burke et al., 2015; Dell et al., 2012; Hsiang, 2010; Lobell et al., 2011). In this sense, weather shocks may affect γ_2 in two directions. On one hand, too low or too high rainfall and temperature might lower productivity, reducing wages in the place of

origin, which in turn, lowers the opportunity cost of migrating and, therefore, increases the probability of migrating. On the other hand, if the child is employed by the household, weather shocks may increase the cost of separation from the family (namely, psychic costs) and, therefore, reduce the probability of migrating.

This identification strategy is expected to produce consistent estimates of the effect of migration on skills under the assumptions that weather shocks impact skills only through their effect on the decision to migrate, and that they are not correlated with unobservable characteristics that affect skills. In this sense, it is assumed that these events are sufficiently far away in time from the measurement of skills and that their effect does not persist over time. Glewwe and King (2001) show suggestive evidence that weather shocks do not affect cognitive skills during early childhood, and, similarly, Leight et al. (2015) find that early childhood weather shocks do not affect non-cognitive skills and their effect on cognitive skills fades away over time. Given that infancy is considered a sensitive period in the process of human capital formation, we could expect that these effects are less strong during adolescence. In order to obtain suggestive evidence on the validity of the instrument, I looked at the association between the outcomes and the instrument among non-migrants. The results are detailed in section 4.5.

Furthermore, as it is the case with any instrumental variables approach in a setting where there are heterogeneous treatment effects, selection on expected gains, and monotonicity of effects, the estimated impact of migration corresponds to local average treatment effects (LATE) – namely, the effects will be estimated only for individuals that choose to migrate (or to stay) in response to these shocks (Blundell & Costa Dias, 2009).

Moreover, 2SLS estimation is also expected to address bias in the effect of migration arising from random error in the measurement of migration. Similarly, this strategy is also expected to address bias in the impact of migration arising from measurement error in the prior level of skills that may contaminate the estimate of the effect of migration – since migration is expected to be partly predicted by lagged skills (Todd & Wolpin, 2003). Nevertheless, 2SLS will address these

issues under the assumption that variation in migration arising from the shocks is uncorrelated with lagged skills.

Given that the measure of migration is binary, I follow Angrist and Pischke (2009) and Wooldridge (2002) in order to avoid the *forbidden regression problem* – namely, replacing a nonlinear function of an endogenous explanatory variable with the same nonlinear function of fitted values from a first-stage estimation (Wooldridge, 2002). Thus, I estimated first a probit model of migration on the weather shocks (and the set of controls), took the predicted value of migration and then used it as an instrument in a 2SLS procedure. This has the further advantage that the resulting 2SLS estimates are more efficient than those using a linear first stage – under the strong assumption that the probit model is a better approximation to the first-stage conditional expectation function than a linear model (Angrist & Pischke, 2009). This procedure provides an exactly identified model, so I also used the most predictive shock as a second instrument in order to test for the validity of the overidentifying restrictions.

As discussed in Franco Gavonell (2017), young migrants are a highly heterogeneous population. It is very likely that differences in unobserved characteristics among subgroups of migrants may lead to heterogeneous effects of migration as they might respond in different ways to the treatment, depending on the reasons for moving. The rationale behind this is that the overall effect of migration, namely the effect on the whole group of migrants, is expected to be the weighted average of the effects across subgroups, with the weights being the share of each subgroup in the total migrant pool. Thus, the average effect of migration may not be informative when looking at young migrants.

Generally, the migration literature has focused mainly on labour migration, but in the case of young people, moving for other reasons is also very likely and should be explicitly considered. In particular, it is expected that adolescents migrating for education on average invest more in inputs and, therefore, have higher skills than those that did not move – hereafter called “relative upskilling”. On the contrary, adolescents moving for family formation would not be expected to

enhance neither their cognitive nor their psychosocial skills since early marriage and teenage pregnancy are actually considered detrimental to human development (UNICEF, 2005). Therefore, it is expected that those that moved for family formation have actually lower scores than non-migrants – hereafter called “relative deskilling”. Finally, the expected effect of migration for those that moved for work remains as an open empirical question. On one hand, work may divert investment in skill formation toward market work, but on the other hand, it could also produce skills that are equally valued in all sectors of the economy (Heckman et al., 2002). In sum, the reasons for moving are also endogenous since those that move for a given reason are not a random subset of all migrants. Thus, I propose the following model to account for differences in the effect of migration based on the reasons for migrating:

$$S_{it} = \alpha_0 + \alpha_1 MR_{it}^w + \alpha_2 MOR_{it}^w + \alpha_3 S_{it-1} + \alpha'_4 X_{it-1} + \alpha'_5 H_{it-1} + \alpha'_6 L_{it-1} + v_{it} \quad (8)$$

where MR_{it}^w and MOR_{it}^w denote moving for a given reason and moving for all other reasons, respectively. The superscript w stands for each reason for migrating: moving for studies, moving for work, or moving for family formation. The empirical strategy employed to estimate the differential effect across those that moved for each reason and those that moved for other reasons relies on the use of weather shocks as instruments for each type of migration. It is expected that a different set of shocks will predict different types of migration (as seen in Tables A.4.1 - A.4.10). Although, to my knowledge, there is no previous evidence on this, the rationale is that the timing of the shock matters. For example, weather deviations from the mean when the adolescent is 15 years old may have a different effect on the type of migration than a shock that occurs when the adolescent is 18 years old. It must be noted that I do not expect that these effects to be similar across countries since there is evidence that weather shocks, in particular rainfall, can have opposite effects on child outcomes depending on cultural norms (Corno et al., 2017).

Lastly, as presented in the previous section, one of the mechanisms through which migration impacts skills is by affecting the level of inputs. An example of these inputs is the adolescent’s time use. Thus, I estimated the empirical analogue of equation (5), as follows:

$$T_{it}^A = \theta_0 + \theta_1 M_{it} + \theta_2 S_{it-1} + \theta_3' X_{it-1} + \theta_4' H_{it-1} + \theta_5' L_{it-1} + \omega_{it} \quad (9)$$

where T_{it}^A is the number of hours per day spent in activity A. Eight activities were considered: sleep, caring for others, domestic tasks, work within the household, work outside the household, school time, studying outside school, and leisure. The identification strategy used to estimate the impact of migration on time allocation relies on 2SLS, together with Heckman's sample selection correction equation (Wooldridge, 2002). The use of the latter stems from the fact that the dependent variables are censored at zero, which results from young people not allocating any time to a particular activity. In order to account for this, I used past participation in a given task as instrument for current participation in the corresponding task, under the assumption that the former affects the number of hours allocated to that particular activity only through its effect on the probability of participating in that activity.

In order to explain the different effects of migration depending on the reason for moving, I also estimated the effect of moving for each reason on time use, as follows:

$$T_{it}^A = \delta_0 + \delta_1 MR_{it}^W + \delta_2 MOR_{it}^W + \delta_3 S_{it-1} + \delta_4' X_{it-1} + \delta_5' H_{it-1} + \delta_6' L_{it-1} + \xi_{it} \quad (10)$$

The identification strategy utilised for the estimation of this equation is similar to the one presented for the estimation of equation (8): weather shocks as instruments for each type of migration.

4.4 Descriptive statistics

In this section, I will present a review of the definitions and measurement of the analysed outcomes and a discussion of the role of migration as a key predictor of skills. I also discuss the weather data used as instruments for the estimation of the effects of migration on skills.

4.4.1 Cognitive and psychosocial skills

Cognitive skills are expressed by measures of numeracy and literacy collected in rounds 3 and 4 of the survey – see Cueto and Leon (2012) for details on the Young Lives' achievement tests.

The Mathematics tests consist of basic operations with numbers and problem solving. The reading tests used in the analysis were different between rounds: in 2009, the Cloze test was administered, consisting of asking the child to read a sentence or a short paragraph with missing words and to complete them. In 2013, a reading comprehension test was administered, consisting in matching words and sentences with pictures, and paragraphs followed by a set of questions about the text. For both tests, the score was calculated as the percentage of correct answers and then it was standardised by age within country to have a mean of zero and a standard deviation of one.

Psychosocial skills were captured by measures of agency, pride, self-efficacy, and self-esteem. Agency is related to an individual's sense of mastery over their life, that is, the general belief that the effect of a given event depends on one's own behaviour rather than on external factors, such as luck, chance, fate, or others' interventions (Rotter, 1966). A related concept is self-efficacy, which is the belief in one's capability to successfully execute a particular behaviour in order to achieve a certain outcome (Bandura, 1977). In the Young Lives survey, this measure is based on the Generalised Self-Efficacy Scale (Schwarzer & Jerusalem, 1995), which captures a broad sense of perceived self-efficacy.³⁶ In this respect, perceived self-efficacy is closely related to coping behaviour as it influences the choice of activities and settings; for instance, individuals tend to avoid situations that may exceed their coping skills, while they would engage in those that they consider are capable of handling (Bandura, 1977).

A different concept is that of self-esteem, which can be understood as an individual's assessment of their self-worth. Its measure is based on the General Self-Esteem Scale captured by Self-Description Questionnaires, which in turn are grounded on theoretical models of self-concept developed by Shavelson (1976). A closely related concept is that of pride, which is a more specific measure of self-worth. The pride index is an adaptation of the Rosenberg Self-Esteem Scale (Rosenberg, 1965) and is linked to specific domains of the child's living conditions, such as school, work, clothing and housing (Dercon & Krishnan, 2009).

³⁶ See Ogando and Yorke (2018) for more details on the construction of each scale by the Young Lives study.

Table 4.1: Items included in the construction of 2013 psychosocial indices

Index	Statements	Mean			
		Ethiopia	India	Peru	Vietnam
Agency	1. If I try hard I can improve my situation in life	4.56	4.31	4.32	4.13
	2. Other people in my family make all the decisions about how I spend my time	3.39	2.12	3.23	3.37
	3. I like to make plans for my future studies and work	4.28	3.82	4.27	3.95
	4. If I study hard at school I will be rewarded by a better job in the future	4.27	3.96	4.46	3.80
	5. I have no choice about the work I do – I must do this sort of work	2.75	2.36	2.60	3.50
Pride	1. I am proud of my shoes or of having shoes	3.35	3.03	3.90	3.39
	2. I feel my clothing is right for all occasions	3.24	3.61	3.65	3.29
	3. I am proud of my clothes	3.45	3.39	3.78	3.32
	4. I am proud of the work I have to do	3.72	3.64	3.82	3.50
Self-Efficacy	1. I can always manage to solve difficult problems if I try hard enough	3.30	3.29	3.15	3.13
	2. If someone opposes me, I can find the means and ways to get what I want	2.96	3.00	2.71	2.64
	3. It is easy for me to stick to my aims and accomplish my goals	2.98	3.19	3.25	2.73
	4. I am confident that I could deal efficiently with unexpected events	2.83	2.99	2.85	2.76
	5. Thanks to my resourcefulness, I know how to handle unforeseen situations	2.88	3.03	3.03	2.74
	6. I can solve most problems if I invest the necessary effort	3.26	3.16	3.12	3.06
	7. I can remain calm when facing difficulties because I can rely on my coping abilities	2.92	3.03	3.05	2.90
	8. When I am confronted with a problem, I can usually find several solutions	3.10	3.04	3.08	2.97
	9. If I am in trouble, I can usually think of a solution	3.17	3.12	3.11	3.02
	10. I can usually handle whatever comes my way	2.92	3.06	2.91	2.79
Self-Esteem	1. I do lots of important things	3.13	2.92	3.00	2.52
	2. In general, I like being the way I am	3.08	3.21	3.28	2.85
	3. Overall, I have a lot to be proud of	2.81	2.83	3.19	2.73
	4. I can do things as well as most people	3.16	3.15	3.10	2.83
	5. Other people think I am a good person	3.06	3.13	3.08	2.92
	6. A lot of things about me are good	3.01	3.11	3.08	2.86
	7. I'm as good as most other people	3.19	3.17	3.06	2.44
	8. When I do something, I do it well	3.23	3.16	3.02	2.86

Note: These are raw scores. The Agency and Pride scores range from 1 to 5, whereas the Self-Efficacy and Self-Esteem scores range from 1 to 4.

Based on the Young Lives data, each psychosocial index consists of a set of statements – shown in Table 4.1 – that were presented to the child, who was asked to show their degree of agreement based on a Likert scale³⁷ that ranges from strong disagreement to strong agreement. The indices were constructed as follows: each item was recoded to be a positive outcome, then it was standardised by age (within each country) to have a mean of zero and a standard deviation of one, and finally, the average score (of non-missing values) was calculated for the relevant set of items. The agency and pride indices were collected in both Rounds 3 and 4, whereas self-efficacy and self-esteem were only collected in Round 4. As a result, agency in Round 3 is used as lagged self-efficacy, and pride in Round 3 is used as lagged self-esteem.

4.4.2 Internal migration

Migration is defined as any move outside the locality³⁸ of residence for at least 3 months that was made between Round 3 (2009) and Round 4 (2013) – a period during which the individuals in the sample were between 15 and 19 years old, respectively. This definition of migration excludes within-locality moves from the analysis, which implies that results do not address selection of migrants that move short distances, but only selection of those that move between localities (i.e. the analysis focuses on migration rather than on mobility in general).

Additionally, all migrants were asked to report the main reason for their movement and then this information was recoded into 4 categories: i) moved for studies, ii) moved for work, iii) moved for family formation (only applicable to India and Vietnam),³⁹ and iv) moved for other reasons. Table 4.2 shows the distribution of migrants by reasons and streams of migration. In all countries, the main reason for moving was to study, whereas the main stream varies per country: in Ethiopia and Vietnam, migrants move mostly from rural to urban areas; in India, they move from

³⁷ The agency and pride scores are based on a 5-point Likert scale, whereas the self-efficacy and self-esteem scores are based on a 4-point Likert scale.

³⁸ Locality is defined as a kebele in Ethiopia, a village/ward in India, a province in Peru, and a commune in Vietnam.

³⁹ Given that the prevalence of migration for family formation is very low in Ethiopia and Peru, these countries will be excluded from the analysis of the effect of moving for this reason on skills.

rural to rural areas; and in Peru, they move from urban to urban areas.

Table 4.2: Distribution of migrants by reasons for migrating and streams of migration

	Rural-Rural	Rural-Urban	Urban-Rural	Urban-Urban	Total
Ethiopia					
To study	0.04	0.18	0.02	0.14	0.37
To work	0.03	0.10	0.01	0.06	0.19
For marriage/birth	0.03	0.02	0.00	0.01	0.06
To follow/join family	0.08	0.02	0.11	0.08	0.29
Other	0.01	0.03	0.02	0.03	0.09
Total	0.19	0.35	0.16	0.30	1
India					
To study	0.16	0.10	0.03	0.17	0.45
To work	0.05	0.09	0.00	0.06	0.20
For marriage/birth	0.19	0.03	0.03	0.02	0.26
To follow/join family	0.02	0.00	0.01	0.01	0.04
Other	0.02	0.02	0.00	0.01	0.05
Total	0.44	0.23	0.06	0.27	1
Peru					
To study	0.01	0.10	0.03	0.25	0.38
To work	0.03	0.08	0.01	0.14	0.25
For marriage/birth	0.01	0.01	0.01	0.05	0.07
To follow/join family	0.02	0.01	0.04	0.08	0.14
Other	0.01	0.02	0.02	0.13	0.17
Total	0.07	0.20	0.11	0.63	1
Vietnam					
To study	0.05	0.45	0.01	0.04	0.54
To work	0.06	0.18	0.00	0.03	0.28
For marriage/birth	0.08	0.02	0.01	0.01	0.11
To follow/join family	0.00	0.01	0.00	0.00	0.01
Other	0.00	0.01	0.00	0.03	0.05
Total	0.19	0.68	0.02	0.12	1

Note: Each cell shows the probability of the corresponding row *and* column. For example, the probability of moving for studies from a rural area to another rural area is 0.04. Therefore the sum of all these probabilities for each country is 1. The last column and the last row of each panel show the share of migrants moving for a given reason and in a given direction, respectively. The sum of these cells is also 1. The type of locality was constructed as follows: if the adolescent moved more than once, the types of locality of origin and destination were based on the size reported in the migration history – for example, whether it is a village or a district capital – and then this information was recoded into rural or urban; but if the adolescent moved only once, then the type of locality of origin was taken from round 3.

Although the four study countries have different educational systems, some common patterns emerge in terms of schooling attainment. Table 4.3 presents descriptive statistics on the enrolment and highest grade attained at age 19, by migration status. In Ethiopia and Vietnam, migrants have completed on average a higher grade than non-migrants have and are more likely to

be enrolled in higher education. In fact, more than half of the non-migrants in Ethiopia and about one quarter of them in Vietnam are still enrolled in school. In Peru, these figures are reversed: migrants have actually completed a lower grade than non-migrants have, which is mirrored by the fact that they have lower enrolment in higher education (although weakly significant). In India, there are no differences between these two groups regarding enrolment or highest grade attained.

Table 4.3: Enrolment and highest grade attained in 2013, by migration status

	Non-migrants		Migrants		Difference	P-value of Equality
	Mean	N	Mean	N		
Ethiopia						
Enrolled in school	0.55	596	0.26	309	-0.29	0.0000
Enrolled in higher education	0.11	596	0.20	309	0.09	0.0002
Highest grade completed	7.97	594	8.44	297	0.47	0.0243
India						
Enrolled in school	0.10	476	0.09	473	-0.01	0.6774
Enrolled in higher education	0.40	476	0.39	473	-0.01	0.7004
Highest grade completed	10.56	474	10.24	463	-0.32	0.1198
Peru						
Enrolled in school	0.10	410	0.08	201	-0.02	0.4833
Enrolled in higher education	0.44	410	0.37	201	-0.07	0.0845
Highest grade completed	11.86	406	11.42	202	-0.44	0.0476
Vietnam						
Enrolled in school	0.23	444	0.14	428	-0.09	0.0016
Enrolled in higher education	0.27	444	0.44	428	0.17	0.0000
Highest grade completed	10.32	440	10.84	418	0.52	0.0012

Note: The last column shows the p-value of equality of means between migrants and non-migrants.

Table 4.4 presents the average scores in 2013 for the full sample and for five different groups: i) non-migrants, ii) migrants, iii) migrants that moved for studies, iv) migrants that moved for work, and v) migrants that moved for family formation. Two patterns emerge from this table. First, migrants that moved for studies have the highest scores in Math, Reading and Self-Efficacy. Second, except for Peru, those that moved for family formation performed worse in Math and Reading than all the other groups, even the non-migrants. These results suggest that it is not only necessary to look at the differences in changes of scores between migrants and non-migrants, but also across subgroups of migrants.

Table 4.4: Descriptive statistics of 2013 test scores, by migration status and reasons for moving

	Ethiopia			India			Peru			Vietnam		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
<i>Math Score</i>												
Full sample	0.00	0.99	864	0.00	0.99	898	0.00	0.99	595	0.00	0.99	840
Non-migrants	-0.03	1.00	566	-0.02	0.96	456	0.07	0.99	397	-0.03	0.99	422
Migrants	0.05	0.98	298	0.02	1.02	442	-0.14	0.98	198	0.03	0.98	418
Moved for studies	0.49	0.90	115	0.57	0.81	213	0.23	0.96	74	0.37	0.87	234
Moved for work	-0.06	0.94	55	-0.50	0.91	82	-0.49	0.84	48	-0.39	0.92	112
Moved for family form.	-	-	-	-0.64	0.86	107	-	-	-	-0.75	0.82	45
<i>Reading Score</i>												
Full sample	0.00	0.99	896	0.00	0.99	901	0.00	0.99	594	0.00	0.99	840
Non-migrants	-0.05	0.98	590	0.01	0.92	451	0.07	0.97	398	-0.01	0.99	423
Migrants	0.10	1.00	306	-0.01	1.06	450	-0.14	1.01	196	0.00	0.99	417
Moved for studies	0.61	0.67	115	0.53	0.77	213	0.28	0.92	73	0.34	0.82	232
Moved for work	-0.25	1.05	59	-0.54	1.02	88	-0.66	1.01	48	-0.53	1.03	114
Moved for family form.	-	-	-	-0.57	1.03	108	-	-	-	-0.63	0.91	44
<i>Agency Score</i>												
Full sample	0.00	0.55	905	0.01	0.56	951	0.00	0.55	612	0.02	0.57	880
Non-migrants	-0.03	0.54	596	0.02	0.55	478	0.05	0.57	410	-0.05	0.57	447
Migrants	0.07	0.56	309	-0.01	0.56	473	-0.09	0.52	202	0.08	0.56	433
Moved for studies	0.19	0.56	115	0.25	0.46	213	-0.02	0.53	75	0.19	0.52	235
Moved for work	0.01	0.58	60	-0.11	0.51	95	-0.16	0.52	49	-0.03	0.58	121
Moved for family form.	-	-	-	-0.38	0.53	123	-	-	-	-0.12	0.62	49
<i>Pride Score</i>												
Full sample	0.00	0.76	905	0.00	0.70	951	0.00	0.67	612	0.00	0.71	880
Non-migrants	0.02	0.77	596	-0.01	0.72	478	0.02	0.69	410	-0.06	0.71	447
Migrants	-0.03	0.74	309	0.01	0.68	473	-0.03	0.63	202	0.06	0.71	433
Moved for studies	0.02	0.75	115	-0.04	0.73	213	0.07	0.53	75	0.16	0.66	235
Moved for work	-0.05	0.75	60	-0.02	0.66	95	-0.14	0.69	49	-0.09	0.78	121
Moved for family form.	-	-	-	0.14	0.60	123	-	-	-	-0.11	0.73	49

<i>Self-Efficacy Score</i>												
Full sample	0.00	0.57	905	0.00	0.61	950	0.00	0.56	612	0.00	0.51	880
Non-migrants	-0.03	0.56	596	0.00	0.62	477	0.01	0.59	410	-0.03	0.52	447
Migrants	0.06	0.58	309	0.00	0.61	473	-0.03	0.50	202	0.03	0.50	433
Moved for studies	0.17	0.61	115	0.17	0.60	213	0.04	0.44	75	0.08	0.44	235
Moved for work	-0.01	0.65	60	-0.08	0.47	95	-0.09	0.52	49	-0.04	0.59	121
Moved for family form.	-	-	-	-0.22	0.56	123	-	-	-	-0.09	0.50	49
<i>Self-Esteem Score</i>												
Full sample	0.00	0.59	905	0.00	0.55	951	0.00	0.57	612	0.00	0.55	880
Non-migrants	0.01	0.59	596	0.03	0.55	478	-0.02	0.58	410	-0.02	0.55	447
Migrants	-0.02	0.59	309	-0.04	0.55	473	0.04	0.56	202	0.02	0.56	433
Moved for studies	0.09	0.57	115	0.02	0.54	213	0.09	0.54	75	0.05	0.56	235
Moved for work	-0.22	0.64	60	-0.07	0.50	95	-0.03	0.49	49	-0.03	0.57	121
Moved for family form.	-	-	-	-0.07	0.56	123	-	-	-	0.02	0.59	49

Note: Test scores are standardised by age to have a mean of zero and a standard deviation of one. Those that moved for family formation in Ethiopia and Peru are excluded from the analysis due to little variation.

Finally, Table 4.5 presents the average number of hours allocated to different activities on a typical day for the full sample and the six groups mentioned above. Three patterns are worth highlighting. First, the difference in time spent at school between migrants and non-migrants is very small (between -0.9 and 0.9 hours in each country). Second, migrants that moved for studies spent the highest amount of time at school among all groups, whereas, except for Ethiopia, those that moved for family formation allocated the least amount of hours at school among all groups. In fact, the latter group spent more time than all other groups caring for others in all countries. These results support the previous claim that it is necessary to acknowledge the great heterogeneity across subgroups of migrants in order to reflect the heterogeneous effects of migration.

Table 4.5: Descriptive statistics of child's time use (in number of hours), by migration status and reasons for moving

	Ethiopia			India			Peru			Vietnam		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
<i>Sleep</i>												
Full sample	8.50	1.38	905	8.25	0.94	951	8.22	1.43	615	8.26	1.36	880
Non-migrants	8.46	1.27	596	8.36	0.90	478	8.33	1.42	411	8.33	1.33	447
Migrants	8.59	1.57	309	8.13	0.98	473	8.01	1.45	204	8.19	1.39	433
Moved for studies	8.44	1.73	115	7.76	0.91	213	7.83	1.41	75	7.98	1.36	235
Moved for work	8.42	1.64	60	8.53	0.95	95	7.94	1.32	50	8.60	1.49	121
Moved for family form.	-	-	-	8.45	0.88	123	-	-	-	8.17	1.09	49
<i>Caring for others</i>												
Full sample	0.59	1.45	905	0.74	1.85	951	1.17	2.57	615	0.52	1.65	880
Non-migrants	0.59	1.39	596	0.50	1.38	478	1.18	2.29	411	0.56	1.57	447
Migrants	0.59	1.58	309	0.99	2.21	473	1.17	3.06	204	0.48	1.74	433
Moved for studies	0.17	0.65	115	0.05	0.24	213	0.40	1.33	75	0.04	0.25	235
Moved for work	0.48	1.76	60	0.48	1.40	95	1.10	3.24	50	0.23	1.05	121
Moved for family form.	-	-	-	3.16	3.20	123	-	-	-	3.48	3.69	49
<i>Domestic tasks</i>												
Full sample	2.12	2.08	905	1.89	1.70	951	1.48	1.52	615	1.45	1.21	880
Non-migrants	2.21	1.87	596	1.86	1.54	478	1.51	1.52	411	1.47	1.30	447
Migrants	1.94	2.44	309	1.92	1.85	473	1.42	1.53	204	1.43	1.10	433
Moved for studies	1.68	1.81	115	0.93	1.09	213	1.23	1.06	75	1.46	1.04	235
Moved for work	1.58	3.33	60	1.64	1.59	95	1.20	1.48	50	1.10	1.06	121
Moved for family form.	-	-	-	3.89	1.68	123	-	-	-	2.31	1.06	49
<i>Work within household</i>												
Full sample	1.73	2.88	905	1.10	2.65	951	0.68	1.85	615	1.30	2.69	880
Non-migrants	1.89	2.87	596	1.20	2.76	478	0.78	1.91	411	1.92	3.06	447
Migrants	1.42	2.87	309	0.99	2.54	473	0.49	1.70	204	0.66	2.06	433
Moved for studies	0.25	1.23	115	0.40	1.53	213	0.32	1.57	75	0.14	0.82	235
Moved for work	1.65	3.45	60	1.12	3.05	95	0.36	1.26	50	0.89	2.35	121
Moved for family form.	-	-	-	1.89	3.21	123	-	-	-	2.55	3.42	49

<i>Work outside household</i>												
Full sample	1.56	3.43	905	1.91	3.58	951	2.94	4.00	615	2.78	4.09	880
Non-migrants	1.16	2.79	596	1.84	3.39	478	2.41	3.70	411	2.72	3.98	447
Migrants	2.34	4.33	309	1.98	3.77	473	3.99	4.37	204	2.83	4.21	433
Moved for studies	0.76	2.44	115	0.26	1.46	213	2.13	3.45	75	0.79	2.20	235
Moved for work	6.51	5.71	60	6.93	4.27	95	6.87	4.02	50	6.90	4.24	121
Moved for family form.	-	-	-	0.78	2.29	123	-	-	-	1.78	3.78	49
<i>At school</i>												
Full sample	3.13	2.83	905	3.24	3.56	951	3.07	3.23	615	2.44	2.83	880
Non-migrants	3.42	2.72	596	3.31	3.48	478	3.32	3.28	411	2.00	2.76	447
Migrants	2.56	2.97	309	3.17	3.64	473	2.56	3.09	204	2.91	2.84	433
Moved for studies	5.03	2.30	115	6.33	2.56	213	4.79	2.62	75	5.01	1.87	235
Moved for work	0.24	0.95	60	0.28	1.37	95	0.72	1.88	50	0.18	1.11	121
Moved for family form.	-	-	-	0.22	1.19	123	-	-	-	0.00	0.00	49
<i>Studying outside school</i>												
Full sample	1.61	1.80	905	1.18	1.56	951	1.47	1.84	615	1.17	1.61	880
Non-migrants	1.67	1.66	596	1.08	1.36	478	1.47	1.64	411	1.04	1.64	447
Migrants	1.50	2.04	309	1.29	1.73	473	1.45	2.18	204	1.29	1.57	433
Moved for studies	3.17	1.96	115	2.52	1.63	213	2.40	2.16	75	2.22	1.47	235
Moved for work	0.10	0.40	60	0.11	0.52	95	0.70	1.71	50	0.02	0.19	121
Moved for family form.	-	-	-	0.14	0.64	123	-	-	-	0.00	0.00	49
<i>Leisure</i>												
Full sample	4.18	2.57	905	5.04	2.60	951	3.61	2.23	615	5.67	2.76	880
Non-migrants	3.94	2.37	596	5.11	2.82	478	3.64	2.24	411	5.56	2.90	447
Migrants	4.63	2.85	309	4.97	2.37	473	3.56	2.20	204	5.79	2.60	433
Moved for studies	3.90	2.42	115	4.98	2.12	213	3.21	1.97	75	5.82	2.40	235
Moved for work	4.67	2.84	60	4.36	2.04	95	3.76	2.21	50	5.77	2.54	121
Moved for family form.	-	-	-	5.33	2.59	123	-	-	-	5.58	3.27	49

Note: Those that moved for family formation in Ethiopia and Peru are excluded from the analysis due to little variation.

4.4.3 Weather shocks

The weather data – namely, precipitation and temperature information – were collated by the Global Climate Database of the University of Delaware (UDEL), and it was matched to the communities where the children were living in rounds 3 and 4 of the Young Lives survey – see Georgiadis (2017) for more details.⁴⁰ These gridded data represent an improvement over ground station data, especially in the context of developing countries, in that they provide complete coverage by interpolating ground station information over a grid and, thereby, creating a balanced panel of weather data for each point of the grid (Dell et al., 2014).

As discussed in section 4.2, I exploit exogenous variation in migration arising from weather shocks in order to examine the impact of migration on skills. These “shocks” are defined as rainfall and temperature deviations from the community, season, and year norm (over the period 1950-2014) between rounds 3 and 4. Specifically, the variables used for the analysis in this article correspond to rainfall and temperature shocks averaged over each half of the year of the child’s life between the ages of 14 and 19. Table 4.6 shows descriptive statistics of the set of shocks used in each country, evidencing differences in weather conditions across countries within each period considered.

⁴⁰ I am deeply grateful to Dr. Andreas Georgiadis for having matched these data with the Young Lives data.

Table 4.6: Child and household characteristics of YL sample before migration (2009)

	Ethiopia		India		Peru		Vietnam	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Male	0.54	0.50	0.49	0.50	0.53	0.50	0.48	0.5
Age of YL Child in months (2009)	179.81	3.64	179.18	4.13	178.72	4.63	180.45	3.84
First born	0.19	0.39	0.28	0.45	0.32	0.47	0.37	0.48
Father's years of schooling	4.33	3.85	4.73	5.05	9.24	4.65	8.01	5.04
Caregiver's years of schooling	2.91	3.53	2.93	4.29	7.44	4.27	6.84	4.21
Wealth index (2009)	0.35	0.17	0.52	0.17	0.59	0.18	0.62	0.19
Urban (2009)	0.42	0.49	0.25	0.43	0.77	0.42	0.19	0.39
Rainfall shock in first half of year 14 after birth (mm)	-20.42	72.89	7.81	83.79	18.71	67.22	-11.95	326.96
Rainfall shock in second half of year 14 after birth (mm)	-0.59	78.64	-3.11	84.53	2.50	65.48	-22.24	253.53
Rainfall shock in first half of year 15 after birth (mm)	-8.52	66.51	-11.76	116.82	-19.76	40.26	92.99	233.33
Rainfall shock in second half of year 15 after birth (mm)	10.75	57.43	-26.25	102.91	-16.81	46.18	43.85	282.07
Rainfall shock in first half of year 16 after birth (mm)	22.88	55.16	-44.50	127.89	-9.78	39.36	-87.84	278.46
Rainfall shock in second half of year 16 after birth (mm)	-16.22	49.87	-0.68	153.47	-4.58	37.95	-53.19	299.24
Rainfall shock in first half of year 17 after birth (mm)	-3.58	68.94	82.73	121.53	-5.84	45.82	40.18	340.22
Rainfall shock in second half of year 17 after birth (mm)	-12.36	77.60	4.11	111.09	7.41	63.42	-43.65	292.18
Rainfall shock in first half of year 18 after birth (mm)	-16.24	67.21	-62.98	83.66	26.51	75.68	71.06	332.83
Rainfall shock in second half of year 18 after birth (mm)	7.92	56.57	-20.80	74.19	3.75	84.93	25.71	216.11
Rainfall shock in first half of year 19 after birth (mm)	1.05	48.92	-8.02	86.45	-4.08	69.82	-51.69	154.79
Rainfall shock in second half of year 19 after birth (mm)	-5.49	54.46	5.18	82.76	4.85	67.87	-43.33	160.72
Temperature shock in first half of year 14 after birth (°C)	-0.05	1.49	-0.79	2.10	-1.27	4.07	-1.14	1.90
Temperature shock in second half of year 14 after birth (°C)	-0.28	1.17	-0.31	2.53	-0.75	4.27	0.20	2.70
Temperature shock in first half of year 15 after birth (°C)	-0.43	1.31	0.27	2.40	-0.47	3.23	1.20	2.63
Temperature shock in second half of year 15 after birth (°C)	0.13	1.14	0.33	1.78	-0.09	2.32	0.62	2.44
Temperature shock in first half of year 16 after birth (°C)	-0.31	1.80	0.04	1.40	1.32	2.34	1.49	2.43
Temperature shock in second half of year 16 after birth (°C)	0.04	1.77	-0.35	1.87	-0.08	3.79	0.28	2.80
Temperature shock in first half of year 17 after birth (°C)	0.01	1.57	-1.41	1.46	-1.66	3.56	-2.17	2.53
Temperature shock in second half of year 17 after birth (°C)	0.20	1.41	-0.46	2.66	-0.52	3.25	0.12	3.55
Temperature shock in first half of year 18 after birth (°C)	-0.34	1.37	1.26	2.16	-0.10	4.06	0.89	2.83
Temperature shock in second half of year 18 after birth (°C)	0.08	1.58	0.68	1.94	0.13	5.05	0.39	2.55
Temperature shock in first half of year 19 after birth (°C)	0.71	1.33	0.03	2.16	0.09	4.71	2.46	2.91
Temperature shock in second half of year 19 after birth (°C)	-0.43	1.33	0.16	2.36	-0.63	4.99	1.15	3.66
N	905		951		615		882	

The relationship between weather variation and migration has triggered an emerging literature in different parts of the developing world. However, it still remains controversial since some studies find that weather shocks increase the propensity to migrate, whereas other studies find the opposite – for a recent review of this literature, see Falco et al. (2018). Different explanations have attempted to account for these different effects. For example, Gray and Mueller (2012) differentiate the effect of drought on migration, by distance and reasons for moving. They find that drought increases men’s labour migration, whereas it decreases women’s short-distance marriage-related moves. On a more recent paper, Cattaneo and Peri (2016) find that changes in temperature are negatively associated with the probability of migration in poor countries, whereas the opposite holds in middle-income countries. They argue that lower income resulting from lower agricultural productivity constrains poor households preventing them from migrating. Still, less is known about the relationship between weather variation and youth migration and the mechanisms through which the former affect the latter.

