

Child Welfare in Rural Ethiopia: The role of Transfers, Old Age Support and Child Ability

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To my dearest Starinká, Mamka and Muchko

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Abstract

This research examines intrahousehold resource allocation in rural Ethiopia with a focus on education and asset investments in children. Throughout our work we look for potential causes and signs of gender bias in childhood investments. In particular, we first look at whether poverty constrained households substitute the provision of asset and education transfers to their children. For this purpose we use a two-stages-least-squares model of educational demand which controls for the endogeneity of asset transfers. We find a trade-off mechanism between endowments of human capital and bequests to girls but not to boys. Secondly, we investigate the effect of parental transfers on the postmarital residence of children. We look at whether transfers induce old age security from children in the form of a postmarital residence close to the parents. We model postmarital residence using a multinomial logit which controls for the endogeneity of transfers. Our results show that off-springs who receive more assets are more likely to live close to their parents after marriage. On the contrary, more education induces children to leave their home at marriage. Finally, we analyze household choices between education and farm employment of children. We model these choices jointly while looking at how ability affects them. Our findings suggest that in the long-run, more able children accumulate more schooling and less farming experience. However, the latter only applies to boys; farming decisions regarding girls are independent of their ability. In summary, our research addresses four important factors affecting the welfare of children and young people in rural Ethiopia: educational investments, asset transfers, old age security mechanisms and child work decisions.

JEL classification: D12, D13, I21, I22, O15

Keywords: Human capital, Non-human capital, Old-age support , Postmarital residence, Ability, Child work.

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Chapter 1

Introduction

Our research focuses on analysing crucial components of economic development and gender empowerment in rural Ethiopia, which are despite many national and international initiatives still a cause for concern in this developing African economy. Ethiopia is a country with the second largest population (85,237,338) in Sub-Saharan Africa after Nigeria. Its per capita income was US\$350 (Atlas Method) in 2009, which is very low compared to the Sub-Saharan African average of US\$1,077. It is a prevalently agricultural country, with 85% of the labour force working in the agricultural sector. In addition, the Ethiopian agriculture suffers from frequent droughts and poor technology. The main industries prevalent in the country are food processing, production of beverages and textiles. The country has small reserves of gold, platinum, copper and natural gas. The main commodity of export is coffee but due to low coffee prices in the international market, many farmers choose to produce tchat.¹ The main ethnic groups in the country are Oromos, Amharas and Tigrays and over 70% of the population is either Orthodox or Muslim (The World Bank, 2010; Central Intelligence Agency (CIA) World Factbook, 2010).²

¹Leaves which are mild stimulants.

²The World Bank country overview. Web. 15 September 2010:
<<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/ETHIOPIAEXTN/0,,menuPK:295939~pagePK:141132~piPK:141107~theSitePK:295930,00.html>>

Ethiopia is a country with high levels of poverty, low levels of schooling, a persistent educational gender gap and one of the highest incidences of child labour in the world. In addition, approximately 85% of the population lives in rural areas with subsistence farming as the main economic activity of households (World Development Indicators, 2010; CIA World Factbook, 2010). In 2005, 39% of Ethiopians lived below the international poverty line of US\$1.25 a day. The average years of schooling attained by young adults between the ages of 15-19 was three years in the poorest quintile compared to six years in the richest quintile. Primary completion rates in the richest quintile were 90% in 2005 and for the poorest quintile 14%. Both the latter and the former suggest that there is education income inequality in the country. This inequality extends to gender as well. Male and female primary completion rates in 2008 were at 56% and 48% respectively; literacy rates for males and females were 62% and 39% in 2008. Also, 74% of the poorest children versus 30% of the richest children were out of school in 2005 (WDI, 2010)³.

In the last decade, Ethiopia has implemented various national and international initiatives aimed at reaching the Millennium Development Goals, which include universal primary education, the eradication of poverty and the elimination of gender disparities by 2015. These initiatives have led to some improvements, including the increase in the ratio of female to male primary enrolment rates from 59% in 1995 to 83% in 2005; primary school enrolment rates increased from 18% in 1995 to 59% in 2005 for females, and from 28% in 1995 to 66% in 2005 for males. However, there is still a persistent educational gender gap in the country (WDI, 2010).

According to the ILO (The International Labour Organisation) and the Ethiopian

Central Intelligence Agency. Web. 15 September 2010:

<https://www.cia.gov/library/publications/the-world-factbook/geos/et.html>

³Primary completion rate is “the number of students in the last year of primary school minus the number of repeaters in that grade, divided by the number of students of official graduation age” (WDI Report, 2010, pp. 119). Children out of school are the percentage of primary aged children who are out of primary or secondary school. Literacy rate represents people “above 15 years of age who can with understanding, read and write a short, simple statement on their everyday life” (WDI 2010, pp. 51).

Child Labour Survey 2001 (ECLS), 52% of Ethiopian children aged 5-7 were economically active in 2001. Also, in 2005, 69.4% of children aged 7-14 had work as their primary activity and 30.6% combined school with work. Out of the latter groups, around 95% were employed in unpaid family agricultural work (WDI 2010).

These striking statistics and the fact that 46% of the Ethiopian population is very young, between the ages of 5-14, highlight the importance of research in the areas of childhood investments and children's time allocation in education and child labour.

The work in this analysis can be divided into three main areas of research. The second chapter analyses the determinants of intrahousehold resource allocation in terms of educational investments in children and looks at the relationship between human-capital and non-human-capital parental transfers⁴ and whether they are complements or substitutes. The third chapter looks at motives behind the provision of parental transfers to children and how different transfers to children affect old age security prospects of parents. The last chapter provides a simultaneous analysis of the determinants of child work and education with main focus on the effect of ability.

1.1 The Role of the Rural Ethiopian Environment in Parental Investment Decisions

Before we proceed to introduce the main ideas and contributions of the different chapters in this thesis, we will explain a few specifics about rural Ethiopia. This will give a clear picture of the conditions which affect child welfare in terms of education, asset provision or child work; and the context within which we do this research.

Rural Ethiopia is characterised by a specific form of *household specialisation* which

⁴Two most important indicators of household wealth in rural Ethiopia are land and livestock ownership. Therefore, we analyse these two types of non-human capital transfers. We focus on inheritance transfers which mostly take place at marriage or shortly after marriage. Also, due to early age at marriage, inheritance decisions are most likely made at the time of educational investment decisions.

affects educational outcomes of children. Boys mostly specialise in household farm work and girls specialise in household chores. In addition, boys have better labour market opportunities and they mostly bring their brides to stay with their parents upon marriage. Consequently, they are more likely to provide old age support to their parents.

The *production setting* is characterised by a lack of important inputs such as physical capital or appropriate production technologies. In addition, frequent droughts and heavy rains affect household production outcomes. Therefore labour (including child work) is one of the most decisive inputs in the production function of the household. The work of females is much more time intensive which translates in higher opportunity costs of schooling relative to boys (Gopal, 1998). This production setting and household poverty constraints often lead parents to allocate children's time towards work at the expense of schooling. The primary reasons for not attending school in rural Ethiopia include poverty and the need for household work (ECLS 2001, Bhalotra 2003). Overall, 89% of children in rural Ethiopia are involved in elementary agricultural and related activities such as cattle herding or farming (ECLS, 2001). Moreover, only 1% of children and less than 10% of adults work outside the household for wages or in-kind payment, which shows the importance of subsistence farming for rural households and at the same time the constraints that children face in terms of schooling and overall child welfare (Cockburn and Dostie, 2007).

Another aspect of rural Ethiopian households which is important for the future welfare of children is the *marriage market*. The marriage market is an institution which affects investment decisions of parents. It is characterised by assortative matching, meaning that brides and grooms who are more educated and bring more assets to the marriage will most likely be matched with partners who have more education and assets as well (Fafchamps and Quisumbing 2002, 2003, 2005). In rural Ethiopia, "the marriage market appears to be a major conduit for household and gender inequality

in the Ethiopian countryside” (Fafchamps and Quisumbing, 2005, pp. 377). Also, due to the fact that marriages are mostly virilocal⁵, marriages are mostly characterised by a transfer of human-capital from the bride’s parents to the groom’s parents. The former and the latter often translate in grooms receiving more asset transfers relative to girls. On the other hand, in relation to the marriage market, females who bring more assets to the marriage and are more educated, have higher control over household production and sale decisions and do better in terms of settlement in the case of a divorce. Brides who bring more assets to the marriage have higher claim rights over asset division upon divorce which is often reflected in higher bargaining power within the marriage. Divorce norms still lead to males gaining more from the divorce, but brides with higher bargaining power, in terms of transfers and education that they bring to the marriage, are better off relative to the ones who bring less (Gopal, 1998; Fafchamps and Quisumbing 2002, 2005). Even though divorce is common in rural Ethiopia, divorced women are less likely to remarry relative to their male counterparts (Fafchamps and Quisumbing, 2005). Culture and marriage laws have an important impact on the role of females in the households and their education and therefore on their decision-making power (Coclough et al., 2000; Rose and Al-Samarrai, 2001; Ezra, 2003; Fafchamps and Quisumbing, 2002; Fafchamps and Quisumbing, 2005).

Also, *customs and customary laws* play a very important role in intrahousehold resource allocation in rural Ethiopia often leading to differing interpretations of the national law. In the last decade, many laws have been implemented in Ethiopia to protect the role of gender and children in terms of child work, access to asset ownership or age at marriage.⁶ However, many of these laws are interpreted differently in different parts of the country due to the formalisation of customary laws and interpretation of

⁵Virilocality describes a custom where after the wedding, the bride moves to the family home of her groom before she moves to the groom’s own house.

⁶These include Ethiopia’s Labour Proclamation no. 42/1993 setting the minimum age for work at 14 and setting working conditions, ratification of the ILO Convention no. 138 on Minimum Age for Employment in May 1999, the General Education Quality Improvement Program of 2009 and The Constitution of Ethiopia 1994.

national laws at the local level (The World Bank, 2009). These interpretations often work as local adaptations to the law and are not always in line with the law.

Another important aspect connected to our research is the *Ethiopian Land Reform of 1975*. This reform abolished all private ownership of land and led to the consequent land redistribution following the policy of ‘Land to the Tiller’ or ‘Meret Larashu’. Following the reform, land should be provided to individuals who till the land in the households irrespective of the gender of the individual. However, in practice, land allocations are based on headship to the household, which is mostly taken by males. Land redistribution is often affected by individuals’ connections with Peasant Association⁷ (PA) members and redistribution is becoming scarce, increasing the role of parents in land endowments to young families. “Young couples typically obtain land through their parents, either directly or indirectly by having their parents lobby the PA” (Fafchamps and Quisumbing, 2005, pp. 13).

Summarising, the traditional and legal preconditions per se highlight the importance of assets and human-capital transfers to children for securing their future welfare but also for securing parents’ old age welfare. Moreover, they form a strong basis for gender bias in rural Ethiopia. Therefore, education and asset ownership are two important determinants of child welfare and parents who care about their children will consider this. The latter is the main motivation leading us to examine asset and education investments in rural Ethiopia and conditions surrounding them. Moreover, evidence suggests that Ethiopian females who own more land or are more educated are more likely to have a higher social status, improved access to credit, and better marriage and remarriage possibilities (Gopal, 1998).

⁷Peasant Associations, also named Kebeles, are regional entities parallel to towns or village councils.

1.2 Data Specification: The Ethiopian Rural Household Survey

For this research, we use the 1997 Ethiopian Rural Household Survey (ERHS). This survey was conducted by the International Food Policy Research Institute (IFPRI) in collaboration with the Economics Department, Addis Ababa University and the Centre for the Study of African Economies (CSAE) at the University of Oxford.⁸ The ERHS is a longitudinal dataset which covers 1,477 households with approximately 10,800 individuals in 15 villages during the years 1989, 1994, 1995, 1997, 1999 and 2004. Households in the villages were randomly selected but the choice of villages was selected non-randomly in order to cover the main farming systems in the country. The dataset represents households with all the main farming systems of Ethiopia but it is not representative for the country as a whole. The sample is distributed across four regions (Oromiya, Amhara, Tigray and the South) and represents the main ethnic groups in the country (the Oromos, Amharas, Tigrays and different ethnic groups from the Southern region such as the Gurages, the Gedeos and the Gamos).⁹

Our sample comes from a cross-section of 2,926 males and females in 1,463 households. In the second chapter we use the whole sample of households. In the consequent chapters, we extract 532 households with 1,064 individuals who are in their first marriages. Different sample choices were needed based on the hypothesis of each chapter. In chapter two we focus on all individuals, whether they are in their first, consequent marriages or single. However, in chapters three and four we focus on variables which can change after the first marriage, leading us to limit the sample to first marriages only.

We have chosen the Ethiopian Rural Household Survey 1997 because of its unique-

⁸The funding for the survey was provided by the Economic and Social Research Council (ESRC); Swedish International Development Agency (SIDA); United States Agency for International Development (USAID) and the World Bank.

⁹Appendix 1 provides a map of the sites surveyed in the ERHS.

ness and wide variety of topics covered. This round of the dataset provides extensive information on intergenerational transfers, childhood farming and schooling experience, marriage markets, family and individual socioeconomic characteristics and regional specifics.

1.3 Summary of Chapters: Motivations, Contributions and Findings

Chapter 2

The main motivation for this chapter emerges from the persistent low levels of education in rural Ethiopia which are accompanied by a significant gender gap in human-capital and asset ownership. The aim of this chapter is to examine how households in rural Ethiopia allocate their resources towards human-capital and non-human-capital transfers to children. We aim to understand the main factors driving these decisions which are very important in securing children’s future welfare.

This chapter emerges from the idea that decisions about investments in education and inheritance are taken simultaneously. This is a plausible assumption because many marriages in rural Ethiopia and in other parts of Sub-Saharan Africa are arranged when the children are still very young or in some cases even unborn. In rural Ethiopia parents endow their children with bequests at marriage or shortly after and because children marry very young, parental decisions about inheritance take place before marriage simultaneously with decisions about educational investments. According to Ezra:

“In Ethiopia, theoretically, age at first marriage for girls is determined by three sets of codified rules. One can also add customary law as a fourth set of rules. The three formal ones are: the Feteha Negest, the Ethiopian Civil Code, and the Sharia Law (binding only on Moslems). The Gada system,

which is the most prominent in the set of customary laws, is the fourth.

The Ethiopian Civil Code sets the minimum age at first marriage at 15, the Feteha Negest at 12, the Sharia Law at 9 and the Gada at 16 (Alasebu, 1988). And now, the National Population Policy stipulates that the minimum age at first marriage should be 18 years (NOP, 1993). However, neither the old laws nor the new one have any meaningful interpretation, demographically speaking, because marriages are not performed upon producing a birth certificate to prove that the minimum age requirement has been reached” (Ezra, 2003, pp. 511).

The ERHS village description files do not state the age at marriage in all the villages, but for the ones they do, the average age at marriage for girls is between 14-17 and for boys 14-19. In one of the villages, Shumsheha, boys may marry at the age of 14 and girls at the age of 6 (Bevan and Pankhurst, 1996).

Also, “alliance between the two families who are looking for each other for marital relationship starts early on when the would-be partners are still children and at times even before they were born” (Ezra, 2003, pp. 513). The latter underlines the importance of modelling intrahousehold decisions regarding inheritance and education simultaneously. Both decisions are most likely taken by parents before their children marry, which due to the early age at marriage, happens when children are very young.

We assume that children enter the parents’ utility function and parents secure the welfare of their children via two main sources, their educational attainment and/or the provision of asset transfers. Due to the assortative character of the marriage markets in rural Ethiopia, where grooms and brides match according to their human-capital and asset profiles, these endowments are also very important for the marriage prospects of children. The main question we wish to answer in this chapter is whether parents apply a trade-off or a complementary mechanism when deciding about asset and human-capital transfers to children. Finding out whether such a mechanism exists

will provide grounds for policy implications in different areas including ownership rights, marriage laws and education demand. In addition, due to the importance of asset ownership and education for the position of females in their marriage and for the health of their children (Fafchamps et al., 2009; Fafchamps and Quisumbing, 2002; Gopal, 1998), this research provides an insight to potential initiatives for improving the position of females and children in rural Ethiopia.

In this part of our research we contribute to the current literature on educational investments in children in rural Ethiopia by analysing how asset endowments affect human-capital investments. There are only a few papers which analyse the determinants of education and asset transfers in rural Ethiopia, and they do not combine them in one analysis. In most cases these papers focus on studying the determinants and effects of parental bargaining power, measured by assets brought to marriage, on intrahousehold resource allocation decisions about food, health or education investments (Fafchamps and Quisumbing, 2005; Fafchamps et al., 2007; Quisumbing and Maluccio 1999, 2003). Quisumbing and Hallman (2003) provide an analysis of individual, household and regional determinants of age at marriage, education and assets at marriage in six developing countries including Ethiopia. We extend their work by including the role of asset transfers and marriage market characteristics. Also, we study all marriages, whereas they include a study of first marriages only. Fafchamps and Quisumbing (2005) look at the determinants of assets brought to marriage in rural Ethiopia while controlling for exogenously given education and they do not find a significant effect of education. We study the other side of the causality while focusing on education determinants and we control for the possible endogeneity of inheritance. Finally, Fafchamps et al. (2009) analyse the determinants of individual welfare (including the education of children) in rural Ethiopian households with a focus on the effect of spousal bargaining power.

We implement a two-stage least squares methodology to model household educa-

tional demand. Due to the simultaneity of asset transfers and education, we treat the endogeneity of asset transfers in the educational demand function by instrumenting them. We choose spousal transfers, a binary variable for the presence of brothers and postmarital residence as instruments. Due to the assortative matching character of rural Ethiopian marriage markets, there is a high correlation between spousal assets and human-capital endowments (Fafchamps and Quisumbing, 2005). We also use an additional instrument for the grooms, which is the presence of male siblings. The rationale behind it is that brothers are competitors in terms of parental inheritance (Fafchamps and Quisumbing, 2005). Postmarital residence is an additional instrument we choose to use for bridal inheritance, because the postmarital location of the daughter is correlated with inheritance transfers.

Our empirical results confirm a trade-off mechanism between human-capital and non-human-capital investments in children. We find that inheritance transfers and educational investments are substitutes. In addition, this effect is only existent in the case of the females, signalling a potential gender bias. Grooms receive more education independently of inheritance transfers from parents but bequests to girls are followed by lower educational investments. Our findings imply that in poverty stricken areas with strong patrilocal customs of inheritance, parents not only provide less transfers to female children, but there is a trade-off in parental provision of human-capital and non-human-capital endowments to girls. Therefore, gender bias does not only apply to significant differences in absolute levels of asset and education endowments of males and females. In addition, females who are more advantaged in terms of receiving one type of transfer from their parents, either in the form of human-capital or asset transfers, will receive less of the other transfer.

Chapter 3

In rural Ethiopia, children are a very important source of old age support due to lagging capital and labour markets and the prevalence of household labour-intensive

subsistence farming as the main source of livelihood. In addition, marriage often follows a virilocal pattern which leads to the loss of parental returns from investments in their female children. Due to the prevalence of virilocality in the country, we aim to find out whether this custom is related to gender education and asset inequalities. Quisumbing and Maluccio (2003) suggest that sons are an important source of old age security for parents and one of the potential causes of gender bias in parental investments of education in rural Ethiopia is the need for future old age security. Fafchamps and Quisumbing's (2005) paper states that gender differences in inheritance transfers are related to an old age support motive. However, the authors do not develop or test this idea in their paper and we aim to fill this gap in the existing literature.

Our dataset does not provide information on financial or time transfers to parents. Due to the lack of old age support variables, we proxy old age support by the postmarital residence of children, i.e. the place of residence of the brides and grooms after marriage. We have a variable which states whether the child has moved from home at the time of the first marriage or whether they stay at their birthplace. We believe that this variable is a sensible proxy due to the difficulties of distance transfers in conditions of lacking transport infrastructure and the labour intensive character of household subsistence farming; the main source of household consumption. Therefore, when children's postmarital residence is close to their parents, it is much more likely that they will provide old age support to their parents either in financial terms or through labour and time devoted to the advantage of parents.

As far as we are aware, except in one case, discussed below, the literature does not provide an analysis similar to the one we provide in this chapter. The existing literature which provides the base for this analysis can be divided into two groups. In one group there are papers which analyse transfers between parents and children and look at motives behind these transfers (Willis, 1979; Bernheim, 1985; Cox, 1987; Lucas and Stark, 1985; Lillard and Willis, 1997; Hoddinot, 1992). The second group analyses

the determinants or effects of specific postmarital residence patterns (Rosenzweig and Stark, 1989; Korotayev, 2003; Baker and Jacobsen, 2007). We aim to create a bridge between the two and look at transfer motives in relation to postmarital residence as a proxy for old age support in rural Ethiopia. We contribute to the existing literature by analysing the determinants of different patterns of postmarital residence, while considering the role of human-capital investments and transfer provision in securing old age support.

The only paper that, to our knowledge, analyses the link between virilocal postmarital patterns and childhood investments is Levine and Kevane’s (2003) study of Indonesia. This paper finds that educational outcomes are independent of virilocality, but this custom has a detrimental effect on girl’s inheritance. In virilocal regions, daughters are less likely to inherit relative to sons. We extend their study by using African data and analysing other forms of postmarital residence patterns as well as virilocality. In addition, we endogeneise investments in the postmarital residence regression. Also, our postmarital residence variable is constructed from the realised migration at marriage, whereas Levine and Kevane’s residence variable is determined by the custom prevalent in the location as perceived by the location elders and determined by the percentage of virilocal marriages in the area. In our analysis, the variable measuring old age support, postmarital location, is disaggregated into four categories: virilocal, uxorilocal, neolocal and bilocal.¹⁰ In addition, we use another specification of postmarital residence in the form of a binary variable representing residence close to the parents.

Our empirical results confirm that one of the motives driving investments in children is the need for old age support from children. Children who receive more inheritance are more likely to live close to their parents after marriage. However, more

¹⁰Virilocality is explained above in footnote 5. Uxorilocality depicts a postmarital residence pattern where the groom moves to the location of the bride. In neolocal marriages, the married couple moves to live in a new place away from both sets of parents. Bilocal (ambilocal) marriage residence is characterised by the married couple residing at the location where both parents live.

educated children are more likely to migrate at marriage and therefore educational investments do not work as a source for securing old age support. These results suggest that prevalently virilocal patterns of postmarital residence could be one of the causes driving the existing gender bias in transfers to children in rural Ethiopia.

Chapter 4

One of the main problems affecting children's education and welfare in rural Ethiopia is the high incidence of child labour. Overall, 89% of children in rural Ethiopia are involved in elementary agricultural and related activities such as herding cattle and helping adults in farming (ECLS, 2001). The allocation of children's time between education and farming is one of the most important decisions which poor parents in rural Ethiopia have to face. Moreover, child labour is one of the biggest impediments to children's enrolment in rural Ethiopia (ECLS, 2001; Bhalotra, 2003). Children start working at a very early age and are often subjected to long working hours (Admassie, 2002). These facts serve as a motivation for this chapter, which aims to understand the determinants of the demand for child work. We study the allocation of children's time amongst education and farming with a focus on the effect that ability has on these parental choices.

The existing literature on child labour offers an extensive analysis of the determinants of child labour including the role of poverty, household composition, household size, parental education, individual and community characteristics (e.g. studies for Africa: Glewwe, 1996; Heady, 2003, for Latin America: Psacharopoulos, 1997; Ray 2002; for Asia: Rosati and Rossi, 2003; Phoumin, 2008). However, there is only one paper in the literature which studies the effect of ability on child labour and education. This is Bhalotra's and Angeriz's (2002) study of the role of ability in children's work and schooling in Ghana.¹¹ This paper concludes that male children who are more able are more likely to go to school and less likely to work. Our findings provide similar

¹¹We have not been able to view this paper because it is not published. However, Bhalotra (2003) and Bhalotra and Tzannatos (2003) summarize its results.

results. However, we extend this study by looking at total childhood accumulated farming and schooling experience rather than the likelihood of work versus school. Also, we use a dataset which has not been used for this purpose before.

Studies on child labour in rural Ethiopia do not analyse the role of child ability. Admassie (2000, 2002 and 2003) focuses on the analysis of the poverty-child labour link, Cockburn (2001) and Cockburn and Dostie (2007) examine how child labour and schooling differs with different components of asset profiles owned by households (land, tools, small and large livestock). Haile et al. (2007) studies the child labour-schooling link while looking at the effect of household socioeconomic characteristics including gender and household composition. We contribute to the existing literature on child labour by providing the analysis of the effect of child's ability on child work-schooling decisions in rural Ethiopia.

We estimate farming experience and schooling years completed during childhood as two simultaneous parental decisions. We construct two ability variables based on a quiz questionnaire which is available in the data. One is constructed as a dummy for correct answers to a question about mathematical skills. The other combines the mathematics ability measure with two other measures which come from answers to questions about people's knowledge of their surroundings.

Our results show that parental demand for boys' farming is a decreasing function of their ability. On the contrary, boys' and girls' schooling demand increases with their ability. We also find that gender, sibling composition and locality are additional variables which need consideration in child labour studies in rural Ethiopia. In addition, our results are consistent with other existing evidence on the poverty-child labour link.

1.4 Research Questions

To summarise, the main research questions we aim to answer in this thesis are:

- Do parents in rural Ethiopia face a trade-off when deciding about the provision of educational and asset transfers to their children?
- If there is a trade-off mechanism; does it differ by gender?
- Do virilocal postmarital patterns and the need for old age support drive gender asset and educational inequality?
- Do parents allocate children's time in a way that more able children acquire more education and are required to work less?