4.5 Results

In this section, I will first discuss the results obtained from an attempt to test the validity of my instrument. Then I will present the findings on selection on skills, which are followed by the results of the effect of migration on skills, and the analysis on time use as a potential mechanism for the effects of migration. Similarly, in the next sub-section, I follow the same logic to present my findings on the heterogeneous effects of migration.

In order to assess the validity of the instrument used in the estimation, I look at the association between each outcome and the instrument among non-migrants. I would expect to find no association between them, which can be interpreted as the instrument not having any direct effect on skills in the absence of treatment. Table 4.7 shows the results for each country. Most of the outcomes have no statistically significant association (at 5 percent significance level) with the instrument, except for Pride in Ethiopia (as shown in Panel A column 4) and Math in India (Panel

B column 1) and Vietnam (Panel D column 1). This suggests that we should be cautious with the interpretation of results related to the aforementioned outcomes since violation of the exogeneity assumption may lead to inconsistent estimates (Angrist & Pischke, 2009).

Table 4.7: Association between skills and the instrument among non-migrants

	(1) Math (2013)	(2) Reading (2013)	(3) Agency (2013)	(4) Pride (2013)	(5) Efficacy (2013)	(6) Esteem (2013)
<i>Panel A: Ethiopia</i>						
Instrument	0.288 (0.394)	0.070 (0.352)	0.048 (0.118)	-0.670** (0.331)	0.018 (0.206)	-0.175 (0.199)
Observations	546	548	596	596	596	596
<i>Panel B: India</i>						
Instrument	-0.502*** (0.190)	0.061 (0.303)	0.002 (0.186)	0.262 (0.233)	-0.157 (0.212)	-0.140 (0.163)
Observations	448	435	477	477	476	477
<i>Panel C: Peru</i>						
Instrument	0.273 (0.206)	0.172 (0.211)	0.015 (0.180)	-0.377* (0.223)	0.124 (0.172)	-0.025 (0.168)
Observations	386	387	404	404	404	404
<i>Panel D: Vietnam</i>						
Instrument	-0.561** (0.271)	-0.556* (0.314)	-0.329 (0.218)	0.142 (0.252)	0.146 (0.152)	0.059 (0.184)
Observations	415	414	445	445	445	445

Clustered standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All specifications include individual, household, and locality characteristics.

4.5.1 Effects of average migration

As presented in section 4.2, in order to estimate the impact of migration by 2SLS, I first estimated a probit model of migration on the weather shocks, their quadratic form, and the covariates.⁴¹ Table 4.8 shows the results for each country. Each column presents the results controlling for different lagged skills in the specification and, therefore, examines whether there is selection on each given skill, its direction and magnitude.⁴² In all countries, except for Peru, there

⁴¹ This regression does not correspond to the first-stage estimation: it is an auxiliary regression that provides the predicted value of migration, which will then be used as an instrument for the 2SLS estimation.

⁴² Note that there are only four columns – despite having six outcomes – because, as I mentioned in section 3, I used the agency and pride scores in Round 3 as the lagged skills for self-efficacy and self-esteem, respectively.

is positive selection of Math and Reading skills, that is, individuals with higher skills are more likely to migrate. These findings are consistent with the literature on migration summarised by Gollin et al. (2014). However, in the case of Peru, we observe negative selection on Reading. This initially seems as a contradiction, but it may not be one. Borjas et al. (1992) posited that individuals are more likely to migrate the greater is the mismatch between their skill endowments and the returns to their skills in their place of origin. Thus, it may be the case that positive selection is more likely to occur when out-rural migration prevails – as is the case of Ethiopia, India and Vietnam – whereas the opposite holds for out-urban migration – as is the case of Peru.

Finally, in terms of the psychosocial skills, there is no selection into migration in any of the countries. This result diverges from recent studies that find a positive association between non-cognitive skills and the decision to migrate (Ayhan et al., 2017; Butikofer & Peri, 2017). However, the main source of discrepancy may be due to the fact that my main focus here is on young people, who move for various reasons (not only labour migration) and that follow different streams of migration (not only rural-urban).

Table 4.8: Effect of weather shocks on migration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Ethiopia				India			
	Dependent variable: Moved							
Math Score (2009)	0.139** (0.059)				0.169*** (0.048)			
Reading Score (2009)		0.173*** (0.062)				0.170*** (0.053)		
Agency Score (2009)			0.047 (0.086)				0.085 (0.086)	
Pride Score (2009)				-0.054 (0.079)				-0.097 (0.065)
Rainfall shock in 1st half of year 14 after birth	0.003* (0.002)	0.003 (0.002)	0.003 (0.002)	0.003 (0.002)	-0.002 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.002 (0.001)
Rainfall shock in 1st half of year 14 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 14 after birth	-0.002 (0.003)	-0.003 (0.003)	-0.003 (0.003)	-0.003 (0.003)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Rainfall shock in 2nd half of year 14 after birth ^2	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 15 after birth	0.004 (0.003)	0.003 (0.003)	0.004 (0.003)	0.004 (0.003)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 1st half of year 15 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 15 after birth	-0.004 (0.004)	-0.004 (0.004)	-0.003 (0.004)	-0.003 (0.004)	0.002 (0.001)	0.003* (0.001)	0.002* (0.001)	0.002* (0.001)
Rainfall shock in 2nd half of year 15 after birth ^2	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 16 after birth	-0.006* (0.004)	-0.005 (0.004)	-0.003 (0.004)	-0.003 (0.004)	0.002 (0.001)	0.002** (0.001)	0.002* (0.001)	0.002* (0.001)
Rainfall shock in 1st half of year 16 after birth ^2	0.000** (0.000)	0.000* (0.000)	0.000* (0.000)	0.000* (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)

Rainfall shock in 2nd half of year 16 after birth	-0.006 (0.005)	-0.006 (0.005)	-0.005 (0.005)	-0.005 (0.005)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)
Rainfall shock in 2nd half of year 16 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	-0.002 (0.005)	-0.001 (0.005)	-0.002 (0.005)	-0.002 (0.005)	-0.000 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)
Rainfall shock in 1st half of year 17 after birth ^2	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000* (0.000)
Rainfall shock in 2nd half of year 17 after birth	-0.000 (0.004)	0.000 (0.005)	0.001 (0.005)	0.001 (0.004)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Rainfall shock in 2nd half of year 17 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 18 after birth	-0.002 (0.004)	-0.001 (0.004)	-0.003 (0.003)	-0.003 (0.003)	0.003* (0.002)	0.003* (0.002)	0.003** (0.002)	0.003** (0.002)
Rainfall shock in 1st half of year 18 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000** (0.000)	0.000* (0.000)	0.000* (0.000)	0.000* (0.000)
Rainfall shock in 2nd half of year 18 after birth	-0.001 (0.004)	-0.002 (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.003** (0.001)	-0.004*** (0.002)	-0.003** (0.001)	-0.003** (0.001)
Rainfall shock in 2nd half of year 18 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 19 after birth	-0.003 (0.004)	-0.005 (0.004)	-0.006* (0.004)	-0.006* (0.004)	0.003** (0.001)	0.003** (0.001)	0.002* (0.001)	0.002* (0.001)
Rainfall shock in 1st half of year 19 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 19 after birth	-0.006** (0.003)	-0.006** (0.003)	-0.005** (0.002)	-0.005** (0.002)	-0.001 (0.002)	0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Rainfall shock in 2nd half of year 19 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Temperature shock in 1st half of year 14 after birth	0.051 (0.128)	0.079 (0.122)	0.064 (0.121)	0.067 (0.119)	-0.108 (0.089)	-0.169* (0.097)	-0.137 (0.086)	-0.139 (0.087)
Temperature shock in 1st half of year 14 after birth ^2	-0.008 (0.020)	0.001 (0.018)	-0.005 (0.020)	-0.005 (0.020)	-0.001 (0.020)	-0.009 (0.021)	-0.010 (0.019)	-0.009 (0.019)
Temperature shock in 2nd half of year 14 after birth	-0.057 (0.129)	-0.030 (0.126)	-0.092 (0.115)	-0.091 (0.117)	0.039 (0.059)	0.028 (0.061)	0.034 (0.057)	0.043 (0.058)

Temperature shock in 2nd half of year 14 after birth ^2	0.017 (0.045)	-0.005 (0.043)	-0.029 (0.045)	-0.027 (0.045)	0.004 (0.014)	-0.001 (0.014)	0.005 (0.013)	0.006 (0.013)
Temperature shock in 1st half of year 15 after birth	0.402*** (0.144)	0.319** (0.141)	0.294*** (0.113)	0.303*** (0.117)	-0.064 (0.090)	-0.012 (0.094)	-0.047 (0.083)	-0.046 (0.083)
Temperature shock in 1st half of year 15 after birth ^2	-0.036 (0.056)	-0.034 (0.055)	-0.053 (0.050)	-0.052 (0.052)	0.030* (0.016)	0.034** (0.017)	0.030** (0.015)	0.031** (0.015)
Temperature shock in 2nd half of year 15 after birth	-0.099 (0.174)	-0.084 (0.172)	-0.108 (0.157)	-0.111 (0.158)	0.077 (0.083)	0.088 (0.086)	0.114 (0.081)	0.116 (0.080)
Temperature shock in 2nd half of year 15 after birth ^2	-0.072 (0.059)	-0.065 (0.062)	-0.090* (0.054)	-0.090 (0.055)	0.021 (0.022)	0.018 (0.024)	0.013 (0.020)	0.013 (0.020)
Temperature shock in 1st half of year 16 after birth	-0.217** (0.107)	-0.185* (0.110)	-0.206* (0.108)	-0.214** (0.107)	-0.159 (0.099)	-0.168* (0.101)	-0.128 (0.096)	-0.137 (0.096)
Temperature shock in 1st half of year 16 after birth ^2	-0.005 (0.029)	-0.015 (0.029)	-0.014 (0.027)	-0.014 (0.027)	0.019 (0.028)	0.004 (0.030)	0.004 (0.027)	0.007 (0.027)
Temperature shock in 2nd half of year 16 after birth	0.015 (0.107)	0.052 (0.106)	0.066 (0.101)	0.065 (0.103)	0.030 (0.064)	0.030 (0.068)	-0.008 (0.066)	-0.003 (0.064)
Temperature shock in 2nd half of year 16 after birth ^2	-0.026 (0.026)	-0.023 (0.024)	-0.025 (0.022)	-0.024 (0.023)	-0.003 (0.021)	-0.015 (0.022)	-0.005 (0.019)	-0.001 (0.019)
Temperature shock in 1st half of year 17 after birth	0.032 (0.081)	0.003 (0.076)	0.038 (0.074)	0.034 (0.071)	0.009 (0.087)	0.024 (0.090)	-0.001 (0.078)	0.000 (0.078)
Temperature shock in 1st half of year 17 after birth ^2	-0.002 (0.028)	-0.007 (0.030)	-0.002 (0.030)	-0.002 (0.029)	0.006 (0.018)	0.010 (0.018)	-0.000 (0.016)	-0.000 (0.016)
Temperature shock in 2nd half of year 17 after birth	-0.058 (0.066)	-0.046 (0.067)	0.000 (0.070)	-0.003 (0.071)	-0.027 (0.061)	-0.029 (0.068)	-0.043 (0.056)	-0.041 (0.056)
Temperature shock in 2nd half of year 17 after birth ^2	0.028 (0.025)	0.026 (0.026)	0.021 (0.024)	0.022 (0.024)	-0.009 (0.014)	-0.005 (0.014)	-0.002 (0.013)	-0.003 (0.013)
Temperature shock in 1st half of year 18 after birth	0.018 (0.140)	0.081 (0.133)	0.134 (0.118)	0.137 (0.116)	0.227** (0.092)	0.166* (0.095)	0.158** (0.076)	0.162** (0.075)
Temperature shock in 1st half of year 18 after birth ^2	0.022 (0.046)	0.022 (0.047)	0.033 (0.045)	0.033 (0.045)	-0.028* (0.016)	-0.024 (0.016)	-0.023 (0.014)	-0.023 (0.014)
Temperature shock in 2nd half of year 18 after birth	0.248 (0.187)	0.259 (0.165)	0.272 (0.167)	0.277* (0.162)	-0.011 (0.096)	-0.073 (0.101)	-0.040 (0.095)	-0.054 (0.096)
Temperature shock in 2nd half of year 18 after birth ^2	-0.057 (0.044)	-0.062 (0.042)	-0.066* (0.040)	-0.066* (0.040)	0.017 (0.017)	0.029 (0.019)	0.022 (0.016)	0.021 (0.017)

Temperature shock in 1st half of year 19 after birth	0.100 (0.208)	-0.027 (0.210)	-0.008 (0.203)	-0.001 (0.200)	0.072 (0.076)	0.058 (0.077)	0.075 (0.070)	0.075 (0.071)
Temperature shock in 1st half of year 19 after birth ^2	0.060* (0.035)	0.047 (0.035)	0.063* (0.033)	0.061* (0.033)	-0.001 (0.013)	0.007 (0.013)	0.003 (0.012)	0.002 (0.012)
Temperature shock in 2nd half of year 19 after birth	0.038 (0.132)	-0.035 (0.125)	-0.017 (0.114)	-0.017 (0.113)	-0.051 (0.059)	-0.042 (0.060)	-0.060 (0.055)	-0.060 (0.055)
Temperature shock in 2nd half of year 19 after birth ^2	0.032 (0.052)	0.048 (0.051)	0.049 (0.051)	0.049 (0.051)	0.003 (0.010)	0.002 (0.011)	-0.000 (0.010)	-0.001 (0.009)
Constant	-7.793 (10.088)	-9.080 (10.582)	-3.887 (8.286)	-4.282 (8.062)	1.125 (5.898)	2.717 (5.840)	-1.345 (5.626)	-1.070 (5.538)
Observations	835	835	901	901	876	857	947	947
R-squared	0.15	0.14	0.13	0.13	0.13	0.15	0.12	0.13

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Peru				Vietnam			
	Dependent variable: Moved							
Math Score (2009)	-0.131 (0.081)				0.268*** (0.063)			
Reading Score (2009)		-0.216** (0.084)				0.239*** (0.059)		
Agency Score (2009)			0.008 (0.105)				-0.036 (0.092)	
Pride Score (2009)				0.104 (0.087)				-0.018 (0.086)
Rainfall shock in 1st half of year 14 after birth	-0.007*** (0.002)	-0.006*** (0.002)	-0.006*** (0.002)	-0.006*** (0.002)	-0.004*** (0.001)	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)
Rainfall shock in 1st half of year 14 after birth ^2	0.000* (0.000)	0.000 (0.000)	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 14 after birth	-0.009*** (0.003)	-0.008*** (0.003)	-0.007*** (0.003)	-0.008*** (0.003)	-0.005*** (0.001)	-0.004*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)
Rainfall shock in 2nd half of year 14 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Rainfall shock in 1st half of year 15 after birth	-0.005* (0.002)	-0.004 (0.003)	-0.004* (0.002)	-0.004* (0.002)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)
Rainfall shock in 1st half of year 15 after birth ^2	0.000* (0.000)	0.000 (0.000)						
Rainfall shock in 2nd half of year 15 after birth	-0.004* (0.002)	-0.005* (0.002)	-0.004* (0.002)	-0.004* (0.002)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 2nd half of year 15 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 16 after birth	-0.000 (0.002)	-0.000 (0.002)	-0.000 (0.002)	-0.000 (0.002)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 1st half of year 16 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 16 after birth	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)

Rainfall shock in 2nd half of year 16 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	-0.001 (0.003)	-0.001 (0.003)	-0.000 (0.002)	-0.000 (0.002)	0.001 (0.001)	0.000 (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 1st half of year 17 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000* (0.000)	0.000** (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 17 after birth	-0.003* (0.002)	-0.003* (0.002)	-0.003** (0.002)	-0.003** (0.002)	0.002* (0.001)	0.003* (0.001)	0.002* (0.001)	0.002* (0.001)
Rainfall shock in 2nd half of year 17 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 18 after birth	-0.005 (0.003)	-0.005 (0.003)	-0.003 (0.003)	-0.003 (0.003)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)
Rainfall shock in 1st half of year 18 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 18 after birth	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	0.002** (0.001)	0.002** (0.001)	0.002 (0.001)	0.002 (0.001)
Rainfall shock in 2nd half of year 18 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000* (0.000)
Rainfall shock in 1st half of year 19 after birth	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.002* (0.001)	0.003** (0.001)	0.002** (0.001)	0.002** (0.001)
Rainfall shock in 1st half of year 19 after birth ^2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 19 after birth	-0.000 (0.002)	-0.000 (0.002)	-0.001 (0.002)	-0.001 (0.002)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 2nd half of year 19 after birth ^2	-0.000* (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Temperature shock in 1st half of year 14 after birth	-0.036 (0.039)	-0.044 (0.039)	-0.029 (0.036)	-0.027 (0.036)	-0.066 (0.095)	-0.077 (0.095)	-0.035 (0.094)	-0.036 (0.094)
Temperature shock in 1st half of year 14 after birth ^2	-0.005 (0.004)	-0.004 (0.004)	-0.003 (0.004)	-0.003 (0.004)	0.015 (0.020)	0.016 (0.021)	0.008 (0.019)	0.008 (0.019)
Temperature shock in 2nd half of year 14 after birth	-0.055 (0.044)	-0.038 (0.045)	-0.036 (0.043)	-0.038 (0.043)	-0.131 (0.107)	-0.151 (0.119)	-0.105 (0.118)	-0.108 (0.121)
Temperature shock in 2nd half of year 14 after birth ^2	0.005 (0.005)	0.005 (0.005)	0.004 (0.004)	0.004 (0.004)	0.035** (0.016)	0.032* (0.017)	0.029* (0.016)	0.029* (0.016)

Temperature shock in 1st half of year 15 after birth	0.069 (0.045)	0.057 (0.045)	0.043 (0.042)	0.044 (0.042)	-0.126 (0.114)	-0.106 (0.119)	-0.050 (0.119)	-0.049 (0.118)
Temperature shock in 1st half of year 15 after birth ^2	-0.001 (0.004)	-0.002 (0.005)	-0.002 (0.004)	-0.002 (0.004)	0.018 (0.018)	0.010 (0.018)	0.011 (0.019)	0.011 (0.019)
Temperature shock in 2nd half of year 15 after birth	-0.179** (0.078)	-0.156** (0.076)	-0.173** (0.082)	-0.171** (0.082)	-0.190** (0.096)	-0.177* (0.100)	-0.156 (0.102)	-0.154 (0.101)
Temperature shock in 2nd half of year 15 after birth ^2	-0.023 (0.016)	-0.020 (0.015)	-0.025* (0.015)	-0.024* (0.015)	0.010 (0.018)	0.002 (0.019)	-0.002 (0.019)	-0.001 (0.019)
Temperature shock in 1st half of year 16 after birth	0.096 (0.061)	0.074 (0.062)	0.082 (0.058)	0.081 (0.057)	-0.138 (0.109)	-0.136 (0.110)	-0.116 (0.101)	-0.114 (0.101)
Temperature shock in 1st half of year 16 after birth ^2	0.008 (0.010)	0.007 (0.010)	0.006 (0.010)	0.007 (0.010)	-0.014 (0.016)	-0.016 (0.016)	-0.024 (0.016)	-0.024 (0.016)
Temperature shock in 2nd half of year 16 after birth	-0.170*** (0.035)	-0.161*** (0.034)	-0.156*** (0.036)	-0.157*** (0.035)	-0.191** (0.088)	-0.226** (0.088)	-0.193** (0.084)	-0.194** (0.085)
Temperature shock in 2nd half of year 16 after birth ^2	-0.019*** (0.004)	-0.018*** (0.004)	-0.018*** (0.005)	-0.018*** (0.005)	-0.014 (0.013)	-0.010 (0.013)	-0.005 (0.011)	-0.005 (0.011)
Temperature shock in 1st half of year 17 after birth	0.014 (0.053)	0.022 (0.052)	0.024 (0.052)	0.022 (0.052)	0.042 (0.110)	0.045 (0.108)	-0.017 (0.090)	-0.018 (0.090)
Temperature shock in 1st half of year 17 after birth ^2	-0.007 (0.007)	-0.005 (0.007)	-0.007 (0.007)	-0.007 (0.007)	0.023* (0.012)	0.017 (0.012)	0.013 (0.011)	0.014 (0.011)
Temperature shock in 2nd half of year 17 after birth	-0.023 (0.039)	-0.013 (0.038)	-0.020 (0.038)	-0.021 (0.037)	0.169 (0.111)	0.194* (0.114)	0.152 (0.116)	0.151 (0.116)
Temperature shock in 2nd half of year 17 after birth ^2	-0.003 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	0.008 (0.013)	0.010 (0.013)	0.007 (0.012)	0.007 (0.012)
Temperature shock in 1st half of year 18 after birth	0.073* (0.040)	0.069* (0.038)	0.070* (0.038)	0.071* (0.039)	0.149 (0.094)	0.112 (0.093)	0.104 (0.093)	0.107 (0.093)
Temperature shock in 1st half of year 18 after birth ^2	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.031*** (0.010)	-0.029*** (0.011)	-0.027*** (0.010)	-0.027*** (0.010)
Temperature shock in 2nd half of year 18 after birth	0.051 (0.043)	0.040 (0.041)	0.051 (0.044)	0.050 (0.043)	-0.028 (0.147)	-0.076 (0.145)	-0.032 (0.140)	-0.031 (0.139)
Temperature shock in 2nd half of year 18 after birth ^2	-0.003 (0.003)	-0.002 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.011 (0.015)	-0.002 (0.016)	-0.010 (0.014)	-0.010 (0.014)
Temperature shock in 1st half of year 19 after birth	-0.065 (0.048)	-0.057 (0.047)	-0.056 (0.047)	-0.055 (0.047)	-0.041 (0.115)	-0.032 (0.119)	-0.085 (0.120)	-0.086 (0.119)

Temperature shock in 1st half of year 19 after birth ^2	0.001 (0.003)	0.002 (0.003)	0.004 (0.003)	0.004 (0.003)	-0.002 (0.010)	-0.001 (0.010)	0.001 (0.009)	0.001 (0.009)
Temperature shock in 2nd half of year 19 after birth	0.024 (0.050)	0.021 (0.049)	0.011 (0.047)	0.009 (0.047)	0.023 (0.063)	0.021 (0.061)	0.002 (0.058)	-0.001 (0.060)
Temperature shock in 2nd half of year 19 after birth ^2	0.003 (0.004)	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)	0.014 (0.009)	0.016* (0.009)	0.010 (0.006)	0.009 (0.006)
Constant	-14.480*** (3.484)	-14.842*** (3.596)	-13.737*** (3.405)	-13.788*** (3.490)	-16.586** (7.045)	-18.191** (7.144)	-15.733** (7.407)	-15.896** (7.489)
Observations	584	583	604	604	827	822	874	874
R-squared	0.23	0.23	0.21	0.21	0.26	0.26	0.24	0.24

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

Another pattern emerging from this table is that the relationship between weather shocks and the probability of migrating changes with age: precipitation and temperature shocks during school-age years predict migration in a different direction than shocks during post-school-age years. The clearest example is Vietnam. Columns 13 to 16 in Table 4.8 show that the likelihood of migration is a decreasing and convex function of weather shocks at age 14, whereas it is an increasing and concave function of these shocks at age 18. A potential explanation for this is that too low and too high rainfall or temperature reduces agricultural productivity (or labour productivity in the case of urban areas, in line with Burke et al. (2015)), lowering local wages, which in turn reduce the opportunity cost of migrating, and thus, increase the probability of moving – hence the convex relationship during school-age years. However, in the case of weather shocks taking place at a later stage of the child’s life – when the child actually gains responsibility in the household –, too low and too high rainfall or temperature may increase the cost of separation from the family (higher psychic costs), thus reducing the probability of migration – hence the concave relationship during post-school years.

Table 4.9 shows the results obtained from the estimation of equation (7) for cognitive and psychosocial skills. For each country, the first column shows the results using OLS estimation and the second and third columns show the results for the 2SLS estimation using the exactly identified and the overidentified models, respectively. Before interpreting the point estimates, I will first present the Kleibergen-Paap rk Wald F statistic, shown at the bottom of each panel, as a test for weak instruments with non i.i.d. errors. All of them are well above the rule of thumb of 10 proposed by Staiger and Stock (1997) and above the critical values proposed by Stock and Yogo (2005), suggesting the rejection of the null hypothesis of weak instruments. The last row of each panel shows the p-value of the Hansen J statistic as a test of the validity of overidentifying restrictions. All of them fail to reject the null hypothesis that the full set of orthogonality conditions are valid, which suggests that the instrument set is appropriate, or as Deaton (2010) points, at least a subset of the instruments is valid.

Table 4.9: Effects of migration on skills: OLS and 2SLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Ethiopia			India			Peru			Vietnam	
	OLS	2SLS	2SLS	OLS	2SLS	2SLS	OLS	2SLS	2SLS	OLS	2SLS	2SLS
<i>Panel A - Dependent variable: Math Score (2013)</i>												
Moved	0.036 (0.059)	0.166 (0.219)	0.166 (0.219)	0.002 (0.049)	-0.379** (0.178)	-0.378** (0.178)	0.040 (0.065)	0.181 (0.125)	0.180 (0.125)	0.031 (0.079)	-0.509*** (0.149)	-0.509*** (0.148)
Observations	835	835	835	876	876	876	584	584	584	827	827	827
K-P F-Statistic		58.92	29.44		78.69	39.57		130.09	64.91		132.04	69.35
Hansen J P-value			0.76			0.37			0.76			0.68
<i>Panel B - Dependent variable: Reading Score (2013)</i>												
Moved	0.052 (0.099)	0.243 (0.200)	0.243 (0.201)	-0.010 (0.053)	0.159 (0.203)	0.158 (0.203)	0.105 (0.071)	0.291* (0.158)	0.290* (0.158)	-0.037 (0.080)	-0.375** (0.149)	-0.375** (0.150)
Observations	835	835	835	857	857	857	583	583	583	822	822	822
K-P F-Statistic		57.30	28.62		80.95	41.09		113.85	57.20		133.42	69.53
Hansen J P-value			0.82			0.57			0.43			0.92
<i>Panel C - Dependent variable: Agency Score (2013)</i>												
Moved	0.089* (0.050)	0.263** (0.114)	0.263** (0.114)	0.015 (0.033)	-0.035 (0.125)	-0.035 (0.125)	-0.070 (0.046)	-0.048 (0.131)	-0.046 (0.131)	0.139*** (0.043)	-0.052 (0.097)	-0.052 (0.097)
Observations	901	901	901	947	947	947	604	604	604	874	874	874
K-P F-Statistic		61.79	30.86		68.52	34.35		104.77	52.53		125.83	64.08
Hansen J P-value			0.97			0.73			0.31			0.89

<i>Panel D - Dependent variable: Pride Score (2013)</i>												
Moved	-0.029 (0.048)	-0.186 (0.183)	-0.185 (0.183)	0.084** (0.042)	0.127 (0.152)	0.127 (0.152)	0.004 (0.056)	-0.117 (0.145)	-0.117 (0.145)	0.188*** (0.052)	0.287* (0.153)	0.287* (0.153)
Observations	901	901	901	947	947	947	604	604	604	874	874	874
R-squared	0.106	0.098	0.098	0.109	0.109	0.109	0.069	0.062	0.062	0.066	0.061	0.061
K-P F-Statistic		63.06	31.49		67.36	33.80		105.23	52.82		125.93	64.12
Hansen J P-value			0.37			0.79			0.55			0.86
<i>Panel E - Dependent variable: Self-Efficacy Score (2013)</i>												
Moved	0.080* (0.047)	0.107 (0.143)	0.108 (0.143)	0.054 (0.043)	-0.086 (0.142)	-0.085 (0.142)	0.050 (0.041)	0.060 (0.091)	0.059 (0.091)	0.080* (0.040)	-0.004 (0.081)	-0.003 (0.081)
Observations	901	901	901	946	946	946	604	604	604	874	874	874
R-squared	0.048	0.048	0.048	0.120	0.108	0.108	0.127	0.127	0.127	0.056	0.051	0.051
K-P F-Statistic		61.79	30.86		69.74	34.96		104.77	52.53		125.83	64.08
Hansen J P-value			0.27			0.66			0.52			0.57
<i>Panel F - Dependent variable: Self-Esteem Score (2013)</i>												
Moved	0.000 (0.049)	-0.011 (0.154)	-0.010 (0.154)	-0.037 (0.035)	-0.027 (0.124)	-0.028 (0.124)	0.117* (0.061)	0.070 (0.098)	0.070 (0.097)	0.042 (0.047)	-0.029 (0.098)	-0.029 (0.098)
Observations	901	901	901	947	947	947	604	604	604	874	874	874
R-squared	0.045	0.045	0.045	0.079	0.079	0.079	0.073	0.072	0.072	0.025	0.021	0.021
K-P F-Statistic		63.06	31.49		67.36	33.80		105.23	52.82		125.93	64.12
Hansen J P-value			0.20			0.54			0.75			0.87

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All models include lagged skills, as well as individual, household and locality controls.

Turning to the interpretation of the variables of interest in Panel A of Table 4.9, in all countries, the OLS estimates are positive, whereas the 2SLS estimates vary in sign. In Ethiopia and Peru, individuals with higher ability are less likely to migrate, creating negative bias in the OLS estimates. Meanwhile, in India and Vietnam, young people with higher ability are more likely to migrate and, therefore, there is a positive bias in the OLS estimates. Furthermore, the 2SLS results suggest that, migration has a negative effect on Math in India and Vietnam: migrants have 0.38 and 0.5 lower standard deviations than non-migrants, respectively. The size of these point estimates are non-trivial since McEwan (2015) shows, from a meta-analysis on 77 randomised control trials, that the largest mean effect sizes on learning were obtained from treatments that included providing computers or instructional technology (0.15 standard deviations) and teacher training (0.12 standard deviations). However, before concluding that migration per se is deleterious for skills, it is important to understand what type of migration is dominating these results, which will be explored in the next subsection.

In Panel B, except for Vietnam, the OLS estimates are smaller than the 2SLS estimates, suggesting that there are omitted variables that are negatively biasing the former. Unlike the previous results, migration has a positive effect on Reading scores in Peru and a negative effect in Vietnam – as it is the case for Math. This is indicative that Math and Reading may have different technologies and, therefore, the mechanisms through which migration affects them may be different.⁴³ It must also be noted that in both Panels A and B, the OLS coefficients are smaller (in absolute value) than the 2SLS ones, suggesting that the former may be underestimating the effect of migration on cognitive skills.

Regarding the psychosocial skills, Panels C to F show that OLS estimates suffer from bias in different directions depending on the outcome and the country. In terms of the size of the coefficients, there is no clear pattern between the OLS and 2SLS estimates. For example, in

⁴³ Cragg (2014) finds that executive function (EF) skills, such as working memory, suppressing distractions, and flexible thinking, play a key role in developing Math skills. However, in order to develop reading skills, Foy (2012) point that in addition to EF skills, visual perception and language skills are also needed.

Vietnam, OLS estimates in Panels C and E are positively biased, whereas the one in Panel D is negatively biased. The latter implies that individuals with unobserved characteristics that are positively correlated with Pride are less likely to migrate or, alternatively, those with unobserved characteristics that are negatively correlated with Pride are more likely to migrate. Furthermore, the 2SLS estimates suggest that migration leads to an increase of 0.26 standard deviations on the Agency score of migrants in Ethiopia and of 0.29 standard deviations on the Pride score in Vietnam.

Given that this analysis comprises six outcomes in four countries, inferences need to account for potential correlation among skills, which may lead to the multiple-inference problem (Anderson, 2012). This was done by controlling for the False Discovery Rate (FDR) – i.e. the expected proportion of rejections that are type I errors or “false discoveries” – using the method proposed in Benjamini and Yekutieli (2001). Table 4.10 compares the p-values – i.e. the probability of observing a sample difference at least as large as the one in the sample, assuming that the population difference is zero – obtained from single hypothesis testing (as in Table 4.9) with the q-values – i.e. adjusted p-values that take into account the FDR – obtained from multiple hypotheses testing. The results suggest that only the effects found on Math and Reading in Vietnam are significant at the 10 percent level of significance, which suggests that we should be very cautious about the results discussed above.

Table 4.10: P-Values and Q-Values of Migration Variable to adjust for Multiple Hypotheses Testing

Outcome	Ethiopia			India			Peru			Vietnam		
	Estimate	P-Value	Q-Value									
Math	0.1665	0.45	1.00	-0.3793	0.033	0.48	0.1806	0.15	1.00	-0.5089	0.00061	0.01
Reading	0.243	0.23	1.00	0.1587	0.430	1.00	0.2915	0.064	0.95	-0.3754	0.012	0.09
Agency	0.2634	0.02	0.30	-0.0354	0.780	1.00	-0.0482	0.71	1.00	-0.052	0.590	1.00
Pride	-0.1857	0.31	1.00	0.1272	0.400	1.00	-0.1166	0.42	1.00	0.2873	0.060	0.30
Self-Efficacy	0.1073	0.45	1.00	-0.0857	0.550	1.00	0.0601	0.51	1.00	-0.0037	0.960	1.00
Self-Esteem	-0.0108	0.94	1.00	-0.0273	0.830	1.00	0.0704	0.47	1.00	-0.0294	0.760	1.00

The columns under P-Value and Q-Value were calculated using the Benjamini-Yekutieli method as explained in section 4.5.1.

In order to explore potential mechanisms that may explain the findings discussed above, I test whether migration affects the allocation of the adolescent's time use across different tasks on a typical day. From this evidence only, we cannot tell whether some activities are more productive than others are, in general terms of skill formation, but we can expect that migrants that spend more time at school or studying outside school will have higher cognitive skills. In this regard, Fiorini and Keane (2014) points that whether or not an activity is beneficial to the individual, in terms of skill formation, depends on what the substitutes are for this activity. Thus, if migrants place significantly more time on one task, then they should also be placing significantly less time on another task. It must be noted, though, that the direction of this effect on psychosocial skills is more ambiguous as we do not know which activities may affect, for instance, their sense of agency or self-esteem. In this sense, Fiorini and Keane (2014) provides evidence from Australian children that time allocation has no effect on their psychosocial skills.

The results are presented in Table 4.11. Except for India, migration led to an increase in the number of hours spent working outside the household: 1.7 hours in Ethiopia, 2.6 in Peru, and 0.8 in Vietnam. However, the trade-off between carrying out this activity versus undertaking other activities varies across countries. For example, in Vietnam migrants reduced the amount of time spent on domestic tasks and working within the household (0.4 and 1.7 hours, respectively), whereas in Peru, they reduced their time allocated to sleep, work within the household, and at school (0.9, 0.9, and 1.1 hours, respectively). Still, these diverse patterns do not seem really informative to explain the observed effects of migration on average. Therefore, the next subsection will explore in more depth the types of migration that may be leading these results.