Answering these questions will contribute to the current literature on intrahousehold resource and time allocation and its impact on children's education and work in rural Ethiopia. It will also allow us to better understand how marriage market characteristics of the country affect investments in children and old age support for parents. Finally, it will create grounds for more informed policy choices.

Chapter 2

Household School Choices: The Decision between Providing Transfers or Schooling to the Child

Abstract

This chapter focuses on exploring the idea that in conditions of rural Ethiopia, parental decisions about investments in the human capital of their children and about the bequests provided to them are negatively related. We analyse this by implementing a two-stage least squares model of educational attainment which controls for the endogeneity of bequests. In addition, we control for other determinants of educational investments such as household welfare, sibling composition, parental socioeconomic characteristics and marriage market characteristics. We test our hypothesis using the Ethiopian Rural Household Survey dataset. Our results support our hypothesis as they indicate that there is a trade-off between education and bequest transfers to girls. Girls who receive higher bequests acquire less education. Family welfare, sibling composition and arrangement of marriages also affect children's schooling. Our principal finding about the bequests-human capital substitution mechanism could provide policy implications for targeting low female educational levels in rural Ethiopia.

JEL classification: D12, I22, O15

Keywords: Human capital, Bequests, Marriage market.

2.1 Introduction

In rural parts of Ethiopia, which are prevalently agrarian and characterised by subsistence farming and poverty¹, intrahousehold resource allocation and transfers are of crucial importance for securing the welfare of household members. At the same time, educational development is an important contributing factor for the improvement of household farming systems which in turn leads to better household welfare.² Our main idea emerges from these two facts and we aim to explore the main determinants of educational outcomes with a focus on the relationship between transfers of human-capital and physical capital from parents to children.³ In rural Ethiopia, the two main occasions of intergenerational transfers from parents to children occur via gifts at marriage and via inheritance at marriage or after marriage. This paper is based on the idea that when parents decide about the educational investments for their children, they simultaneously consider the transfers that they plan to endow them with in the future. Therefore, children enter the parents' utility function and parents secure the welfare of their children via two main avenues, through ensuring their educational attainment and/or increasing their future welfare through the provision of asset transfers. Because of the existence of assortative matching⁴ in rural Ethiopian marriage markets, endowing children with education and/or asset transfers is not only a way of providing security for their future employment prospects and welfare, but also a tool for enhancing their marriage prospects. Therefore, our main research questions in this chapter are: In conditions of household financial constraints, is there a mechanism of

¹Ethiopia is one of the poorest countries in the world (54.9% of the population lived on less than a dollar a day and 77% on less than two dollars a day in 2007). It has one of the lowest female literacy rates (the national average for adult literacy rates in 2004 was 62.2% for males and 38.5% for females) and the completion rates for 2006 were 48.1% and 37.8% for males and females accordingly (World Bank Education Statistics, WDI, 2006, WDI, 2010).

²Weir and Knight (2007) find a significant positive effect of education on household farm output.

³Education as a human capital transfer and inheritance as non-human capital transfers. The latter take the form of land or livestock.

⁴Richer brides marry richer grooms and poorer ones marry the poorer (Fafchamps and Quisumbing, 2002, 2003, 2005).

intrahousehold resource allocation such that offsprings who receive more transfers from parents at marriage or after their marriage, are less educated and vice versa? Does intrahousehold resource allocation follow a trade-off mechanism between human and non-human-capital transfers from parents to children? It is very important to understand this mechanism because previous research has shown that Ethiopian wives, who bring more assets to the marriage through inheritance or own acquisition, exert more control over intrahousehold resource allocation decisions. More control subsequently leads to higher claims over disposition of assets upon divorce. Also, more educated brides and ones who are better endowed in terms of assets at marriage have a higher say in household decisions (Fafchamps and Quisumbing 2002).⁵ Moreover, evidence suggests that Ethiopian females who own more land or have more education are more likely to have a higher social status, improved access to credit, and better marriage and remarriage possibilities (Gopal, 1998). Therefore, we presume that if parents care about the welfare of their children, they will consider both bequests and education in order to secure their future welfare.⁶ The latter is perhaps more important in the case of the brides, whose future welfare is much more dependent on the outcomes of the marriage market relative to grooms.⁷

There are only a few papers which analyse the determinants of education and/or transfers in rural Ethiopia.⁸ In most cases, these centralise on studying the effect of

⁵Fafchamps and Quisumbing (2002, pp.51) state that “Control over productive resources within the household has a strong effect on disposition rules in the sense that the spouse with greater control over an asset gets a larger share of the asset upon divorce or death”.

⁶In this context, Quisumbing and Hallman (2003) find that the gender gap in education in rural Ethiopia, calculated as the difference between the years of schooling of the husband and wife, has increased over time. Moreover, there is evidence which underlines the importance of girls schooling in Ethiopia. Ezra (2003) finds that more educated Ethiopian women are less likely to marry at an early age or to become involved in a polygamous marriage. In addition, in rural Ethiopian households where females have more education, children are better nourished (Fafchamps 2007). As Schultz summarises, countries which have in the last decades achieved the “most economic and social progress are those that-among other things-have most successfully promoted equal educational achievements for men and women” (Schultz, 2002, pp. 207).

⁷Grooms have more possibilities of securing their future welfare through other means. Therefore in this sense the marriage market outcomes are not so important for them (Fafchamps and Quisumbing, 2005, pp.22-23).

⁸There is a paper for the Philippines by Estudillo et al. (2001) which simultaneously models

the bargaining power of the parents on intrahousehold decisions about food, health or education investments.⁹ Quisumbing and Hallman (2003) provide an analysis of individual, household and regional determinants of age at marriage, education and assets at marriage in six developing countries including Ethiopia. We study all marriages, whereas they include a study of first marriages only. Fafchamps et al. (2009) analyse the determinants of household welfare including children's education in rural Ethiopia with a focus on the role of bargaining power and household asset ownership on children's educational and nutritional outcomes. We extend this work by including the analysis of asset transfers and marriage market characteristics.

In respect to our analysis, Fafchamps and Quisumbing (2005) study the determinants of assets brought to marriage by brides and grooms in a rural Ethiopian sample.¹⁰ In their analysis, assets include land and livestock brought to marriage by the groom and bride or gifts from their parents or other sources.¹¹ In relation to our analysis, this paper includes an analysis of the effect of exogenously given education on parental asset transfers. They do not find a significant effect of girls' education on asset transfers. On the other hand, their results show that grooms who are more educated bring more assets to the marriage. The authors conclude that these results show that education is not a substitute for wealth. We study the other direction of the relationship between parental transfers and schooling, while focusing on analysing the

education and inheritance decisions in the Philippines. They do not find a substitution mechanism between the two.

⁹In this context and in line with our analysis, Quisumbing and Maluccio (2003) study the effect of household determinants on child's schooling while focusing on the effects of the bargaining power of the parents, which is proxied by assets brought to marriage. They find that pre-marriage assets of the fathers have a positive but weak effect on the education of girls. In households where wives bring more assets to the marriage, boys have better schooling attainment. They suggest that the reason for this might be that mothers exert a preferential treatment towards sons in order to improve their old age security. However, in their previous work of 1999, they find that in families where mothers bring more assets, the education of girls is better. This suggests that the results are still inconclusive. Moreover, they focus on all the assets brought to marriage, whether acquired by the male or female or gifted from their parents. Also, they focus on the education of a different age cohort than the one we use in this study.

¹⁰They use the same sample of the survey as do we, we will explain the sample in detail in the next part of the chapter.

¹¹Fafchamps and Quisumbing (2005, pp.349).

determinants of education. In addition, we endogeneise inheritance in order to control for the simultaneity of parental decisions about asset and educational transfers. Moreover, we aim to analyse the determinants of education rather than determinants of assets brought to marriage.

In order to analyse the determinants of education in rural Ethiopia and the relationship between parental endowments and educational outcomes, we develop a model of educational investments which we test with the 1997 Ethiopian Rural Household Survey dataset (ERHS). This dataset is very useful for the purposes of our analysis as it offers a wide variety of variables with information on the human-capital and physical capital of the parents, the grooms and the brides, inheritance, gifts, bride prices¹², marriage markets and demographic characteristics. For the purposes of our analysis, we use information on the educational attainment of the grooms and brides measured by the years of schooling. We look for determinants such as parental transfers in the form of inheritance (in money-metric measures), land ownership of the parents (in hectares), the years of education of the parents and other controls such as sibling composition, household welfare measured by household consumption, individuals' age and location.

In regards to the methodology, because of the endogenous character of the transfers variable, we choose an instrumental variables approach. The endogeneity comes from the fact that transfers can be influenced by unobserved factors such as endogenously determined parental decisions over resource and farming time allocation. Moreover, we assume that transfers and education are simultaneously determined by the parents. Due to the long recall period we also have to account for measurement error. After trying different instruments and testing their validity, we choose to use spousal transfers, brothers and migration at marriage as instruments for parental transfers. The latter variable is a dummy with the value one if the individuals live close to parents,

¹²Gifts at marriage which are given from the groom or his parents to the parents of the bride.

i.e. at their place of birth, after the marriage.

Our empirical results confirm our hypothesis. Girls who receive more bequests receive less education. However, we do not find a substitution mechanism in the case of the grooms. Therefore, there is a trade-off mechanism between parental inheritance transfers to girls and the education that they receive. This implies that in conditions of substantial financial constraints parents have to decide between the two. In addition, there is an inequality amongst the sexes in terms of parental investments which may be driven by the prevalence of patrilocality and the norm of patrilineal descent.

The chapter is organised as follows. Section 2 introduces the basic model framework which we later develop empirically, section 3 provides a detailed specification of the dataset and it describes the determinants of household formation and resource allocation in the sample. Section 4 develops the empirical model. Section 5 provides the results of the empirical analysis and finally, section 6 concludes the main findings.

2.2 The Model

In this analysis, we aim to examine intrahousehold resource allocation decisions of parents in regards to two important factors of child welfare: educational investments and inheritance transfers. Human capital investments and non-human capital investments are simultaneously determined. Therefore child welfare w_i is secured through accumulated human-capital h_i and asset ownership which comes from parental transfers t_i . We depart from other sources of welfare of individuals such as own income, asset ownership or non-income sources of welfare.

$$w_i = f(h_i, t_i) \tag{2.1}$$

Parents j in the sample are characterised with a certain distribution of wealth

which we proxy with land ownership L_i^j , and human-capital h_i^j . We have:

$$h_i = f(t_i; L_i^j; h_i^j; \mathbf{X}_i) \quad (2.2)$$

and

$$t_i = f(h_i; L_i^j; h_i^j; B_i; R_i; t_i^s; \mathbf{X}_i) \quad (2.3)$$

These two equations denote the determinants of education h_i and inheritance t_i of the children in household i , which are simultaneously determined. $\mathbf{X}_i$ is a vector of socioeconomic and demographic characteristics of the household. B_i is the number of brothers, R_i represents a postmarital residence dummy and t_i^s denotes spousal (super-script s represents spouses) transfers. We use the latter three variables as instruments for the endogenous transfer variable.

Our hypothesis states the following:

$$h_i'(t_i) < 0; \quad t_i'(h_i) < 0 \quad (2.4)$$

and

$$t_b > t_g; \quad h_b > h_g \quad (2.5)$$

That is, children who receive more transfers receive less education and vice versa. In addition, boys b receive more transfers and education relative to girls g . We will test these conjectures empirically in a two-stage least squares framework, which will control for the simultaneity of human-capital and non-human-capital transfers.

2.3 Data

In our analysis, we use the 1997 Ethiopian Rural Household Survey and a module from the 1994 round. The ERHS is a longitudinal dataset which covers 1,477 households with approximately 10,800 individuals in 15 villages. Our sample comes from a cross-section of 2,926 individuals in 1,463 households. Most of these individuals are married and live in monogamous unions (approximately 72%), some live in polygamous unions (approximately 7%). The rest is formed by single individuals (approximately 21%) who mostly report information about their last spouses. Most of the households are male headed (77%). Households which are female-headed are prevalently the ones where the husband is either away or dead. We examine data about the marriages of grooms and brides at the time of the interview or data about their marriage to their last spouses if they do not have a current spouse (this limits our sample to 1,345 households with a bride and a groom). We are interested in two generations, as can be seen from the model described in the last section. These are the generation of the parents of the respondents (the decision-makers, which are the parents of the brides and grooms) and the respondents (heads and spouses or brides and grooms). The reason for choosing the parents as the decision makers, rather than the brides and grooms (and therefore the newer generation), is that we analyse parental decisions about educational investments to children while considering intergenerational transfers. The survey provides data on marriages and transfers only for the generation of the brides and grooms. It does not provide information on intergenerational bequests from brides and grooms to their children. Moreover, the educational investment decisions of the brides and grooms are finalised at the time of the marriage, which is another advantage of analysing the generations in the setting described.