Table 4.11: Effects of migration on time use

	(1) Sleep	(2) Caring for others	(3) Domestic tasks	(4) Work within household	(5) Work outside household	(6) At school	(7) Studying outside school	(8) Leisure
<i>Ethiopia</i>								
Moved	-0.297 (0.315)	-0.333 (0.329)	-0.495 (0.631)	-0.704 (0.787)	1.747*** (0.579)	-0.479 (0.346)	-0.496 (0.549)	1.097** (0.536)
Observations	835	835	835	835	835	835	835	835
K-P F-Statistic	58.92	58.88	62.26	63.70	62.65	59.78	59.80	58.92
<i>India</i>								
Moved	-0.0326 (0.222)	1.099*** (0.416)	0.0956 (0.386)	-0.477 (0.368)	0.321 (0.384)	-0.762* (0.453)	0.188 (0.252)	-0.102 (0.643)
Observations	876	876	876	876	876	876	876	876
K-P F-Statistic	78.69	78.69	82.47	80.21	78.27	77.11	77.69	78.69
<i>Peru</i>								
Moved	-0.893*** (0.333)	-0.182 (0.325)	-0.323 (0.279)	-0.913*** (0.290)	2.621*** (0.548)	-1.091*** (0.356)	0.435 (0.272)	-0.469 (0.476)
Observations	584	584	584	584	584	584	584	584
K-P F-Statistic	130.1	131.8	130.9	129.6	133	128.5	128.9	130.1
<i>Vietnam</i>								
Moved	-0.116 (0.259)	0.317 (0.227)	-0.418* (0.224)	-1.686*** (0.628)	0.832* (0.436)	0.457 (0.453)	-0.0732 (0.284)	0.850** (0.389)
Observations	787	787	787	787	787	787	787	787
K-P F-Statistic	127.2	128.3	125.4	125.6	127.5	122.7	124.5	127.2

Note: Column (2) includes looking after younger children or ill household members. Column (3) refers to activities such as fetching water, firewood, cleaning, cooking, washing, and shopping. Column (4) refers to activities such as tasks on family farm, cattle herding, other family business, shepherding, piecework or handicrafts done at home. Column (5) refers mainly to paid activities outside the household or for someone not in the household, excluding travelling time. Column (6) refers to time spent at any educational institute excluding travelling time. Column (7) includes time studying at home and doing extra-tuition. Column (8) refers to general leisure including time eating or doing self-hygiene. These results were estimated using lagged Math scores, but conclusions remain the same when lagged Reading, Agency or Pride scores are used.

4.5.2 Heterogeneous effects of migration

As mentioned before, differences in unobserved characteristics among subgroups of migrants may lead to heterogeneous effects of migration as they might respond in different ways to the treatment. In this paper, I explore this possibility by disaggregating the effects of migration by reasons for moving. Tables A.4.1 to A.4.10 in the Appendix show the effect of weather shocks on each reason for migrating per country, where the different specifications correspond to the inclusion of different lagged skills. These tables show that different rainfall and temperature shocks predict the different types of migration, which is in line with the identification strategy proposed in section 4.2.

Two observations are in order. First, adolescents with higher Math and Reading scores self-select into migration for studies,⁴⁴ whereas those with lower Math scores are more likely to move for work (except for Ethiopia) and for family formation. The former is consistent with the results obtained in the previous chapter, where I found evidence of positive self-selection into migrating for studies – i.e. those that move for studies are better educated than those who do not. The latter is also consistent with the previous chapter in that those that move for family formation have, on average, less years of education than those that do not. Second, adolescents with higher Agency scores are more likely to move for studies (except for Ethiopia), whereas those with lower Agency scores are more likely to move for work and for family formation. These findings stand alone in the analysis as a piece of evidence that supports this thesis' claim that young migrants that move for studies positively self-select into migration, whereas those that move for work or family formation are negatively self-selected, both in terms of cognitive and psychosocial skills.

Table 4.12 shows the results obtained from the estimation of equation (8). Based on the OLS estimates, moving for studies is positively and significantly associated with Math and Reading scores (except for Vietnam, where this is not statistically significant, although this may be due to large standard errors). Nevertheless, looking at the 2SLS results, moving for studies has a large

⁴⁴ Except for Peru, where only lagged Math scores predict this type of move.

positive effect on Reading in all countries, except for Vietnam, where this effect is also large, but negative – together with the effect on Math. Specifically, moving for studies increased in 0.55, 0.51, and 0.63 standard deviations the Reading scores in Ethiopia, India, and Peru, respectively, whereas it decreased them in 0.51 standard deviations in Vietnam. Regarding the psychosocial skills, this subgroup shows statistically significant positive effects on Self-Efficacy (in India) and on Pride (in Vietnam). It is worth noting that the results for Vietnam remain a puzzle since this subgroup of migrants seem to relatively deskill, but at the same time are more proud than those that do not move.

When I looked at the effects of migration on these subgroups' time allocation, the results seem to explain partly the patterns described above. As shown in Table 4.13, moving for studies increases the amount of time spent at school (1.6, 1.5, 1.2, and 1.4 more hours in each country), while decreasing the time allocated to working within the household (1.2, 1.6, 1.4, and 1.2 fewer hours in each country). This may explain the results on Reading scores, but not on Math or the ones obtained for Vietnam either. Regarding the latter, it must be noted that those that moved for studies in Vietnam also increased their time spent on leisure, which may partly explain the relative deskilling of this subgroup in terms of cognitive skills.

Table 4.12: Effects of moving for studies on skills: OLS and 2SLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Ethiopia			India			Peru			Vietnam	
	OLS	2SLS	2SLS	OLS	2SLS	2SLS	OLS	2SLS	2SLS	OLS	2SLS	2SLS
<i>Panel A - Dependent variable: Math Score (2013)</i>												
Moved for studies	0.251*** (0.080)	0.371 (0.277)	0.372 (0.277)	0.197*** (0.060)	-0.006 (0.192)	-0.002 (0.192)	0.256*** (0.084)	0.225 (0.161)	0.224 (0.162)	0.156 (0.100)	-0.333** (0.167)	-0.333** (0.168)
Moved for other reason	-0.090 (0.059)	-0.048 (0.197)	-0.047 (0.197)	-0.164*** (0.056)	-0.629*** (0.165)	-0.632*** (0.165)	-0.089 (0.064)	0.091 (0.173)	0.086 (0.172)	-0.107 (0.083)	-0.339 (0.218)	-0.339 (0.217)
Observations	835	835	835	876	876	876	584	584	584	827	827	827
K-P F-Statistic		31.47	16.36		34.85	18.04		32.13	16.64		42.45	21.88
Hansen J P-value			0.92			0.90			0.73			0.88
<i>Panel B - Dependent variable: Reading Score (2013)</i>												
Moved for studies	0.347*** (0.104)	0.549* (0.281)	0.550** (0.281)	0.198*** (0.055)	0.507** (0.247)	0.507** (0.249)	0.409*** (0.102)	0.629*** (0.217)	0.629*** (0.217)	0.168* (0.098)	-0.513*** (0.170)	-0.513*** (0.170)
Moved for other reason	-0.125 (0.089)	-0.243 (0.258)	-0.243 (0.259)	-0.189*** (0.065)	-0.306 (0.235)	-0.306 (0.235)	-0.102 (0.086)	-0.084 (0.214)	-0.086 (0.214)	-0.273*** (0.080)	-0.479* (0.280)	-0.478* (0.280)
Observations	835	835	835	857	857	857	583	583	583	822	822	822
K-P F-Statistic		30.44	15.47		39.80	20.62		30.55	16.03		43.79	22.62
Hansen J P-value			0.85			0.91			0.60			0.99
<i>Panel C - Dependent variable: Agency Score (2013)</i>												
Moved for studies	0.207** (0.084)	-0.140 (0.223)	-0.139 (0.223)	0.189*** (0.040)	0.062 (0.163)	0.060 (0.163)	-0.033 (0.072)	-0.236 (0.153)	-0.234 (0.153)	0.206*** (0.054)	-0.085 (0.121)	-0.087 (0.121)
Moved for other reason	0.022 (0.041)	0.120 (0.144)	0.120 (0.145)	-0.125*** (0.039)	-0.392*** (0.150)	-0.390*** (0.151)	-0.101** (0.050)	0.110 (0.142)	0.107 (0.143)	0.068 (0.047)	-0.120 (0.150)	-0.118 (0.151)
Observations	901	901	901	947	947	947	604	604	604	874	874	874
K-P F-Statistic		14.71	7.45		34.60	17.26		29.03	15.05		52.23	26.50
Hansen J P-value			0.78			0.34			0.49			0.53

<i>Panel D - Dependent variable: Pride Score (2013)</i>												
Moved for studies	-0.004 (0.076)	-0.316 (0.367)	-0.323 (0.364)	0.000 (0.051)	0.071 (0.205)	0.065 (0.204)	0.078 (0.072)	-0.213 (0.205)	-0.212 (0.204)	0.280*** (0.066)	0.367* (0.187)	0.367* (0.188)
Moved for other reason	-0.044 (0.048)	-0.247 (0.219)	-0.250 (0.218)	0.152*** (0.049)	0.036 (0.169)	0.039 (0.169)	-0.015 (0.064)	0.184 (0.187)	0.187 (0.187)	0.090 (0.065)	0.078 (0.192)	0.078 (0.192)
Observations	901	901	901	947	947	947	604	604	604	874	874	874
K-P F-Statistic		14.81	7.48		33.91	16.97		32.31	16.79		54.03	27.53
Hansen J P-value			0.60			0.39			0.59			0.98
<i>Panel E - Dependent variable: Self-Efficacy Score (2013)</i>												
Moved for studies	0.219*** (0.064)	0.078 (0.172)	0.071 (0.169)	0.149*** (0.053)	0.320* (0.175)	0.319* (0.174)	0.075 (0.059)	-0.152 (0.139)	-0.153 (0.139)	0.115** (0.046)	0.087 (0.081)	0.085 (0.082)
Moved for other reason	0.000 (0.045)	0.083 (0.167)	0.081 (0.167)	-0.022 (0.048)	-0.230 (0.158)	-0.229 (0.158)	0.031 (0.047)	0.241 (0.153)	0.243 (0.153)	0.042 (0.047)	-0.086 (0.105)	-0.083 (0.105)
Observations	901	901	901	946	946	946	604	604	604	874	874	874
K-P F-Statistic		14.71	7.45		35.22	17.58		29.03	15.05		52.23	26.50
Hansen J P-value			0.28			0.85			0.79			0.22
<i>Panel F - Dependent variable: Self-Esteem Score (2013)</i>												
Moved for studies	0.134* (0.070)	-0.077 (0.273)	-0.085 (0.271)	-0.012 (0.044)	0.215 (0.163)	0.214 (0.162)	0.124** (0.060)	-0.086 (0.158)	-0.087 (0.158)	0.061 (0.055)	-0.147 (0.110)	-0.150 (0.110)
Moved for other reason	-0.076* (0.041)	-0.093 (0.195)	-0.097 (0.196)	-0.057 (0.043)	-0.313* (0.160)	-0.311* (0.161)	0.090 (0.070)	0.204 (0.137)	0.203 (0.137)	0.022 (0.054)	0.096 (0.141)	0.099 (0.141)
Observations	901	901	901	947	947	947	604	604	604	874	874	874
K-P F-Statistic		14.81	7.48		33.91	16.97		32.31	16.79		54.03	27.53
Hansen J P-value			0.08			0.72			0.90			0.12

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All models include lagged skills, as well as individual, household and locality controls.

Table 4.13: Effects of moving for studies on time use

	(1) Sleep	(2) Caring for others	(3) Domestic tasks	(4) Work within household	(5) Work outside household	(6) At school	(7) Studying outside school	(8) Leisure
<i>Ethiopia</i>								
Moved for studies	0.134 (0.599)	-0.348 (0.295)	-0.456 (0.704)	-1.166* (0.692)	-0.166 (0.823)	1.612* (0.839)	1.084** (0.473)	-0.458 (1.065)
Moved for other reason	-0.924*** (0.335)	0.190 (0.353)	-0.858 (0.741)	0.0948 (0.789)	2.933*** (0.813)	-2.397*** (0.497)	-1.197** (0.542)	2.310*** (0.625)
Observations	835	835	835	835	835	835	835	835
K-P F-Statistic	31.47	31.24	31.73	32.10	34.69	34.90	34.33	31.47
<i>India</i>								
Moved for studies	-0.417 (0.284)	0.212 (0.467)	-0.107 (0.426)	-1.614*** (0.529)	-1.983*** (0.535)	1.478** (0.609)	1.370*** (0.360)	1.326 (0.862)
Moved for other reason	0.172 (0.186)	1.940*** (0.416)	0.571 (0.363)	0.0166 (0.462)	1.389*** (0.539)	-2.036*** (0.461)	-0.885*** (0.287)	-0.849 (0.690)
Observations	876	876	876	876	876	876	876	876
K-P F-Statistic	34.85	39.10	34.94	35.80	34.54	41.30	42.60	34.85
<i>Peru</i>								
Moved for studies	-0.600 (0.412)	0.462 (0.517)	-0.0669 (0.291)	-1.364*** (0.391)	-0.730 (0.596)	1.154* (0.636)	0.380 (0.353)	-0.273 (0.468)
Moved for other reason	-1.013** (0.474)	-0.848* (0.449)	-0.464 (0.285)	-0.162 (0.378)	5.127*** (0.867)	-2.195*** (0.537)	-0.0994 (0.373)	-0.334 (0.710)
Observations	584	584	584	584	584	584	584	584
K-P F-Statistic	32.13	32.96	32.04	32.42	31.71	38.06	35.45	32.13
<i>Vietnam</i>								
Moved for studies	0.0684 (0.238)	-0.0345 (0.247)	-0.437** (0.217)	-1.171*** (0.447)	-0.715* (0.369)	1.362*** (0.410)	0.183 (0.321)	0.852* (0.485)
Moved for other reason	-0.385 (0.345)	1.472*** (0.432)	-0.199 (0.372)	-1.674** (0.659)	2.766*** (0.611)	-2.269*** (0.513)	-1.036*** (0.334)	1.494** (0.719)

Observations	787	787	787	787	787	787	787	787
K-P F-Statistic	44.63	46.66	44.72	46.15	50.69	47.07	48.65	44.63

Note: Column (2) includes looking after younger children or ill household members. Column (3) refers to activities such as fetching water, firewood, cleaning, cooking, washing, and shopping. Column (4) refers to activities such as tasks on family farm, cattle herding, other family business, shepherding, piecework or handicrafts done at home. Column (5) refers mainly to paid activities outside the household or for someone not in the household, excluding travelling time. Column (6) refers to time spent at any educational institute excluding travelling time. Column (7) includes time studying at home and doing extra-tuition. Column (8) refers to general leisure including time eating or doing self-hygiene. These results were estimated using lagged Math scores, but conclusions remain the same when lagged Reading, Agency or Pride scores are used.

Meanwhile, Table 4.14 shows that moving for work does not systematically affect any cognitive skill, except for a strong negative impact on Math in India (0.76 standard deviations less than non-migrants). This could be related to the precarity of jobs available for migrants in this country (Deshingkar, 2010), which may translate into relative deskilling of youth. The key message here is that labour migration among young people may increase income in the short run, but may hamper long run income flows due to the loss of human capital.

Regarding psychosocial skills, I find a positive impact on Self-Efficacy in Ethiopia and Peru: this subgroup of migrants have 0.3 and 0.37 higher standard deviations on this score than stayers. It is reasonable to find that moving to earn a living increases an adolescent's sense of mastery over their own life since both migration and entering into the labour force are markers of adulthood (Morrow, 2013).

Looking at the effect of this type of move on the child's time allocation – see Table 4.15 – shows that it leads to more hours working outside the household (between 2.3 and 8.5 hours) and fewer hours at school (between -3.5 and -1.6 hours) and studying outside school (between -1.2 and -0.6 hours) than non-migrants. Then, why does this subgroup do not exhibit the same (negative) effect of migration on skills in all countries? This may actually be in line with the framework outlined in section 4.1 in that the effect of migration on skills is ambiguous as it may lead to improvements in some inputs, but deterioration in others.

Table 4.14: Effects of moving for work on skills: OLS and 2SLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Ethiopia			India			Peru			Vietnam	
	OLS	2SLS	2SLS	OLS	2SLS	2SLS	OLS	2SLS	2SLS	OLS	2SLS	2SLS
<i>Panel A - Dependent variable: Math Score (2013)</i>												
Moved for work	-0.005 (0.100)	0.015 (0.244)	0.014 (0.244)	-0.231*** (0.088)	-0.766*** (0.201)	-0.762*** (0.202)	-0.063 (0.086)	0.047 (0.216)	0.046 (0.216)	-0.086 (0.103)	-0.314 (0.224)	-0.317 (0.225)
Moved for other reason	0.046 (0.064)	0.147 (0.245)	0.146 (0.244)	0.058 (0.049)	-0.241 (0.182)	-0.241 (0.182)	0.077 (0.072)	0.040 (0.158)	0.040 (0.158)	0.074 (0.085)	-0.493*** (0.162)	-0.492*** (0.162)
Observations	835	835	835	876	876	876	584	584	584	827	827	827
R-squared	0.477	0.475	0.475	0.560	0.527	0.527	0.550	0.549	0.549	0.389	0.330	0.330
K-P F-Statistic		23.69	12.34		47.50	25.26		45.41	23.48		35.63	18.15
Hansen J P-value			0.86			0.79			0.68			0.88
<i>Panel B - Dependent variable: Reading Score (2013)</i>												
Moved for work	-0.141 (0.111)	0.122 (0.278)	0.118 (0.279)	-0.191** (0.083)	-0.306 (0.268)	-0.305 (0.269)	-0.187 (0.116)	-0.225 (0.231)	-0.229 (0.232)	-0.303*** (0.102)	-0.300 (0.300)	-0.301 (0.299)
Moved for other reason	0.098 (0.099)	0.313 (0.263)	0.305 (0.261)	0.035 (0.054)	0.369 (0.232)	0.369 (0.231)	0.181** (0.077)	0.466** (0.190)	0.467** (0.190)	0.059 (0.086)	-0.490*** (0.137)	-0.490*** (0.138)
Observations	835	835	835	857	857	857	583	583	583	822	822	822
R-squared	0.343	0.331	0.332	0.410	0.380	0.380	0.449	0.433	0.433	0.251	0.189	0.189
K-P F-Statistic		19.81	9.99		49.43	26.26		52.03	26.70		48.39	25.04
Hansen J P-value			0.58			0.98			0.57			0.98
<i>Panel C - Dependent variable: Agency Score (2013)</i>												
Moved for work	0.032 (0.048)	0.074 (0.114)	0.072 (0.114)	-0.072 (0.062)	-0.058 (0.155)	-0.056 (0.154)	-0.085 (0.079)	0.155 (0.178)	0.158 (0.179)	0.077 (0.058)	0.026 (0.140)	0.028 (0.140)
Moved for other reason	0.103* (0.060)	0.189 (0.168)	0.185 (0.168)	0.037 (0.034)	-0.038 (0.151)	-0.031 (0.151)	-0.072 (0.058)	-0.098 (0.149)	-0.099 (0.148)	0.162*** (0.051)	-0.128 (0.112)	-0.132 (0.113)
Observations	901	901	901	947	947	947	604	604	604	874	874	874
R-squared	0.066	0.062	0.062	0.159	0.155	0.155	0.113	0.099	0.098	0.081	0.034	0.032
K-P F-Statistic		21.66	10.95		39.47	20.35		38.04	19.52		57.63	30.19
Hansen J P-value			0.47			0.77			0.44			0.47

<i>Panel D - Dependent variable: Pride Score (2013)</i>												
Moved for work	-0.108 (0.088)	0.066 (0.347)	0.065 (0.348)	0.214*** (0.068)	0.142 (0.222)	0.144 (0.222)	-0.068 (0.115)	0.277 (0.266)	0.276 (0.267)	0.071 (0.081)	-0.016 (0.181)	-0.016 (0.181)
Moved for other reason	-0.010 (0.056)	-0.098 (0.231)	-0.107 (0.231)	0.051 (0.046)	0.156 (0.164)	0.167 (0.163)	0.047 (0.062)	-0.070 (0.183)	-0.069 (0.183)	0.232*** (0.054)	0.430** (0.188)	0.431** (0.189)
Observations	901	901	901	947	947	947	604	604	604	874	874	874
R-squared	0.107	0.100	0.100	0.113	0.106	0.105	0.070	0.042	0.042	0.070	0.050	0.050
K-P F-Statistic		21.16	10.66		39.82	20.50		36.41	18.73		54.73	28.44
Hansen J P-value			0.35			0.52			0.58			0.91
<i>Panel E - Dependent variable: Self-Efficacy Score (2013)</i>												
Moved for work	-0.049 (0.091)	0.303* (0.170)	0.304* (0.170)	0.007 (0.054)	-0.056 (0.152)	-0.055 (0.153)	0.071 (0.087)	0.369** (0.156)	0.368** (0.156)	0.012 (0.062)	-0.018 (0.133)	-0.016 (0.132)
Moved for other reason	0.111** (0.053)	0.149 (0.141)	0.149 (0.141)	0.066 (0.048)	-0.071 (0.145)	-0.068 (0.148)	0.041 (0.053)	-0.139 (0.110)	-0.139 (0.111)	0.105** (0.041)	0.022 (0.083)	0.017 (0.084)
Observations	901	901	901	946	946	946	604	604	604	874	874	874
R-squared	0.052	0.031	0.031	0.121	0.111	0.111	0.127	0.081	0.081	0.059	0.054	0.054
K-P F-Statistic		21.66	10.95		40.15	20.71		38.04	19.52		57.63	30.19
Hansen J P-value			0.37			0.91			0.91			0.20
<i>Panel F - Dependent variable: Self-Esteem Score (2013)</i>												
Moved for work	0.266*** (0.082)	-0.172 (0.204)	-0.172 (0.204)	-0.007 (0.052)	-0.111 (0.158)	-0.113 (0.158)	0.087 (0.059)	0.248 (0.170)	0.246 (0.171)	0.011 (0.067)	-0.019 (0.165)	-0.016 (0.166)
Moved for other reason	0.066 (0.056)	0.106 (0.191)	0.104 (0.190)	-0.044 (0.039)	-0.025 (0.127)	-0.032 (0.128)	0.108 (0.068)	-0.006 (0.140)	-0.006 (0.140)	0.054 (0.048)	-0.036 (0.114)	-0.041 (0.115)
Observations	901	901	901	947	947	947	604	604	604	874	874	874
R-squared	0.061	0.059	0.059	0.079	0.075	0.076	0.072	0.056	0.056	0.025	0.021	0.020
K-P F-Statistic		21.16	10.66		39.82	20.50		36.41	18.73		54.73	28.44
Hansen J P-value			0.44			0.55			0.91			0.15

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All models include lagged skills, as well as individual, household and locality controls.

Table 4.15: Effects of moving for work on time use

	(1) Sleep	(2) Caring for others	(3) Domestic tasks	(4) Work within household	(5) Work outside household	(6) At school	(7) Studying outside school	(8) Leisure
<i>Ethiopia</i>								
Moved for work	-0.759 (0.736)	0.178 (0.296)	-1.562*** (0.506)	-0.743 (0.707)	6.401*** (1.261)	-3.190*** (0.890)	-1.534*** (0.427)	1.550* (0.837)
Moved for other reason	-0.213 (0.484)	-0.156 (0.335)	0.313 (0.510)	-0.819 (0.816)	-1.063 (0.867)	0.513 (0.577)	0.265 (0.465)	1.283* (0.662)
Observations	835	835	835	835	835	835	835	835
K-P F-Statistic	23.69	23.74	23.55	24.16	23.74	23.54	23.18	23.69
<i>India</i>								
Moved for work	0.558** (0.261)	0.0657 (0.425)	-0.406 (0.410)	-0.921* (0.556)	5.316*** (0.818)	-2.085*** (0.493)	-0.617** (0.271)	-1.558* (0.878)
Moved for other reason	-0.192 (0.212)	1.017** (0.406)	0.153 (0.421)	-0.374 (0.373)	-1.279** (0.548)	-0.0904 (0.493)	0.468 (0.325)	0.551 (0.682)
Observations	876	876	876	876	876	876	876	876
K-P F-Statistic	47.50	47.20	49.02	47.96	45.70	47.76	48.13	47.50
<i>Peru</i>								
Moved for work	-1.029** (0.484)	-1.398** (0.624)	-0.772** (0.363)	-1.658*** (0.462)	8.498*** (1.198)	-3.493*** (0.719)	-1.210*** (0.351)	0.324 (0.730)
Moved for other reason	-0.559 (0.359)	0.0570 (0.383)	-0.0520 (0.301)	-0.256 (0.328)	0.838 (0.663)	-0.378 (0.578)	0.228 (0.371)	-0.523 (0.508)
Observations	584	584	584	584	584	584	584	584
K-P F-Statistic	45.41	45.40	46.13	45.24	46.16	49.10	47.56	45.41
<i>Vietnam</i>								
Moved for work	-0.285 (0.346)	0.528 (0.374)	-0.0392 (0.343)	-0.461 (0.812)	2.298*** (0.610)	-1.633*** (0.528)	-0.702** (0.342)	0.468 (0.965)
Moved for other reason	-0.0149 (0.266)	0.197 (0.236)	-0.505** (0.242)	-1.871** (0.775)	0.320 (0.409)	1.088** (0.484)	0.206 (0.271)	0.697* (0.394)

Observations	787	787	787	787	787	787	787	787
K-P F-Statistic	35.99	35.32	35.91	36.12	38.39	34.36	39.20	35.99

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Column (2) includes looking after younger children or ill household members. Column (3) refers to activities such as fetching water, firewood, cleaning, cooking, washing, and shopping. Column (4) refers to activities such as tasks on family farm, cattle herding, other family business, shepherding, piecework or handicrafts done at home. Column (5) refers mainly to paid activities outside the household or for someone not in the household, excluding travelling time. Column (6) refers to time spent at any educational institute excluding travelling time. Column (7) includes time studying at home and doing extra-tuition. Column (8) refers to general leisure including time eating or doing self-hygiene. These results were estimated using lagged Math scores, but conclusions remain the same when lagged Reading, Agency or Pride scores are used.

Lastly, as expected, Table 4.16 shows that moving for family formation leads to 0.34 and 0.33 standard deviations lower Math scores in comparison to non-migrants in India and Vietnam, respectively. In the latter country, it also leads a negative effect of 0.55 standard deviations on Reading scores. These young people may have stopped investing in the production of cognitive skills compared to non-migrants and, therefore, could be relatively deskilling as a result of this. This is very relevant for policy-making as it speaks to the need of empowering adolescents to avoid early marriage since it may act as a deskilling mechanism. Similar to the case of those that move for work, moving for marriage can also be seen as an income diversification strategy. The question is for how long this would last given the loss of human capital resulting from adolescents moving for the latter reason. Provided that girls are the ones who mainly move for family formation in these countries (as shown in the previous chapter), this strategy could also be questionable on the long run on the basis of intergenerational transmission of poverty: less skilled girls may perform worse as primary caregivers than better skilled ones. Although the mechanisms through which this may operate go beyond the scope of this thesis, it is still worth posing the question to reflect on this strategy from a normative point of view.

Regarding the psychosocial skills, moving for family formation has a negative effect on Agency (-0.26 standard deviations) and a positive effect on Pride (0.39 standard deviations) in India. Identifying the mechanism behind this finding can be challenging, but there may be two potential explanations – which go beyond the scope of this thesis. One relates to the sending household: given that arranged marriages are the norm in this context, moving for family formation may decrease the girls' sense of Agency since they did not fully chose the groom. The other explanation relates to the receiving household: the fact that India has a patrilocal society in which the bride moves with the groom's family may explain the loss of Agency given the new setting in which the girl has to cohabit with her in-laws.

Finally, Table 4.17 shows the effect of moving for family formation on time use. Similar patterns are observed in both countries: this type of move leads to more hours caring for others and fewer hours at school and studying outside school, which may partly explain the effects found.

Table 4.16: Effects of moving for family formation on skills: OLS and 2SLS

	(1)	(2)	(3)	(4)	(5)	(6)
		India			Vietnam	
	OLS	2SLS	2SLS	OLS	2SLS	2SLS
<i>Panel A - Dependent variable: Math Score (2013)</i>						
Moved for family formation	-0.177** (0.069)	-0.348* (0.203)	-0.343* (0.202)	-0.134 (0.088)	-0.331*** (0.119)	-0.332*** (0.119)
Moved for other reason	0.060 (0.060)	-0.291 (0.183)	-0.288 (0.183)	0.053 (0.083)	-0.400*** (0.139)	-0.400*** (0.138)
Observations	876	876	876	827	827	827
K-P F-Statistic		38.30	19.66		74.91	42.08
Hansen J P-value			0.58			0.87
<i>Panel B - Dependent variable: Reading Score (2013)</i>						
Moved for family formation	-0.194** (0.089)	0.152 (0.252)	0.153 (0.253)	-0.459*** (0.113)	-0.550** (0.223)	-0.550** (0.223)
Moved for other reason	0.050 (0.057)	0.200 (0.212)	0.200 (0.212)	0.016 (0.085)	-0.326** (0.161)	-0.326** (0.161)
Observations	857	857	857	822	822	822
K-P F-Statistic		40.38	20.65		75.05	40.61
Hansen J P-value			0.75			0.99
<i>Panel C - Dependent variable: Agency Score (2013)</i>						
Moved for family formation	-0.225*** (0.052)	-0.255 (0.155)	-0.256* (0.155)	0.043 (0.080)	0.091 (0.140)	0.093 (0.140)
Moved for other reason	0.098*** (0.037)	-0.044 (0.120)	-0.040 (0.120)	0.152*** (0.044)	-0.077 (0.100)	-0.075 (0.100)
Observations	947	947	947	874	874	874
K-P F-Statistic		37.57	19.36		62.73	33.99
Hansen J P-value			0.60			0.62
<i>Panel D - Dependent variable: Pride Score (2013)</i>						
Moved for family formation	0.178*** (0.068)	0.389** (0.182)	0.388** (0.182)	0.066 (0.097)	0.210 (0.191)	0.210 (0.191)
Moved for other reason	0.052 (0.046)	0.031 (0.168)	0.035 (0.168)	0.205*** (0.054)	0.330** (0.153)	0.330** (0.153)
Observations	947	947	947	874	874	874
K-P F-Statistic		37.81	19.50		62.96	34.11
Hansen J P-value			0.58			0.98
<i>Panel E - Dependent variable: Self-Efficacy Score (2013)</i>						
Moved for family formation	-0.038 (0.067)	0.172 (0.158)	0.172 (0.157)	0.072 (0.074)	-0.095 (0.129)	-0.091 (0.130)
Moved for other reason	0.086* (0.048)	0.051 (0.144)	0.051 (0.145)	0.081* (0.042)	0.010 (0.080)	0.014 (0.080)
Observations	946	946	946	874	874	874
K-P F-Statistic		37.84	19.46		62.73	33.99
Hansen J P-value			0.96			0.17

<i>Panel F - Dependent variable: Self-Esteem Score (2013)</i>						
Moved for family formation	-0.049 (0.053)	-0.093 (0.168)	-0.093 (0.168)	0.056 (0.089)	0.022 (0.162)	0.027 (0.162)
Moved for other reason	-0.032 (0.039)	-0.012 (0.134)	-0.016 (0.134)	0.040 (0.050)	-0.078 (0.089)	-0.075 (0.089)
Observations	947	947	947	874	874	874
R-squared	0.079	0.078	0.078	0.025	0.016	0.016
K-P F-Statistic		37.81	19.50		62.96	34.11
Hansen J P-value			0.56			0.16

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4.17: Effects of moving for family formation on time use

	(1) Sleep	(2) Caring for others	(3) Domestic tasks	(4) Work within household	(5) Work outside household	(6) At school	(7) Studying outside school	(8) Leisure
<i>India</i>								
Moved for family formation	-0.0953 (0.259)	3.030*** (0.525)	2.020*** (0.472)	0.569 (0.475)	-1.922*** (0.606)	-2.137*** (0.506)	-0.878*** (0.290)	-0.0269 (0.849)
Moved for other reason	-0.00666 (0.244)	0.542 (0.359)	-0.0964 (0.336)	-0.769* (0.415)	0.179 (0.405)	-0.522 (0.437)	0.539** (0.242)	0.534 (0.658)
Observations	876	876	876	876	876	876	876	876
K-P F-Statistic	40.15	40.36	40.91	40.86	40.42	39.60	39.74	40.15
<i>Vietnam</i>								
Moved for family formation	-0.993*** (0.346)	2.747*** (0.510)	0.523 (0.342)	-1.239** (0.497)	0.139 (0.589)	-1.930*** (0.342)	-0.786*** (0.202)	1.672** (0.769)
Moved for other reason	-0.0946 (0.225)	0.0577 (0.186)	-0.453*** (0.163)	-1.116*** (0.296)	0.389 (0.314)	0.543* (0.282)	-0.144 (0.178)	0.982** (0.455)
Observations	787	787	787	787	787	787	787	787
K-P F-Statistic	126.0	125.6	125.9	130.6	126.0	130.2	126.4	126.0

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Column (2) includes looking after younger children or ill household members. Column (3) refers to activities such as fetching water, firewood, cleaning, cooking, washing, and shopping. Column (4) refers to activities such as tasks on family farm, cattle herding, other family business, shepherding, piecework or handicrafts done at home. Column (5) refers mainly to paid activities outside the household or for someone not in the household, excluding travelling time. Column (6) refers to time spent at any educational institute excluding travelling time. Column (7) includes time studying at home and doing extra-tuition. Column (8) refers to general leisure including time eating or doing self-hygiene. These results were estimated using lagged Math scores, but conclusions remain the same when lagged Reading, Agency or Pride scores are used.

Table 4.18 compares p-values and q-values as calculated in section 4.5.1. The effects of moving for studies that are statistically significant *and* robust to multiple hypotheses testing are those obtained on Reading in Peru and Vietnam. Similarly, the effects of moving for work and moving for family formation that remain statistically significant are those on Math in India and Vietnam, respectively. As it was noted in the previous section, this suggests that we should take the results presented in this paper with caution.

Table 4.18: P-Values and Q-Values of Reasons for Moving to adjust for Multiple Hypotheses Testing

Outcome	Ethiopia			India			Peru			Vietnam		
	Estimate	P-Value	Q-Value									
<i>Parameter of interest: Moving for studies</i>												
Math	0.3710	0.18	1.00	-0.0064	0.970	1.00	0.2245	0.16	0.80	-0.3335	0.046	0.25
Reading	0.5491	0.05	0.75	0.5071	0.040	0.49	0.6295	0.00	0.05	-0.5128	0.003	0.04
Agency	-0.1400	0.53	1.00	0.0620	0.700	1.00	-0.2358	0.12	0.80	-0.0850	0.480	1.00
Pride	-0.3162	0.39	1.00	0.0712	0.730	1.00	-0.2129	0.30	0.88	0.3666	0.050	0.25
Self-Efficacy	0.0775	0.65	1.00	0.3201	0.067	0.49	-0.1524	0.27	0.88	0.0871	0.280	0.83
Self-Esteem	-0.0773	0.78	1.00	0.2149	0.190	0.92	-0.0863	0.59	1.00	-0.1472	0.180	0.66
<i>Parameter of interest: Moving for work</i>												
Math	0.0152	0.95	1.00	-0.7659	0.00	0.00	0.0472	0.83	1.00	-0.3145	0.16	1.00
Reading	0.122	0.66	1.00	-0.3058	0.25	1.00	-0.2249	0.33	1.00	-0.3001	0.32	1.00
Agency	0.0736	0.52	1.00	-0.0582	0.71	1.00	0.1547	0.39	1.00	0.0259	0.85	1.00
Pride	0.0659	0.85	1.00	0.1417	0.52	1.00	0.2769	0.30	1.00	-0.0155	0.93	1.00
Self-Efficacy	0.3027	0.075	1.00	-0.0565	0.71	1.00	0.3688	0.018	0.27	-0.0178	0.89	1.00
Self-Esteem	-0.1724	0.40	1.00	-0.1111	0.48	1.00	0.2476	0.14	1.00	-0.0189	0.91	1.00
<i>Parameter of interest: Moving for family formation</i>												
Math				-0.3475	0.088	0.49				-0.3314	0.005	0.08
Reading				0.1516	0.55	1.00				-0.55	0.01	0.10
Agency				-0.2551	0.1	0.49				0.0907	0.52	1.00
Pride				0.3892	0.033	0.48				0.2101	0.27	1.00
Self-Efficacy				0.172	0.28	1.00				-0.0955	0.46	1.00
Self-Esteem				-0.0932	0.58	1.00				0.022	0.89	1.00

The columns under P-Value and Q-Value were calculated using the Benjamini-Yekutieli method as explained in section 4.5.2.