The ERHS provides extensive information on intergenerational transfers, marriage markets, schooling, parental socioeconomic profiles, family composition before and after marriage and demographics, characteristics which are crucial components of our

analysis. Also, the dataset represents rural villages characterised by virilocality¹³ and educational gender bias, characteristics which we wish to address.

In order to obtain a representative education profile of the chosen sample and gain the maximum amount of observations for our variable of focus-education, we have also used an earlier round of the survey. We merged a file from the 1994 round of the survey, which provides information on the educational attainment of the individuals, with the 1997 round.¹⁴ Round 1995 does not provide any information on measures of educational attainment such as enrolment rates, literacy or years of education. The earliest round, 1989 covers only six villages and therefore we do not use it.

The sample of households in the villages was randomly selected but the choice of the villages was selected non-randomly in order to cover the main farming systems in the country. The sample is distributed across four regions (Oromiya, Amhara, Tigray and the South) and represents the main ethnic groups in the country (the Oromos, Amharas, Tigrays and different ethnic groups from the Southern region such as the Gurages, the Gedeos and the Gamos). However, in this context it is important to note that in the sample analysed some ethnic groups are underrepresented or overrepresented in the dataset.¹⁵ Therefore, the dataset represents households with all the main farming systems implemented in Ethiopia but it is not representative for the country as a whole.

¹³In virilocal marriages there is a transfer of productive labour from the bride's family to the groom's family. This could be prevalent at first marriages, but it can be applicable to consequent marriages as well (the data shows that in most instances of divorce, wives return to their home unless they remarry).

¹⁴The 1997 round and the 1994 round are compatible and provide information on the same individuals. We have only used information from the 1994 round in cases where the observations for the years of education were missing for the 1997 round, making use of the most updated information.

¹⁵This applies e.g. to the Oromos, of whom we have relatively less as would be representative of Ethiopia. In the contrary, the Amharic ethnic group is overrepresented, most brides and grooms in the dataset are Amharas.

2.3.1 Household Formation, Gender and Land Acquisition in Rural Ethiopia

Household Specialisation

Rural Ethiopia is characterised by a specific form of household specialisation such that boys mostly specialise in household farm work, prevalently cattle herding, and girls specialise in performing household chores and child care. In addition, boys have better labour market opportunities and they mostly stay with their parents upon marriage and are therefore more likely to support their parents in old age. The production setting is characterised by lack of important inputs such as physical capital or natural resources and therefore labour (including child work) is one of the most decisive inputs in the production function of the household. Mostly, the work of girls takes the form of non-marketable goods such as baby-sitting and household chores like cleaning and cooking (Fafchamps et al., 2009). In addition, it is much more time intensive relative to boys' work and it is therefore a stronger impediment to education (Gopal, 1998).

The Law, Marriage and Divorce

Gender role specialisation is also reiterated by the Civil Code of Ethiopia, which specifies the role of men as heads of households and of women as the individuals responsible for all the household duties including child caring. In practice, customary laws are very important in most of rural Ethiopia and they vary across regions (Gopal, 1998; The World Bank, 2009). They are implemented by Peasant Associations' (PA)¹⁶ Committee members who are mostly village elders, prevalently men with traditional views when it comes to solving marriage disputes.¹⁷ The division of assets upon divorce is such that land jointly owned by the spouses is either divided equally between both

¹⁶Peasant Associations, also named Kebeles, are regional entities parallel to towns or village councils.

¹⁷As stated in Bevan and Pankhurst (2007): "The formal justice system relies heavily on informal institutions throughout the legal process leading to increasing formalisation of customary laws" (Bevan and Pankhurst, 2007, pp. 49).

but, as is often the case, village elders decide to give it to the men upon divorce (Gopal, 1998). Jointly owned livestock is divided equally between the spouses and livestock brought to the marriage by the spouses individually is mostly given to its owner upon divorce (Fafchamps and Quisumbing, 2005). Therefore, it is logical to assume that providing the female off-spring with livestock could ensure at least some security for her in case that her marriage dissolves¹⁸ as well as higher control in her marriage (Fafchamps and Quisumbing, 2002).

If altruistic parents¹⁹ do not endow children with education, access to land or livestock in the form of asset transfers could replace their disadvantage caused by lower educational investments during their childhood. In this context, Fafchamps and Quisumbing (2002) find that brides who bring more assets to the marriage have more control over assets during marriage. More control over assets during marriage leads to higher claims upon divorce. In addition, due to assortative matching in the marriage markets, brides who bring more assets to the marriage are more likely to marry grooms who are better off and achieve higher future welfare.

Culture and Education

Rural Ethiopian family relations and household formation are based on a virilocal form of organisation. Decision-making based on customary laws favours males when deciding about the disposition of assets upon divorce. Parents often decide to take young girls from school in order to marry them or to protect them from being kidnapped or raped (Rose and Al-Samarrai, 2001; Ezra, 2003). In addition, school often perceives the education of girls to be less important relative to boys. This might be due to cultural perceptions but it can also be a consequence of girls being more likely to belong to the students who drop out relative to boys. Coclough et al. (2000) present evidence on these and other cultural practices and specifics of the institution

¹⁸Even though divorce is common in rural Ethiopia, divorced women are less likely to marry again (Fafchamps and Quisumbing, 2005, pp. 35).

¹⁹I.e. the ones who care not only about their own welfare, but also about their children's welfare.

of marriage which work as determinants of education gender bias in rural Ethiopia. Culture and marriage laws have an important impact on the role of females in the households and therefore on their decision-making power (Fafchamps and Quisumbing 2002, 2005).

Land Acquisition

For the purposes of our analysis and when describing the rural settings and household formation in rural Ethiopia, it is worth discussing the role of the PAs and the history of land distribution in rural Ethiopia. The first allocation of land to households in rural Ethiopia is implemented by the PAs. Further land reallocations are often a decision of the people to whom the ownership rights were provided. Redistribution of land through the PA is becoming more and more rare, giving support to the importance of asset transfers from parents.²⁰ Most of the households are male headed and land acquisition and redistribution follow a pattern whereas males are the ones who mostly receive land from PAs. As they also bring more of their own assets or gifts to the marriage, females are disadvantaged in the areas of land acquisition as well as marriage formation.²¹

As it is possible to see, the traditional and legal preconditions per se form a strong basis for gender bias in rural Ethiopia. However, decisions which are gender biased also have economic incentives at the level of household resource allocation and these are of interest to our analysis. They can emerge from determinants such as household welfare, asset ownership or sibling composition. Our main focus will be to look at the decision-making of the parents when deciding about the provision of human-capital

²⁰The Ethiopian Land Reform of 1975 resulted in the abolition of private land and the consequent land redistribution following the policy of 'Land to the Tiller' or 'Meret Larashu'. Following the reform, land should be provided to individuals who till the land in the households irrespective of the gender of the individual. However, in practice, land allocations are based on headship to the household, which is mostly taken by males.

²¹In 1992, with a change in the government, policies allowed for lease rights to become legal but sale of land is still illegal. Farmers have the right to use and rent land but they cannot sell it. However, there is evidence in contrast to the latter as individuals in the dataset were able to provide land values (Fafchamps and Quisumbing, 2005).

and bequests to children.

2.4 Empirical Methodology

In order to analyse the determinants of the education of brides and grooms in the sample, we apply a two-stage least squares regression (2SLS) methodology with instrumental variables and heteroskedasticity robust standard errors. 2SLS controls for the endogeneity of bequests.

In the first stage transfers are predicted in a reduced form equation using all the exogenous variables of the model and the instruments.

$$T_i = \alpha_1 + \alpha_2 A_i + \alpha_3 EP_i + \alpha_4 P_i + \alpha_5 LF_i + \alpha_6 LM_i + \alpha_7 \mathbf{X}_i + \alpha_8 \mathbf{Z}_i + \theta_i \quad (2.6)$$

In the second stage the predicted values of transfers are inserted in the structural form regression:

$$E_i = \beta_1 + \beta_2 \widehat{T}_i + \beta_3 A_i + \beta_4 EP_i + \beta_5 P_i + \beta_6 LF_i + \beta_7 LM_i + \beta_8 \mathbf{X}_i + \varepsilon_i \quad (2.7)$$

where E_i denotes the years of education of the individual in household i , be it a male or a female. T_i denotes assets bequeathed from the parents at marriage or after marriage (measured in Ethiopian Birr²²), A_i is the number of family members in the household who are parents or uncles of the brides or grooms. This variable depicts adult people who were probably living with the groom or bride in their schooling age and it therefore portrays agents who take part in decreasing the opportunity costs of schooling (foregone household production) and who represent support networks.

²² As of 18.10.2010, one US\$ is 16.40 Birr and one GBP is 26.04 Birr.

On the other hand it depicts people who might benefit from old age support due to living with the bride or groom when they become older.²³ EP_i represents the years of education of the parents.²⁴ P_i is a dummy variable which depicts whether the marriage and the spouse chosen was the decision of the parents rather than the decision of the individual, their spouse or the parents of their spouse. It therefore portrays parental intervention in the marriage market. LF_i and LM_i respectively account for the land ownership of the father and mother of the bride or groom in hectares and we use it as a proxy for the bargaining power of the parents, fathers and mothers respectively.²⁵ Finally, $\mathbf{X}_i$ is a vector of additional individual, household and regional characteristics such as age, log of household consumption, the number of brothers and sisters, regional dummies and a dummy for individuals who come from previous marriages of the parents (which might show discrimination towards children who are not their own). $\mathbf{Z}_i$ is a vector of instruments for assets received from parents and we will specify them in detail in the next section of the chapter. Finally, θ_i and ε_i are normally distributed error terms for the reduced and the structural form equations respectively.

2.4.1 Variables of Interest

Education

We measure educational outcomes by the years of schooling of the individuals. We also account for literacy programmes which we believe is equivalent to one year of

²³Parents who plan to live with their children or whose relatives plan to live with their children might be willing to invest more in their child relative to those who plan to live alone in old age.

²⁴We have also tried using the education of the father and mother separately and the effects are not significant. This may be due to the very low levels of parental education and the fact that less than 5 % of parents have acquired some education. Putting parental education together as the sum of mother's and father's education increases the significance and it improves the 2SLS results.

²⁵We use proxies for bargaining power due to the fact that previous research finds no support for the unitary model (or common preference model) and resource pooling in the households (Chiappori, 1992; Lundberg and Pollak, 1996; Echevarria and Moe, 2000). For the conditions of rural Ethiopia see Quisumbing and Maluccio (1999, 2003).

education.²⁶ It seems reasonable to do so as the main purpose of literacy programmes is to teach the students to learn how to read and write, which is what pupils do as part of the curriculum in first grade. This variable was generated from two rounds (1994 and 1997) to maximise the amount of observations. Therefore, we first used the education data for the males and females, which was provided in the 1997 dataset. Consequently, if this information was missing, we used the 1994 dataset-round b, which also provides data on the educational attainment of the same individuals. The datasets are compatible and can be merged. This is justified because the variable (i.e. years of schooling) is time-consistent regardless of the waves we considered for merging.

Transfers

Transfers to children represent asset endowments from parents in the form of inheritance. They are measured in 1997 Ethiopian Birr. In rural Ethiopia intergenerational transfers take two forms. Parents provide gifts at marriage to seal the marriage and bequests to children at the time of marriage or after marriage. The gifts prevalently take the form of livestock, cash or crops. Inheritance takes the form of land or livestock. We focus on the effect of inheritance (land and livestock), which has much higher value relative to gifts. Brides mostly inherit livestock and grooms mostly inherit land. The latter strengthens the argument behind our main hypothesis. The disposition of assets upon divorce in the sample sites is such that the brides are more likely to leave the marriage better off if they have brought more livestock to the marriage relative to land. This is because upon divorce, land is often kept by the grooms but livestock is either divided between the spouses or is taken by the spouse who brought it to the marriage.²⁷ Also, having a larger amount of inherited land in the marriage leads to

²⁶The education variable is defined in years of schooling. It is labelled as follows: 0-never any schooling; 1-literacy programmes and 1st grade; 2-2nd grade; 3-3rd grade; 4-4th grade; 5-5th grade; 6-6th grade; 7-7th grade; 8-8th grade; 9-9th grade; 10-10th grade; 11-11th grade and incomplete high school; 12-12th grade and completed high school; 15-university incomplete; 16-university complete and teacher training. It is in accordance with the education structure specified by the Ethiopian National Agency for UNESCO, Addis Ababa, 2005. http://www.unesco.org/iau/online_databases/systems_data/et.rtf

²⁷When we compare the year of marriage and the time of endowment of inheritance for the years

more control in the marriage over decisions regarding land rental, and a higher share of land and livestock within the marriage. More pre-marriage livestock owned by the bride increases her rights on livestock sales decisions (Fafchamps and Quisumbing, 2005). Land is well known as an indicator of wealth in rural Ethiopia. In addition, according to Ezra’s study (2003) on rural Ethiopia livestock ownership is very important for household welfare and it is an important indicator of the economic status of households.