4.6 Discussion

This paper aims to identify the impact of migration on adolescents' cognitive and psychosocial skills. Although I find evidence of selection on cognitive skills, migration has mixed effects on Math and Reading. Conversely, I find that there is no selection on psychosocial skills, but I find positive effects of migration on Agency and Pride in Ethiopia and Vietnam, respectively.

The results of the effects of migration on average, however, do not provide an accurate picture of these young people. When migrants are disaggregated by their reasons for moving, clearer patterns emerge: those that move for studies have higher cognitive skills (except for Vietnam, where these effects are negative) and higher psychosocial skills (in India and Vietnam) than non-migrants do.⁴⁵ On the contrary, those that moved for family formation show negative effects in cognitive skills. In the middle, there are those that moved for work, for whom the evidence is mixed.

In order to explain these results, I examined the impact of migration on the adolescent's time allocation and found a consistent story between the reasons for moving and the time use: those that move for studies spend more time at school, those that move for work spend more time working outside the household, and those that move for family formation spend more time caring for others than non-migrants do. Nevertheless, this still cannot fully explain the variety of results obtained. This suggests that there may be other unobserved inputs that get triggered by migration and that affect the level of skills. This is consistent with the conceptual framework outlined in section 3, according to which migration affects skills mainly by altering the level and productivity of investments. However, the size and direction of these effects remain ambiguous as some inputs may increase, but others may decrease as a result of migration. The results obtained also suggest that there may be different technologies of cognitive and psychosocial skills as the patterns they follow, both in terms of selection and impact, diverge.

⁴⁵ It must be noted that the results for Vietnam remain a puzzle: young migrants do worse in cognitive skills than non-migrants, but they are more proud as a result of migration.

As mentioned before, the limitations of this study are mainly related to the use of instrumental variables. First, the empirical strategy only allows us to estimate the impact of migration among compliers – namely, those that choose to move (or stay) as a result of weather variation. Therefore, the always-takers – those who would migrate irrespective of the presence (or absence) of a shock – and the never-takers – those who would not migrate anyway – are excluded from the analysis.⁴⁶ Second, and perhaps more importantly, results can be susceptible to biases if the exclusion restriction is violated, which is difficult to test without major assumptions.

4.7 Conclusions

Migration does have an impact on skills, although these effects are heterogeneous across subgroups of migrants since the reasons for their move shape the impact of migration. This is an important insight of this article since migration *alone* should not be encouraged among young people, but it should be accompanied with the key message that it is what one chooses to do *after* moving what shapes ultimately the impact of migration. This implies that reducing the cost of migration among young people (for example, with subsidies) may not necessarily result in human capital formation. Still, understanding the mechanisms through which migration operates represents fruitful avenues for further research.

⁴⁶ This would hold under the assumption of monotonicity.

APPENDIX

Table A.4.1: Effect of weather shocks on moving for studies in Ethiopia

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Moved for Studies				Dependent Variable: Moved for Other Reason			
Math Score (2009)	0.377*** (0.064)				-0.121*** (0.043)			
Reading Score (2009)		0.354*** (0.079)				-0.065 (0.041)		
Agency Score (2009)			0.033 (0.130)				0.042 (0.106)	
Pride Score (2009)				0.127* (0.074)				-0.159** (0.080)
Rainfall shock in 1st half of year 14 after birth	0.002 (0.003)	0.001 (0.003)	-0.000 (0.003)	-0.000 (0.003)	0.004** (0.002)	0.004** (0.002)	0.005** (0.002)	0.005** (0.002)
Rainfall shock in 1st half of year 14 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 14 after birth	-0.006 (0.005)	-0.007 (0.005)	-0.007* (0.004)	-0.007* (0.004)	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)
Rainfall shock in 2nd half of year 14 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 15 after birth	0.004 (0.004)	0.003 (0.004)	0.002 (0.004)	0.002 (0.004)	0.004 (0.004)	0.004 (0.004)	0.005 (0.004)	0.005 (0.004)
Rainfall shock in 1st half of year 15 after birth ^2	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000* (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000*** (0.000)
Rainfall shock in 2nd half of year 15 after birth	0.000 (0.006)	-0.001 (0.006)	-0.002 (0.006)	-0.002 (0.006)	-0.006 (0.004)	-0.006 (0.004)	-0.004 (0.004)	-0.004 (0.004)
Rainfall shock in 2nd half of year 15 after birth ^2	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 16 after birth	-0.005 (0.006)	-0.006 (0.006)	-0.006 (0.005)	-0.006 (0.005)	-0.006 (0.004)	-0.004 (0.005)	-0.002 (0.004)	-0.002 (0.004)
Rainfall shock in 1st half of year 16 after birth ^2	-0.000 (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000* (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Rainfall shock in 2nd half of year 16 after birth	0.001 (0.007)	0.001 (0.007)	-0.000 (0.007)	-0.001 (0.007)	-0.007 (0.005)	-0.005 (0.005)	-0.005 (0.004)	-0.005 (0.004)

Rainfall shock in 2nd half of year 16 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	-0.005 (0.007)	-0.005 (0.007)	-0.005 (0.007)	-0.005 (0.007)	-0.000 (0.006)	0.002 (0.007)	-0.001 (0.006)	-0.001 (0.006)
Rainfall shock in 1st half of year 17 after birth ^2	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)
Rainfall shock in 2nd half of year 17 after birth	-0.001 (0.008)	-0.003 (0.008)	-0.001 (0.007)	-0.001 (0.007)	0.000 (0.006)	0.003 (0.007)	0.000 (0.006)	0.001 (0.006)
Rainfall shock in 2nd half of year 17 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 18 after birth	0.000 (0.004)	0.000 (0.004)	-0.001 (0.004)	-0.001 (0.005)	-0.003 (0.005)	-0.002 (0.005)	-0.004 (0.005)	-0.004 (0.004)
Rainfall shock in 1st half of year 18 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 18 after birth	0.007* (0.004)	0.007* (0.004)	0.004 (0.004)	0.004 (0.004)	-0.005 (0.004)	-0.006 (0.005)	-0.007 (0.005)	-0.007 (0.005)
Rainfall shock in 2nd half of year 18 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 19 after birth	0.000 (0.004)	0.001 (0.004)	0.000 (0.004)	0.001 (0.004)	-0.004 (0.004)	-0.007 (0.005)	-0.009** (0.005)	-0.009* (0.005)
Rainfall shock in 1st half of year 19 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 19 after birth	-0.010*** (0.004)	-0.012*** (0.004)	-0.008** (0.004)	-0.008** (0.004)	-0.002 (0.002)	-0.001 (0.002)	-0.002 (0.002)	-0.002 (0.002)
Rainfall shock in 2nd half of year 19 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Temperature shock in 1st half of year 14 after birth	0.464** (0.191)	0.415** (0.172)	0.445*** (0.171)	0.436** (0.171)	-0.146 (0.166)	-0.108 (0.166)	-0.122 (0.160)	-0.111 (0.159)
Temperature shock in 1st half of year 14 after birth ^2	0.025 (0.025)	0.018 (0.025)	0.023 (0.023)	0.022 (0.023)	-0.004 (0.028)	0.010 (0.025)	-0.001 (0.026)	-0.000 (0.025)

Temperature shock in 2nd half of year 14 after birth	0.303 (0.212)	0.268 (0.193)	0.211 (0.204)	0.203 (0.203)	-0.184 (0.185)	-0.162 (0.183)	-0.184 (0.171)	-0.179 (0.171)
Temperature shock in 2nd half of year 14 after birth ^2	-0.029 (0.065)	-0.006 (0.062)	-0.019 (0.065)	-0.021 (0.065)	0.083 (0.053)	0.049 (0.048)	0.018 (0.046)	0.023 (0.046)
Temperature shock in 1st half of year 15 after birth	0.055 (0.203)	0.039 (0.196)	-0.113 (0.165)	-0.139 (0.163)	0.401*** (0.155)	0.311* (0.161)	0.360*** (0.119)	0.385*** (0.123)
Temperature shock in 1st half of year 15 after birth ^2	0.013 (0.074)	0.020 (0.078)	-0.053 (0.072)	-0.059 (0.072)	-0.042 (0.059)	-0.041 (0.059)	-0.040 (0.054)	-0.035 (0.054)
Temperature shock in 2nd half of year 15 after birth	0.162 (0.265)	0.221 (0.255)	0.105 (0.239)	0.102 (0.238)	-0.171 (0.178)	-0.140 (0.174)	-0.130 (0.150)	-0.130 (0.150)
Temperature shock in 2nd half of year 15 after birth ^2	-0.065 (0.081)	-0.051 (0.085)	-0.080 (0.076)	-0.088 (0.075)	-0.050 (0.065)	-0.058 (0.067)	-0.070 (0.061)	-0.068 (0.061)
Temperature shock in 1st half of year 16 after birth	-0.428** (0.192)	-0.354* (0.183)	-0.360* (0.185)	-0.355* (0.186)	-0.105 (0.124)	-0.055 (0.118)	-0.123 (0.114)	-0.143 (0.114)
Temperature shock in 1st half of year 16 after birth ^2	-0.027 (0.037)	-0.014 (0.034)	-0.028 (0.035)	-0.028 (0.035)	0.011 (0.034)	-0.006 (0.034)	0.002 (0.031)	0.000 (0.031)
Temperature shock in 2nd half of year 16 after birth	-0.204 (0.172)	-0.207 (0.167)	-0.142 (0.158)	-0.139 (0.158)	0.176 (0.128)	0.228* (0.134)	0.186 (0.117)	0.179 (0.118)
Temperature shock in 2nd half of year 16 after birth ^2	-0.011 (0.042)	-0.002 (0.043)	-0.004 (0.040)	-0.011 (0.041)	-0.039 (0.026)	-0.040 (0.025)	-0.042* (0.023)	-0.039 (0.024)
Temperature shock in 1st half of year 17 after birth	-0.047 (0.112)	-0.059 (0.106)	-0.054 (0.111)	-0.045 (0.111)	0.099 (0.106)	0.048 (0.099)	0.101 (0.098)	0.089 (0.095)
Temperature shock in 1st half of year 17 after birth ^2	-0.020 (0.035)	-0.025 (0.034)	-0.010 (0.033)	-0.012 (0.033)	0.002 (0.032)	0.003 (0.030)	-0.002 (0.032)	-0.002 (0.031)
Temperature shock in 2nd half of year 17 after birth	-0.279*** (0.093)	-0.290*** (0.090)	-0.258*** (0.075)	-0.249*** (0.075)	0.037 (0.089)	0.059 (0.091)	0.092 (0.086)	0.088 (0.086)
Temperature shock in 2nd half of year 17 after birth ^2	0.036 (0.034)	0.034 (0.036)	0.038 (0.029)	0.038 (0.028)	0.010 (0.029)	0.012 (0.030)	0.002 (0.027)	0.003 (0.026)
Temperature shock in 1st half of year 18 after birth	-0.012 (0.199)	-0.098 (0.205)	0.020 (0.185)	0.011 (0.185)	-0.031 (0.177)	0.096 (0.167)	0.089 (0.142)	0.094 (0.139)

Temperature shock in 1st half of year 18 after birth ^2	-0.064 (0.053)	-0.037 (0.049)	-0.043 (0.052)	-0.045 (0.052)	0.033 (0.045)	0.031 (0.048)	0.047 (0.043)	0.048 (0.042)
Temperature shock in 2nd half of year 18 after birth	0.472** (0.216)	0.419** (0.196)	0.463** (0.201)	0.458** (0.201)	-0.015 (0.205)	0.020 (0.191)	0.039 (0.185)	0.053 (0.182)
Temperature shock in 2nd half of year 18 after birth ^2	-0.019 (0.056)	-0.012 (0.059)	-0.023 (0.054)	-0.027 (0.053)	-0.095* (0.055)	-0.117** (0.057)	-0.102** (0.050)	-0.106** (0.050)
Temperature shock in 1st half of year 19 after birth	-0.292 (0.206)	-0.270 (0.227)	-0.224 (0.196)	-0.223 (0.203)	0.343** (0.161)	0.221 (0.161)	0.220 (0.153)	0.221 (0.151)
Temperature shock in 1st half of year 19 after birth ^2	0.014 (0.061)	0.013 (0.062)	0.053 (0.054)	0.060 (0.053)	0.042 (0.048)	0.031 (0.047)	0.022 (0.050)	0.015 (0.049)
Temperature shock in 2nd half of year 19 after birth	-0.470* (0.265)	-0.439* (0.247)	-0.415* (0.224)	-0.397* (0.221)	0.225 (0.152)	0.199 (0.158)	0.175 (0.141)	0.173 (0.143)
Temperature shock in 2nd half of year 19 after birth ^2	-0.005 (0.087)	0.008 (0.086)	0.022 (0.078)	0.025 (0.075)	0.054 (0.067)	0.059 (0.067)	0.061 (0.064)	0.058 (0.064)
Constant	-25.730** (11.404)	-29.595** (11.488)	-19.969** (9.284)	-19.210** (9.107)	7.634 (9.525)	10.871 (9.472)	9.161 (8.216)	8.155 (7.897)
Observations	835	835	901	901	835	835	901	901
R-squared	0.25	0.24	0.20	0.20	0.15	0.14	0.14	0.15

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

Table A.4.2: Effect of weather shocks on moving for studies in India

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Moved for Studies				Dependent Variable: Moved for Other Reason			
Math Score (2009)	0.537*** (0.055)				-0.303*** (0.062)			
Reading Score (2009)		0.507*** (0.058)				-0.242*** (0.051)		
Agency Score (2009)			0.440*** (0.093)				-0.223** (0.096)	
Pride Score (2009)				0.010 (0.085)				-0.142** (0.063)
Rainfall shock in 1st half of year 14 after birth	0.000 (0.002)	0.000 (0.002)	-0.000 (0.002)	-0.000 (0.002)	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)
Rainfall shock in 1st half of year 14 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 14 after birth	-0.000 (0.002)	-0.001 (0.002)	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Rainfall shock in 2nd half of year 14 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 15 after birth	-0.002 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	0.002** (0.001)	0.003** (0.001)	0.002** (0.001)	0.003** (0.001)
Rainfall shock in 1st half of year 15 after birth ^2	0.000** (0.000)	0.000* (0.000)	0.000** (0.000)	0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 15 after birth	0.000 (0.002)	0.001 (0.002)	0.001 (0.002)	0.000 (0.002)	0.003 (0.002)	0.002 (0.002)	0.003 (0.002)	0.003* (0.002)
Rainfall shock in 2nd half of year 15 after birth ^2	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000* (0.000)
Rainfall shock in 1st half of year 16 after birth	-0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.003*** (0.001)	0.003** (0.001)	0.003** (0.001)	0.003*** (0.001)

Rainfall shock in 1st half of year 16 after birth ^2	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 16 after birth	-0.001 (0.001)	-0.002 (0.001)	-0.001 (0.001)	-0.002 (0.001)	0.003** (0.001)	0.003** (0.001)	0.002* (0.001)	0.002* (0.001)
Rainfall shock in 2nd half of year 16 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	-0.000 (0.002)	0.000 (0.002)	0.001 (0.002)	0.001 (0.002)	-0.000 (0.002)	0.001 (0.002)	-0.000 (0.002)	-0.000 (0.002)
Rainfall shock in 1st half of year 17 after birth ^2	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000* (0.000)
Rainfall shock in 2nd half of year 17 after birth	-0.004** (0.002)	-0.003* (0.002)	-0.003* (0.002)	-0.003* (0.002)	0.001 (0.002)	0.002 (0.002)	0.000 (0.002)	0.000 (0.002)
Rainfall shock in 2nd half of year 17 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 18 after birth	0.003* (0.002)	0.003 (0.002)	0.003* (0.002)	0.003* (0.001)	0.001 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)
Rainfall shock in 1st half of year 18 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.000* (0.000)	0.000** (0.000)	0.000** (0.000)
Rainfall shock in 2nd half of year 18 after birth	0.000 (0.002)	-0.001 (0.002)	-0.000 (0.002)	-0.000 (0.001)	-0.005*** (0.002)	-0.005*** (0.002)	-0.005*** (0.001)	-0.005*** (0.002)
Rainfall shock in 2nd half of year 18 after birth ^2	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 19 after birth	0.002 (0.001)	0.002* (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 1st half of year 19 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 19 after birth	-0.003* (0.002)	-0.003 (0.002)	-0.004** (0.002)	-0.003** (0.002)	0.002 (0.002)	0.004** (0.002)	0.003* (0.001)	0.002* (0.001)
Rainfall shock in 2nd half of year 19 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)

Temperature shock in 1st half of year 14 after birth	0.001 (0.105)	-0.005 (0.114)	-0.041 (0.103)	-0.033 (0.100)	-0.199* (0.103)	-0.284*** (0.107)	-0.214** (0.095)	-0.219** (0.094)
Temperature shock in 1st half of year 14 after birth ^2	0.015 (0.026)	0.012 (0.028)	0.003 (0.026)	0.008 (0.025)	-0.019 (0.023)	-0.027 (0.023)	-0.019 (0.022)	-0.022 (0.022)
Temperature shock in 2nd half of year 14 after birth	0.010 (0.083)	0.025 (0.085)	0.031 (0.080)	0.056 (0.078)	0.018 (0.063)	0.014 (0.065)	0.002 (0.058)	-0.002 (0.057)
Temperature shock in 2nd half of year 14 after birth ^2	0.006 (0.018)	0.017 (0.017)	0.010 (0.016)	0.011 (0.015)	-0.007 (0.016)	-0.022 (0.017)	-0.008 (0.016)	-0.007 (0.016)
Temperature shock in 1st half of year 15 after birth	-0.221** (0.110)	-0.180 (0.113)	-0.184* (0.099)	-0.179* (0.093)	0.099 (0.103)	0.121 (0.104)	0.127 (0.090)	0.129 (0.087)
Temperature shock in 1st half of year 15 after birth ^2	-0.003 (0.022)	0.009 (0.025)	0.004 (0.019)	0.003 (0.019)	0.046** (0.021)	0.048** (0.022)	0.042** (0.020)	0.041** (0.020)
Temperature shock in 2nd half of year 15 after birth	-0.083 (0.097)	-0.020 (0.101)	-0.010 (0.086)	-0.016 (0.082)	0.158* (0.095)	0.152 (0.095)	0.142* (0.085)	0.158* (0.085)
Temperature shock in 2nd half of year 15 after birth ^2	0.026 (0.025)	0.020 (0.026)	0.019 (0.024)	0.016 (0.024)	0.006 (0.024)	0.002 (0.024)	-0.003 (0.021)	-0.001 (0.021)
Temperature shock in 1st half of year 16 after birth	0.054 (0.104)	0.005 (0.104)	0.032 (0.099)	0.008 (0.097)	-0.217** (0.100)	-0.251** (0.106)	-0.181* (0.106)	-0.175* (0.104)
Temperature shock in 1st half of year 16 after birth ^2	0.064* (0.038)	0.054 (0.036)	0.045 (0.035)	0.053 (0.035)	-0.045 (0.031)	-0.053* (0.032)	-0.045 (0.030)	-0.048 (0.030)
Temperature shock in 2nd half of year 16 after birth	0.126 (0.084)	0.167** (0.083)	0.104 (0.081)	0.119 (0.078)	-0.123* (0.068)	-0.155** (0.070)	-0.140** (0.067)	-0.154** (0.065)
Temperature shock in 2nd half of year 16 after birth ^2	0.030 (0.028)	0.022 (0.030)	0.026 (0.029)	0.032 (0.028)	-0.044** (0.022)	-0.046** (0.022)	-0.038* (0.021)	-0.036* (0.021)
Temperature shock in 1st half of year 17 after birth	-0.049 (0.098)	-0.042 (0.106)	-0.035 (0.091)	-0.011 (0.089)	-0.031 (0.085)	-0.004 (0.084)	-0.016 (0.076)	-0.016 (0.078)
Temperature shock in 1st half of year 17 after birth ^2	-0.034 (0.022)	-0.036 (0.024)	-0.033 (0.020)	-0.032* (0.020)	0.028 (0.019)	0.032* (0.019)	0.030 (0.018)	0.031 (0.019)
Temperature shock in 2nd half of year 17 after birth	0.007 (0.082)	0.009 (0.085)	-0.041 (0.075)	-0.023 (0.075)	-0.043 (0.061)	-0.027 (0.065)	-0.031 (0.059)	-0.040 (0.058)

Temperature shock in 2nd half of year 17 after birth ^2	-0.019 (0.014)	-0.023 (0.015)	-0.014 (0.013)	-0.020 (0.013)	0.013 (0.015)	0.025 (0.015)	0.019 (0.014)	0.022* (0.014)
Temperature shock in 1st half of year 18 after birth	0.262** (0.108)	0.227** (0.113)	0.193** (0.090)	0.182** (0.087)	0.102 (0.102)	0.088 (0.103)	0.068 (0.089)	0.067 (0.088)
Temperature shock in 1st half of year 18 after birth ^2	-0.017 (0.018)	-0.026 (0.018)	-0.008 (0.015)	-0.008 (0.015)	-0.024 (0.020)	-0.016 (0.022)	-0.022 (0.020)	-0.022 (0.019)
Temperature shock in 2nd half of year 18 after birth	0.157 (0.102)	0.108 (0.108)	0.090 (0.105)	0.056 (0.101)	-0.138 (0.109)	-0.200* (0.118)	-0.102 (0.111)	-0.096 (0.109)
Temperature shock in 2nd half of year 18 after birth ^2	-0.012 (0.021)	-0.013 (0.024)	0.003 (0.020)	-0.000 (0.020)	0.043* (0.023)	0.052** (0.024)	0.036 (0.024)	0.035 (0.023)
Temperature shock in 1st half of year 19 after birth	0.057 (0.087)	0.095 (0.087)	0.043 (0.079)	0.055 (0.079)	0.023 (0.086)	0.004 (0.084)	0.036 (0.081)	0.037 (0.083)
Temperature shock in 1st half of year 19 after birth ^2	-0.013 (0.016)	-0.012 (0.015)	-0.007 (0.014)	-0.011 (0.013)	0.022 (0.016)	0.025 (0.016)	0.017 (0.015)	0.019 (0.016)
Temperature shock in 2nd half of year 19 after birth	-0.112 (0.081)	-0.138 (0.084)	-0.130* (0.074)	-0.130* (0.072)	0.032 (0.081)	0.074 (0.085)	0.061 (0.081)	0.061 (0.082)
Temperature shock in 2nd half of year 19 after birth ^2	0.017 (0.014)	0.015 (0.015)	0.012 (0.013)	0.011 (0.013)	-0.008 (0.014)	-0.008 (0.015)	-0.012 (0.014)	-0.011 (0.014)
Constant	7.892 (7.790)	6.426 (7.780)	6.652 (7.143)	5.952 (6.934)	-8.656 (6.332)	-7.448 (6.289)	-9.288 (5.838)	-9.387 (5.879)
Observations	876	857	947	947	876	857	947	947
R-squared	0.25	0.25	0.20	0.18	0.18	0.18	0.17	0.17

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

Table A.4.3: Effect of weather shocks on moving for studies in Peru

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Moved for Studies				Dependent Variable: Moved for Other Reason			
Math Score (2009)	0.171*				-0.261***			
	(0.095)				(0.084)			
Reading Score (2009)		0.038				-0.260***		
		(0.102)				(0.081)		
Agency Score (2009)			0.341**				-0.217*	
			(0.157)				(0.130)	
Pride Score (2009)				0.181*				-0.003
				(0.101)				(0.098)
Rainfall shock in 1st half of year 14 after birth	-0.006**	-0.005**	-0.007***	-0.006***	-0.005**	-0.004**	-0.004*	-0.004*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Rainfall shock in 1st half of year 14 after birth ^2	-0.000	-0.000	-0.000	-0.000	0.000*	0.000*	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 2nd half of year 14 after birth	-0.007**	-0.007**	-0.007**	-0.007**	-0.007***	-0.006***	-0.007***	-0.007***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Rainfall shock in 2nd half of year 14 after birth ^2	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 1st half of year 15 after birth	-0.007**	-0.007**	-0.008**	-0.007**	-0.005**	-0.004	-0.004*	-0.005*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Rainfall shock in 1st half of year 15 after birth ^2	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 2nd half of year 15 after birth	-0.003	-0.003	-0.004	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Rainfall shock in 2nd half of year 15 after birth ^2	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 1st half of year 16 after birth	-0.005	-0.005	-0.007*	-0.007*	0.003	0.003	0.004*	0.004*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)

Rainfall shock in 1st half of year 16 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 16 after birth	-0.001 (0.003)	-0.001 (0.003)	-0.002 (0.003)	-0.002 (0.003)	0.002 (0.002)	0.003 (0.002)	0.003 (0.002)	0.003 (0.002)
Rainfall shock in 2nd half of year 16 after birth ^2	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	-0.006** (0.003)	-0.006** (0.003)	-0.005* (0.003)	-0.004 (0.003)	0.001 (0.003)	0.000 (0.003)	0.002 (0.003)	0.001 (0.003)
Rainfall shock in 1st half of year 17 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 17 after birth	-0.004 (0.003)	-0.004 (0.003)	-0.004* (0.002)	-0.004 (0.003)	-0.001 (0.002)	-0.001 (0.002)	0.000 (0.002)	-0.000 (0.002)
Rainfall shock in 2nd half of year 17 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000* (0.000)
Rainfall shock in 1st half of year 18 after birth	-0.008** (0.004)	-0.008** (0.004)	-0.006* (0.004)	-0.006* (0.004)	-0.002 (0.002)	-0.002 (0.002)	-0.001 (0.002)	-0.001 (0.002)
Rainfall shock in 1st half of year 18 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 18 after birth	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.002 (0.002)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)
Rainfall shock in 2nd half of year 18 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 19 after birth	0.000 (0.002)	0.000 (0.002)	0.001 (0.002)	0.000 (0.002)	-0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Rainfall shock in 1st half of year 19 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000* (0.000)
Rainfall shock in 2nd half of year 19 after birth	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.003** (0.002)	-0.003** (0.002)
Rainfall shock in 2nd half of year 19 after birth ^2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000** (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)

Temperature shock in 1st half of year 14 after birth	-0.059 (0.046)	-0.055 (0.047)	-0.056 (0.047)	-0.052 (0.048)	0.014 (0.040)	0.008 (0.041)	0.014 (0.042)	0.015 (0.040)
Temperature shock in 1st half of year 14 after birth ^2	0.003 (0.005)	0.003 (0.005)	0.002 (0.005)	0.001 (0.005)	-0.006 (0.005)	-0.005 (0.005)	-0.003 (0.005)	-0.003 (0.004)
Temperature shock in 2nd half of year 14 after birth	-0.080 (0.054)	-0.080 (0.055)	-0.080 (0.054)	-0.093* (0.055)	-0.033 (0.042)	-0.018 (0.042)	-0.017 (0.043)	-0.013 (0.043)
Temperature shock in 2nd half of year 14 after birth ^2	-0.007 (0.007)	-0.006 (0.007)	-0.005 (0.007)	-0.004 (0.007)	0.007 (0.005)	0.006 (0.005)	0.005 (0.005)	0.005 (0.005)
Temperature shock in 1st half of year 15 after birth	0.036 (0.070)	0.037 (0.071)	0.044 (0.073)	0.048 (0.072)	0.059 (0.049)	0.042 (0.049)	0.043 (0.048)	0.046 (0.049)
Temperature shock in 1st half of year 15 after birth ^2	0.010 (0.008)	0.010 (0.008)	0.008 (0.008)	0.007 (0.008)	-0.002 (0.005)	-0.004 (0.005)	-0.003 (0.005)	-0.003 (0.005)
Temperature shock in 2nd half of year 15 after birth	-0.134* (0.070)	-0.128* (0.070)	-0.106 (0.073)	-0.108 (0.071)	-0.108 (0.073)	-0.091 (0.071)	-0.129 (0.085)	-0.130 (0.084)
Temperature shock in 2nd half of year 15 after birth ^2	-0.026 (0.017)	-0.027 (0.017)	-0.025 (0.018)	-0.025 (0.019)	-0.011 (0.014)	-0.010 (0.013)	-0.014 (0.014)	-0.015 (0.014)
Temperature shock in 1st half of year 16 after birth	0.038 (0.068)	0.030 (0.068)	0.020 (0.070)	0.017 (0.072)	0.073 (0.063)	0.055 (0.062)	0.075 (0.063)	0.077 (0.064)
Temperature shock in 1st half of year 16 after birth ^2	0.020 (0.013)	0.023* (0.013)	0.018 (0.012)	0.021* (0.013)	0.014 (0.010)	0.012 (0.010)	0.013 (0.010)	0.012 (0.010)
Temperature shock in 2nd half of year 16 after birth	-0.106** (0.043)	-0.104** (0.042)	-0.099** (0.042)	-0.104** (0.043)	-0.141*** (0.046)	-0.136*** (0.047)	-0.139*** (0.047)	-0.137*** (0.047)
Temperature shock in 2nd half of year 16 after birth ^2	-0.011* (0.007)	-0.012* (0.006)	-0.011 (0.007)	-0.010 (0.007)	-0.024*** (0.007)	-0.023*** (0.007)	-0.024*** (0.007)	-0.025*** (0.006)
Temperature shock in 1st half of year 17 after birth	-0.050 (0.051)	-0.055 (0.050)	-0.048 (0.050)	-0.048 (0.051)	0.021 (0.053)	0.031 (0.051)	0.034 (0.052)	0.037 (0.052)
Temperature shock in 1st half of year 17 after birth ^2	-0.005 (0.005)	-0.006 (0.005)	-0.007 (0.006)	-0.007 (0.006)	-0.005 (0.008)	-0.002 (0.007)	-0.004 (0.007)	-0.006 (0.007)
Temperature shock in 2nd half of year 17 after birth	-0.010 (0.056)	-0.012 (0.059)	0.007 (0.056)	-0.002 (0.057)	-0.003 (0.038)	0.008 (0.037)	-0.022 (0.038)	-0.020 (0.038)

Temperature shock in 2nd half of year 17 after birth ^2	-0.007 (0.006)	-0.007 (0.006)	-0.003 (0.003)	-0.002 (0.003)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)	0.001 (0.002)
Temperature shock in 1st half of year 18 after birth	-0.010 (0.050)	-0.010 (0.050)	-0.035 (0.051)	-0.034 (0.051)	0.089** (0.035)	0.081** (0.034)	0.096*** (0.034)	0.095*** (0.034)
Temperature shock in 1st half of year 18 after birth ^2	0.001 (0.003)	0.000 (0.003)	-0.001 (0.003)	-0.000 (0.003)	-0.009*** (0.003)	-0.008*** (0.003)	-0.006** (0.003)	-0.006** (0.003)
Temperature shock in 2nd half of year 18 after birth	0.061 (0.052)	0.053 (0.052)	0.067 (0.052)	0.071 (0.053)	0.014 (0.045)	0.011 (0.043)	0.028 (0.045)	0.033 (0.046)
Temperature shock in 2nd half of year 18 after birth ^2	-0.007* (0.004)	-0.008* (0.004)	-0.010** (0.004)	-0.009** (0.004)	-0.000 (0.003)	0.002 (0.004)	0.001 (0.004)	0.001 (0.004)
Temperature shock in 1st half of year 19 after birth	-0.053 (0.058)	-0.061 (0.059)	-0.078 (0.062)	-0.066 (0.062)	-0.062 (0.056)	-0.051 (0.055)	-0.061 (0.056)	-0.067 (0.055)
Temperature shock in 1st half of year 19 after birth ^2	0.002 (0.005)	0.002 (0.005)	0.004 (0.005)	0.003 (0.005)	0.002 (0.004)	0.003 (0.004)	0.003 (0.003)	0.004 (0.003)
Temperature shock in 2nd half of year 19 after birth	0.119** (0.055)	0.128** (0.057)	0.153** (0.060)	0.138** (0.056)	-0.034 (0.065)	-0.038 (0.066)	-0.053 (0.063)	-0.053 (0.062)
Temperature shock in 2nd half of year 19 after birth ^2	0.002 (0.005)	0.003 (0.005)	0.003 (0.005)	0.003 (0.005)	0.002 (0.005)	-0.002 (0.005)	-0.001 (0.005)	-0.001 (0.005)
Constant	-9.417 (5.854)	-9.111 (6.008)	-10.953* (5.731)	-11.057* (5.868)	-16.778*** (4.468)	-16.808*** (4.974)	-16.355*** (4.873)	-15.821*** (4.859)
Observations	584	583	604	604	584	583	604	604
R-squared	0.26	0.26	0.25	0.25	0.21	0.21	0.20	0.20

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

Table A.4.4: Effect of weather shocks on moving for studies in Vietnam

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Moved for Studies				Dependent Variable: Moved for Other Reason			
Math Score (2009)	0.703*** (0.074)				-0.251*** (0.074)			
Reading Score (2009)		0.446*** (0.066)				-0.029 (0.071)		
Agency Score (2009)			0.347*** (0.108)				-0.343*** (0.078)	
Pride Score (2009)				-0.098 (0.081)				0.049 (0.095)
Rainfall shock in 1st half of year 14 after birth	-0.004*** (0.002)	-0.002 (0.002)	-0.003** (0.001)	-0.003* (0.001)	-0.002* (0.001)	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)
Rainfall shock in 1st half of year 14 after birth ^2	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	0.000* (0.000)	0.000* (0.000)
Rainfall shock in 2nd half of year 14 after birth	-0.004*** (0.001)	-0.003** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)
Rainfall shock in 2nd half of year 14 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 15 after birth	-0.006*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)
Rainfall shock in 1st half of year 15 after birth ^2	0.000** (0.000)	0.000 (0.000)	0.000** (0.000)	0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 15 after birth	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)
Rainfall shock in 2nd half of year 15 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 16 after birth	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)