Household Welfare

We proxy household welfare by total monthly household consumption of bought, gifted or home-produced food and expenditures on non-food items. The consumption variable is deflated by a price index which accounts for spatial differences (Capeáu and Dercon, 2005)²⁸. Household welfare is a crucial determinant of education and therefore we aim to study its effects on educational attainment.²⁹

Parental Intervention

The variable of parental intervention is a dummy variable which has the value of one if the choice of spouse at marriage was the decision of the parents and zero otherwise. The survey questionnaire provides answers to the question: “Who chose your spouse?”. The respondents identify whether it was the spouse, the head, the head’s parents or the spouse’s parents. Our purpose in implementing this variable in

provided, most of them were given at marriage or before marriage (52% of individuals received their inheritance before or at marriage and 72% within five years after marriage).

²⁸Respondents provided information on consumption and transactions for approximately 80 food items. They provided information on purchased items, consumption from own harvest and stock, consumption from wages in kind, gifts received from relatives or friends, etc.

²⁹The data provides information on the groom’s and bride’s perceptions about the wealth of their parents. They were asked: How would you rate the prosperity of your parents/spouse’s parents at the time of your marriage? The answers ranged from very poor to very rich. Therefore, this is a subjective measure because it is assessed by the respondents. As a consequence, we have decided to proxy the consumption of the parents with the average consumption in the households of the brides and grooms. The latter is reasonable due to the existence of low intergenerational mobility in wealth in rural Ethiopia which is perpetuated through the marriage market via assortative matching. According to Fafchamps and Quisumbing (2002), the correlation of parental wealth with the wealth of grooms and brides at marriage is high. We have also estimated the regression by replacing household consumption by the parental wealth variable and the results are qualitatively similar.

the regression was to see whether parental interference in the marriage market and therefore parental arrangement of marriages has an impact on the education outcomes of children.³⁰ If this cultural trait would be an impediment to the child's education, we would further analyse why.

Table 2.1 provides detailed descriptive statistics of the sample and the variables of focus. As an illustration of the average sample wealth and for understanding the importance of inherited and gifted assets, the total average monthly food and non-food consumption in the sample households accounts for approximately 500 ETB (Ethiopian Birr), 90% of which goes towards food consumption.

As we can see from the table, the average fertility level in the sample is approximately five to six children, which is quite a high level of fertility and this has not changed through the generations of the sample.³¹ The human-capital of the grooms is higher relative to the brides in terms of years of education, farming experience and wage employment. The average level of schooling of the individuals in the sample is very low and the average gap between the brides and grooms is nearly a year of education.³² This difference in years of education is statistically significant at the 1% level. The gap between the percentage of brides and grooms in the sample who have some level of education is 11%; 38% of brides and 49% of grooms have acquired some education. Because of the non-existent or very scarce labour-market employment opportunities in the surveyed areas, grooms and brides have on average a year or less of wage employment experience. Men receive more inheritance from their parents and bring more assets to the marriage relative to the females. The average value of inheritance covers approximately four times the average monthly food consumption in the case of the grooms and approximately over a month in the case of the brides. In our

³⁰ "Arranged marriages are the norm in rural Ethiopia. Moreover, around 30% of husbands and 60% of wives were not involved in the marriage decision. The majority has never spoken to their spouses before marriage" (Fafchamps and Quisumbing, 2002, pp. 72).

³¹ In urban Ethiopia the average fertility is two children per household (Kedir et. al, 2006).

³² Even though schooling levels of the grooms and brides have improved through time, the gender gap between females and males in Ethiopia has increased (Quisumbing and Hallman 2003, pp. 50-51).

sample, 15% of brides receive inheritance compared to 43% of grooms.

Table 2.1: Descriptive Statistics of the Sample

	Females			Males		
<i>Number of observations</i>	1345			1345		
	Mean	Std.D.	Median	Mean	Std.D.	Median
<i>Personal characteristics</i>						
Age at the time of the survey	38	14	36	47	15.8	45
Children from all marriages	5	3	5	6	4.1	6
Number of brothers	2.1	1.7	2	2	1.8	2
Number of sisters	2	1.6	2	2	1.6	2
Years of education	1.1	2.1	0	1.8	2.6	0
Years of farming experience	7.6	6.7	6	12.5	10	10
Years of wage employment	0.1	0.7	0	0.8	2.9	0
<i>Assets at marriage, inheritance and gifts</i>						
Inheritance from parents	659.7	4022.9	0	1866.3	6445.7	0
Gifts from parents	219.2	745	0	350.5	840.7	0
Bride price	293.5	1208.4	0	293.5	1208.4	0
<i>Parents' characteristics</i>						
Household consumption	510.2	469.3	377.7	510.2	469.3	377.7
Educated mothers (%)	1.2	-	-	1.2	-	-
Educated fathers (%)	4.9	-	-	4.5	-	-
Size of father's land (ha)	2.5	6.7	1	2.8	8.6	1
Size of mother's land (ha)	0.4	2.4	0	0.7	4.8	0

Note: The education of the parents consists mainly of literacy programmes or religious education. All the monetary values are in 1997 Ethiopian Birr. The education percentages show the amount of all the individuals that have acquired some level of education.

We also find that dowry incidence is not common for Ethiopia, but there are quite a few marriages (20%) which are sealed using bride prices. Approximately 40% of these account for at least twice the value of the average monthly household food and non-food consumption (900 ETB). With an average value of bride price, a household can obtain approximately 86% of the average stock of livestock held by households in the dataset (approximately 340 ETB) (Dercon, 1999). However, the value of it is not as large as it is in the case of inheritance. The average value of gifts at marriage is of a magnitude similar to the value of bride prices. For illustration of the significance of these quantities in rural Ethiopia, buying a cow, an important source of income, costs around 400 Birr, opening a business for trading livestock costs 300-550 Birr and starting a less lucrative income-generating activity such as food processing or charcoal making costs up to 20 Birr (Dercon, 2002).

Even though cultural gender bias is stronger in the South of Ethiopia, we do not find a strong North-South divide in education levels.³³ However, we do notice that inherited brides' bequests decrease when moving from the North to the South.³⁴ Appendix 2 illustrates the distribution of average education, inheritance and consumption across villages.

2.4.2 Empirical Issues

The first estimation problem that we encounter in the model is heteroskedasticity. The nature of our sample, which comes from various villages in regions with very different characteristics, provides possibility for inter-cluster heterogeneity and therefore heteroskedasticity. We test for heteroskedasticity using the Breusch-Pagan test and we reject the null hypothesis of constant variance. As this can cause inference problems and we have a reasonably large sample, we generate estimates with heteroskedasticity-robust standard errors (Hubert White standard errors) (White 1980; Wooldridge 2006).³⁵

Our model allows for simultaneous determination of the education of children and asset transfers to children.³⁶ In addition, bequests can be related to determinants not

³³As Quisumbing and Hallman (2003) argue: "women's status is relatively higher in the North but declines as one goes to the South" (Quisumbing and Hallman, 2003, pp. 19). This is also linked to the fact that women in the South of the country receive fewer assets at marriage and after marriage relative to men. Therefore, it is plausible to consider whether a similar gender bias could be reflected in lower levels of education in the South relative to the North. However, we do not find such a divide.

³⁴"Rules regarding divorce and inheritance vary across locations, with more patriarchal rules prevalent in the Muslim and Protestant South and more egalitarian rules prevailing in the Orthodox North" (Fafchamps and Quisumbing 2005, pp.51).

³⁵Apart from performing a heteroskedasticity test and consequently implementing a heteroskedasticity robust methodology, we have also tested for perfect multicollinearity in the model by using pairwise correlations and accounting for variance inflation factors. Results show that the model does not suffer from severe collinearity.

³⁶This is quite plausible in the sample, amongst the Amhara, Tigray and Oromo who represent majority of the sample, "the whole process of marriage arrangement is fully controlled by parents. Alliance between the two families who are looking for each other for marital relationship starts early on when the would-be partners are still children and at times even before they were born" (Ezra, 2003, pp. 513). This together with the time of inheritance provision leads us towards implementing a simultaneous model of investments in children. Also, "... intergenerational transfers take place primarily at the time of marriage..." (Fafchamps and Quisumbing, 2005, pp. 3).

accounted for, such as parental endogenously determined decisions over resource allocation. Therefore, in order to check the endogeneity of parental transfers in the model, we apply the Durbin-Wu-Hausman (DWH) augmented regression test of endogeneity (Cameron and Trivedi, 2005). We test for the null hypothesis that:

$$p \lim(\beta_{OLS} - \beta_{IV}) \rightarrow 0 \quad (2.8)$$

where β_{OLS} and β_{IV} are the ordinary least squares and the instrumental variable estimators respectively. In order to perform the test, we use the predicted residuals θ_i from the reduced form equation (2.6), insert them in the structural form equation (2.7) and test their significance. Due to heteroskedasticity, we perform the test after using robust standard errors. Otherwise the test would not be valid (Cameron and Trivedi, 2005). The coefficient on the predicted error term is significant in both the case of the brides and the grooms respectively and therefore we control for endogeneity of asset transfers as OLS would provide inconsistent estimates. Thus, we use a two-stage least squares model with instrumental variables which is appropriate in settings where exogeneity is rejected.

In order to address the endogeneity problem we test different potential instrumental variables for asset transfers. We test a variety of instruments including transfers provided to the spouses of the individuals from their parents, a dummy for parents who were divorced³⁷, assets acquired individually or through friends at marriage and sibling composition. We chose transfers of the spouse (which are exogenous in the individual's equation but endogenous in the equation of their spouse), brothers and

³⁷Parents who are divorced may be able to provide more inheritance or gifts to the child in cases where they have acquired assets upon divorce. In this context Fafchamps and Quisumbing (2005) find that females who were previously married own more land and livestock (or exert more user rights over land). Another paper from the same authors from 2005 suggests that "they (previous marriages) affect asset accumulation before a new marriage, particularly for women" (Fafchamps and Quisumbing, 2005, pp.15).

postmarital residence (a dummy for individuals who stayed at their birthplace at marriage) as instruments for inheritance. We checked whether the chosen instruments are consistent and the model is identified by testing their validity, i.e. their correlation with the endogenous variable and their orthogonality with the disturbance term of the structural equation. That is:

$$Cov(\mathbf{Z}_i, T_i) \neq 0 \quad (2.9)$$

$$Cov(\mathbf{Z}_i, \varepsilon_i) = 0 \quad (2.10)$$

Consequently, unobserved variables such as parental tastes about transfer provision, will have an indirect effect on our dependent variable-education, through the instruments $\mathbf{Z}_i$. Therefore, the IV estimator has the following form:

$$\hat{\beta}_{IV} = \frac{dE}{dT} = \frac{dE}{dZ} \times \frac{dZ}{dT} \quad (2.11)$$

We have two instruments for the endogenous variable in our model. As explained above, our endogenous variables are the transfers that brides and grooms have received from parents in the form of inheritance. In the case of the brides, we have instrumented the inheritance she receives from her parents with the inheritance that the groom receives from his parents and with her residence at marriage. The residence at marriage is a dummy indicating whether the bride stayed at her birthplace at marriage. The latter is chosen due to its correlation with inherited assets. This may be because parents provide more inheritance to children who stay living with them after marriage. Using the transfers of the grooms as an instrument for the bride's transfers variable is reasonable not only because it passes the overidentification test, but also because it is correlated to the transfers that the bride receives. The latter is a consequence of the assortative matching on the marriage markets of the rural sample. At the same

time, transfers of the groom do not affect the educational choices of the bride’s parents and are therefore not correlated with the error in the structural equation. Therefore, spousal transfers do not determine the education of the brides and grooms directly but rather through the transfers that the bride or groom receive.

The transfers of the grooms are instrumented by the number of brothers and by the transfers that the bride receives from her parents. The former is because of the fact that in rural Ethiopia, brothers compete for parental inheritance (Fafchamps and Quisumbing, 2005). The intuition for the latter is guided by the same argument provided above for the brides. We do not reject the null hypothesis of identification and therefore our instruments are valid.³⁸

2.5 Empirical Findings

Table 2.2 illustrates the results of our estimation. We report two-stage least squares coefficients with robust standard errors.³⁹

2.5.1 Bequests and Human-Capital Substitution

The results of the educational attainment regression function (2.7) show a significant negative relationship between the education levels of the brides and the inheritance transfers they receive from the parents. This supports our hypothesis that there is a trade-off between the provision of human-capital and physical capital bequests to girls. We find that every additional percentage of inheritance bequeathed to the bride decreases her education levels by 0.004 years (i.e. 1.5 days) and this is significant

³⁸For the brides the overidentification test result is: Score $\chi^2(1) = 0.572084$ ($p = 0.4494$)

For the grooms the overidentification test result is: Score $\chi^2(1) = 0.049445$ ($p = 0.8240$)

³⁹We have performed GMM estimation for comparison and in order to test the robustness of our model. The results are compatible with and qualitatively similar to the 2SLS results. First-stage regressions can be seen in Appendix 3.

at the 10% level.⁴⁰ The effect of inheritance on educational outcomes of the grooms is insignificant. This suggests that grooms receive education regardless of parental decisions about inheritance transfers, whereas in the case of the girls, parental human-capital and non-human-capital investments are substitutes.⁴¹ When looking at these effects, it is feasible to think that parents in such financially constrained settings take decisions about the education of their children also based on the transfers they plan to provide for their future, which was our initial prediction. Due to strong patrilineal customs of inheritance provision to sons in rural Ethiopia, this result is plausible. It suggests that not only do sons inherit more, but daughters who inherit do so at the expense of education. In developing countries, it is very important to consider these effects even if they are not very large, because even a year of education or less, depending on its quality and content, can cause a significant difference. Because sons are preferred in inheritance (Fafchamps, 2005), if parents choose to send children to school, they will send the boys indifferently of the transfers which they plan to bequeath to them. However, girls who receive more inheritance acquire less schooling. When we consider the low level of education stock in rural Ethiopia, these findings are not negligible. This is due to the high marginal returns at such low levels of education and the very low initial level of education in the economy.⁴² In addition, our

⁴⁰From a decision not to provide to one of providing an inheritance of the size which is the average for the brides in the sample, i.e. 659 Birr, the education decreases by nearly five months. Increasing the average inheritance by additional 50% decreases their education by over two months at the margin. If we look again at the individuals who do receive inheritance and we do not account for the ones who do not receive, these effects become stronger.

⁴¹We have also ran the same regression with gifts for the brides and the sum of gifts and bride prices for the grooms as the main variables of interest. We used the same instruments, i.e. assets (this time in the form of gifts and bride prices, which take the form of livestock, cash or crops), residence at marriage and brothers. We find that grooms who receive more gifts have higher educational levels, so transfers and education are complements for the grooms rather than substitutes. This finding points to the severity in gender inequality in rural Ethiopia. The rest of the results are qualitatively similar and so we do not display them. Therefore, based on our findings, inheritance does not affect the education of the grooms, but grooms who receive more gifts at marriage, have higher educational levels. Household welfare has a positive effect on education and grooms whose families afford higher gifts also have higher levels of education. Therefore the results on gift effects might be showing a wealth effect.

⁴²At the individual level, these returns can take the form of higher household farm output (Weir, 2007) or better labour market opportunities. However, the latter is less feasible because of the low

results provide one possible explanation to one of the reasons behind low agricultural modernisation in rural Ethiopia. To a certain degree, our findings suggest that farmers in rural Ethiopia might have the resources to adopt new technologies, but lack of education and therefore skills to adopt it. This idea deserves further research.

Table 2.2: The Determinants of Schooling: 2SLS

Dependent variable: Years of schooling	BRIDES	GROOMS
<i>Independent variables</i>	Coeff.	Coeff.
<i>Transfers from parents</i>		
Inheritance (log+1)	-0.365* (0.217)	0.111 (0.138)
<i>Sibling composition</i>		
Number of brothers	0.041 (0.037)	-
Number of sisters	0.108** (0.049)	0.092* (0.048)
<i>Support systems</i>		
Number of adults in the household	0.142 (0.229)	0.355 (0.260)
<i>Parents' wealth and human capital</i>		
Parental intervention	0.734* (0.396)	-0.107 (0.185)
Land owned by the father (hectares)	-0.005 (0.008)	0.006 (0.009)
Land owned by the mother (hectares)	0.025 (0.027)	-0.007 (0.009)
Log of household consumption	0.462*** (0.077)	0.316** (0.125)
Child-previous marriages father	0.046 (0.157)	0.037 (0.194)
Child-previous marriages mother	-0.027 (0.217)	-0.538* (0.312)
Education of the parents	0.063 (0.049)	0.149* (0.082)
<i>Personal characteristics</i>		
Age	0.009 (0.006)	-0.021*** (0.006)
Number of observations	1304	1075
Adj. R squared	-	0.06
Wald χ^2	62.43	125.81
Prob> χ^2	0.0000	0.0000

Note: *significant at 10% level, ** significant at 5% level, *** significant at 1% level
We also control for regional differences.

2.5.2 Household Composition

Our results also show that sibling composition matters. Sisters work as a support network; brides with an additional sister have additional 0.108 years (over a month)

labour market opportunities in the country, mainly for females.

of education (this is significant at the 1% level). Also, grooms with an additional sister have 0.092 more years of schooling and this is significant at the 10% level. This might be perhaps because sisters endow their siblings with knowledge and attitudes. It can also mean that they have a strong role in decreasing the work burden and school opportunity costs of their siblings. In addition, sisters who marry may be able to financially support the education of their younger siblings (Alderman et al., 1998). These findings are in line with the findings of Fafchamps et al. (2009), who find that children in households with more individuals acquire higher education. Our results regarding household size support the idea that in poorer societies such as Ethiopia, a larger number of children or adults are a source of household financial security and household labour (Cockburn and Dostie, 2007).⁴³

2.5.3 Asset Ownership, Household Welfare and Other Controls

We also controlled for asset ownership of the parents by including the land that they own. Parental land ownership does not have a significant effect on educational outcomes of the grooms and brides.⁴⁴ The dataset does not provide information on the livestock held by the decision-makers and so we could not control for it. Quisumbing and Maluccio (2003) develop this idea in relation to education expenditures and outcomes and find that land and livestock brought to marriage by the father increases girls' education while the assets brought by the mother decrease it and the opposite applies to the boys. In addition, they find that in households where the wives bring more assets, girls' educational outcomes are worse. They conclude that the preferential treatment of boys by the mothers is a consequence of the need for future old age

⁴³Also, Ezra (2003) states that in rural Ethiopia, extended families are usually wealthier than nuclear families.

⁴⁴We use the sum of parental land. In addition, we looked at the effects of the ratios of father's to mother's land and vice versa, but we did not find a significant effect on these variables either.

security which can be provided by sons and this can deepen the educational disadvantage of girls through generations. Quisumbing and Maluccio (2003) use data on a younger cohort of children in the ERHS who are between 10-15 years of age. These are the children of the brides and grooms, whereas we focus on the brides and grooms. However, this result should be taken into consideration.

Cockburn and Dostie (2007) find that household asset accumulation in the form of land and livestock in rural Ethiopia encourages the increase of child work and withdrawal of children from school. However, their results are mostly insignificant, which, as they argue, could be due to the small sample size they use. However, Fafchamps et al. (2009) also find that livestock ownership has a negative effect on children’s schooling as “school attendance is lower in households with livestock wealth” (Fafchamps et al., 2009, pp. 24).⁴⁵

Our results show that poverty and low parental education in rural Ethiopia are two additional factors determining low schooling levels in the country. We find that in households with higher consumption, children acquire more years of schooling. Also, higher parental education has a significant positive effect on grooms’ schooling. However, parental education has no effect on bride’s schooling. This result is in line with Quisumbing and Hallman’s (2003) findings on the educational attainment of grooms and brides in their first marriages. They find a positive effect of father’s education on groom’s schooling in the sample but no effect of parental education on the educational outcomes of the brides.

As for other controls, our regression results indicate that parental intervention in deciding who should marry their offspring increases the education of the brides at the margin by 0.734 years, i.e. nearly a year. This result supports the idea that if parents are the ones who choose the spouse for the bride or interfere in her marriage decisions, it is better for her educational outcome. Also, grooms who are born to

⁴⁵In our study we focus on a different age cohort of individuals. For this cohort we do not have information on livestock ownership of the parents.

previous marriages of the mother have lower educational levels. This might signal an investment bias towards children born in previous marriages of the mother. We do not find such an effect for children of the father, which is plausible due to the stronger decision-making powers of males in most rural Ethiopian households. Finally, age is negatively correlated with the education of the grooms suggesting that older grooms accumulated less education during their childhood. This is reasonable due to lower educational attainment in older generations and the steady increase in schooling outcomes in the country.

2.6 Concluding Remarks

Using household level data for rural Ethiopia, we analyse the idea that parental decisions about human-capital and non-human-capital endowments to children are taken simultaneously. Moreover, we study whether there is a trade-off between these two components of parental transfers. Our results show a presence of a substitution effect between schooling outcomes and asset transfers for females. Brides who receive more inheritance acquire less schooling during their childhood. However, inheritance and education transfers to the grooms are not mutually exclusive, suggesting a gender bias in investments to children. The existence of this trade-off mechanism might be explained with the fact that rural Ethiopian households face significant financial constraints in the intrahousehold resource allocation process. Under scarcity of land provision from PAs, high opportunity costs of schooling and poverty, households are often forced to make choices between physical capital and human-capital endowments to children. Due to strong patrilocal patterns of inheritance, this choice disadvantages girls but not boys. It may also be that groom's household farm labour is a prepayment for future inheritance transfers. Grooms work more intensively on the farm relative to brides, giving support to the latter. However, further research is required in this area.

Apart from our main finding, we find that household welfare, sibling composition, marriage market characteristics and parental education have a significant effect on the educational attainment of children. Our findings provide a better understanding of factors affecting schooling outcomes in rural Ethiopia and the potential role that customs play in children's human-capital formation. However, our results should be considered alongside supply side determinants of education.⁴⁶ Also, a further study of different customs leading to gender bias in childhood investments and the role of schooling opportunity costs in terms of child work would provide a useful extension to these findings.

⁴⁶These include the role of school infrastructure, pupil-teacher ratios, school meal programmes, distance to school, quality of education, gender composition of teachers or cash transfer programmes.

Chapter 3

Postmarital Residence as a Source of Old Age Support: How do Parental Transfers affect it?

Abstract

The main purpose of this chapter is to investigate whether parental transfers of human and non-human capital affect the postmarital residence of children in rural Ethiopia. Therefore, we look at whether transfers to children are an avenue which parents use to obtain old-age security. We model postmarital residence by using a multinomial logit model which controls for the endogeneity of education and inheritance transfers. We test our model using a sample of married monogamous individuals from the Ethiopian Rural Household Survey dataset. Our findings show that childhood investments and transfers at marriage affect postmarital residence of children. Children who receive more asset transfers are more likely to stay at their place of birth after marriage and the opposite applies for education investments. Our findings are limited by the lack of better variables depicting old-age support, such as remittances from children or time endowments that they provide to parents. However, our analysis suggests that transfers and postmarital residence in rural Ethiopia are two inter-related decisions made by households.

JEL classification: D13, I21, J13, O15

Keywords: Human capital, Non-human capital transfers, Old-age support, Postmarital residence.

3.1 Introduction

In Ethiopia children are a very important source of old age support. They replace lacking old age security mechanisms, scarce insurance options¹ (Hoddinott et al., 2005) and missing welfare provision by governments. In this chapter we aim to examine whether the relationship between parental transfers and postmarital residence is one of the causes driving asset and education gender bias in rural Ethiopia. The idea behind our hypothesis is that parents who invest more in their children increase their chances for securing old age support provided by their children. Consequently, due to the fact that rural Ethiopia is prevalently virilocal, parents invest more in their sons relative to their daughters, which is reflected in the existent inheritance and education gender bias. For this purpose, we will use postmarital residence as a proxy for old age support. We therefore assume that in societies with very primitive transport infrastructure and labour intensive subsistence farming, when a child lives close to their parents, it is much more likely provide old age support for the parent either in financial terms or in time devoted to parents.

Even though there are some papers in the literature which study education investments and asset transfers in rural Ethiopia², the literature does not provide an analysis similar to the one we develop in this chapter. It has been suggested in previous studies on rural Ethiopia, that one of the reasons behind gender bias in investments of education in rural Ethiopia might be the need for future old age security, which can be provided by sons (Quisumbing and Maluccio, 2003).³ However, the authors do not develop or test this idea in their paper.

¹People do take part in social network institutions which allow for savings but these do not provide a regular income in old age. One example are the iddirs: “insurance institutions indigenous to Ethiopia that are used to cope with the high cost of funerals...Some iddir provide assistance in the event of shocks apart from death, such as fire and illness” (Dercon et. al., 2005, pp.3 and pp.13).

²Fafchamps et al. (2007); Fafchamps and Quisumbing (2005); Quisumbing and Maluccio (1999, 2003); Quisumbing and Hallman (2003).

³“Since boys are important sources of old age security, mothers may choose to invest more in them” (Quisumbing and Maluccio, 2003, pp.320).

Further, in the context of inheritance transfers and gender bias, Fafchamps and Quisumbing's (2005) paper on assets at marriage in rural Ethiopia suggests that:

“Gender differences in inheritance can be understood in the context of old age support patterns in Ethiopia: sons are traditionally responsible for their parents’ care in their old age, although recently daughters who are employed increasingly contribute to their parents’ support as well” (Fafchamps and Quisumbing, 2005, pp. 366).