Rainfall shock in 1st half of year 16 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 16 after birth	0.002 (0.002)	0.001 (0.001)	0.001 (0.002)	0.001 (0.002)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	0.000 (0.001)
Rainfall shock in 2nd half of year 16 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Rainfall shock in 1st half of year 17 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 17 after birth	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	-0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)
Rainfall shock in 2nd half of year 17 after birth ^2	-0.000* (0.000)	-0.000* (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 18 after birth	0.005** (0.002)	0.004* (0.002)	0.004** (0.002)	0.004* (0.002)	-0.001 (0.002)	-0.000 (0.002)	-0.000 (0.002)	-0.000 (0.002)
Rainfall shock in 1st half of year 18 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 18 after birth	0.002** (0.001)	0.003** (0.001)	0.002* (0.001)	0.002* (0.001)	0.001 (0.001)	0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Rainfall shock in 2nd half of year 18 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 19 after birth	0.001 (0.001)	0.002 (0.001)	0.001 (0.001)	0.001 (0.001)	0.002 (0.002)	0.002 (0.002)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 1st half of year 19 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 19 after birth	-0.002 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.002 (0.002)	0.001 (0.001)	0.001 (0.002)	0.001 (0.002)
Rainfall shock in 2nd half of year 19 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)

Temperature shock in 1st half of year 14 after birth	-0.340*** (0.103)	-0.307*** (0.104)	-0.279*** (0.098)	-0.278*** (0.101)	0.144* (0.086)	0.121 (0.083)	0.130 (0.087)	0.141* (0.084)
Temperature shock in 1st half of year 14 after birth ^2	0.012 (0.026)	0.004 (0.024)	-0.003 (0.022)	0.001 (0.022)	0.012 (0.019)	0.017 (0.019)	0.017 (0.018)	0.012 (0.019)
Temperature shock in 2nd half of year 14 after birth	-0.447*** (0.109)	-0.360*** (0.119)	-0.290*** (0.112)	-0.276** (0.112)	0.151 (0.118)	0.075 (0.120)	0.096 (0.119)	0.080 (0.119)
Temperature shock in 2nd half of year 14 after birth ^2	0.038* (0.020)	0.022 (0.020)	0.020 (0.019)	0.018 (0.019)	0.018 (0.019)	0.025 (0.020)	0.024 (0.019)	0.024 (0.018)
Temperature shock in 1st half of year 15 after birth	-0.577*** (0.125)	-0.485*** (0.125)	-0.397*** (0.124)	-0.408*** (0.124)	0.299*** (0.108)	0.248** (0.105)	0.249** (0.110)	0.270** (0.107)
Temperature shock in 1st half of year 15 after birth ^2	0.052*** (0.019)	0.044** (0.019)	0.051*** (0.018)	0.047** (0.019)	-0.017 (0.017)	-0.018 (0.017)	-0.020 (0.018)	-0.019 (0.017)
Temperature shock in 2nd half of year 15 after birth	-0.465*** (0.123)	-0.373*** (0.128)	-0.286** (0.126)	-0.292** (0.126)	0.217* (0.117)	0.146 (0.120)	0.123 (0.124)	0.124 (0.129)
Temperature shock in 2nd half of year 15 after birth ^2	0.066*** (0.024)	0.055** (0.024)	0.054** (0.025)	0.053** (0.024)	-0.055*** (0.019)	-0.052*** (0.018)	-0.052*** (0.019)	-0.050*** (0.019)
Temperature shock in 1st half of year 16 after birth	0.075 (0.168)	0.053 (0.174)	0.127 (0.177)	0.090 (0.176)	-0.139 (0.126)	-0.138 (0.126)	-0.149 (0.134)	-0.128 (0.131)
Temperature shock in 1st half of year 16 after birth ^2	0.001 (0.018)	-0.000 (0.017)	-0.011 (0.018)	-0.005 (0.017)	-0.007 (0.017)	-0.007 (0.018)	-0.009 (0.016)	-0.013 (0.016)
Temperature shock in 2nd half of year 16 after birth	0.056 (0.108)	-0.000 (0.111)	0.089 (0.107)	0.088 (0.100)	-0.245*** (0.067)	-0.251*** (0.069)	-0.254*** (0.069)	-0.269*** (0.069)
Temperature shock in 2nd half of year 16 after birth ^2	-0.029* (0.017)	-0.016 (0.015)	-0.009 (0.015)	-0.009 (0.015)	0.010 (0.014)	0.005 (0.013)	0.006 (0.012)	0.006 (0.012)
Temperature shock in 1st half of year 17 after birth	0.132 (0.123)	0.111 (0.123)	0.073 (0.112)	0.077 (0.110)	-0.002 (0.118)	0.022 (0.122)	-0.017 (0.113)	-0.029 (0.111)
Temperature shock in 1st half of year 17 after birth ^2	0.039*** (0.014)	0.028* (0.015)	0.023* (0.014)	0.021 (0.015)	-0.003 (0.018)	0.000 (0.017)	-0.001 (0.016)	0.000 (0.016)
Temperature shock in 2nd half of year 17 after birth	0.145 (0.109)	0.103 (0.111)	0.136 (0.103)	0.130 (0.102)	0.196* (0.114)	0.214** (0.108)	0.192* (0.116)	0.194* (0.114)

Temperature shock in 2nd half of year 17 after birth ^2	-0.001 (0.012)	0.005 (0.012)	0.003 (0.012)	0.004 (0.012)	0.005 (0.012)	0.004 (0.013)	0.004 (0.013)	0.004 (0.012)
Temperature shock in 1st half of year 18 after birth	0.432*** (0.134)	0.310** (0.134)	0.338*** (0.122)	0.313** (0.133)	-0.007 (0.121)	0.012 (0.119)	0.005 (0.112)	0.019 (0.116)
Temperature shock in 1st half of year 18 after birth ^2	-0.011 (0.013)	-0.011 (0.013)	-0.010 (0.012)	-0.010 (0.012)	-0.029** (0.013)	-0.026** (0.013)	-0.026** (0.012)	-0.026** (0.012)
Temperature shock in 2nd half of year 18 after birth	0.241 (0.152)	0.201 (0.150)	0.248 (0.153)	0.232 (0.152)	-0.196 (0.140)	-0.214 (0.134)	-0.206 (0.139)	-0.198 (0.139)
Temperature shock in 2nd half of year 18 after birth ^2	-0.018 (0.018)	-0.009 (0.017)	-0.015 (0.017)	-0.013 (0.016)	0.005 (0.013)	0.007 (0.012)	0.002 (0.012)	0.000 (0.012)
Temperature shock in 1st half of year 19 after birth	0.032 (0.121)	0.070 (0.122)	0.010 (0.116)	0.027 (0.118)	-0.157 (0.101)	-0.130 (0.086)	-0.147 (0.102)	-0.157 (0.096)
Temperature shock in 1st half of year 19 after birth ^2	-0.012 (0.011)	-0.011 (0.010)	-0.015 (0.010)	-0.016 (0.010)	0.010 (0.012)	0.010 (0.011)	0.010 (0.012)	0.011 (0.011)
Temperature shock in 2nd half of year 19 after birth	0.056 (0.085)	0.064 (0.083)	0.017 (0.076)	0.024 (0.076)	-0.069 (0.079)	-0.066 (0.077)	-0.058 (0.076)	-0.062 (0.076)
Temperature shock in 2nd half of year 19 after birth ^2	-0.007 (0.009)	-0.005 (0.009)	-0.012 (0.009)	-0.012 (0.010)	0.023** (0.009)	0.022** (0.010)	0.021** (0.009)	0.020** (0.009)
Constant	-12.449 (8.242)	-12.643 (8.879)	-10.449 (8.855)	-10.952 (8.762)	-17.832*** (5.858)	-16.781*** (5.818)	-15.196*** (5.812)	-15.252** (6.084)
Observations	827	822	874	874	827	822	874	874
R-squared	0.34	0.29	0.27	0.26	0.18	0.16	0.17	0.16

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

Table A.4.5: Effect of weather shocks on moving for work in Ethiopia

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Moved for Work				Dependent Variable: Moved for Other Reason			
Math Score (2009)	-0.028 (0.080)				0.147*** (0.055)			
Reading Score (2009)		0.000 (0.102)				0.167*** (0.055)		
Agency Score (2009)			0.314* (0.186)				-0.055 (0.079)	
Pride Score (2009)				-0.014 (0.115)				-0.061 (0.069)
Rainfall shock in 1st half of year 14 after birth	0.006 (0.005)	0.013*** (0.005)	0.010*** (0.003)	0.010*** (0.003)	0.001 (0.002)	-0.000 (0.002)	0.000 (0.002)	-0.000 (0.002)
Rainfall shock in 1st half of year 14 after birth ^2	0.000 (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 14 after birth	0.004 (0.006)	0.005 (0.006)	0.005 (0.006)	0.004 (0.006)	-0.004 (0.003)	-0.006** (0.003)	-0.006** (0.003)	-0.005** (0.003)
Rainfall shock in 2nd half of year 14 after birth ^2	-0.000*** (0.000)	-0.000** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 15 after birth	0.005 (0.007)	0.004 (0.006)	0.007 (0.006)	0.007 (0.005)	0.004 (0.003)	0.004 (0.003)	0.003 (0.003)	0.003 (0.003)
Rainfall shock in 1st half of year 15 after birth ^2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 15 after birth	0.005 (0.009)	-0.001 (0.009)	0.003 (0.009)	0.004 (0.008)	-0.002 (0.003)	-0.002 (0.004)	-0.002 (0.003)	-0.001 (0.003)
Rainfall shock in 2nd half of year 15 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 16 after birth	-0.002 (0.011)	-0.004 (0.010)	0.000 (0.008)	-0.001 (0.008)	-0.004 (0.004)	-0.004 (0.004)	-0.003 (0.003)	-0.002 (0.004)

Rainfall shock in 1st half of year 16 after birth ^2	0.000*** (0.000)	0.000*** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 16 after birth	0.006 (0.013)	0.003 (0.013)	0.011 (0.012)	0.011 (0.012)	-0.006 (0.005)	-0.006 (0.005)	-0.006 (0.004)	-0.005 (0.004)
Rainfall shock in 2nd half of year 16 after birth ^2	0.000** (0.000)	0.000** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	0.013 (0.013)	0.011 (0.013)	0.009 (0.009)	0.009 (0.010)	-0.005 (0.004)	-0.005 (0.004)	-0.004 (0.004)	-0.004 (0.004)
Rainfall shock in 1st half of year 17 after birth ^2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 17 after birth	0.003 (0.011)	0.003 (0.011)	0.001 (0.008)	0.002 (0.009)	-0.002 (0.004)	-0.001 (0.004)	0.001 (0.004)	0.001 (0.004)
Rainfall shock in 2nd half of year 17 after birth ^2	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 18 after birth	0.014 (0.011)	0.008 (0.009)	0.004 (0.007)	0.005 (0.007)	-0.004 (0.003)	-0.003 (0.003)	-0.003 (0.002)	-0.003 (0.002)
Rainfall shock in 1st half of year 18 after birth ^2	-0.000 (0.000)							
Rainfall shock in 2nd half of year 18 after birth	0.004 (0.007)	0.005 (0.005)	0.007 (0.005)	0.006 (0.005)	-0.002 (0.003)	-0.002 (0.003)	-0.003 (0.003)	-0.003 (0.003)
Rainfall shock in 2nd half of year 18 after birth ^2	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 19 after birth	-0.016** (0.006)	-0.016*** (0.005)	-0.018*** (0.006)	-0.018*** (0.006)	-0.002 (0.003)	-0.003 (0.003)	-0.003 (0.003)	-0.003 (0.003)
Rainfall shock in 1st half of year 19 after birth ^2	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Rainfall shock in 2nd half of year 19 after birth	-0.023*** (0.006)	-0.022*** (0.006)	-0.021*** (0.005)	-0.022*** (0.005)	-0.002 (0.003)	-0.003 (0.004)	-0.001 (0.003)	-0.001 (0.003)
Rainfall shock in 2nd half of year 19 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)

Temperature shock in 1st half of year 14 after birth	-0.366 (0.307)	-0.153 (0.286)	-0.143 (0.289)	-0.136 (0.294)	0.041 (0.116)	0.064 (0.110)	0.050 (0.113)	0.055 (0.113)
Temperature shock in 1st half of year 14 after birth ^2	0.085* (0.051)	0.094* (0.050)	0.098** (0.047)	0.106** (0.047)	-0.016 (0.018)	-0.009 (0.017)	-0.014 (0.018)	-0.015 (0.018)
Temperature shock in 2nd half of year 14 after birth	-0.271 (0.361)	-0.322 (0.365)	-0.184 (0.372)	-0.219 (0.388)	-0.117 (0.144)	-0.091 (0.138)	-0.178 (0.136)	-0.171 (0.137)
Temperature shock in 2nd half of year 14 after birth ^2	0.194 (0.130)	0.123 (0.111)	-0.059 (0.093)	-0.054 (0.089)	-0.007 (0.052)	-0.017 (0.050)	-0.009 (0.054)	-0.008 (0.053)
Temperature shock in 1st half of year 15 after birth	0.510 (0.503)	0.193 (0.364)	0.272 (0.325)	0.272 (0.332)	0.272** (0.132)	0.235* (0.135)	0.176* (0.104)	0.187* (0.101)
Temperature shock in 1st half of year 15 after birth ^2	-0.148 (0.126)	-0.221** (0.106)	-0.140 (0.095)	-0.143 (0.099)	-0.024 (0.051)	-0.017 (0.053)	-0.051 (0.051)	-0.047 (0.051)
Temperature shock in 2nd half of year 15 after birth	-0.011 (0.394)	-0.012 (0.396)	0.234 (0.332)	0.266 (0.332)	-0.021 (0.164)	0.016 (0.156)	-0.035 (0.144)	-0.032 (0.144)
Temperature shock in 2nd half of year 15 after birth ^2	0.157 (0.153)	0.071 (0.137)	0.114 (0.141)	0.096 (0.137)	-0.101 (0.064)	-0.079 (0.068)	-0.124** (0.058)	-0.119** (0.058)
Temperature shock in 1st half of year 16 after birth	-0.390 (0.238)	-0.480** (0.228)	-0.404* (0.214)	-0.386* (0.223)	-0.135 (0.118)	-0.083 (0.121)	-0.100 (0.122)	-0.104 (0.122)
Temperature shock in 1st half of year 16 after birth ^2	0.033 (0.061)	0.015 (0.057)	0.076* (0.045)	0.075* (0.045)	-0.044 (0.031)	-0.049* (0.029)	-0.058* (0.032)	-0.058* (0.032)
Temperature shock in 2nd half of year 16 after birth	0.315 (0.266)	0.247 (0.222)	0.185 (0.188)	0.180 (0.191)	0.062 (0.099)	0.117 (0.097)	0.138 (0.095)	0.135 (0.096)
Temperature shock in 2nd half of year 16 after birth ^2	-0.106** (0.048)	-0.112** (0.047)	-0.083* (0.044)	-0.089** (0.043)	-0.020 (0.022)	-0.019 (0.022)	-0.022 (0.019)	-0.019 (0.019)
Temperature shock in 1st half of year 17 after birth	0.268 (0.234)	0.242 (0.248)	0.281 (0.278)	0.269 (0.282)	0.002 (0.085)	-0.028 (0.084)	0.006 (0.083)	-0.000 (0.084)
Temperature shock in 1st half of year 17 after birth ^2	-0.110* (0.062)	-0.113** (0.051)	-0.051 (0.048)	-0.052 (0.048)	0.009 (0.023)	0.006 (0.025)	0.008 (0.024)	0.009 (0.024)
Temperature shock in 2nd half of year 17 after birth	0.274 (0.188)	0.275 (0.213)	0.293 (0.218)	0.279 (0.215)	-0.072 (0.073)	-0.096 (0.079)	-0.043 (0.071)	-0.046 (0.071)

Temperature shock in 2nd half of year 17 after birth ^2	0.084 (0.058)	0.094** (0.045)	0.064 (0.041)	0.059 (0.039)	0.038 (0.024)	0.036 (0.024)	0.031 (0.022)	0.031 (0.022)
Temperature shock in 1st half of year 18 after birth	-0.295 (0.284)	-0.224 (0.313)	0.026 (0.263)	0.063 (0.251)	0.043 (0.143)	0.074 (0.140)	0.116 (0.145)	0.118 (0.146)
Temperature shock in 1st half of year 18 after birth ^2	-0.048 (0.074)	0.031 (0.067)	0.035 (0.068)	0.042 (0.069)	0.021 (0.048)	0.009 (0.051)	0.030 (0.045)	0.030 (0.045)
Temperature shock in 2nd half of year 18 after birth	-1.103** (0.442)	-0.823** (0.320)	-0.765*** (0.294)	-0.795*** (0.299)	0.355* (0.190)	0.348* (0.179)	0.367* (0.195)	0.374* (0.194)
Temperature shock in 2nd half of year 18 after birth ^2	-0.404** (0.177)	-0.369*** (0.128)	-0.235** (0.092)	-0.244*** (0.093)	0.004 (0.041)	0.007 (0.042)	-0.002 (0.040)	-0.002 (0.040)
Temperature shock in 1st half of year 19 after birth	0.553* (0.289)	0.581** (0.267)	0.336 (0.261)	0.348 (0.253)	0.039 (0.191)	-0.059 (0.205)	-0.004 (0.193)	-0.011 (0.195)
Temperature shock in 1st half of year 19 after birth ^2	-0.017 (0.104)	0.027 (0.104)	0.002 (0.085)	-0.008 (0.091)	0.020 (0.044)	-0.004 (0.046)	0.027 (0.042)	0.024 (0.042)
Temperature shock in 2nd half of year 19 after birth	-0.127 (0.353)	0.073 (0.323)	-0.081 (0.294)	-0.090 (0.296)	0.026 (0.185)	-0.081 (0.172)	-0.009 (0.157)	-0.015 (0.156)
Temperature shock in 2nd half of year 19 after birth ^2	-0.023 (0.153)	0.019 (0.145)	0.069 (0.137)	0.076 (0.133)	0.069 (0.052)	0.076 (0.050)	0.074 (0.050)	0.070 (0.051)
Constant	17.997 (18.993)	22.645 (17.476)	21.729 (14.968)	23.199 (14.787)	-10.940 (10.917)	-15.050 (11.206)	-8.218 (9.135)	-8.800 (9.057)
Observations	835	835	901	901	835	835	901	901
R-squared	0.35	0.35	0.34	0.33	0.16	0.15	0.14	0.14

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

Table A.4.6: Effect of weather shocks on moving for work in India

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Moved for Work				Dependent Variable: Moved for Other Reason			
Math Score (2009)	-0.416*** (0.094)				0.286*** (0.050)			
Reading Score (2009)		-0.323*** (0.079)				0.294*** (0.054)		
Agency Score (2009)			-0.295** (0.132)				0.220*** (0.083)	
Pride Score (2009)				0.015 (0.100)				-0.081 (0.067)
Rainfall shock in 1st half of year 14 after birth	-0.002 (0.002)	-0.001 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.002 (0.001)
Rainfall shock in 1st half of year 14 after birth ^2	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 14 after birth	0.001 (0.002)	0.001 (0.002)	0.003 (0.002)	0.003 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.001 (0.001)
Rainfall shock in 2nd half of year 14 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 15 after birth	0.004** (0.002)	0.003* (0.002)	0.004** (0.002)	0.004** (0.002)	-0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Rainfall shock in 1st half of year 15 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 15 after birth	0.001 (0.003)	0.002 (0.003)	0.001 (0.002)	0.001 (0.002)	0.003* (0.001)	0.002* (0.001)	0.003** (0.001)	0.003** (0.001)
Rainfall shock in 2nd half of year 15 after birth ^2	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 16 after birth	0.001 (0.002)	0.000 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.001)	0.002* (0.001)	0.002 (0.001)	0.001 (0.001)

Rainfall shock in 1st half of year 16 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000** (0.000)	-0.000** (0.000)
Rainfall shock in 2nd half of year 16 after birth	0.003* (0.002)	0.004* (0.002)	0.002 (0.002)	0.002 (0.002)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Rainfall shock in 2nd half of year 16 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	-0.001 (0.002)	-0.000 (0.002)	-0.000 (0.002)	-0.001 (0.002)	0.000 (0.001)	0.002 (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 1st half of year 17 after birth ^2	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 17 after birth	-0.000 (0.003)	0.003 (0.003)	-0.001 (0.003)	-0.002 (0.003)	-0.001 (0.001)	-0.001 (0.002)	-0.001 (0.001)	-0.001 (0.001)
Rainfall shock in 2nd half of year 17 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 18 after birth	0.001 (0.002)	0.000 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.001)	0.004** (0.002)	0.002 (0.001)	0.002 (0.001)
Rainfall shock in 1st half of year 18 after birth ^2	0.000 (0.000)	-0.000 (0.000)	0.000** (0.000)	0.000** (0.000)	0.000 (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 18 after birth	-0.004 (0.003)	-0.005 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.001 (0.001)	-0.002 (0.002)	-0.001 (0.001)	-0.001 (0.001)
Rainfall shock in 2nd half of year 18 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 19 after birth	0.003 (0.002)	0.003 (0.002)	0.003 (0.002)	0.003 (0.002)	0.002 (0.001)	0.003** (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 1st half of year 19 after birth ^2	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 19 after birth	0.001 (0.002)	0.004* (0.002)	0.004* (0.002)	0.003 (0.002)	-0.001 (0.002)	0.000 (0.002)	-0.002 (0.002)	-0.001 (0.002)
Rainfall shock in 2nd half of year 19 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)

Temperature shock in 1st half of year 14 after birth	-0.140 (0.128)	-0.144 (0.126)	-0.299** (0.123)	-0.297** (0.123)	-0.081 (0.094)	-0.168* (0.102)	-0.079 (0.088)	-0.081 (0.088)
Temperature shock in 1st half of year 14 after birth ^2	-0.071** (0.032)	-0.065* (0.035)	-0.071** (0.029)	-0.071** (0.029)	0.023 (0.022)	0.010 (0.024)	0.016 (0.021)	0.018 (0.021)
Temperature shock in 2nd half of year 14 after birth	-0.010 (0.088)	-0.068 (0.095)	-0.013 (0.081)	-0.028 (0.080)	0.070 (0.058)	0.064 (0.062)	0.074 (0.058)	0.088 (0.058)
Temperature shock in 2nd half of year 14 after birth ^2	0.051** (0.021)	0.025 (0.023)	0.050** (0.020)	0.048** (0.020)	-0.010 (0.015)	-0.009 (0.016)	-0.009 (0.014)	-0.009 (0.014)
Temperature shock in 1st half of year 15 after birth	0.094 (0.133)	0.045 (0.142)	0.185 (0.129)	0.192 (0.129)	-0.090 (0.091)	-0.024 (0.092)	-0.096 (0.083)	-0.094 (0.082)
Temperature shock in 1st half of year 15 after birth ^2	0.053** (0.025)	0.056** (0.025)	0.053** (0.024)	0.052** (0.024)	0.009 (0.016)	0.017 (0.018)	0.014 (0.014)	0.014 (0.014)
Temperature shock in 2nd half of year 15 after birth	0.065 (0.158)	0.031 (0.170)	0.032 (0.148)	0.044 (0.148)	0.035 (0.084)	0.066 (0.087)	0.095 (0.081)	0.089 (0.080)
Temperature shock in 2nd half of year 15 after birth ^2	0.003 (0.027)	-0.019 (0.027)	0.001 (0.030)	0.002 (0.029)	0.013 (0.021)	0.016 (0.023)	0.005 (0.020)	0.005 (0.021)
Temperature shock in 1st half of year 16 after birth	-0.310 (0.190)	-0.392* (0.223)	-0.346* (0.196)	-0.332* (0.194)	-0.111 (0.096)	-0.125 (0.097)	-0.076 (0.092)	-0.096 (0.093)
Temperature shock in 1st half of year 16 after birth ^2	-0.031 (0.043)	-0.061 (0.047)	-0.041 (0.039)	-0.049 (0.039)	0.020 (0.026)	0.009 (0.028)	0.009 (0.025)	0.015 (0.025)
Temperature shock in 2nd half of year 16 after birth	-0.063 (0.107)	-0.084 (0.111)	-0.220** (0.103)	-0.247** (0.102)	0.017 (0.061)	0.025 (0.062)	0.019 (0.064)	0.028 (0.062)
Temperature shock in 2nd half of year 16 after birth ^2	-0.008 (0.031)	-0.008 (0.033)	-0.029 (0.030)	-0.035 (0.031)	0.001 (0.019)	-0.017 (0.021)	0.002 (0.018)	0.008 (0.018)
Temperature shock in 1st half of year 17 after birth	-0.097 (0.140)	-0.000 (0.165)	-0.036 (0.146)	-0.047 (0.144)	0.038 (0.084)	0.026 (0.092)	0.026 (0.082)	0.032 (0.082)
Temperature shock in 1st half of year 17 after birth ^2	0.079** (0.031)	0.077** (0.033)	0.076** (0.032)	0.075** (0.032)	-0.017 (0.018)	-0.016 (0.020)	-0.025 (0.019)	-0.025 (0.019)
Temperature shock in 2nd half of year 17 after birth	-0.079 (0.102)	0.007 (0.099)	0.016 (0.092)	0.010 (0.091)	-0.017 (0.069)	-0.033 (0.077)	-0.064 (0.060)	-0.056 (0.060)

Temperature shock in 2nd half of year 17 after birth ^2	-0.000 (0.021)	0.001 (0.021)	-0.001 (0.018)	0.004 (0.018)	-0.009 (0.014)	-0.006 (0.015)	-0.001 (0.014)	-0.004 (0.014)
Temperature shock in 1st half of year 18 after birth	0.192* (0.110)	0.174 (0.115)	0.206* (0.106)	0.208* (0.107)	0.165* (0.095)	0.111 (0.099)	0.088 (0.074)	0.090 (0.073)
Temperature shock in 1st half of year 18 after birth ^2	-0.013 (0.021)	-0.019 (0.025)	-0.021 (0.021)	-0.020 (0.021)	-0.022 (0.018)	-0.019 (0.018)	-0.018 (0.015)	-0.017 (0.015)
Temperature shock in 2nd half of year 18 after birth	0.147 (0.200)	-0.002 (0.209)	0.112 (0.210)	0.142 (0.205)	-0.044 (0.092)	-0.089 (0.096)	-0.081 (0.091)	-0.097 (0.091)
Temperature shock in 2nd half of year 18 after birth ^2	0.019 (0.040)	0.033 (0.040)	0.017 (0.042)	0.013 (0.041)	0.016 (0.017)	0.028 (0.020)	0.028* (0.016)	0.026 (0.017)
Temperature shock in 1st half of year 19 after birth	0.080 (0.163)	0.023 (0.160)	0.119 (0.147)	0.110 (0.151)	0.095 (0.085)	0.112 (0.088)	0.100 (0.078)	0.104 (0.080)
Temperature shock in 1st half of year 19 after birth ^2	0.001 (0.026)	0.008 (0.027)	-0.005 (0.025)	-0.004 (0.026)	-0.003 (0.013)	0.003 (0.013)	0.003 (0.012)	0.001 (0.012)
Temperature shock in 2nd half of year 19 after birth	0.031 (0.132)	0.125 (0.145)	0.160 (0.129)	0.155 (0.125)	-0.041 (0.066)	-0.048 (0.068)	-0.068 (0.062)	-0.068 (0.061)
Temperature shock in 2nd half of year 19 after birth ^2	-0.006 (0.016)	-0.007 (0.017)	-0.016 (0.016)	-0.012 (0.016)	0.003 (0.010)	-0.001 (0.011)	-0.002 (0.009)	-0.003 (0.009)
Constant	-17.575** (7.819)	-16.426** (8.020)	-21.334*** (7.117)	-21.072*** (7.302)	4.207 (5.607)	6.499 (5.897)	3.584 (5.539)	3.775 (5.465)
Observations	876	857	947	947	876	857	947	947
R-squared	0.28	0.29	0.27	0.26	0.14	0.16	0.13	0.12

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

Table A.4.7: Effect of weather shocks on moving for work in Peru

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Moved for Work				Dependent Variable: Moved for Other Reason			
Math Score (2009)	-0.322*** (0.109)				-0.020 (0.085)			
Reading Score (2009)		-0.303*** (0.116)				-0.049 (0.095)		
Agency Score (2009)			-0.289* (0.154)				0.114 (0.117)	
Pride Score (2009)				0.016 (0.106)				0.108 (0.090)
Rainfall shock in 1st half of year 14 after birth	-0.006** (0.003)	-0.005* (0.003)	-0.005* (0.003)	-0.005* (0.003)	-0.005** (0.002)	-0.005** (0.002)	-0.005** (0.002)	-0.005** (0.002)
Rainfall shock in 1st half of year 14 after birth ^2	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 14 after birth	0.002 (0.003)	0.002 (0.003)	0.003 (0.003)	0.002 (0.003)	-0.012*** (0.002)	-0.012*** (0.002)	-0.010*** (0.002)	-0.010*** (0.002)
Rainfall shock in 2nd half of year 14 after birth ^2	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 15 after birth	-0.002 (0.003)	-0.002 (0.003)	-0.000 (0.003)	-0.001 (0.003)	-0.009*** (0.003)	-0.008*** (0.003)	-0.009*** (0.003)	-0.009*** (0.003)
Rainfall shock in 1st half of year 15 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 15 after birth	0.004 (0.003)	0.003 (0.003)	0.004* (0.003)	0.004 (0.003)	-0.004* (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.004** (0.002)
Rainfall shock in 2nd half of year 15 after birth ^2	0.000** (0.000)	0.000** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 16 after birth	0.011*** (0.004)	0.010*** (0.004)	0.010*** (0.003)	0.010*** (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)

Rainfall shock in 1st half of year 16 after birth ^2	-0.000*	-0.000	-0.000*	-0.000*	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 2nd half of year 16 after birth	0.000	0.001	0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.006)	(0.006)	(0.005)	(0.005)	(0.003)	(0.002)	(0.002)	(0.002)
Rainfall shock in 2nd half of year 16 after birth ^2	-0.000***	-0.000***	-0.000***	-0.000***	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 1st half of year 17 after birth	-0.001	-0.001	-0.001	-0.002	-0.003	-0.003	-0.001	-0.001
	(0.005)	(0.006)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)
Rainfall shock in 1st half of year 17 after birth ^2	0.000**	0.000**	0.000***	0.000**	-0.000*	-0.000*	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 2nd half of year 17 after birth	-0.002	-0.002	-0.002	-0.002	-0.003	-0.003	-0.003*	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Rainfall shock in 2nd half of year 17 after birth ^2	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 1st half of year 18 after birth	-0.008***	-0.010***	-0.007***	-0.006***	-0.005	-0.005	-0.004	-0.003
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Rainfall shock in 1st half of year 18 after birth ^2	0.000***	0.000***	0.000**	0.000**	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 2nd half of year 18 after birth	-0.006***	-0.006**	-0.006**	-0.005**	0.000	0.001	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Rainfall shock in 2nd half of year 18 after birth ^2	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 1st half of year 19 after birth	-0.003	-0.003	-0.002	-0.002	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Rainfall shock in 1st half of year 19 after birth ^2	-0.000	-0.000	-0.000	-0.000	-0.000**	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rainfall shock in 2nd half of year 19 after birth	-0.001	-0.002	-0.002	-0.002	0.001	0.001	0.000	0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Rainfall shock in 2nd half of year 19 after birth ^2	-0.000	-0.000	-0.000	-0.000	-0.000***	-0.000***	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Temperature shock in 1st half of year 14 after birth	0.111** (0.052)	0.109** (0.053)	0.098* (0.052)	0.090* (0.054)	-0.047 (0.039)	-0.058 (0.040)	-0.046 (0.039)	-0.045 (0.039)
Temperature shock in 1st half of year 14 after birth ^2	-0.013* (0.007)	-0.013* (0.007)	-0.011* (0.007)	-0.012* (0.007)	0.000 (0.004)	0.000 (0.004)	0.001 (0.004)	0.001 (0.004)
Temperature shock in 2nd half of year 14 after birth	-0.083 (0.058)	-0.077 (0.058)	-0.056 (0.053)	-0.048 (0.054)	-0.026 (0.048)	-0.016 (0.048)	-0.009 (0.046)	-0.014 (0.046)
Temperature shock in 2nd half of year 14 after birth ^2	0.025*** (0.008)	0.025*** (0.008)	0.022*** (0.009)	0.024*** (0.009)	-0.000 (0.006)	0.000 (0.005)	0.000 (0.005)	0.000 (0.005)
Temperature shock in 1st half of year 15 after birth	0.266*** (0.069)	0.256*** (0.070)	0.228*** (0.073)	0.239*** (0.074)	0.027 (0.056)	0.021 (0.057)	0.014 (0.053)	0.015 (0.054)
Temperature shock in 1st half of year 15 after birth ^2	-0.010 (0.010)	-0.009 (0.010)	-0.008 (0.011)	-0.007 (0.011)	0.003 (0.006)	0.002 (0.006)	0.001 (0.006)	0.000 (0.006)
Temperature shock in 2nd half of year 15 after birth	-0.405*** (0.105)	-0.414*** (0.108)	-0.374*** (0.114)	-0.366*** (0.112)	-0.085 (0.055)	-0.071 (0.055)	-0.087 (0.059)	-0.085 (0.059)
Temperature shock in 2nd half of year 15 after birth ^2	-0.010 (0.020)	-0.011 (0.018)	-0.011 (0.019)	-0.012 (0.019)	-0.016 (0.016)	-0.015 (0.016)	-0.016 (0.015)	-0.015 (0.015)
Temperature shock in 1st half of year 16 after birth	0.129** (0.062)	0.148** (0.063)	0.096 (0.059)	0.100* (0.058)	0.043 (0.066)	0.031 (0.065)	0.046 (0.064)	0.045 (0.063)
Temperature shock in 1st half of year 16 after birth ^2	0.054*** (0.018)	0.053*** (0.019)	0.050*** (0.017)	0.048*** (0.017)	0.007 (0.013)	0.007 (0.013)	0.003 (0.013)	0.004 (0.013)
Temperature shock in 2nd half of year 16 after birth	-0.129 (0.079)	-0.128 (0.082)	-0.091 (0.080)	-0.091 (0.080)	-0.140*** (0.045)	-0.137*** (0.044)	-0.137*** (0.045)	-0.138*** (0.045)
Temperature shock in 2nd half of year 16 after birth ^2	-0.058*** (0.013)	-0.055*** (0.013)	-0.047*** (0.010)	-0.048*** (0.010)	-0.016*** (0.005)	-0.015*** (0.005)	-0.016*** (0.005)	-0.016*** (0.005)
Temperature shock in 1st half of year 17 after birth	-0.014 (0.079)	-0.009 (0.081)	-0.035 (0.075)	-0.024 (0.076)	0.001 (0.047)	0.013 (0.048)	0.019 (0.045)	0.018 (0.045)
Temperature shock in 1st half of year 17 after birth ^2	-0.038*** (0.010)	-0.034*** (0.010)	-0.038*** (0.009)	-0.040*** (0.009)	-0.005 (0.005)	-0.003 (0.006)	-0.004 (0.006)	-0.004 (0.006)
Temperature shock in 2nd half of year 17 after birth	0.066 (0.062)	0.063 (0.060)	0.065 (0.062)	0.067 (0.063)	-0.055 (0.039)	-0.054 (0.040)	-0.061 (0.039)	-0.063 (0.039)