The literature which provides the base for our analysis can be divided into two groups. In one group there are papers which analyse transfers between parents and children and look at motives behind these transfers (Willis, 1979; Becker, 1981; Becker, 1993; Bernheim, 1985; Cox, 1987; Lucas and Stark, 1985; Hoddinot, 1992; Lillard and Willis, 1997). The second group analyses the determinants or consequences of specific postmarital residence patterns (Rosenzweig and Stark, 1989; Korotayev, 2003; Baker and Jacobsen 2007). We aim to create a bridge between the two and look at transfer motives in relation to postmarital residence as a proxy for old age support in rural Ethiopia. We contribute to the existing literature by analysing the determinants of different patterns of postmarital residence, while considering the role of human-capital investments and asset transfer provision in securing old age support in rural Ethiopia.

Motives for Transfers

Childhood investments and bequest behaviour can be driven by a variety of motives depending on the type of family relations and socioeconomic conditions within the family and in its environment. Parents may be driven by an *altruistic* motive for bequeathing (Becker, 1981, 1993) driven by parental affection and love for the child. Parental transfers can also be used in a *strategic* manner (Bernheim, 1985) to induce certain actions from children with the threat of disinheritance or lower inheritance. The strategic motive supports bequests as a medium of exchange for “attention”⁴ from

⁴Any type of attention such as visits or care.

children (Cox, 1987). In the Beckerian model transfers are benevolent, in Bernheim's model they are strategic.

Hoddinott's study (1992) finds support for the strategic motive in a study of Western Kenya, where transfers from children form a large part of parental old age income (34%) and "children are a source of *old age security*" (Hoddinott, 1992, pp. 545). They find that parental land ownership (expected inheritance) increases transfers from children. Also, children do not compensate parents who are worse off in terms of widowhood or wealth. On the contrary, wealthier parents in terms of savings and livestock ownership receive more transfers from children. Their findings support the strategic motive of transfers.

In some cases, interfamily transfers are driven by both, the altruistic motive as well as the strategic self interest motive. As an example, Lucas and Stark's study (1985) of Botswana finds that children remit more to families who are worse off in line with the altruist motive. However, they prefer to send more remittances to vulnerable households which own more cattle, a potential source of inheritance. The latter is a sign of strategic transfers.

Lillard and Willis's (1997) paper which uses Malaysian data, tests additional motives driving inter-vivo family transfers and finds support for the *repayment hypothesis* and the *old age security motive*. They find a strong effect of children's educational attainment on the financial transfers they provide to parents, but time transfers are unaffected by education. This suggests that transfers in Malaysia work as a repayment for childhood educational investments. In addition, children provide more transfers to older parents. The latter and the fact that transfers are dominant from the younger to the older generation rather than the other way, support the old age security motive for parental investments.

The main motive driving parental investments in children which we aim to analyse, is the old age security motive (Willis 1979; Lillard and Willis 1997). According to

Willis, children are “the poor man’s capital” (Willis, 1979, pp. 25), i.e. parents invest in their children in order to secure old age support and fertility decisions are closely related to returns to children and the need for old age security. Willis (1979) further analyses the relationship between the rate of returns to children, rate of population growth and a sustainable social welfare system. In relation to our work, we focus on the microeconomic aspect of his paper, which explains that in poor countries with low rates of returns to children, parents choose to have more children to cover their old age security. We depart from fertility decisions and focus exclusively on parental decisions in the form of investments, or quality of children rather than quantity.

Postmarital Residence Patterns

In most cases, studies which examine postmarital residence patterns do not analyse them from the perspective of old age support and in relation to parental transfers. These include Rosenzweig and Stark’s study (1989) of marriage migration in India with a focus on the role that postmarital location and marriage play in consumption smoothing. Korotayev (2003) explores the effects of labour division on patrilocal and matrilocal postmarital residence rules. The author shows that there is a significant correlation between very low female contribution to farming (patridominant subsistence farming) and patrilocal residence. Baker and Jacobsen (2007) study the determinants of fixed postmarital residence rules (patrilocal or matrilocal) relative to choice postmarital residence rules (neolocal or ambilocal). The authors find that fixed postmarital residence rules are more likely to happen in societies without skilled labour markets (measuring non-marriage returns to human-capital investments), with lower agricultural development (depicting lower need for location specific human-capital) and higher enforceability of contracts (measured by community size and the existence of large kin groups). The authors conclude their findings by arguing that in pre-modern societies fixed rules are implemented because they mitigate the problem of uncertainty leading to underinvestment in human-capital.

Childhood Investments and Postmarital Residence

To our knowledge, there is only one paper which analyses virilocal postmarital residence patterns in relation to childhood investments. It is Levine and Kevane's (2003) study of Indonesia which analyses the effect of virilocal postmarital residence on fertility decisions, health, education and inheritance investments in children. In their paper they treat virilocal postmarital residence as an exogenous variable. They do not find a significant effect of virilocal or uxrilocal postmarital residence custom on educational investment decisions (measured by household educational expenditures, years of schooling and enrolment). However, they find that in virilocal regions of Indonesia, daughters are less likely to inherit relative to sons. We extend their study by using African data and analysing other forms of postmarital locations as well as virilocality. In addition, we endogeneise investments in the postmarital residence regression to account for unobserved preferences and simultaneity of transfers and postmarital residence decisions. Also, Levine and Kevane's postmarital residence variable is determined by the custom prevalent in the location as perceived by the location elders and by the percentage of virilocal marriages in the area. We focus on the postmarital residence realised by each household.

We test our hypothesis using a subsample of individuals in their first marriages from the 1997 Ethiopian Rural Household Survey dataset (ERHS). We generate a categorical variable which represents the place of residence of the brides and grooms after marriage. Postmarital location is disaggregated into four categories to set up the multinomial logit estimation: virilocal, uxrilocal, neolocal and bilocal⁵. In addition, we use another specification of postmarital residence in the form of a binary variable which obtains the value of one if the child stays with the parent at marriage and zero

⁵Virilocality describes a custom where after the wedding, the bride moves to the family home of her groom. After that, the couple creates their new home. Uxorilocality depicts a postmarital residence pattern where the groom moves to the location of the bride. In neolocal marriages, the married couple moves to live in a new place away from both sets of parents. Bilocal (ambilocal) marriage residence is characterised by the married couple residing at the location where both parents live.

otherwise. The latter is done in order to check for robustness of the results and to provide a simpler specification of the model with an easier interpretation. On the other hand, the multinomial logit specification provides interesting results on different postmarital residence patterns and so we decide to perform both the multinomial logit and binary logit models. Therefore, if the groom or bride lives at the place of birth, it is plausible to assume that he or she is more likely to provide old age support in financial terms, in the form of non-monetary transfers or time assistance provided to the parents.

Our empirical results support our hypothesis. Brides and grooms who receive more inheritance are more likely to live at their place of birth. However, more educated children are more likely to move away from their parents at marriage and therefore educational investments do not work as a source for securing old age support. In addition, grooms who accumulate human-capital via wage employment or farming experience are less likely to stay at their birthplace after marriage.

The chapter is organised as follows. Section 2 introduces the empirical model, its formulation and the use of variables in it. Section 3 discusses the results of the empirical analysis. Section 4 concludes.

3.2 Empirical Methodology

In order to look at the effects of childhood investments on the postmarital residence patterns and the potential for securing old age support in rural Ethiopia, we adopt a multinomial logit model as well as a binomial logit with a dependent variable depicting various categories of postmarital residence.

The two main explanatory variables of interest are human-capital and non-human-capital transfers provided to the brides and grooms by their parents. These two variables are potentially endogenous due to unobserved factors such as parental prefer-

ences, and the simultaneity of household decisions about postmarital residence, education and inheritance transfers. Hence, we predict the latter two variables by using two-stage least squares before inserting them as regressors in the multinomial and the binomial logit models. In the first stage we predict the transfers from a two-stage least squares regression while controlling for endogenous education. We apply the same to education while controlling for the endogeneity of non-human-capital investments. The latter procedure controls for simultaneity of education and transfers. Consequently, we insert the predicted values in the postmarital residence regression. The next part of this chapter explains this procedure in detail.

3.2.1 Postmarital Residence Regression Function

In order to analyse the effects of childhood transfers (human-capital and non-human-capital) on postmarital residence patterns of males and females, and consequently on the likelihood of old age support to parents, we use a multinomial logit and a binomial logit model with a robust variance-covariance matrix. In the multinomial logit we use a categorical dependent variable with a base category depicting brides and grooms who live away from their birthplace after marriage. We compare three categories, namely one which depicts virilocal households, one uxrilocal households and the last one which has households where both the groom and bride live at their birthplace after marriage, relative to the base category. The binary model uses a binary dependent variable which is 0 if the bride/groom has relocated at marriage and 1 otherwise. The difference between the omitted variable in the multinomial logit and in the binary logit is that in the multinomial logit it depicts a pattern where both moved away and it compares it to them both staying at the birthplace or just one moving away (therefore having a virilocal or uxrilocal postmarital residence). On the other hand, the binary logit shows whether only the bride or the groom has moved away from home at marriage relative to not moving away. Therefore, the binary variable only depicts

the postmarital residence of the groom or bride independently of whether the spouse moved away or stayed at their birthplace. The multinomial logit provides interesting results on virilocal and uxorilocal residence and therefore we have decided to estimate both models. In addition, it is also a tool for robustness check.

The simplified version of the model looks as follows:

$$PR_i = \beta_0 + \beta_1 \widehat{T}_i + \beta_2 \widehat{E}_i + \beta_3 \mathbf{X}_i + \varepsilon_i \quad (3.1)$$

PR_i is the postmarital residence of the groom or bride in household i , $\widehat{T}_i$ and $\widehat{E}_i$ are the predicted values of education and inheritance (or net transfers)⁶ and $\mathbf{X}_i$ is a vector of socioeconomic background characteristics and location specifics. The latter includes human-capital in the form of wage employment and farming experience before marriage, time effects (year of marriage), parental land in hectares, parental education, household consumption, number of male and female siblings, a dummy for a child who comes from previous marriages of the father, ethnicity and village specific controls like the land received from the Peasant Association, wealth and soil quality in the village of postmarital residence. Lastly, ε_i is the stochastic term of the regression.

The Model

In the binary model we look at the probability P of an individual in household i staying at the birthplace after marriage:

$$P(PR_i = 1 | \mathbf{x}) = \phi(\beta_0 + \beta_1 \widehat{T}_i + \beta_2 \widehat{E}_i + \beta_3 \mathbf{X}_i) = \phi(\beta_0 + \boldsymbol{\beta}' \mathbf{x}_i) = \phi(z) \quad \text{for } i = 1, \dots, n \quad (3.2)$$

⁶In the case of the brides, this variable depicts the difference between the bequests and gifts that her parents give to her and the bride price they receive from the groom or groom's family. In the groom's case, the net transfers account for the inheritance and gifts that the parents endow him with, and the bride price that his parents paid to the bride's parents at marriage. Therefore the variable shows the net costs of parental investments.

The response probability $p(x) = P(PR_i = 1|\mathbf{x}) = \phi(z)$ belongs to $0 < \phi(z) < 1$ for all real numbers z . Function $\phi(\cdot)$ is given by the logistic cumulative distribution function:

$$p(x) = \phi(\beta_0 + \beta_1 \widehat{T}_i + \beta_2 \widehat{E}_i + \beta_3 \mathbf{X}_i) = \frac{e^z}{1 + e^z} = \Lambda(z)^7 \quad 0 < \Lambda(z) < 1 \quad (3.3)$$

Consequently, in the multinomial case the logistic cumulative distribution function is:

$$p_j(x) = (PR_i = j|\mathbf{x}) = \frac{e^{z_j}}{\sum_{k=0}^J e^{z_k}} = \varphi(z)^8 \quad \text{for } j = 0, \dots, J \quad (3.4)$$

We use maximum likelihood estimation to obtain our estimators, therefore maximising the log likelihood of an outcome 1 for the postmarital binary logit regression function B and outcomes 1 to J in the multinomial regression function M . Our binary regression function coefficients $\widehat{\beta}_B$ solve (maximise) the log-likelihood function:

$$\ln \mathfrak{L}(\beta) = \sum_{i=1}^n \ln l_i(\beta) = \sum_{i=1}^n \{PR_i \ln[\phi(\beta' \mathbf{x}_i)] + (1 - PR_i) \ln[1 - \phi(\beta' \mathbf{x}_i)]\} \quad (3.5)$$

$$\widehat{\beta}_B = \underset{\beta}{\operatorname{argmax}} \mathfrak{L}(\beta) \Rightarrow \frac{\partial \ln \mathfrak{L}}{\partial \beta} = \sum_{i=1}^n \left[\frac{PR_i}{\phi(z)} \phi'(z) + \frac{(1 - PR_i)}{1 - \phi(z)} (-\phi'(z)) \right] \mathbf{x}_i = 0 \quad (3.6)$$

⁷Using the quotient rule we have the logit density function:

$$\frac{\partial \phi_i}{\partial z} = \frac{[e^z \times (1 + e^z)] - [e^z \times e^z]}{(1 + e^z)^2} = \frac{e^z}{(1 + e^z)^2} = g(z)$$

The marginal effects in the binomial case are: $\frac{\partial p_j(x)}{\partial x_i} = \frac{\partial \phi_i}{\partial z} \times \frac{\partial z}{\partial x_i} = g(z) \times \beta_i$.