Temperature shock in 2nd half of year 17 after birth ^2	-0.000 (0.003)	0.002 (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.002 (0.002)	-0.002 (0.002)	-0.000 (0.002)	-0.000 (0.002)
Temperature shock in 1st half of year 18 after birth	0.155*** (0.060)	0.166*** (0.062)	0.150*** (0.057)	0.147*** (0.057)	0.020 (0.038)	0.018 (0.036)	0.015 (0.036)	0.017 (0.037)
Temperature shock in 1st half of year 18 after birth ^2	-0.011*** (0.004)	-0.011*** (0.004)	-0.008** (0.004)	-0.008** (0.004)	-0.002 (0.003)	-0.002 (0.003)	-0.003 (0.002)	-0.003 (0.003)
Temperature shock in 2nd half of year 18 after birth	0.146** (0.061)	0.145** (0.060)	0.139** (0.060)	0.151*** (0.057)	0.034 (0.040)	0.026 (0.039)	0.037 (0.040)	0.035 (0.040)
Temperature shock in 2nd half of year 18 after birth ^2	-0.004 (0.005)	-0.001 (0.005)	-0.003 (0.005)	-0.004 (0.005)	-0.005 (0.004)	-0.005 (0.004)	-0.006* (0.003)	-0.006* (0.003)
Temperature shock in 1st half of year 19 after birth	-0.129 (0.097)	-0.125 (0.100)	-0.087 (0.093)	-0.103 (0.090)	-0.060 (0.042)	-0.058 (0.042)	-0.070 (0.044)	-0.067 (0.044)
Temperature shock in 1st half of year 19 after birth ^2	0.009 (0.008)	0.010 (0.008)	0.007 (0.008)	0.008 (0.007)	-0.001 (0.006)	-0.001 (0.006)	0.001 (0.005)	0.002 (0.005)
Temperature shock in 2nd half of year 19 after birth	-0.108 (0.086)	-0.117 (0.091)	-0.124 (0.079)	-0.127 (0.079)	0.075 (0.048)	0.076 (0.048)	0.078 (0.048)	0.077 (0.048)
Temperature shock in 2nd half of year 19 after birth ^2	-0.000 (0.006)	-0.005 (0.007)	-0.001 (0.007)	-0.001 (0.007)	0.005 (0.005)	0.005 (0.005)	0.005 (0.005)	0.004 (0.005)
Constant	-5.509 (6.553)	-5.613 (6.640)	-3.850 (6.017)	-4.475 (6.075)	-15.456*** (3.529)	-15.687*** (3.585)	-14.684*** (3.868)	-14.957*** (3.972)
Observations	584	583	604	604	584	583	604	604
R-squared	0.35	0.36	0.33	0.33	0.19	0.19	0.17	0.17

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

Table A.4.8: Effect of weather shocks on moving for work in Vietnam

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Moved for Work				Dependent Variable: Moved for Other Reason			
Math Score (2009)	-0.206** (0.083)				0.391*** (0.059)			
Reading Score (2009)		-0.014 (0.084)				0.291*** (0.052)		
Agency Score (2009)			-0.282*** (0.081)				0.123 (0.095)	
Pride Score (2009)				-0.002 (0.117)				-0.037 (0.079)
Rainfall shock in 1st half of year 14 after birth	-0.002 (0.002)	-0.002 (0.002)	-0.001 (0.002)	-0.002 (0.002)	-0.004*** (0.001)	-0.003** (0.001)	-0.002* (0.001)	-0.002* (0.001)
Rainfall shock in 1st half of year 14 after birth ^2	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 14 after birth	-0.004*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)	-0.003** (0.001)
Rainfall shock in 2nd half of year 14 after birth ^2	0.000** (0.000)	0.000** (0.000)	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 15 after birth	0.001 (0.002)	0.001 (0.002)	0.000 (0.002)	0.000 (0.002)	-0.003* (0.002)	-0.003* (0.002)	-0.003* (0.002)	-0.003* (0.002)
Rainfall shock in 1st half of year 15 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 15 after birth	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	-0.003* (0.002)	-0.003* (0.002)	-0.003* (0.002)	-0.003* (0.002)
Rainfall shock in 2nd half of year 15 after birth ^2	-0.000* (0.000)	-0.000* (0.000)	-0.000** (0.000)	-0.000** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 16 after birth	-0.000 (0.002)	-0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)	0.000 (0.001)

Rainfall shock in 1st half of year 16 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 16 after birth	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.001)	0.001 (0.002)	0.001 (0.002)
Rainfall shock in 2nd half of year 16 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	-0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	0.001 (0.001)	0.001 (0.001)	0.002 (0.001)	0.002 (0.001)
Rainfall shock in 1st half of year 17 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 17 after birth	0.001 (0.001)	0.002 (0.001)	0.002* (0.001)	0.002 (0.001)	0.002* (0.001)	0.002* (0.001)	0.002 (0.001)	0.002* (0.001)
Rainfall shock in 2nd half of year 17 after birth ^2	-0.000** (0.000)	-0.000** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 18 after birth	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)
Rainfall shock in 1st half of year 18 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 18 after birth	0.002 (0.002)	0.001 (0.002)	0.001 (0.001)	0.001 (0.001)	0.002 (0.001)	0.002* (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 2nd half of year 18 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 19 after birth	0.001 (0.002)	0.002 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 1st half of year 19 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 19 after birth	-0.002 (0.002)	-0.002 (0.002)	-0.003 (0.002)	-0.003 (0.002)	0.000 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 2nd half of year 19 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)

Temperature shock in 1st half of year 14 after birth	-0.220 (0.168)	-0.212 (0.150)	-0.163 (0.144)	-0.158 (0.140)	-0.063 (0.111)	-0.082 (0.114)	-0.055 (0.105)	-0.058 (0.105)
Temperature shock in 1st half of year 14 after birth ^2	0.050 (0.038)	0.046 (0.039)	0.054 (0.037)	0.053 (0.038)	-0.001 (0.024)	-0.002 (0.024)	-0.009 (0.023)	-0.008 (0.023)
Temperature shock in 2nd half of year 14 after birth	-0.201 (0.185)	-0.223 (0.184)	-0.270 (0.191)	-0.298 (0.191)	-0.134 (0.105)	-0.153 (0.113)	-0.082 (0.110)	-0.077 (0.109)
Temperature shock in 2nd half of year 14 after birth ^2	0.022 (0.024)	0.024 (0.024)	0.025 (0.024)	0.025 (0.023)	0.027* (0.016)	0.022 (0.016)	0.022 (0.015)	0.021 (0.015)
Temperature shock in 1st half of year 15 after birth	-0.097 (0.130)	-0.136 (0.124)	-0.131 (0.131)	-0.121 (0.132)	-0.136 (0.128)	-0.124 (0.134)	-0.066 (0.132)	-0.073 (0.130)
Temperature shock in 1st half of year 15 after birth ^2	-0.003 (0.029)	-0.006 (0.029)	0.000 (0.029)	0.003 (0.029)	0.023 (0.016)	0.021 (0.017)	0.015 (0.018)	0.015 (0.018)
Temperature shock in 2nd half of year 15 after birth	0.145 (0.177)	0.047 (0.174)	0.037 (0.169)	0.044 (0.166)	-0.245** (0.112)	-0.196* (0.112)	-0.186* (0.112)	-0.190* (0.111)
Temperature shock in 2nd half of year 15 after birth ^2	-0.040* (0.024)	-0.033 (0.024)	-0.031 (0.025)	-0.029 (0.025)	0.026 (0.019)	0.019 (0.020)	0.014 (0.019)	0.014 (0.019)
Temperature shock in 1st half of year 16 after birth	-0.454*** (0.170)	-0.461*** (0.168)	-0.444** (0.180)	-0.413** (0.183)	0.209 (0.177)	0.206 (0.177)	0.175 (0.170)	0.166 (0.173)
Temperature shock in 1st half of year 16 after birth ^2	0.036* (0.018)	0.033* (0.018)	0.041** (0.018)	0.039** (0.018)	-0.032 (0.026)	-0.032 (0.025)	-0.037* (0.021)	-0.036* (0.022)
Temperature shock in 2nd half of year 16 after birth	-0.237*** (0.090)	-0.249*** (0.084)	-0.213** (0.086)	-0.233*** (0.087)	-0.041 (0.111)	-0.083 (0.108)	-0.062 (0.102)	-0.059 (0.100)
Temperature shock in 2nd half of year 16 after birth ^2	0.034** (0.016)	0.026* (0.015)	0.034** (0.014)	0.036** (0.014)	-0.029** (0.013)	-0.023* (0.014)	-0.021* (0.012)	-0.021* (0.012)
Temperature shock in 1st half of year 17 after birth	-0.008 (0.133)	0.033 (0.126)	-0.088 (0.144)	-0.112 (0.140)	0.045 (0.119)	0.040 (0.120)	0.046 (0.106)	0.048 (0.106)
Temperature shock in 1st half of year 17 after birth ^2	0.005 (0.020)	0.006 (0.019)	0.005 (0.021)	0.006 (0.021)	0.020* (0.012)	0.015 (0.013)	0.014 (0.012)	0.014 (0.013)
Temperature shock in 2nd half of year 17 after birth	0.255* (0.145)	0.283** (0.140)	0.249* (0.137)	0.243* (0.134)	0.043 (0.113)	0.038 (0.114)	0.037 (0.108)	0.034 (0.108)

Temperature shock in 2nd half of year 17 after birth ^2	0.004 (0.015)	0.002 (0.017)	0.005 (0.015)	0.006 (0.015)	0.006 (0.010)	0.010 (0.010)	0.005 (0.010)	0.005 (0.010)
Temperature shock in 1st half of year 18 after birth	0.299** (0.147)	0.281** (0.142)	0.338** (0.149)	0.357** (0.147)	0.150 (0.110)	0.099 (0.113)	0.094 (0.114)	0.087 (0.115)
Temperature shock in 1st half of year 18 after birth ^2	-0.024 (0.019)	-0.022 (0.019)	-0.028 (0.017)	-0.026 (0.018)	-0.020 (0.012)	-0.017 (0.012)	-0.017 (0.011)	-0.017 (0.011)
Temperature shock in 2nd half of year 18 after birth	0.078 (0.159)	0.043 (0.153)	0.057 (0.154)	0.077 (0.159)	0.059 (0.137)	0.025 (0.134)	0.033 (0.130)	0.030 (0.130)
Temperature shock in 2nd half of year 18 after birth ^2	-0.003 (0.018)	0.002 (0.019)	-0.002 (0.018)	-0.006 (0.019)	-0.009 (0.015)	-0.001 (0.015)	-0.009 (0.013)	-0.009 (0.013)
Temperature shock in 1st half of year 19 after birth	0.344** (0.158)	0.345** (0.151)	0.334** (0.162)	0.328** (0.161)	-0.151 (0.112)	-0.135 (0.116)	-0.170 (0.117)	-0.166 (0.119)
Temperature shock in 1st half of year 19 after birth ^2	-0.017 (0.016)	-0.013 (0.016)	-0.017 (0.016)	-0.017 (0.016)	-0.002 (0.010)	-0.001 (0.009)	0.003 (0.009)	0.002 (0.009)
Temperature shock in 2nd half of year 19 after birth	-0.147** (0.072)	-0.120* (0.069)	-0.175** (0.070)	-0.177*** (0.069)	0.080 (0.069)	0.072 (0.066)	0.079 (0.062)	0.082 (0.063)
Temperature shock in 2nd half of year 19 after birth ^2	0.021* (0.012)	0.024** (0.012)	0.018 (0.011)	0.016 (0.011)	-0.002 (0.010)	-0.001 (0.010)	-0.003 (0.008)	-0.003 (0.008)
Constant	-27.755*** (6.748)	-25.310*** (6.563)	-22.559*** (6.392)	-22.660*** (6.594)	-5.314 (7.271)	-7.541 (7.602)	-6.680 (7.622)	-6.810 (7.552)
Observations	827	822	874	874	827	822	874	874
R-squared	0.25	0.25	0.26	0.25	0.24	0.22	0.21	0.20

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

Table A.4.9: Effect of weather shocks on moving for family formation in India

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Moved for Family Formation				Dependent Variable: Moved for Other Reason			
Math Score (2009)	-0.240** (0.107)				0.250*** (0.055)			
Reading Score (2009)		-0.133 (0.098)				0.235*** (0.054)		
Agency Score (2009)			-0.265* (0.136)				0.181* (0.100)	
Pride Score (2009)				-0.149 (0.098)				-0.059 (0.079)
Rainfall shock in 1st half of year 14 after birth	-0.004* (0.002)	-0.005** (0.002)	-0.004* (0.002)	-0.004* (0.002)	-0.000 (0.001)	0.000 (0.002)	-0.001 (0.001)	-0.001 (0.001)
Rainfall shock in 1st half of year 14 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 14 after birth	-0.006*** (0.002)	-0.006** (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)
Rainfall shock in 2nd half of year 14 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 15 after birth	0.001 (0.002)	0.001 (0.002)	0.001 (0.001)	0.001 (0.002)	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)
Rainfall shock in 1st half of year 15 after birth ^2	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	0.000* (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)
Rainfall shock in 2nd half of year 15 after birth	0.003 (0.002)	0.002 (0.003)	0.004** (0.002)	0.005** (0.002)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)	0.001 (0.002)
Rainfall shock in 2nd half of year 15 after birth ^2	-0.000** (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 16 after birth	0.002 (0.002)	0.003** (0.001)	0.002 (0.001)	0.002 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)

Rainfall shock in 1st half of year 16 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000* (0.000)
Rainfall shock in 2nd half of year 16 after birth	0.005** (0.002)	0.006*** (0.002)	0.004* (0.002)	0.004* (0.002)	-0.000 (0.001)	-0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Rainfall shock in 2nd half of year 16 after birth ^2	0.000 (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	-0.002 (0.002)	0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.000 (0.002)	-0.000 (0.002)	0.001 (0.001)	0.001 (0.001)
Rainfall shock in 1st half of year 17 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000* (0.000)
Rainfall shock in 2nd half of year 17 after birth	0.003 (0.003)	0.003 (0.003)	0.002 (0.002)	0.002 (0.002)	-0.002 (0.001)	-0.002 (0.002)	-0.003* (0.001)	-0.002 (0.002)
Rainfall shock in 2nd half of year 17 after birth ^2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000** (0.000)	-0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 18 after birth	-0.002 (0.002)	0.001 (0.003)	-0.001 (0.002)	-0.000 (0.002)	0.003** (0.002)	0.003 (0.002)	0.004** (0.002)	0.004*** (0.001)
Rainfall shock in 1st half of year 18 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)
Rainfall shock in 2nd half of year 18 after birth	-0.008*** (0.003)	-0.011*** (0.003)	-0.006** (0.003)	-0.006** (0.003)	-0.002 (0.002)	-0.003** (0.002)	-0.003** (0.001)	-0.003** (0.001)
Rainfall shock in 2nd half of year 18 after birth ^2	-0.000 (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 19 after birth	-0.000 (0.002)	0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	0.002* (0.001)	0.003** (0.001)	0.002* (0.001)	0.003* (0.001)
Rainfall shock in 1st half of year 19 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 19 after birth	0.001 (0.003)	0.003 (0.003)	0.000 (0.003)	0.000 (0.003)	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Rainfall shock in 2nd half of year 19 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)

Temperature shock in 1st half of year 14 after birth	-0.024 (0.144)	-0.223 (0.161)	-0.027 (0.132)	-0.019 (0.134)	-0.141 (0.096)	-0.140 (0.104)	-0.181* (0.094)	-0.180* (0.095)
Temperature shock in 1st half of year 14 after birth ^2	0.022 (0.035)	-0.009 (0.039)	0.018 (0.035)	0.015 (0.036)	-0.016 (0.021)	-0.015 (0.023)	-0.024 (0.021)	-0.022 (0.021)
Temperature shock in 2nd half of year 14 after birth	0.172* (0.093)	0.231** (0.099)	0.138 (0.084)	0.131 (0.084)	-0.009 (0.062)	-0.030 (0.063)	-0.005 (0.061)	0.007 (0.061)
Temperature shock in 2nd half of year 14 after birth ^2	-0.009 (0.023)	-0.017 (0.026)	-0.016 (0.021)	-0.014 (0.021)	0.011 (0.013)	0.011 (0.015)	0.016 (0.014)	0.017 (0.014)
Temperature shock in 1st half of year 15 after birth	0.095 (0.133)	0.180 (0.138)	0.106 (0.103)	0.093 (0.103)	-0.089 (0.096)	-0.060 (0.101)	-0.069 (0.092)	-0.068 (0.091)
Temperature shock in 1st half of year 15 after birth ^2	0.013 (0.029)	0.022 (0.032)	0.010 (0.025)	0.011 (0.026)	0.028* (0.016)	0.029* (0.018)	0.028* (0.015)	0.029* (0.015)
Temperature shock in 2nd half of year 15 after birth	0.110 (0.130)	0.193 (0.144)	0.147 (0.126)	0.166 (0.128)	0.067 (0.085)	0.078 (0.088)	0.098 (0.083)	0.099 (0.082)
Temperature shock in 2nd half of year 15 after birth ^2	0.046 (0.035)	0.057 (0.036)	0.024 (0.031)	0.025 (0.032)	0.013 (0.022)	0.008 (0.023)	0.010 (0.022)	0.011 (0.022)
Temperature shock in 1st half of year 16 after birth	-0.071 (0.163)	-0.122 (0.179)	0.020 (0.156)	0.025 (0.153)	-0.125 (0.104)	-0.118 (0.105)	-0.131 (0.101)	-0.142 (0.100)
Temperature shock in 1st half of year 16 after birth ^2	-0.108*** (0.040)	-0.118*** (0.041)	-0.102** (0.041)	-0.099** (0.039)	0.046* (0.027)	0.036 (0.030)	0.035 (0.026)	0.040 (0.026)
Temperature shock in 2nd half of year 16 after birth	-0.003 (0.099)	-0.044 (0.103)	0.049 (0.099)	0.045 (0.098)	0.035 (0.073)	0.061 (0.076)	-0.006 (0.072)	0.001 (0.071)
Temperature shock in 2nd half of year 16 after birth ^2	-0.059** (0.026)	-0.075*** (0.027)	-0.024 (0.024)	-0.020 (0.024)	0.013 (0.023)	0.005 (0.024)	0.006 (0.024)	0.010 (0.023)
Temperature shock in 1st half of year 17 after birth	0.072 (0.133)	0.042 (0.127)	0.075 (0.119)	0.081 (0.127)	-0.015 (0.094)	-0.001 (0.095)	-0.022 (0.084)	-0.017 (0.084)
Temperature shock in 1st half of year 17 after birth ^2	0.029 (0.033)	0.044 (0.033)	0.024 (0.031)	0.023 (0.031)	0.003 (0.023)	0.003 (0.022)	0.001 (0.020)	0.001 (0.020)
Temperature shock in 2nd half of year 17 after birth	-0.166 (0.138)	-0.214 (0.152)	-0.216* (0.125)	-0.215* (0.127)	-0.001 (0.062)	0.008 (0.068)	-0.008 (0.061)	-0.000 (0.061)

Temperature shock in 2nd half of year 17 after birth ^2	-0.007 (0.023)	0.005 (0.024)	0.005 (0.020)	0.007 (0.020)	-0.010 (0.014)	-0.010 (0.014)	-0.009 (0.014)	-0.012 (0.013)
Temperature shock in 1st half of year 18 after birth	0.133 (0.167)	0.131 (0.158)	0.005 (0.117)	-0.006 (0.119)	0.251*** (0.093)	0.186* (0.096)	0.226*** (0.087)	0.229*** (0.086)
Temperature shock in 1st half of year 18 after birth ^2	-0.088** (0.038)	-0.082** (0.039)	-0.066** (0.030)	-0.066** (0.030)	-0.015 (0.015)	-0.015 (0.016)	-0.012 (0.014)	-0.013 (0.014)
Temperature shock in 2nd half of year 18 after birth	-0.055 (0.179)	-0.166 (0.187)	-0.004 (0.159)	-0.007 (0.161)	0.007 (0.100)	-0.037 (0.098)	-0.035 (0.100)	-0.054 (0.100)
Temperature shock in 2nd half of year 18 after birth ^2	0.015 (0.038)	0.039 (0.039)	0.019 (0.033)	0.018 (0.033)	0.011 (0.019)	0.016 (0.020)	0.013 (0.019)	0.011 (0.019)
Temperature shock in 1st half of year 19 after birth	0.090 (0.128)	0.125 (0.130)	0.103 (0.119)	0.116 (0.122)	0.047 (0.076)	0.041 (0.077)	0.052 (0.070)	0.051 (0.071)
Temperature shock in 1st half of year 19 after birth ^2	-0.008 (0.023)	-0.009 (0.023)	-0.002 (0.021)	-0.002 (0.022)	0.002 (0.013)	0.007 (0.013)	0.002 (0.012)	0.001 (0.012)
Temperature shock in 2nd half of year 19 after birth	-0.064 (0.143)	-0.066 (0.154)	-0.080 (0.142)	-0.089 (0.143)	-0.062 (0.065)	-0.055 (0.063)	-0.069 (0.062)	-0.069 (0.061)
Temperature shock in 2nd half of year 19 after birth ^2	-0.007 (0.019)	-0.015 (0.020)	-0.019 (0.019)	-0.017 (0.018)	0.006 (0.011)	0.007 (0.012)	0.006 (0.011)	0.005 (0.011)
Constant	-6.359 (9.049)	-7.688 (10.363)	-0.907 (8.371)	-1.020 (8.572)	2.301 (6.317)	3.191 (6.501)	-0.186 (6.189)	-0.172 (6.090)
Observations	876	857	947	947	876	857	947	947
R-squared	0.37	0.38	0.39	0.38	0.19	0.19	0.18	0.18

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

Table A.4.10: Effect of weather shocks on moving for family formation in Vietnam

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Moved for Family Formation				Dependent Variable: Moved for Other Reason			
Math Score (2009)	-0.885*** (0.205)				0.407*** (0.066)			
Reading Score (2009)		-0.414*** (0.104)				0.318*** (0.058)		
Agency Score (2009)			-0.488** (0.215)				0.049 (0.091)	
Pride Score (2009)				-0.171 (0.209)				-0.047 (0.083)
Rainfall shock in 1st half of year 14 after birth	-0.008** (0.004)	-0.009** (0.004)	-0.009*** (0.003)	-0.008** (0.003)	-0.002* (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)
Rainfall shock in 1st half of year 14 after birth ^2	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 14 after birth	-0.003 (0.003)	-0.004 (0.003)	-0.005** (0.003)	-0.006** (0.002)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
Rainfall shock in 2nd half of year 14 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Rainfall shock in 1st half of year 15 after birth	-0.001 (0.003)	-0.002 (0.003)	-0.001 (0.003)	-0.000 (0.003)	-0.004*** (0.001)	-0.003** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
Rainfall shock in 1st half of year 15 after birth ^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.000 (0.000)	0.000** (0.000)	0.000** (0.000)
Rainfall shock in 2nd half of year 15 after birth	0.007*** (0.003)	0.005* (0.003)	0.004 (0.003)	0.003 (0.003)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Rainfall shock in 2nd half of year 15 after birth ^2	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000** (0.000)	-0.000** (0.000)
Rainfall shock in 1st half of year 16 after birth	0.003 (0.002)	0.003 (0.002)	0.002 (0.002)	0.002 (0.002)	-0.002 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)

Rainfall shock in 1st half of year 16 after birth ^2	-0.000*** (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 16 after birth	0.006** (0.003)	0.004 (0.003)	0.001 (0.003)	0.001 (0.003)	-0.000 (0.002)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Rainfall shock in 2nd half of year 16 after birth ^2	-0.000*** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 1st half of year 17 after birth	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	-0.000 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Rainfall shock in 1st half of year 17 after birth ^2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000** (0.000)	0.000** (0.000)
Rainfall shock in 2nd half of year 17 after birth	-0.005** (0.002)	-0.002 (0.002)	-0.001 (0.002)	-0.001 (0.002)	0.003** (0.001)	0.002** (0.001)	0.002* (0.001)	0.002* (0.001)
Rainfall shock in 2nd half of year 17 after birth ^2	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 18 after birth	0.000 (0.003)	0.003 (0.003)	0.001 (0.003)	0.001 (0.003)	0.003*** (0.001)	0.003** (0.001)	0.003** (0.001)	0.003** (0.001)
Rainfall shock in 1st half of year 18 after birth ^2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 18 after birth	0.002 (0.003)	-0.000 (0.002)	-0.001 (0.003)	-0.001 (0.002)	0.002** (0.001)	0.002** (0.001)	0.001* (0.001)	0.001* (0.001)
Rainfall shock in 2nd half of year 18 after birth ^2	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Rainfall shock in 1st half of year 19 after birth	-0.012** (0.005)	-0.011** (0.005)	-0.009** (0.004)	-0.008** (0.004)	0.002* (0.001)	0.003** (0.001)	0.002* (0.001)	0.002* (0.001)
Rainfall shock in 1st half of year 19 after birth ^2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 19 after birth	0.001 (0.002)	-0.001 (0.003)	0.001 (0.002)	0.001 (0.002)	-0.000 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)
Rainfall shock in 2nd half of year 19 after birth ^2	0.000** (0.000)	0.000** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)

Temperature shock in 1st half of year 14 after birth	0.293 (0.198)	0.139 (0.166)	0.080 (0.159)	0.090 (0.156)	-0.213** (0.096)	-0.205** (0.097)	-0.153 (0.098)	-0.157 (0.099)
Temperature shock in 1st half of year 14 after birth ^2	-0.210*** (0.043)	-0.159*** (0.043)	-0.113*** (0.038)	-0.113*** (0.038)	0.039** (0.018)	0.038** (0.019)	0.027 (0.019)	0.027 (0.019)
Temperature shock in 2nd half of year 14 after birth	0.539*** (0.186)	0.244 (0.170)	0.420** (0.212)	0.389** (0.196)	-0.334*** (0.108)	-0.318*** (0.115)	-0.265** (0.116)	-0.265** (0.118)
Temperature shock in 2nd half of year 14 after birth ^2	0.068 (0.049)	0.080** (0.034)	0.081*** (0.029)	0.082*** (0.030)	0.024 (0.016)	0.019 (0.015)	0.013 (0.015)	0.014 (0.015)
Temperature shock in 1st half of year 15 after birth	0.891*** (0.323)	0.666** (0.259)	0.665** (0.296)	0.727*** (0.281)	-0.342*** (0.122)	-0.298** (0.129)	-0.239* (0.138)	-0.243* (0.138)
Temperature shock in 1st half of year 15 after birth ^2	-0.063 (0.061)	-0.057 (0.047)	-0.029 (0.036)	-0.039 (0.036)	0.024 (0.016)	0.013 (0.017)	0.017 (0.017)	0.016 (0.017)
Temperature shock in 2nd half of year 15 after birth	-0.293 (0.281)	-0.199 (0.209)	-0.088 (0.283)	-0.015 (0.260)	-0.216** (0.091)	-0.193** (0.098)	-0.170* (0.100)	-0.172* (0.100)
Temperature shock in 2nd half of year 15 after birth ^2	-0.063 (0.041)	-0.070* (0.042)	-0.032 (0.039)	-0.042 (0.037)	0.029 (0.018)	0.022 (0.019)	0.015 (0.020)	0.015 (0.019)
Temperature shock in 1st half of year 16 after birth	1.501*** (0.415)	1.185*** (0.376)	0.985*** (0.357)	0.977*** (0.352)	-0.253** (0.111)	-0.233** (0.111)	-0.211** (0.106)	-0.215** (0.106)
Temperature shock in 1st half of year 16 after birth ^2	-0.128*** (0.039)	-0.092** (0.043)	-0.111*** (0.039)	-0.105** (0.041)	-0.001 (0.015)	-0.000 (0.014)	-0.006 (0.014)	-0.005 (0.014)
Temperature shock in 2nd half of year 16 after birth	-0.532*** (0.195)	-0.554** (0.234)	-0.404* (0.222)	-0.467** (0.215)	-0.193** (0.079)	-0.226*** (0.084)	-0.173** (0.080)	-0.171** (0.079)
Temperature shock in 2nd half of year 16 after birth ^2	-0.057** (0.026)	-0.071*** (0.023)	-0.052*** (0.020)	-0.059*** (0.018)	-0.009 (0.010)	-0.005 (0.010)	0.004 (0.010)	0.004 (0.010)
Temperature shock in 1st half of year 17 after birth	-0.031 (0.318)	0.090 (0.289)	0.263 (0.231)	0.294 (0.245)	0.016 (0.089)	0.030 (0.089)	-0.060 (0.084)	-0.058 (0.084)
Temperature shock in 1st half of year 17 after birth ^2	0.001 (0.026)	0.039* (0.020)	0.032* (0.018)	0.038** (0.017)	0.022** (0.010)	0.017* (0.010)	0.007 (0.010)	0.007 (0.010)
Temperature shock in 2nd half of year 17 after birth	-0.339 (0.227)	-0.360 (0.238)	-0.156 (0.197)	-0.156 (0.205)	0.206** (0.093)	0.227** (0.094)	0.213** (0.097)	0.212** (0.098)

Temperature shock in 2nd half of year 17 after birth ^2	-0.004 (0.019)	-0.005 (0.015)	0.009 (0.013)	0.007 (0.013)	0.012 (0.011)	0.012 (0.011)	0.010 (0.011)	0.010 (0.011)
Temperature shock in 1st half of year 18 after birth	0.147 (0.176)	0.312* (0.173)	0.129 (0.168)	0.139 (0.179)	0.246** (0.098)	0.208** (0.092)	0.214** (0.090)	0.213** (0.091)
Temperature shock in 1st half of year 18 after birth ^2	0.008 (0.026)	0.023 (0.025)	-0.012 (0.022)	-0.010 (0.021)	-0.019 (0.013)	-0.018 (0.013)	-0.016 (0.011)	-0.016 (0.011)
Temperature shock in 2nd half of year 18 after birth	-0.022 (0.370)	0.120 (0.289)	0.009 (0.232)	-0.041 (0.240)	0.133 (0.143)	0.083 (0.136)	0.147 (0.138)	0.146 (0.138)
Temperature shock in 2nd half of year 18 after birth ^2	0.022 (0.027)	-0.013 (0.021)	-0.027 (0.019)	-0.030 (0.018)	-0.014 (0.014)	-0.005 (0.014)	-0.010 (0.014)	-0.010 (0.014)
Temperature shock in 1st half of year 19 after birth	-1.200*** (0.371)	-0.895*** (0.292)	-0.760*** (0.261)	-0.778*** (0.254)	0.228* (0.124)	0.214* (0.126)	0.178 (0.124)	0.180 (0.124)
Temperature shock in 1st half of year 19 after birth ^2	0.029 (0.033)	0.009 (0.026)	0.010 (0.019)	0.014 (0.019)	-0.009 (0.011)	-0.006 (0.012)	-0.010 (0.011)	-0.011 (0.011)
Temperature shock in 2nd half of year 19 after birth	-0.047 (0.165)	0.041 (0.179)	0.036 (0.138)	0.034 (0.140)	0.049 (0.063)	0.054 (0.066)	0.017 (0.063)	0.014 (0.061)
Temperature shock in 2nd half of year 19 after birth ^2	0.013 (0.015)	-0.014 (0.018)	0.010 (0.014)	0.010 (0.014)	0.016** (0.008)	0.019** (0.007)	0.010 (0.007)	0.010 (0.008)
Constant	17.745 (13.666)	15.004 (11.832)	3.579 (10.185)	0.607 (12.280)	-19.534*** (6.625)	-20.779*** (7.009)	-17.622** (6.992)	-17.915** (7.041)
Observations	827	822	874	874	827	822	874	874
R-squared	0.56	0.49	0.47	0.46	0.27	0.26	0.24	0.24

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age to have a mean of zero and a standard deviation of one. All specifications include individual, household, and locality controls.

5. Does the Effect of Internal Migration on Skills depend on the Age at Migration?

Abstract

Previous studies in developed countries have looked at the age at migration as an element that affects the impact of international migration on educational *attainment*. However, little is known about the role of age on the effect of internal migration on educational *achievement*. In this article, I posit that migration can be seen not only as a productivity shifter in the production function of cognitive and psychosocial skills, but also, and more importantly, as an input in itself since it may have a direct effect on skills. I use household fixed effects and Two-Stage Least Squares estimation and exploit novel data on sibling pairs during childhood and adolescence in Ethiopia, India, Peru, and Vietnam. I find suggestive evidence that the direct effect of age at migration is negative, which is indicative that moving at a younger age leads to more skills formation relative to moving at an older age.

5.1 Introduction

At a time when there is rising concern about the future of work due to a fast-paced technological progress (World Bank, 2019a) and rapid urbanisation – especially in developing countries – (Gollin et al., 2016), there is an increasing need to address the challenge of preparing the future workforce for a constantly changing and highly competitive environment. Moreover, they need to be lifelong learners in order to adapt and thrive under these circumstances. Thus, building key cognitive and psychosocial skills among children today is the basis for preparing them to succeed tomorrow. If left aside, the cost of low human capital would be tremendous and, therefore, the need to invest in skills – by improving households, schools, and local environments – becomes a pressing issue for governments and families.

In this context, one way to develop human capital could be to migrate: by changing their place of residence, individuals can modify their investments and environments so that skills may be altered – although the direction of this change is unknown a priori (Franco Gavonel, 2018). This leads to an important question about the timing of migration: does age at migration matter? In the last two decades, a growing number of studies looked at the effect of age at immigration, mainly to Northern European countries and the US, on children's educational attainment (Böhlmark, 2008;

Chiswick & DebBurman, 2004; Gjefsen & Galloway, 2013; Hermansen, 2017; Lemmermann & Riphahn, 2018; Ohinata & van Ours, 2012; van den Berg et al., 2014). These studies find a negative association between age at immigration and educational outcomes, mainly schooling.

However, more schooling does not necessarily lead to more skills and despite there is a “learning crisis” around the world (Kaffenberg & Pritchett, 2017; World Bank, 2018a), there is a lack of studies on the impact of age at arrival on the educational *achievement* of migrants. Moreover, the studies mentioned above focus on international migration to developed countries and, to my knowledge, there is no evidence on internal migration in developing countries – which is surprising given that internal migration is more prevalent than international migration, especially in this context (Bell & Charles-Edwards, 2013). In this paper, I address these gaps and test whether age at migration affects the impact of internal migration on skills among children and adolescents in developing countries.

In order to address potential bias in previous studies, this article uses household fixed effects and Two-Stage Least Squares (FE-2SLS) using temperature and rainfall in the children’s place of residence as instruments for migration. I exploit within-family variation from a rich data set on children and their siblings aged 18 years old or less from the Young Lives study in Ethiopia, India (Andhra Pradesh and Telangana), Peru, and Vietnam. It must be noted that, as shown in my conceptual framework, in this article I estimate a conditional demand for skills, which correspond to the *total* effect of age at migration on skills. Following Todd and Wolpin (2003) and Glewwe and Miguel (2008), this effect can be decomposed on a *direct* effect – namely, the one that would be estimated through a production function – and *indirect* effects that result from behavioural responses to migration – which can be observed or unobserved. Furthermore, if we assume that the unobserved input responses have the same sign as the observed ones, we can infer the sign of the direct effect.

The skills considered in the analysis are cognitive – Peabody Picture Vocabulary Test (PPVT)⁴⁷ – and psychosocial – Agency, Pride, and Self-esteem. Both types of skills are important predictors of future economic and social behaviour (Heckman et al., 2006). It is also well documented that skills formation processes vary in their malleability at different ages in such a way that there are sensitive and critical periods for their acquisition⁴⁸ (Cunha et al., 2006). Therefore, it is not surprising to expect that there may be periods during which migration is better undertaken.

On one hand, there is vast evidence that shows that some inputs should be applied preferably in the earliest years since their return is higher during this period as basic skills are just being established and neural circuits are most plastic (Knudsen et al., 2006). Thus, we would expect a negative effect of age at migration as younger migrants are expected to perform better than older ones. On the other hand, it is plausible to expect that moving at a very early age may be disruptive for the child as they move away from relatively secure communities. Also, this is consistent with a new wave of research – mainly on developmental science – that finds that adolescence may be a second “window of opportunity” for growth and learning (Dahl et al., 2018; Fuhrmann et al., 2015; Knoll et al., 2016; Sheehan et al., 2017; Steinberg, 2014). Moreover, although the intelligence quotient (IQ) results can be affected by environmental factors only up to age 8-10, achievement test scores may still be affected over a much greater range of ages (Cunha et al., 2006).⁴⁹ Thus, we could also expect a positive effect of age at migration on skills.

In this study, I find evidence that supports the former hypothesis. In Ethiopia, younger migrants perform better in PPVT than their older counterparts; however, in Peru children that migrated at an older age obtain a higher PPVT score than their younger siblings. Meanwhile, in India and Vietnam I find no effect of age at migration. In order to find potential mechanisms that

⁴⁷ The PPVT is used in all countries, except for India, where the Mathematics test was administered instead.

⁴⁸ Sensitive periods can be broadly defined as stages of the technology of skill formation that are more productive in producing some skills than other stages, whereas critical periods are those in which only one stage alone can produce a given skill.

⁴⁹ It must be noted that achievement tests capture crystallised intelligence rather than fluid intelligence, which is better captured by IQ tests. In addition, the former tends to increase monotonically over the life course, whereas the latter tends to peak in early adulthood and then declines (Almlund et al., 2011).

explain these results, I look at the effect of age at migration on highest grade attained of sibling pairs. I find that age at migration has a positive effect on school attainment in Ethiopia and Peru. Putting together these results allows me to do important inferences regarding the impact of age at migration on cognitive skills: given that the observed input response is positive in Ethiopia, but the total effect is negative, we can infer that the direct effect is negative and is larger than the indirect effect. On the contrary, in Peru the observed input response dominates the direct effect and, therefore, I obtain a positive total effect. In India and Vietnam, indirect unobserved effects are at least as large as the direct effect. In sum, we can infer that the direct effect of age at migration is negative, which supports the claim that sensitive periods for migration exist at earlier ages, although the exact period goes beyond the scope of this paper.

Regarding psychosocial skills, results are more mixed: younger migrants outperform their older counterparts on Agency scores in Ethiopia. Following the same reasoning as above, we can infer that the direct effect of age at migration on Agency is negative, supporting too the hypothesis of sensitive periods during early years. Overall, these results are important to inform policymakers on two dimensions: first, how to tailor initiatives that encourage migration of families with children, and second, how to facilitate their corresponding assimilation to the host locality through education.

The remainder of the paper is organised as follows. Section 5.2 presents a conceptual framework that briefly illustrates the relationship between migration and skills. Section 5.3 describes the empirical strategy of the paper. Section 5.4 presents descriptive statistics. Section 5.5 describes the main results, section 5.6 presents a discussion and section 5.7 concludes.

5.2 Conceptual framework

This section lays out a framework that illustrates the relationship between children's skills and migration at different ages that is central to this study. The aim of the proposed framework is threefold: first, it will outline the mechanisms through which migration affects skills; second, it will guide the empirical specification to be estimated by eliciting its main assumptions; and third,

it will flag potential shortcomings in the estimation of the effects of interest. It is an adaptation of the model presented in Todd and Wolpin (2003) that conceives a child's skill as an outcome of a cumulative process of knowledge acquisition in which current and past inputs⁵⁰ are combined with the child's endowment or learning efficiency. With this specification of the skills' production function, I then derive a conditional demand for skills in order to show explicitly the equation to be estimated in section 4. The framework's key contributions are to incorporate migration as the variable of interest into the standard framework of skills formation highlighting the existence of critical and sensitive periods, as well as to allow the effect of migration on skills to vary across different stages of skills development.

As a first step, assume that S_{iha}^v denotes the skill v of child i residing with family h at age a , and it is determined by the following production function – namely, the structural relationship that expresses output (skills) as a function of inputs (endowments, investments, and environments).

$$S_{iha}^v = S_{a,F}^v [I_{ih}(a), M_{ih}(a), \mu_{ih0}; SH_{ih}(a), M_{ih}(a)] \quad (1)$$

where v stands for cognitive or psychosocial skills; $I_{ih}(a)$ denotes the histories of three subset of inputs (those supplied by the child's family, school and local environment) up to age a (Glewwe & King, 2001);⁵¹ $M_{ih}(a)$ denotes the history of migration and implies that migration experienced by the child depends on age a , which reflects the importance of the timing of migration since moving at different developmental stages may have differential effects on skills; μ_{ih0} stands for the child's endowed mental capacity, which includes factors such as ability and motivation; $SH_{ih}(a)$ denotes a vector of productivity shifters and their histories, such as parental education, school quality, and social interactions. Furthermore, the a subscript in $S_{a,F}^v []$ allows for the effect of investments, migration and endowment to vary with the age of the child, whereas the F subscript stands for production function of skills.

⁵⁰ I implicitly define inputs as all factors that have a direct impact on skills, whereas investments are a subset of inputs. For example, in value-added specifications, lagged skills would be inputs, rather than investments.

⁵¹ Following Cunha et al. (2006), this assumes that investments are general in nature, namely that they affect both cognitive and psychosocial skills – thus, they do not require a superscript v .

Migration is defined as a change in locality of residence and it is included twice in equation (1) because it is assumed to be both an input – it affects skills directly, namely $\frac{\partial S_{iha}^v}{\partial M_{iha}} \neq 0$ – and a productivity shifter – it affects them indirectly by influencing the productivity of other inputs, namely $\frac{\partial^2 S_{iha}^v}{\partial M_{iha} \partial I_{iha}} \neq 0$, where it is assumed that migration takes place before the application of investments when the child is aged a . A similar proposition was posited earlier by Cunha et al. (2006) when they apply the concepts of self-productivity – that the stock of past skills is an input in the production of skills in the next stage – and direct complementarity – that higher past skills increase the productivity of inputs in the next period – to the production of human capital. As an analogy to the stock of skills, I argue that migration is an input in itself and it also affects the productivity of other inputs. This is the main departure from the framework outlined by Franco Gavonell (2018), where migration is assumed to be only a productivity shifter.

Generally, migration is expected to change the level of inputs I_{iha} ; more specifically, as a result of migration, at least the subset of inputs provided by the local environment will change.⁵² Normally, migrating would also involve a change in the subset of school inputs.⁵³ In addition, if the child moves alone or if the household arrangements are affected by migration (e.g. the mother enters the labour market), she may even have changes in the three subsets of inputs.

However, the key point here is that migration is an input because its effect should not only be viewed as a mere change in the level of investments, but also as a change in *who* provides them. For example, a child may move with her family from one city to another without the level (or quality) of inputs being altered. Nevertheless, the sole act of *changing* actors (e.g. new teachers, classmates, neighbours, etc.) and environment, beyond the aspect of it that directly affects the

⁵² Strictly speaking, change in environment could also mean that the child's current environment changed due to war, invasion, dictatorship, or departure from a dictatorship. Glewwe and King (2001) also argue that parents' collective action may change the local environment.

⁵³ In the developing world, this may not necessarily be the rule since it is possible that a child that lives in a remote village attends school in the nearest town, and even if he migrates to another remote village, he may still attend the same school in town. See Lucas (1997) for a reference pointing that rural-rural migration is the most prevalent type of movement in developing countries.

provision of other inputs, calls for a process of adaptation that requires effort and may have a direct effect on the child's skills.

For example, new social norms require the child to adapt not only at school, but in the new community. Glewwe and King (2001) include cultural norms as one of the determinants of external stimulation; specifically, as part of educational characteristics of the local environment, together with school quality and availability. In this line, it could be argued further that cultural norms may affect all aspects of the child's life beyond the scholastic aspect and, therefore, it makes the process of adaptation more urgent. Moreover, moving to a place where a different language is spoken is likely to affect the child beyond the educational sphere since it entails a process of adaptation that requires effort, regardless of the level of proficiency that the child may already have on that language.⁵⁴

The sign of this effect – or the *ceteris paribus* effect holding other inputs constant (Todd & Wolpin, 2003) – is ambiguous⁵⁵ as it could promote the child's skills acquisition if he is comfortable with the change of environment or, alternatively, it could prevent him from acquiring more skills as a result of having migrated. The size of this effect, though, is likely to depend on the severity of the change in environment (i.e. on the cultural and socio-economic distance between the place of origin and the place of destination) conditional on the child's personality traits and preferences related to openness to new experiences⁵⁶ (i.e. loosely speaking, the former reflects how much he *can* adapt, while the latter reflects how much he *enjoys* adapting). The inclusion of personality traits

⁵⁴ Of course, if it is a completely new language for the child, this will likely affect his learning process in different subjects at school, but even if this is not the case and he already comes to the new place with some proficiency of it, the sole process of moving to a place where a different language is used in daily life requires adaptation. For a brief discussion on the role of language in educational achievement of immigrants see Ohinata and van Ours (2012).

⁵⁵ In this framework, it is not impossible for an input – in this case, migration – to have a negative effect on the output since this is also the case of the role of the incidence of infectious diseases as part of the local health environment in the health production function according to Glewwe and Miguel (2008) or the effect of risky behaviours, such as smoking or stressful lifestyles as part of the vector of inputs in the health production function according to Strauss and Thomas (2008).

⁵⁶ These are defined as the tendency to be open to new aesthetic, cultural, or intellectual experiences (Almlund et al., 2011).

implies that psychosocial skills may also be contained within equation (1) as inputs, which is consistent with the concepts of self- and cross-productivity discussed above (Cunha et al., 2006).

This direct effect of migration is compounded by the fact that, as mentioned before, it normally also leads to different levels of investments, which may result in indirect effects of migration. Note, however, that these indirect effects should also account for, as in the case of the direct effects, the impact of a relatively large *change* in inputs on skills since the more dramatic the change in inputs (regardless of the sign) as a result of migration, the more the child has to adapt to. Thus, the more negative this effect on skills would be, at least in the short run. Ideally, in the long run, if the change in inputs were positive, it would be expected that the child would adapt and “catch-up” with the natives in the destination place – though this proposition remains to be tested as it goes beyond the scope of this study.

Provided that migration implies a change in actors and general environment, it is reasonable to expect that migration is also a productivity shifter since it will affect the marginal productivity of investments in the current or subsequent periods as they are synergistic.⁵⁷ For instance, following the example of the child that migrates without having the level (or quality) of inputs changed, we could still expect that one hour at school with new teachers and classmates will now produce a different amount of skills than without migrating. The sign of this effect, however, remains ambiguous and should be tested empirically.

The estimation of equation (1), nevertheless, is difficult due to the non-observability of the endowment and the incomplete data on the history of inputs. One way to circumvent the latter is to substitute the investments for their direct determinants following Glewwe and Miguel (2008) and Franco Gavonell (2018). Maximising the household utility subject to a budget constraint and the technology presented in equation (1), yields the following reduced form demand for investments:

$$I_{iha} = I_{a,D}[P_h(a), SH_{ih}(a), W_{h0}, \sigma_h, \mu_{ih0}, r_h] \quad (2)$$

⁵⁷ This relates to the role of migration as a productivity shifter in equation (1).

where $P_h(a)$ denotes the history of prices of all inputs (investments and migration); W_{h0} stands for initial household wealth; σ_h is a parameter for parental preferences that are fixed over time; and r_h is an interest rate at which parents can borrow. The subscript D in $I_{a,D}$ stands for reduced form demand for skills.

Following Pollak (1969), migration can be treated as fixed in the short run at its utility maximising level (M_{iha}^*) at the age at which investments are applied. Thus, from equation (2) we obtain the following demand for investments conditional on migration:

$$I_{iha} = I_{a,CD}[M_{iha}^*; P'_h(a), SH_{ih}(a), W'_{h0}, \sigma_h, \mu_{ih0}, r_h] \quad (3)$$

where $P'_h(a)$ denotes the history of inputs' prices excluding the price of migration, and W'_{h0} stands for income net of expenditure on migration. The CD subscript in $I_{a,CD}$ stands for conditional demand for investments. Equation (3) implies that conditional on migration, the realised levels of exogenous variables up to age a are also fixed. Therefore, it excludes the price and expenditure on migration, which are subsumed in M_{iha}^* . Then, substituting equation (3) in equation (2) yields the following demand for skills conditional on migration:

$$S_{iha}^v = S_{a,CD}^v[M_{iha}^*; P'_h(a), SH_{ih}(a), W'_{h0}, \sigma_h, \mu_{ih0}, r_h] \quad (4)$$

where the CD subscript in $S_{a,CD}^v$ stands for conditional demand for skills. Following Todd and Wolpin (2003) and Glewwe and Miguel (2008), we can assert that equation (4) uncovers the total effect of migration on skills, which captures both direct and indirect effects.

This framework tells us that migration affects skills depending on the age at which it took place, and it does so through three channels: i) as an input of the production function – shown in equation (1); ii) as a productivity shifter and as an element that affects other productivity shifters – also shown in equation (1); and iii) by affecting the level of inputs – shown in equation (3). As a result, the total effect of migration on skills is ambiguous, since the level and productivity of some investments may increase whereas those of other investments may decrease as a result of migration.

5.3 Empirical strategy

The aim of this study is to estimate the difference in skills between older and younger migrants between ages 3 to 18, which allows me to consider sensitive periods during childhood and adolescence. In order to do this, I exploit a rich dataset on sibling pairs – see next section for more details on this –, which allows me to compare two siblings of different ages at the same calendar time.⁵⁸

Following Todd and Wolpin (2003), I will present the set of challenges and assumptions needed to estimate equation (4) under some data limitations. Assuming an additively linear specification, the empirical analogue of equation (4) can be expressed as:

$$S_{ihat} = \alpha_1^a M_{ihat} + \alpha_2^a F_h + \alpha_3^a \mu_{ih0}^c + \alpha_4^a \mathbf{P}'_h(\mathbf{a}) + \alpha_5^a \mathbf{S}\mathbf{H}_{ih}(\mathbf{a}) + \omega_{ihat} \quad (5)$$

where S_{ijat} is a variable for cognitive or psychosocial skills S of child i aged a residing with family h in period t – a new dimension added to equation (4). M_{ihat} is a binary variable that takes the value of 1 if the household – which includes both siblings – migrates between periods $t - 1$ and t .⁵⁹ Endowed mental capacity can be decomposed into a heritable family-specific component (μ_{h0}^f) and an orthogonal child-specific component (μ_{ih0}^c) such that a single household effect (F_h) can be defined as $F_h = \mu_{h0}^f + W'_{h0} + \sigma_h + r_h$. Also, ω_{ihat} is an error term that includes measurement error and any random factors beyond parents' control that may have affected skills at age a . Finally, α_1^a , α_2^a , and α_3^a are parameters, whereas α_4^a and α_5^a are coefficient vectors.

The first challenge to estimate equation (5) by ordinary least squares (OLS) is that we do not observe permanent factors, such as F_h and μ_{ih0}^c , which are correlated with migration. This issue arises if parents have some fixed characteristics that make them more prone to migrate and to provide inputs that facilitate learning to their children. For example, they may be more motivated

⁵⁸ The Young Lives data do not allow to match sibling pairs of same age at different calendar times since this procedure results on a very small sample. Moreover, the fact that in Ethiopia, India, and Vietnam the sibling can be older than the index child makes this task even more difficult to achieve.

⁵⁹ Since the Young Lives study does not collect a migration history of the sibling, I cannot observe his date of migration. Therefore, I assume that if the household moves, both siblings move too. As it will be explained in the next section, I cannot observe individual migration, so the results on this study only hold for households who have remained together.

and would be more likely to move and to help their children with homework. In order to address this, I use within-family estimators that exploit data from siblings at same calendar time t , but different ages (a and a'), so that all elements – both time variant and time invariant – common to both siblings are differenced out.⁶⁰ The analogue of equation (5) for sibling i' aged a' would be:

$$S_{ihart} = \alpha_1^{a'} M_{ihart} + \alpha_2^{a'} F_h + \alpha_3^{a'} \mu_{i'h_0}^c + \alpha_4^{a'} P'_h(a') + \alpha_5^{a'} SH_{i'h}(a') + \omega_{ihart} \quad (6)$$

Assuming that the household-fixed component is independent of age (namely that $\alpha_2^a = \alpha_2^{a'} = \alpha_2$) and subtracting equation (6) from (5) yields:

$$S_{ihat} - S_{i'ha't} = \alpha_1^a M_{ihat} - \alpha_1^{a'} M_{i'ha't} + \alpha_3^a \mu_{ih_0}^c - \alpha_3^{a'} \mu_{i'ha't}^c + \dots + \omega_{ihat} - \omega_{i'ha't} \quad (7)$$

As mentioned above, migration is assumed to be a family input, namely that each pair of siblings move – or stay – together with the household ($M_{ihat} = M_{i'ha't} = M_{ht}$). Then, equation (7) would be:

$$S_{ihat} - S_{i'ha't} = (\alpha_1^a - \alpha_1^{a'}) M_{ht} + [\alpha_3^a \mu_{ih_0}^c - \alpha_3^{a'} \mu_{i'ha't}^c + \dots + \omega_{ihat} - \omega_{i'ha't}] \quad (8)$$

where the error term contains all the elements in square brackets. This implies that differencing between siblings only cancels out the family-specific endowment, whereas the child-specific one is still in the error term. Furthermore, it is very likely that parents' decision to migrate take into account child heterogeneity and intra-household allocation of resources is made considering child-specific endowments and outcomes of *both* children. Thus, in order to deal with the remaining endogeneity of migration, I utilise 2SLS estimation: I use the price of migration as instrument since it is an element that affects M_{ht} , but that is excluded from the conditional demand in equation (4) and the error term in equation (8). As a proxy for the price of migration, I use weather shocks at the place of origin and their quadratic form – see Franco Gavonell (2018) for more details on the latter. I assume that weather variation alters the monetary and non-monetary costs of migration and, therefore, its price, which in turn affect the decision to migrate. This identification strategy is expected to produce consistent estimates of migration on skills as long as the weather shocks only

⁶⁰ It must be noted that since I am looking at household migration, each pair of siblings are exposed to the same amount of time in the destination place, namely, same time of migration and same time of assessment.

affect skills through their effect on the decision to migrate. This empirical strategy is also expected to deal with bias resulting from random measurement error in the variable of migration.

Given the aim of this study and the data availability, the actual estimation of equation (5) would be based on the following equation:

$$S_{iht} = \beta_0 + \beta_1 M_{ht} + \beta_2 M_{ht} * A_{iht} + \beta_3 F_h + \beta'_4 X_{iht} + \beta'_5 H_{ht-1} + \beta'_6 L_{ht-1} + \varepsilon_{iht} \quad (9)$$

where A_{iht} stands for age at the time of migration; X_{iht} is a vector of child characteristics that contains the child's gender, birth order, and ethnicity;⁶¹ H_{ht-1} is a vector of household characteristics that includes parental education and household wealth; L_{ht-1} is a vector of location variables such as the region of origin and whether the origin locality is urban; X_{iht} , H_{ht-1} , and L_{ht-1} account partly for $P'_h(a)$ and $SH_{ih}(a)$; ε_{iht} is an error term that includes all the omitted factors (e.g. any random factors beyond parental control that may have affected scores, the child-specific component of the endowment which is unknown to the parents until some time after birth, and measurement error). β_0 , β_1 and β_2 are parameters, whereas β_4 and β_5 are vectors of parameters. The key assumption of this specification is that the age at migration affects *linearly* the impact of migration on skills.

Differencing across siblings (index child i and her sibling i') in order to remove all elements common to both of them, yields the analogue of equation (7):

$$\Delta S_{ht} = \beta_2 M_{ht} * \Delta A_{ht} + \beta'_4 \Delta X_{ht} + \Delta \varepsilon_{ht} \quad (10)$$

where ΔS_{ht} is the difference in skills between siblings in household h in period t ; ΔA_{ht} is the difference in age at migration between siblings which is equivalent to the difference in dates of birth, since it is assumed that both siblings were affected by the decision to migrate (or not) at the same time; ΔX_{ht} is a vector that captures the differences in gender and birth order between siblings; and $\Delta \varepsilon_{ht}$ is the difference in the idiosyncratic error between siblings. Please note that differencing also eliminates household migration, household characteristics, and locality terms since they are

⁶¹ As it will be explained in the next section, equation (9) does not include age because the scores have already been standardised by age. This allows for a more flexible relationship between age and scores (not only linear).

common to both siblings and it is assumed that they have a common effect between siblings. Looking at equation (4), this procedure also differences out the history of prices and expenditure on migration since these are assumed to be common between siblings. In addition, the inclusion of gender and birth order – as part of X_{ht} – accounts partly for differential parental investments between siblings. For instance, parents may spend more in tuition on boys than on girls (Rosenzweig & Schultz, 1982) or, alternatively, on the first child (Price, 2008).

As mentioned above, once household heterogeneity is accounted for, we are still left with child heterogeneity: parents can still choose to migrate after observing the learning efficiency or endowments of their children (Glewwe et al., 2001). For instance, they may either reinforce (Becker & Tomes, 1976) or compensate (Behrman et al., 1982) differences in ability between siblings by choosing to migrate if it favours one of them. Then we would have that $E[M_{ht} * \Delta A_{ht}, \Delta \varepsilon_{ht}] \neq 0$ which leaves us still with endogeneity of migration. This concern will be addressed by estimating equation (10) by 2SLS using as instruments for migration rainfall and temperature deviations from the historical mean at the place of origin. These weather shocks (C_{ht-1}) are expected to be uncorrelated with children's endowments (ε_{iht} and ε_{iht}), so that $E[C_{ht-1} \Delta \varepsilon_{ht}] = 0$, and they would only affect their skills through migration. In order to attempt to test this assumption, I run a placebo test by estimating the association between each outcome and the instrument among non-migrants. The rationale for this is that given that they have not been exposed to treatment (migration), we would expect to find no association between each skill and the instrument. The results are discussed in section 5.4.

Another reason to implement this empirical strategy is that there may be measurement error in the indicator of migration. Specifically, if this error is uncorrelated with the true migration variable – namely, there is a classical errors-in-variables –, then it would lead to attenuation bias in the OLS estimation of β_2 in equation (10) and I would be underestimating the true β_2 . However, the use of weather shocks as instrumental variables would address this problem.

Given that migration is a binary indicator, I follow Wooldridge (2002) and Angrist and

Pischke (2009) to circumvent the forbidden regression problem – namely, substituting a nonlinear function of an endogenous variable with the same nonlinear function of fitted values from a first-stage estimation. The proposed strategy then is to first estimate an auxiliary probit model of migration on all the instruments and the same covariates used in the OLS model – namely, the vectors X_{iht} , H_{ht-1} , and L_{ht-1} in equation (9). Then, take the fitted value resulting from this estimation, interact it with ΔA_{ht} , and use it as an instrument for the interaction of migration and age at migration in the 2SLS estimation. It is worth noticing that this procedure results in an exactly identified model where the interaction of the fitted value and the difference in age at migration is the only instrument used in the estimation of 2SLS.

Still, following Glewwe et al. (2001), one main criticism remains to this identification strategy. There is a possibility that weather shocks affect household income – considering that between 27 and 79 percent of the sample live in rural areas – so that this might alter the provision of educational inputs, which may, ultimately, affect skills. Although this is an inherent weakness of my empirical strategy, at least I can speculate with the direction of the bias. On one hand, weather shocks may drive out families from their place of origin increasing the likelihood of migrating. In the case that they also impair mental development, this would induce a negative correlation between C_{ht-1} and ε_{iht} , leading to underestimate β_2 . On the other hand, weather shocks may actually make families use all possible resources to resist the shocks in their place of origin, decreasing the likelihood of migration and, ultimately, overestimating β_2 . Whether it is the former or the latter explanation that prevails remains an empirical question – see section 5.5 for more details on this.

Lastly, in order to explore one potential mechanism that may explain how the age at migration affects the impact of migration on skills, I look at the child's school attainment. This yields:

$$\Delta G_{ht} = \theta_2 M_{ht} * \Delta A_{ht} + \theta'_3 \Delta V_{ht} + \Delta \mu_{ht} \quad (11)$$

where ΔG_{ht} denotes the difference between siblings in the highest grade completed; ΔV_{ht} is a vector that contains the differences in gender, birth order and age (in 2013) between siblings;⁶² θ_2 is a parameter and θ_3 is a vector of parameters. Specifically, I look at the empirical analogue of equation (3) following the same identification strategy I used to estimate equation (4).

The estimation of equations (10) and (11) accounts for potential correlation of the unobserved component of outcomes corresponding to children living in the same community by clustering standard errors.

5.4 Descriptive statistics

This section presents a succinct description of the definitions used and a summary of the key variables utilised in the analysis.

5.4.1 Siblings

Since round 3 (2009), the Young Lives study also collects data on one sibling that could be either older or younger than the index child – except for Peru, where exclusively younger siblings were selected. For the analysis of this paper, I restricted the sample to keep only siblings aged 18 or below – the results remained unchanged and although they are not shown in the next section, they could be provided upon request. As discussed in chapter 2, attrition is relatively low as it ranges between 0.6 and 2.1 in each country – see Table 2.5 for a summary of sample size, attrition, ages, and dates per round.

5.4.2 Internal migration and age

Migrants are defined as those who reside in a different locality⁶³ in round 4 (2013) than in round 3 (2009) – a period during which the index children in the sample were between 9 and 12

⁶² Note that the difference in covariates between equations (11) and (12) is that ΔV_{ht} contains ΔX_{ht} since the former includes age in round 4.

⁶³ Locality is defined as a kebele in Ethiopia, a village/ward in India, a district in Peru, and a commune in Vietnam.

years old, respectively, and their siblings were 18 or below – regardless of where they lived during the intervening years. Similarly, non-migrants are those who reside in the same locality in rounds 3 and 4, even if they lived elsewhere in between. Thus, migration was captured by a binary indicator if the child’s community identifier changed between these rounds. In the remainder of this paper, this definition will be labelled as household migration, which is the definition used for the analysis. This is different than child migration as reported in the child’s migration history of the survey, which includes both household *and* individual migration. Therefore, the inferences made in this study hold only for household migration, but not for all types of migration. Table 5.1 compares these definitions and shows the overlap between the two of them. The lowest rate is almost 70 , which is reasonable for my purposes. It must be noted that most studies on age at migration and educational outcomes do not assume household migration as defined here, but they actually make use of data that include the *time* of arrival of each sibling. In my case, given that I do not have access to the sibling’s migration history, I cannot follow the convention by the literature.

Table 5.2 summarises the streams of migration. Urban-urban migration is the most frequent stream in Ethiopia and Peru, whereas rural-rural is the most predominant in India. In Vietnam, both are equally prevalent.

Table 5.1: Migration rates in each round of Young Lives survey

	Ethiopia			India			Peru			Vietnam		
	Household migration	Child Migration	Overlap									
Ever moved in any round	0.15	N.A.	N.A.	0.21	N.A.	N.A.	0.52	N.A.	N.A.	0.14	N.A.	N.A.
Between R1 and R2	0.02	N.A.	N.A.	0.05	N.A.	N.A.	0.35	N.A.	N.A.	0.07	N.A.	N.A.
Between R2 and R3	0.04	N.A.	N.A.	0.03	N.A.	N.A.	0.23	N.A.	N.A.	0.03	N.A.	N.A.
Between R3 and R4	0.14	0.08	0.86	0.19	0.23	0.69	0.20	0.11	0.85	0.07	0.06	0.96

Note: Household migration is defined as a change in community ID between rounds, whereas child migration is recorded in the child's migration history and it is defined as any change in locality that lasted at least 1 month in Vietnam, 2 months in Ethiopia and India, and 3 months in Peru. The overlap shows the share of children that moved (or stayed) according to both definitions. N.A. stands for Not Applicable.

Table 5.2: Streams of migration, conditional on place of origin

	Ethiopia		India		Peru		Vietnam	
Rural-Rural	0.63	80	0.65	160	0.49	49	0.74	42
Rural-Urban	0.38	48	0.35	88	0.51	51	0.26	15
Urban-Rural	0.17	22	0.30	34	0.08	23	0.02	1
Urban-Urban	0.83	108	0.70	78	0.92	251	0.98	43
N		258		360		374		101

Note: Each cell in the odd columns show the probability of moving to a given area conditional on the place of origin. For example, the probability of moving to a rural area conditional on living in another rural area in Ethiopia is 0.63. Therefore, the sum of the two cells corresponding to each type of move is 1.

The age at migration of each pair of siblings was calculated using the date of move from the migration history section of the household questionnaire – provided they had undertaken household migration. Specifically, in order to calculate the difference of the interaction of movement and age at migration ($M_{ht} * \Delta A_{ht}$), I used as an equivalent measure of ΔA_{ht} the difference in the dates of birth of the pair of siblings given that the date of migration is assumed to be common to both children.⁶⁴ Table 5.3 presents the sibling-paired sample with the rest of the YL sample. In Ethiopia and Vietnam, households in the paired sample are less likely to migrate than in the full sample. Table 5.4 compares descriptive statistics across siblings. On average, except for Vietnam, the index children migrated at an older age than their siblings. Figure 5.1 presents the distribution of the age at migration of index children and their siblings. Except for Vietnam, the age at migration of the index child peaks at 10 and 11 years, whereas that of the sibling peaks at 7 in Ethiopia and Peru and at 5 in Vietnam.

⁶⁴ In the YL survey, there is no date of migration for the panel sibling. Therefore, this was imputed, as mentioned above, under the assumption that both children moved with the rest of the household.

Table 5.3: Characteristics of YL sample

Variable	Sibling-Paired Sample			Rest of YL Sample			Difference (p-value)
	Mean	SD	Count	Mean	SD	Count	
<i>Ethiopia</i>							
PPVT score	-0.16	0.99	1008	0.31	0.92	330	0.0000
Agency score	-0.02	0.55	1280	0.06	0.53	277	0.0274
Pride score	-0.02	0.66	1281	0.05	0.63	277	0.1018
Esteem score	0.01	0.62	1280	-0.02	0.61	277	0.4523
Migrated	0.04	0.18	1285	0.07	0.25	273	0.0089
Age (months)	145.22	3.94	1285	145.82	3.67	273	0.0208
Male	0.52	0.50	1285	0.55	0.50	273	0.3408
First born	0.14	0.35	1285	0.56	0.50	273	0.0000
Father's education	4.33	4.08	1285	6.48	4.91	273	0.0000
Caregiver's education	2.44	3.43	1285	3.97	4.27	273	0.0000
Wealth index	0.31	0.16	1285	0.37	0.17	273	0.0000
Urban	0.31	0.46	1285	0.59	0.49	273	0.0000
Enrolled in school	0.94	0.24	1285	0.96	0.19	273	0.1178
Highest grade completed	3.37	1.79	1285	3.81	1.72	273	0.0002
<i>India</i>							
Math score	0.03	0.99	1222	-0.21	1.04	319	0.0002
Agency score	0.01	0.51	1304	-0.08	0.46	273	0.0151
Pride score	-0.01	0.62	1319	-0.06	0.59	259	0.1724
Esteem score	0.01	0.61	1322	-0.07	0.57	257	0.0531
Migrated	0.06	0.24	1341	0.07	0.26	242	0.4088
Age (months)	143.60	3.80	1341	143.98	3.94	242	0.1548
Male	0.54	0.50	1341	0.54	0.50	242	0.9722
First born	0.35	0.48	1341	0.53	0.50	242	0.0000
Father's education	5.56	5.07	1341	5.43	5.20	242	0.7023
Caregiver's education	3.58	4.48	1341	3.43	4.56	242	0.6402
Wealth index	0.51	0.18	1341	0.49	0.19	242	0.2002
Urban	0.24	0.43	1341	0.23	0.42	242	0.5794
Enrolled in school	0.97	0.16	1340	0.98	0.13	242	0.3183
Highest grade completed	5.44	1.30	1340	5.49	1.39	242	0.5362
<i>Peru</i>							
PPVT score	-0.19	1	656	0.12	0.99	892	0.0000
Agency score	-0.06	0.52	640	0.05	0.50	906	0.0001
Pride score	-0.04	0.63	644	0.03	0.60	904	0.0368
Esteem score	-0.01	0.57	649	0.01	0.58	900	0.4380
Migrated	0.09	0.29	662	0.08	0.28	891	0.5151
Age (months)	143.06	3.64	662	142.84	3.66	891	0.2359
Male	0.50	0.50	662	0.51	0.50	891	0.6779
First born	0.39	0.49	662	0.33	0.47	891	0.0168
Father's education	8.28	3.91	662	9.50	3.72	891	0.0000
Caregiver's education	6.97	4.24	662	8.37	4.34	891	0.0000
Wealth index	0.48	0.20	662	0.59	0.20	891	0.0000
Urban	0.64	0.48	662	0.81	0.39	891	0.0000
Enrolled in school	1	0.00	661	1.00	0.06	886	0.1344
Highest grade completed	6.01	0.99	661	6.12	0.88	886	0.0233

<i>Vietnam</i>							
PPVT score	-0.09	1.06	847	0.09	0.91	898	0.0001
Agency score	-0.01	0.53	830	0.00	0.55	927	0.6088
Pride score	-0.01	0.57	830	0.01	0.58	927	0.3322
Esteem score	0.02	0.57	831	-0.01	0.56	926	0.4179
Migrated	0.03	0.16	872	0.06	0.23	888	0.0016
Age (months)	146.24	3.73	872	146.38	3.69	888	0.4185
Male	0.49	0.50	872	0.54	0.50	888	0.0329
First born	0.36	0.48	872	0.57	0.50	888	0.0000
Father's education	6.94	4.05	872	8.08	3.76	888	0.0000
Caregiver's education	5.91	3.95	872	7.57	3.68	888	0.0000
Wealth index	0.58	0.20	872	0.62	0.17	888	0.0000
Urban	0.20	0.40	872	0.18	0.39	888	0.5028
Enrolled in school	0.97	0.16	871	0.98	0.12	888	0.1201
Highest grade completed	5.57	0.97	872	5.72	0.78	888	0.0004

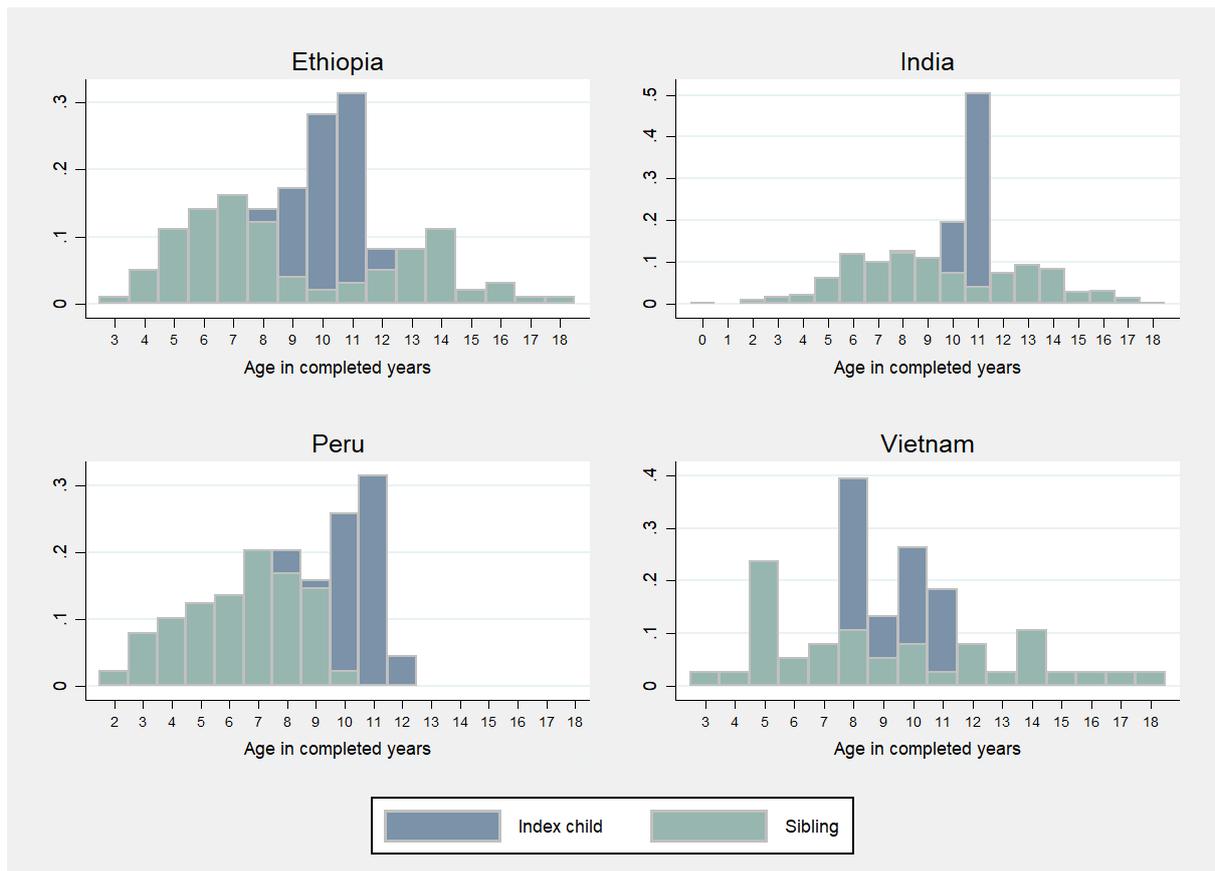
Note: Each score was measured in 2013, as well as enrolment and highest grade completed. The rest of covariates were measured in 2009. The sample of each score corresponds to the number of children that has data on that score, whereas the sample of each covariate corresponds to the number of children that has data on that covariate and in *any* of the scores. Migration is defined as household migration.

Table 5.4: Characteristics of the sibling-paired sample (2013)

Variable	Index Child			Sibling			Difference (p-value)
	Mean	SD	Count	Mean	SD	Count	
<i>Ethiopia</i>							
PPVT score	-0.16	0.99	1008	-0.01	0.99	1008	0.0010
Agency score	-0.02	0.55	1280	-0.03	0.55	1280	0.8589
Pride score	-0.02	0.66	1281	-0.01	0.66	1281	0.6877
Esteem score	0.01	0.62	1280	-0.01	0.62	1280	0.4960
Age (months)	145.22	3.94	1285	130.38	40.56	1285	0.0000
Age at migration (months)	124.49	13.86	96	111.46	43.28	96	0.0055
Male	0.52	0.50	1285	0.51	0.50	1285	0.5024
First born	0.14	0.35	1285	0.08	0.26	1285	0.0000
Enrolled in school	0.94	0.24	1285	0.86	0.35	1209	0.0000
Highest grade completed	3.37	1.79	1285	2.65	2.87	1204	0.0000
Age at enrolment	93.65	21.06	1217	87.09	22.13	1012	0.0000
<i>India</i>							
Math score	0.03	0.99	1222	-0.01	0.99	1222	0.3598
Agency score	0.01	0.51	1304	-0.01	0.53	1304	0.3623
Pride score	-0.01	0.62	1319	0.00	0.66	1319	0.7609
Esteem score	0.01	0.61	1322	-0.02	0.64	1322	0.1963
Age (months)	143.60	3.80	1341	139.01	37.23	1341	0.0000
Age at migration (months)	127.37	14.14	354	119.04	41.72	354	0.0004
Male	0.54	0.50	1341	0.49	0.50	1341	0.0149
First born	0.35	0.48	1341	0.29	0.45	1341	0.0001
Enrolled in school	0.97	0.16	1340	0.95	0.23	1293	0.0004
Highest grade completed	5.44	1.30	1340	5.05	3.09	1288	0.0000
Age at enrolment	63.65	9.48	1331	63.56	10.17	1248	0.8122
<i>Peru</i>							
PPVT score	-0.19	1	656	-0.01	1.01	656	0.0010
Agency score	-0.06	0.52	640	0.00	0.45	640	0.0307
Pride score	-0.04	0.63	644	-0.01	0.6	644	0.4735
Esteem score	-0.01	0.57	649	-0.02	0.57	649	0.8134
Age (months)	143.06	3.64	662	104.61	15.18	662	0.0000
Age at migration (months)	123.31	14.93	80	83.79	23.09	80	0.0000
Male	0.50	0.50	662	0.48	0.50	662	0.5829
First born	0.39	0.49	662	0.00	0.00	660	0.0000
Enrolled in school	1.00	0.00	661	1.00	0.07	657	0.0821
Highest grade completed	6.01	0.99	661	2.94	1.39	657	0.0000
Age at enrolment	71.85	5.83	661	72.06	5.37	624	0.5174
<i>Vietnam</i>							
PPVT score	-0.09	1.06	847	-0.02	1.00	847	0.1660
Agency score	-0.01	0.53	830	-0.04	0.59	830	0.2727
Pride score	-0.01	0.57	830	0.00	0.58	830	0.6198
Esteem score	0.02	0.57	831	0.01	0.54	831	0.8205
Age (months)	146.24	3.73	872	146.14	42.00	872	0.9443
Age at migration (months)	117.97	14.73	35	113.00	48.73	35	0.5653
Male	0.49	0.50	872	0.50	0.50	872	0.7376
First born	0.36	0.48	872	0.32	0.47	872	0.1063
Enrolled in school	0.97	0.16	871	0.90	0.30	867	0.0000
Highest grade completed	5.57	0.97	872	5.34	3.55	867	0.0642
Age at enrolment	73.02	5.19	861	72.90	6.27	809	0.6886

Note: Each score was measured in 2013, as well as enrolment, highest grade completed, and age.

Figure 5.1: Distribution of age at migration



Source: Young Lives Rounds 3 and 4.

5.4.3 Cognitive and psychosocial skills

Cognitive skills in Ethiopia, Peru, and Vietnam are expressed by a measure of receptive vocabulary, namely Peabody Picture Vocabulary Test (PPVT) collected in round 4 of the survey – see Cueto and Leon (2012) for more details on the test. It consists of slides with four pictures presented to the child, from which they have to choose the one that best represents the word named by the enumerator. It is considered a measure of receptive vocabulary because children do not need to name the objects themselves and they do not need to read or write (Schady et al., 2015). The score was calculated as the percentage of correct answers and then it was standardised by age within country to have a mean of zero and a standard deviation of one.

Unlike in the previous countries, cognitive skills in India are expressed by a measure of mathematics. The test consists of a series of questions about basic arithmetic operations and a set

of problems that require reading and solving. The score was also calculated as the percentage of correct answers, and then standardised by age within country to have a mean of zero and a standard deviation of one.

Psychosocial skills were captured by measures of agency, pride, and self-esteem. Agency can be defined as an individual's sense of control over their own life (Rotter, 1966). Self-esteem can be defined as a person's assessment of their self-worth, and its measure is based on Shavelson et al. (1976). Finally, pride is a concept related to that of self-esteem (Rosenberg, 1965), although it is linked to specific domains such as school, work, clothing, and housing (Dercon & Krishnan, 2009). Each index was constructed by first standardising each relevant item by age within country to have a mean of zero and a standard deviation of one, and then taking the average of all the corresponding items – for more details, see Franco Gavonel (2018).

As shown in Table 5.3, index children from the paired sample have a different performance on PPVT – better in India and worse in the other three countries – than the rest of the sample. A second difference lies on the agency score: in Ethiopia and Peru, children in the paired sample perform worse than those in the rest of the sample, whereas in India, the opposite holds. These two stylised facts suggest that my analysis could be based on a selected sample. Nevertheless, to the extent that I assert that my results are representative of relatively poor households with at least two children, sample selection need not be a particular concern.

As seen in Table 5.4, in all countries, the index children have attained a higher grade than their sibling. However, the former perform worse in PPVT than the latter in Ethiopia and Peru. In psychosocial scores, there is no significant difference between the two.

5.4.4 Weather shocks

The data on precipitation and temperature were provided by the Global Climate Database of the University of Delaware (UDEL), which was matched to the localities where children lived in rounds 3 and 4 – see Georgiadis (2017) for more details.⁶⁵

As discussed in section 5.2, in order to assess whether the impact of migration varies with the age at migration, I exploit exogenous variation in migration arising from weather shocks. These shocks are defined as precipitation and temperature deviations from the community and season average between rounds 3 and 4 (over the period 1950-2014). Specifically, the variables used for the analysis correspond to rainfall and temperature shocks averaged over each half of the year of the index child's life between the ages of 8 and 12 (the period between rounds 3 and 4, which is the one when household migration occurs). These deviations from the norm are used as a proxy for weather shocks that affect the household – given that this is my variable of interest. Still, as we will see in the next section, they are good predictors of household migration.

Recently there has been a growing body of literature dedicated to the study of the effect of environmental change on migration (Falco et al., 2018). The results are mixed and are more scant when it comes to relate this phenomenon with child migration.

5.5 Results

I will now show the results from the placebo test on the instrument. Table 5.5 shows the results: only in one case (out of 16), there is a 5 percent statistically significant association between the outcome and the instrument in Vietnam (column 14). Thus, we can assume – relatively safely – that the instrument does not affect the outcomes directly.

⁶⁵ I am deeply grateful to Dr. Andreas Georgiadis for having matched these data with the Young Lives data.

Table 5.5: Association between skills and the instrument among non-migrants

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Ethiopia				India		
	D_PPVT	D_Agency	D_Pride	D_Esteem	D_Math	D_Agency	D_Pride	D_Esteem
Male index child and female sibling	-0.107 (0.082)	0.001 (0.041)	0.006 (0.063)	-0.143** (0.054)	-0.061 (0.081)	-0.005 (0.062)	-0.217*** (0.063)	-0.117* (0.061)
Female index child and male sibling	-0.078 (0.093)	0.108** (0.048)	0.141** (0.068)	-0.068* (0.039)	-0.001 (0.097)	0.063 (0.072)	-0.136** (0.062)	0.037 (0.059)
Female index child and female sibling	-0.076 (0.079)	0.059 (0.047)	0.063 (0.065)	-0.104** (0.047)	0.032 (0.086)	0.023 (0.053)	-0.083 (0.063)	-0.039 (0.056)
Eldest index child only	0.178** (0.069)	0.051 (0.051)	-0.142* (0.069)	0.050 (0.071)	0.103 (0.081)	0.013 (0.064)	-0.002 (0.080)	-0.028 (0.062)
Eldest sibling only	0.090 (0.112)	-0.013 (0.084)	-0.084 (0.098)	-0.108 (0.078)	-0.007 (0.083)	-0.080* (0.042)	0.025 (0.073)	-0.094 (0.060)
Instrument	-0.017* (0.008)	-0.005 (0.006)	0.006 (0.007)	0.005 (0.009)	-0.006 (0.023)	-0.009 (0.015)	-0.007 (0.010)	-0.014 (0.009)
Constant	-0.101 (0.067)	-0.051* (0.029)	-0.040 (0.055)	0.082** (0.036)	-0.018 (0.068)	0.007 (0.059)	0.111* (0.061)	0.087 (0.053)
Observations	926	1,184	1,184	1,184	905	964	968	971

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Peru				Vietnam			
	D_PPVT	D_Agency	D_Pride	D_Esteem	D_PPVT	D_Agency	D_Pride	D_Esteem
Male index child and female sibling	0.021 (0.117)	0.035 (0.071)	-0.255*** (0.094)	-0.296*** (0.076)	0.099 (0.111)	-0.081 (0.068)	0.042 (0.078)	-0.153** (0.065)
Female index child and male sibling	-0.310*** (0.084)	-0.050 (0.065)	-0.123 (0.090)	-0.107 (0.093)	0.006 (0.094)	0.147* (0.078)	0.071 (0.064)	-0.048 (0.049)
Female index child and female sibling	-0.059 (0.114)	0.167** (0.075)	-0.054 (0.106)	-0.152 (0.094)	0.005 (0.094)	0.003 (0.069)	0.151* (0.078)	0.019 (0.082)
Eldest index child only	-0.052 (0.075)	0.162*** (0.061)	0.125 (0.080)	-0.013 (0.071)	0.095 (0.113)	-0.091** (0.044)	-0.071 (0.071)	-0.079 (0.049)
Eldest sibling only					0.089 (0.115)	-0.114* (0.059)	-0.104 (0.096)	-0.092 (0.063)
Instrument	0.007 (0.012)	0.004 (0.009)	-0.003 (0.015)	-0.009 (0.009)	0.035* (0.020)	0.027** (0.010)	0.022 (0.021)	-0.014 (0.015)
Constant	-0.101 (0.077)	-0.183*** (0.045)	0.018 (0.064)	0.168** (0.068)	-0.221** (0.095)	0.055 (0.069)	-0.026 (0.071)	0.116* (0.066)
Observations	575	562	566	570	813	793	793	794

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All outcomes reflect the difference in skills between siblings.

As explained in section 5.2, in order to estimate the difference in skills between older and younger migrants, I first estimated a probit model of migration on the instruments – weather shocks and their quadratic form – and the covariates from the OLS regression.⁶⁶ Table 5.6 shows the results for each country. The shocks that are significant in Ethiopia, India, and Peru are mainly those that are increasing on the level of rainfall or temperature and are concave – namely, the coefficient of the shock in levels has a positive sign often accompanied by a negative squared term. Vietnam is the exception to this observation as weather shocks follow primarily a decreasing and convex function. It must be noted that the literature that looks at the relationship between weather variation and migration is also inconclusive (Falco et al., 2018).

⁶⁶ A word of caution: this is an auxiliary regression – not a first-stage one – to calculate the predicted value of migration, which will then be used as an instrument for the 2SLS estimation.

Table 5.6: Effect of weather shocks on migration

	(1)	(2)	(3)	(4)
	Ethiopia	India	Peru	Vietnam
Male index child and female sibling	-0.177 (0.218)	-0.091 (0.168)	0.129 (0.125)	0.192 (0.259)
Female index child and male sibling	0.062 (0.266)	0.091 (0.176)	0.283* (0.160)	-0.149 (0.235)
Female index child and female sibling	0.019 (0.209)	-0.017 (0.185)	0.185 (0.149)	0.116 (0.323)
Eldest index child only	0.514*** (0.175)	0.429*** (0.136)	0.242 (0.207)	0.445 (0.296)
Eldest sibling only	0.031 (0.321)	-0.217 (0.178)		0.131 (0.317)
Rainfall shock in 1st half of year 9 after birth	0.001 (0.004)	0.000 (0.001)	0.003 (0.003)	-0.014** (0.006)
Rainfall shock in 1st half of year 9 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Rainfall shock in 2nd half of year 9 after birth	0.002 (0.005)	-0.000 (0.001)	-0.003 (0.003)	-0.001 (0.003)
Rainfall shock in 2nd half of year 9 after birth ^2	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000** (0.000)
Rainfall shock in 1st half of year 10 after birth	0.005 (0.004)	0.004** (0.002)	0.010*** (0.002)	0.011* (0.006)
Rainfall shock in 1st half of year 10 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)
Rainfall shock in 2nd half of year 10 after birth	0.000 (0.008)	0.002 (0.001)	0.001 (0.002)	-0.008 (0.006)
Rainfall shock in 2nd half of year 10 after birth ^2	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000** (0.000)
Rainfall shock in 1st half of year 11 after birth	0.003 (0.005)	0.002 (0.002)	-0.001 (0.002)	-0.020*** (0.006)
Rainfall shock in 1st half of year 11 after birth ^2	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000*** (0.000)
Rainfall shock in 2nd half of year 11 after birth	0.002 (0.004)	0.001 (0.002)	0.000 (0.001)	0.026** (0.011)
Rainfall shock in 2nd half of year 11 after birth ^2	0.000 (0.000)	-0.000 (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Rainfall shock in 1st half of year 12 after birth	0.000 (0.004)	-0.001 (0.002)	-0.002 (0.001)	-0.020** (0.009)
Rainfall shock in 1st half of year 12 after birth ^2	-0.000 (0.000)	-0.000 (0.000)	0.000*** (0.000)	-0.000** (0.000)
Rainfall shock in 2nd half of year 12 after birth	-0.013*** (0.004)	0.001 (0.002)	-0.002 (0.002)	-0.000 (0.005)
Rainfall shock in 2nd half of year 12 after birth ^2	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000* (0.000)
Temperature shock in 1st half of year 9 after birth	-0.005 (0.150)	-0.092 (0.084)	0.115** (0.054)	-1.070 (0.713)
Temperature shock in 1st half of year 9 after birth ^2	-0.013 (0.041)	0.062*** (0.024)	-0.001 (0.012)	0.053 (0.117)
Temperature shock in 2nd half of year 9 after birth	0.077 (0.149)	0.084 (0.067)	0.024 (0.038)	-0.371 (0.525)
Temperature shock in 2nd half of year 9 after birth ^2	-0.018 (0.037)	0.002 (0.024)	0.004 (0.006)	-0.017 (0.107)

Temperature shock in 1st half of year 10 after birth	0.373** (0.150)	0.178 (0.112)	-0.071 (0.050)	-2.494 (1.536)
Temperature shock in 1st half of year 10 after birth ^2	-0.063 (0.047)	0.003 (0.027)	-0.012* (0.006)	-0.274 (0.217)
Temperature shock in 2nd half of year 10 after birth	0.263*** (0.101)	0.184** (0.082)	-0.022 (0.042)	1.842** (0.744)
Temperature shock in 2nd half of year 10 after birth ^2	0.062 (0.049)	-0.018 (0.012)	-0.014 (0.011)	-0.166* (0.085)
Temperature shock in 1st half of year 11 after birth	-0.002 (0.178)	0.115 (0.076)	0.011 (0.034)	-1.326** (0.625)
Temperature shock in 1st half of year 11 after birth ^2	0.044 (0.074)	-0.004 (0.016)	-0.002 (0.001)	-0.074 (0.111)
Temperature shock in 2nd half of year 11 after birth	-0.121 (0.191)	0.010 (0.118)	0.038 (0.041)	0.679 (0.658)
Temperature shock in 2nd half of year 11 after birth ^2	-0.006 (0.067)	-0.028 (0.023)	0.001 (0.002)	0.082 (0.080)
Temperature shock in 1st half of year 12 after birth	-0.323 (0.229)	0.065 (0.092)	-0.061 (0.040)	1.250*** (0.439)
Temperature shock in 1st half of year 12 after birth ^2	-0.009 (0.052)	-0.024 (0.016)	0.006** (0.003)	-0.216*** (0.077)
Temperature shock in 2nd half of year 12 after birth	0.038 (0.149)	-0.061 (0.111)	0.004 (0.037)	0.976* (0.548)
Temperature shock in 2nd half of year 12 after birth ^2	-0.033 (0.080)	-0.007 (0.015)	-0.006 (0.004)	0.054 (0.046)
Constant	-1.741*** (0.626)	-1.390*** (0.349)	-1.628*** (0.258)	-14.497*** (3.979)
Observations	1,008	1,222	654	847
R-squared	0.21	0.14	0.13	0.34

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models include as covariates ethnicity and region (in 2009).

Table 5.7 presents the results obtained from estimating equation (10) for cognitive and psychosocial skills. For each country, the first column shows the results using OLS estimation, the second column using within-family estimation (FE, hereafter), and the third one using household fixed effects and 2SLS estimation (FE-2SLS, hereafter) – which is my preferred specification. Before interpreting the point estimates, I will first present the 2SLS diagnostics. At the bottom of the table lies the Kleibergen-Paap rk Wald F statistic (KPF-statistic, hereafter), which tests for weak instruments with non-i.i.d. errors. In all countries, the KPF-statistic is above the rule of thumb of 10 posited by Staiger and Stock (1997) and in most cases, above the critical values proposed by Stock and Yogo (2005). This suggests the rejection of the null hypothesis of weak instruments.

Turning to the analysis of the variables of interest in Panel A of Table 5.7, in Ethiopia I find that age at migration has a negative effect on PPVT, namely that younger migrants perform 0.023 standard deviations better than older ones. Although the size of this effect is relatively small, it is worth noting that it is significant at the 1 percent level of significance. This finding goes in line with the literature on sensitive periods of human development, according to which cognitive skills are better developed at earlier ages. On the contrary, in the other countries I do not find evidence of an effect of age at migration probably due to the fact that 2SLS generally tend to have large standard errors and that clustered standard errors also tend to be larger. It must be noted that the direction of the bias in the OLS estimates also varies by country. Except for Vietnam, the OLS estimates are positive and greater than the FE estimates, which implies that children living in households with characteristics that are positively correlated with PPVT scores – for example, better-off households – are more likely to migrate. This leads to an overestimation of the OLS point estimates. Furthermore, when comparing the FE with the FE-2SLS estimates, we observe that in Ethiopia, India, and Vietnam the former is larger than the latter, suggesting that there is a positive bias in the FE estimates. Since FE-2SLS accounts for both household and child heterogeneity, this implies that more able children migrate at an older age.

Table 5.7: Effects of migration by age on skills

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Ethiopia			India			Peru			Vietnam		
	OLS	FE	FE-2SLS	OLS	FE	FE-2SLS	OLS	FE	FE-2SLS	OLS	FE	FE-2SLS
<i>Panel A - Dependent variable: PPVT Score (2013)</i>												
Migration*AgeM	0.007 (0.009)	-0.005* (0.003)	-0.023*** (0.007)	0.006 (0.007)	-0.001 (0.003)	-0.001 (0.011)	0.013 (0.008)	0.003 (0.002)	0.019 (0.011)	-0.022* (0.012)	-0.004 (0.007)	0.010 (0.014)
Observations	1,008	1,008	1,008	1,222	1,222	1,222	654	654	654	847	847	847
K-P F-Statistic			17.27			25.82			32.05			10.83
<i>Panel B - Dependent variable: Agency Score (2013)</i>												
Migration*AgeM	0.006 (0.005)	-0.004* (0.002)	-0.016** (0.007)	-0.002 (0.004)	-0.001 (0.001)	-0.003 (0.008)	-0.005 (0.004)	0.001 (0.001)	0.003 (0.007)	-0.001 (0.006)	-0.001 (0.003)	0.011** (0.005)
Observations	1,280	1,280	1,280	1,304	1,304	1,304	638	638	638	830	830	830
K-P F-Statistic			16.56			22.80			19.39			39.82
<i>Panel C - Dependent variable: Pride Score (2013)</i>												
Migration*AgeM	0.000 (0.007)	0.001 (0.003)	0.003 (0.012)	0.003 (0.005)	0.002 (0.002)	0.003 (0.006)	-0.005 (0.003)	0.004* (0.002)	-0.000 (0.012)	0.006 (0.009)	-0.006 (0.005)	0.003 (0.008)
Observations	1,280	1,280	1,280	1,314	1,314	1,314	642	642	642	830	830	830
K-P F-Statistic			16.56			24.23			19.63			39.82
<i>Panel D - Dependent variable: Self-Esteem Score (2013)</i>												
Migration*AgeM	-0.005 (0.005)	0.001 (0.003)	0.004 (0.010)	-0.003 (0.005)	0.003 (0.002)	-0.005 (0.006)	-0.000 (0.003)	0.000 (0.002)	-0.009 (0.006)	-0.007 (0.007)	0.005* (0.003)	-0.007 (0.006)
Observations	1,280	1,280	1,280	1,322	1,322	1,322	647	647	647	831	831	831
K-P F-Statistic			16.56			26.03			34.14			39.81

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All scores are standardised by age within country to have a mean of zero and a standard deviation of one. Panel A corresponds to Math Score in India. The models specification in columns (1), (4), (7), and (10) include the following covariates: migration, gender, ethnicity, birth order, father's and caregiver's education, wealth, type of locality (urban) in 2009, and region in 2009. The specification in all other columns include only the following combinations of gender and birth order: male index child and female sibling, female index child and male sibling, female index child and female sibling, eldest index child only, and eldest sibling only (except for Peru, where the index child is always older than the sibling).

Regarding the psychosocial skills, panel B shows that younger migrants obtain higher Agency scores than older ones in Ethiopia, whereas the opposite holds in Vietnam. It is worth noting that these results do not contradict each other since, in Vietnam, the coefficient obtained on PPVT is positive (albeit not statistically significant), which means that older migrants perform better than younger migrants. Therefore, in both countries scores on PPVT and Agency respond in a similar direction to the age at migration, which goes in line with the notion of cross-productivity, whereby psychosocial skills can be inputs in the cognitive skills production function, and vice versa (Cunha & Heckman, 2007).

In panels C and D, I do not find evidence of a differential effect of migration by age in any of the countries. Given that the size of these coefficients are very small, the standard errors may not be responsible for the lack of significance. Instead, a potential explanation for this could be that there may be different technologies of skills formation between cognitive and psychosocial skills – still this is something that yet needs to be tested.

Given that this analysis comprises four outcomes in four countries, inferences need to account for potential correlation among skills, which may lead to the multiple-inference problem (Anderson, 2012). This was done by controlling for the False Discovery Rate (FDR) using the method proposed in Benjamini and Yekutieli (2001). Table 5.8 compares the p-values obtained from single hypothesis testing (as in Table 5.7) with the q-values obtained from multiple hypotheses testing. The results suggest that the effects found on PPVT and Agency in Ethiopia are still significant (at the 10 percent level of significance) controlling for the FDR, implying that the results obtained in this paper are still robust to multiple hypotheses testing.

Table 5.8: P-Values and Q-Values of Age at Migration adjusted for Multiple Testing Procedures

Outcome	Ethiopia			India			Peru			Vietnam		
	Estimate	P-Value	Q-Value									
PPVT	-0.0227	0.001	0.005	-0.0006	0.960	1.00	0.0185	0.10	0.66	0.0104	0.470	1.00
Agency	-0.0155	0.022	0.093	-0.0035	0.640	1.00	0.0033	0.64	1.00	0.0114	0.030	0.25
Pride	0.0029	0.810	1.000	0.0033	0.590	1.00	-0.0004	0.97	1.00	0.003	0.710	1.00
Self-Esteem	0.0042	0.660	1.000	-0.0052	0.350	1.00	-0.0085	0.16	0.66	-0.0068	0.280	1.00

The columns under P-Value and Q-Value were calculated using the Benjamini-Yekutieli method as explained in section 4.5.2.

In order to explore potential mechanisms that may elucidate the findings presented above, I tested whether there is a differential effect of moving on school attainment by age at migration.⁶⁷ Table 5.9 shows that in Ethiopia and Peru the age of migration has a positive effect on grade completion – namely, older migrants have higher school attainment than younger ones (controlling for age). This finding allows me to deduce the sign of the direct effect of age at migration on skills. Given that in Ethiopia the total effect of age at migration on cognitive skills is negative and its indirect effect on the observed input is positive, we can infer that the direct effect of age at migration on skills is negative and it dominates the indirect effects – assuming that the effect on unobserved inputs have the same sign as on the observed ones.

Analogously, given that in Peru the total effect is positive (although not statistically significant), we can infer that the indirect effects are greater in magnitude than the direct ones. Lastly, for India and Vietnam, where I do not find evidence of a (statistically significant) total effect or observed indirect effect, I can conclude that the unobserved indirect effect is at least as large as the direct one. A similar reasoning allows me to infer that the effect of age at migration on psychosocial skills – specifically, Agency – is negative too.

In sum, this study provides suggestive evidence that the hypothesis of sensitive periods at early ages dominates the impact of age at migration on skills. Thus, younger migrants perform better than older ones in both cognitive and psychosocial skills. However, in some contexts this may be offset or even exceeded by behavioural responses as a result of migration.

My findings go in line with previous studies on international migration, where the main result is that younger immigrants fare better at schooling than their older counterparts. Nevertheless, this thesis provides a more nuanced piece of evidence in that it looks at internal migration in developing countries and its effect on different dimensions of human capital, namely cognitive and psychosocial skills.

⁶⁷ I also looked at time use as an input, but my results do not show any systematic pattern on the effect of age at migration on time allocation. Table A.5.1 shows these results.

Table 5.9: Effects of age at migration on years of schooling

	Dependent variable: Years of schooling (2013)											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	OLS	Ethiopia FE	FE-2SLS	OLS	India FE	FE-2SLS	OLS	Peru FE	FE-2SLS	OLS	Vietnam FE	FE-2SLS
Migration*AgeM	0.011 (0.019)	0.007 (0.008)	0.106** (0.051)	0.004 (0.008)	-0.009 (0.009)	-0.020 (0.025)	-0.006 (0.007)	-0.003 (0.003)	0.018** (0.009)	-0.003 (0.011)	0.003 (0.003)	0.002 (0.016)
Observations	1,217	1,217	1,217	1,315	1,315	1,315	676	676	676	874	874	874
R-squared	0.443	0.624	0.565	0.150	0.656	0.655	0.170	0.563	0.539	0.283	0.719	0.719
K-P F-Statistic			9.99			20.87			26.01			10.70

Note: Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models control for age in 2013 and the following combinations of gender and birth order: male index child and female sibling, female index child and male sibling, female index child and female sibling, eldest index child only, and eldest sibling only (except for Peru, where the index child is always older than the sibling). The auxiliary regression includes the previous covariates, as well as ethnicity, father's and caregiver's education, wealth, type of locality (urban) in 2009, and region in 2009.

5.6 Discussion

In this article, I use FE-2SLS to identify a causal effect of age at migration on the development of cognitive and psychosocial skills. I find suggestive evidence that moving at a younger age is better in terms of skills formation, although in some contexts input responses may counteract this effect, resulting in opposite or even null effects. It must be noted, however, that a limitation of this research is that I do not estimate a production function of skills, and therefore, this paper only provides suggestive evidence rather than direct proof of existence of sensitive periods.

Another limitation of this study, nevertheless, is that I only look at household migration and do not account for individual migration. In a time when child migration is ubiquitous, increasing the risks that children and adolescents are exposed to (UNICEF, 2017), this represents an interesting avenue for further research.

5.7 Conclusions

Age at migration matters and the earlier a child moves the better. This is consistent with vast evidence on early years as a sensitive (or even critical) period. Although I cannot assert what is the exact age at which the effect of migration on skills peaks, I can suggest that – among poor households – moving at an earlier age within the country is more beneficial for the child than doing it at an older age.

APPENDIX

Table A.5.1: Effects of age at migration on time use

	(1) Sleep	(2) Caring for others	(3) Domestic tasks	(4) Work within household	(5) Work outside household	(6) At school	(7) Studying outside school	(8) Leisure
<i>Ethiopia</i>								
Migration*AgeM	-0.000 (0.012)	-0.015 (0.017)	-0.015 (0.021)	0.000 (0.022)	0.034 (0.044)	-0.015 (0.027)	-0.001 (0.013)	-0.003 (0.025)
Observations	950	676	676	676	676	676	676	950
K-P F-Statistic	8.90	21.84	21.79	21.76	21.75	21.82	21.77	8.90
<i>India</i>								
Migration*AgeM	0.008 (0.008)	-0.007* (0.004)	0.005 (0.010)	0.053 (0.039)	0.021 (0.016)	-0.102** (0.049)	-0.016 (0.024)	0.021 (0.017)
Observations	1,156	1,014	1,014	1,014	1,014	1,014	1,014	1,156
K-P F-Statistic	19.45	15.32	15.32	15.32	15.50	15.31	15.34	19.45
<i>Peru</i>								
Migration*AgeM	0.004 (0.010)	0.032 (0.022)	-0.013 (0.017)	-0.051 (0.034)	-0.012* (0.007)	0.020 (0.018)	-0.021 (0.032)	0.008 (0.014)
Observations	645	454	454	453	454	454	454	645
K-P F-Statistic	32.96	10.95	11.05	10.48	11.05	11.02	11.04	32.96
<i>Vietnam</i>								
Migration*AgeM	-0.005 (0.009)	0.010 (0.015)	0.011 (0.016)	-0.031 (0.026)	0.027 (0.055)	-0.027 (0.039)	0.006 (0.030)	-0.003 (0.018)
Observations	812	603	620	620	617	615	608	812
K-P F-Statistic	34.46	18.95	27.60	27.44	27.48	27.60	26.14	34.46

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models control for age and the following combinations of gender and birth order: male index child and female sibling, female index child and male sibling, female index child and female sibling, eldest index child only, and eldest sibling only (except for Peru, where the index child is always older than the sibling). The auxiliary regression includes the previous covariates, as well as ethnicity, father's and caregiver's education, wealth, type of locality (urban) in 2009, and region in 2009.

6. Concluding Remarks

In this thesis, I look at different aspects of internal migration and human capital of young people in the context of developing countries. In the first paper, I analyse the patterns and drivers of youth migration. In the second paper, I evaluate the impact of internal migration on cognitive and psychosocial skills. Lastly, in the third paper, I assess whether age at migration has an impact on cognitive and psychosocial skills. The overarching conclusion is that migration matters for skills formation, and the earlier it takes place, the better. A priori, the direction of the total effect is ambiguous since some inputs in the skills production function may increase, while others may decrease as a result of migration. In addition, the age at migration plays an important role on skills formation since results provide suggestive evidence that younger migrants show better cognitive and psychosocial performance than older migrants do.

The main policy implications of these findings are related to the two dimensions that this thesis is focused on: migration and human capital. First, migration policies that address primarily young people should consider that young migrants are not a homogeneous segment of the population. Therefore, policies that encourage migration need to take into account that not all types of migration are beneficial for young people in terms of skills formation. For example, the subgroup of migrants that move for studies is the only one that shows relative upskilling, whereas those that move for work and for family formation show relative deskilling. However, in order to streamline this view into policymaking, it is important to strengthen first the migration management capacity of governments so that the process of migration is well connected with a wider strategy of economic development and planning. For example, in Namibia, the government has recently launched a National Migration Policy Draft to strengthen migration management and has validated it with different levels of government and civil society (Hilongwa, 2019).

Second, it is now widely accepted that human capital constitutes a strategic driver of economic growth and development (Hanushek & Woessmann, 2008). An indication of this is the recently launched Human Capital Project by the World Bank (World Bank, 2019b), which aims at increasing and improving investments in people. In this sense, the key lesson that this thesis provides is that migration *can* be a mechanism for skills formation. Therefore, it plays a role in the performance of young people. As a result, educational policies, for example, could provide incentives for families to migrate when their children are younger so that they can make the most of this process. In this line, conditional cash transfers could inform their beneficiaries about the advantages of moving while their children are young – provided that the objective is to improve children’s human capital as a long-term household strategy (rather than short-term income creation since migrating may have other impacts on the household).

The policy implications stated above are just speculative and go beyond the scope of this thesis. However, investigating interventions that manage different types of youth migration and assessing their impact on both cognitive and psychosocial skills could be an interesting avenue for further research.

7. References

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