⁸The marginal effects in the multinomial case are: $\frac{\partial p_j(x)}{\partial x_i} = \frac{\partial \varphi}{\partial z} \times \frac{\partial z}{\partial x_i} = \varphi'(z) \times [\beta_j - \beta_k]$ where $\varphi'(z)$ is the multinomial logit density function.

In the multinomial case the same will apply, but to n households and J categories:

$$\ln \mathfrak{L}(\beta) = \sum_{i=1}^n \sum_{j=0}^J \ln l_{ij}(\beta) = \sum_{i=1}^n \sum_{j=0}^J \{PR_{ij} \ln[\varphi(\beta' \mathbf{x}_i)] + (1 - PR_{ij}) \ln[1 - \varphi(\beta' \mathbf{x}_i)]\} \quad (3.7)$$

$$\hat{\beta}_M = \underset{\beta}{\operatorname{argmax}} \mathfrak{L}(\beta) \quad (3.8)$$

$$\cdot = > \frac{\partial \ln \mathfrak{L}(\beta)}{\partial \beta_j} = \sum_{i=1}^n \sum_{j=0}^J \left[\frac{PR_{ij}}{\varphi(z)} \varphi'(z) + \frac{(1 - PR_{ij})}{1 - \varphi(z)} (-\varphi'(z)) \right] \mathbf{x}_i = 0 \quad (3.9)$$

The binary and multinomial maximum-likelihood estimators $\hat{\beta}_B$ and $\hat{\beta}_M$ are solved using Newton-Raphson iterative procedure.⁹(Greene, 2008; Wooldridge, 2006)

Prediction of Education and Transfers

Education and transfers are potentially endogenous in the postmarital regression function (3.1) (PRF). In addition human-capital and non-human-capital transfers might be decided simultaneously. Therefore, we predict them prior to inserting them in (3.1). We have the following equations:

Human-Capital

Stage 1: Reduced form equation:

$$T_i = \alpha_1 + \alpha_2 T S_i^s + \alpha_3 \mathbf{Z}_i + \alpha_4 \mathbf{Y}_i + \theta_i^E \quad (3.10)$$

⁹We use Stata to perform the maximization.

Stage 2: The predicted values of inheritance are inserted in the structural equation:

$$E_i = \beta_1 + \beta_2 \widehat{T}_i + \beta_3 \mathbf{Y}_i + \varepsilon_i^E \quad (3.11)$$

This generates the education variable for the postmarital regression, while we control for endogeneity of transfers.

Transfers

Stage 1: Reduced form equation:

$$E_i = \alpha_1 + \alpha_2 P E_i + \alpha_3 \mathbf{Q}_i + \theta_i^T \quad (3.12)$$

Stage 2: Structural form equation:

$$T_i = \beta_1 + \beta_2 \widehat{E}_i + \beta_3 \mathbf{Q}_i + \varepsilon_i^T \quad (3.13)$$

Equations (3.11) and (3.13) predict the variables transfers and education which we consequently include as explanatory variables in the postmarital regression function (3.1). Variable E_i denotes the years of education of the individual in household i , be it a male or a female. T_i denotes assets bequeathed from the parents in the form of inheritance or net transfers.

Choice of Instruments

In order to treat the endogeneity of education and transfers, we use a two-stage least squares methodology. We use two sets of instrumental variables, the first set $\mathbf{Z}_i$ (spousal transfers and ethnicity in the case of the bride and spousal transfers and the

amount of male siblings in the case of the groom) instruments the transfers variable in the education regression. The second set (the education of the groom's and bride's parents PE_i) treats the endogeneity of human-capital in the transfers' equation. All the equations are generated for both the brides and the grooms.

In the education regression we instrument the transfers of the brides in household i with the transfers of the spouse s TS_i^s and ethnicity. We instrument the transfers of the grooms with bridal transfers and the number of brothers. The second instrument in the case of the brides is her ethnicity. The ethnicity and sibling instruments are represented in the vector $\mathbf{Z}_i$. We chose spousal transfers as an instrument because of the assortative character of marriage market matching in our sample (Fafchamps and Quisumbing 2002, 2003, 2005). Transfers of the grooms and brides at marriage are strongly correlated. Further, transfers of the groom do not affect the education of the brides and are therefore not correlated with the error in the education structural equation ε_i^E . The same intuition is applied when instrumenting a groom's transfers with bride's assets.

In conditions of rural Ethiopia, there is evidence of the effect of male siblings on the inheritance which boys receive from parents.¹⁰ This is confirmed when we run either the reduced form (3.12) or the structural form (3.13) equations of groom's transfers. In addition, based on our previous findings, the number of brothers does not significantly affect the educational outcomes of the grooms. Therefore, the number of brothers is a valid additional instrument for the transfers that grooms receive. The transfers of the brides were instrumented by the transfers of the grooms and ethnicity. We find that ethnicity does not have a direct effect on education but it directly affects inheritance. This is plausible due to the fact that in rural Ethiopia, customs play an important role in determining patterns of inheritance transfers.

¹⁰Fafchamps and Quisumbing (2005) look at the determinants of inheritance in rural Ethiopia. They find that additional brothers decrease the amount of inheritance provided to the groom. The number of brothers has no effect on the inheritance of the brides (Fafchamps and Quisumbing, 2005).

The instrumental variable which corrects for the endogeneity of education in the transfers' equation is parental education. Parental education has an effect on the educational outcomes of the brides and grooms in this sample and we find that in the inheritance regression, parental education is insignificant and therefore this was a plausible choice.¹¹

Our first stage regression results and overidentification tests statistics confirm the validity of our instruments¹², i.e. their covariance with the endogenous variable and their orthogonality with the error term in the structural equation.

Vectors $\mathbf{Y}_i$ and $\mathbf{Q}_i$ control for background characteristics of the individuals and their parents, household welfare and location. Finally ε_i^j and θ_i^j , $j = E, T$ are the error terms for the education E and transfers T structural and reduced form equations respectively.

3.2.2 Empirical Tests

Prior to proceeding with the PRF (3.1), we perform basic tests for heteroskedasticity (Breusch-Pagan) and multicollinearity (using variance inflation factors). We also test exclusions restrictions (Wald tests), endogeneity of transfers and education and the independence of irrelevant alternatives (IIA) in (3.1).

The variance of inflation factor statistics show that the model does not have serious multicollinearity. We also performed pairwise correlations and none of the explanatory variables are strongly correlated. However, we do have heteroskedasticity in the sample

¹¹Our choice of spousal transfers and brothers as instruments for transfers is motivated by previous evidence about assortative matching and sibling rivalry in inheritance in rural Ethiopia (Fafchamps and Quisumbing, 2005). The use of ethnicity as an instrument for the inheritance of the brides comes from the fact that in rural Ethiopia customs have an effect on inheritance descent rules and these can differ by ethnicity. However, we also tried additional instruments for transfers. These include parental land, whether the parents have been divorced before and could therefore acquire more assets to transfer to the child or own land brought to the marriage by the bride or groom. Other instruments which we tried for the education variable are health measured by Body Mass Index, the number of sisters or a dummy for a child who comes from previous marriages.

¹²We have score χ^2 p values of 0.45 for the females' education regression and 0.88 for the males. Also first stage statistics show that the instruments for the transfers' regression are statistically significant.

which is an expected outcome due to inter-cluster heterogeneity. We have a reasonably large sample, so we generate estimates with heteroskedasticity-robust standard errors (Hubert White standard errors) (White 1980; Wooldridge 2006; Asteriou and Hall, 2007).

In order to be able to proceed with the application of the multinomial logit model, we perform the Hausman and McFadden independence of irrelevant alternatives test (IIA test). The Hausman test statistic is asymptotically distributed as a chi-squared with degrees of freedom equal to the number of coefficients estimated in the constrained model. Our test statistics pass the test, we do not reject the null hypothesis and confirm the independence of irrelevant alternatives (Hausman and McFadden 1984; Greene, 2007; Long, 1997; Long and Freese, 2001).

After performing these tests, we proceed to test the endogeneity of human-capital and non-human-capital transfers in the PRF. We perform the augmented Durbin-Wu-Hausman regression test (Cameron and Trivedi, 2005; Baum et al., 2003). Our test confirms the suspected endogeneity of education and transfers in the PRF for brides and grooms, the predicted residuals from the transfers and education regression are significant in the PRF. Due to the latter and due to the simultaneity of education and transfers found in the previous chapter, we use predicted values of transfers in the PRF as specified in the previous section.

3.2.3 Data Specification and Variables of Interest

In order to analyse our hypothesis, we use the Ethiopian Rural Household Survey 1997 (ERHS).¹³ The ERHS is a longitudinal dataset which was collected in seven rounds (1989, 1994a, 1994b, 1995 and 1997, 1999 and 2004). It covers 1,477 households with approximately 10,800 individuals in 15 villages.

¹³The introduction and Chapter 2 provide a detailed specification of the dataset and the socio-economic characteristics of households in the dataset. In this chapter we explain our subsample, which differs from the one used in Chapter 2.

In this chapter we use information on a sub-sample of 532 households with monogamous individuals who are in their first marriages only. We depart from looking at people who have had previous marriages or are polygamous in order to generate a postmarital residence variable which can best represent the potential for old age support. We focus on two generations of individuals. The first is the generation of the parents of the grooms and brides, the decision-makers about human-capital and transfers. The second is the generation of the grooms and brides, the individuals who have completed their education and are in their first marriage; these are the respondents in the dataset.

One of the main caveats of the dataset, in terms of the purposes of our analysis, is that it does not provide information about “postmarital financial transfers”¹⁴ or other non-financial forms of old age support provided to the parents. However, the dataset provides information on the place of birth of the brides and grooms and whether their postmarital residence is the same as their residence at birth. This variable is a good proxy for old age support and it gives an insight into potential effects of parental investments on postmarital residence patterns. Therefore, we can look at whether parents adjust their transfers of human-capital or non-human-capital to their children according to their need for old age security. If parents invest in children in order to obtain support in old age, we would expect childhood investments to be correlated with postmarital residence in a way that if parents invest more, the children will be more likely to stay living close to their parents. Consequently, through transferring human-capital or non-human-capital to children, parents increase the probability of

¹⁴Transfers from children to parents made after they marry. The survey provides information on transfers but does not specify the exact recipients and senders, so we could not use it. This data is available at household level only. In addition, there is a sub-sample survey (Ethiopian sub-sample survey-ESSS) which was generated and used by Weir (2007) and which provides information on remittances from children to parents. However, the ESSS only uses information on a subsample of four out of the fifteen villages in our dataset. Even if we would use information on the children of the grooms and brides, we would not be able to control for marriage market characteristics and transfers’ information which is not available for the generation of the children. Due to these data limitations we have decided to look at postmarital residence as a variable depicting old age support provided to parents.

children living close to them and helping them in terms of financial or non-financial old age support.

Dependent Variable

Postmarital Residence

We proxy old age support by a variable which depicts whether the grooms and brides live at their birth place after marriage. If they do, this means that they are more likely to provide old age support to their parents. However, one might suggest that the place of birth is not necessarily the place where the parents live when the child gets married as the parents might have migrated. In support of the fact that the latter is very unlikely in rural Ethiopia, Ezra's and Kiros' paper (2001)¹⁵ on migration in rural Ethiopia finds that the main reason for internal migration, even during years of economic hardship (such as the period of famine) is marriage. In addition, we have checked migration patterns in our sample in the two years before the time of the ERHS questionnaire¹⁶. Out of 10,788 individuals in the sample, 6.3% report migration and 24% of this migration is due to marriage. We therefore believe that using postmarital residence as a proxy for old age support is reasonable.

In this chapter, we use the same cohort of individuals as we did in our previous chapter; the brides and the grooms in the dataset. However, in this chapter we extract the grooms and brides who are in their first marriages only, rather than considering individuals who have remarried as well. This is the only way to clearly obtain postmarital patterns of residence. If we would focus on further marriages we would not have a way of knowing whether grooms and brides stayed with their parents, or whether they moved away just after marriage and therefore just after the period that parental investment decisions are finalised. If we would include consequent marriages we would

¹⁵They studied a sample of 2,000 households in the northern drought prone parts of Ethiopia which were most affected by the famine.

¹⁶The survey questionnaire provides questions about the reasons which have lead members, who were present in the 1994 round but are not present in the current survey (1997), to leave the households since 1994.

easily omit changes to postmarital residence at first marriage and we would not be able to clearly define old age support from the data available. Our sample includes households where both the groom and bride are present and therefore we do not have to control for male absence, an important determinant of uxorilocal postmarital residence patterns.

Multinomial logit

In the multinomial logit, the postmarital residence variable has four categories for each the bride and the groom, the base (omitted) category depicts postmarital residence where both the bride and the groom have moved away from their birthplace after marriage (neolocality); the first outcome virilocality and the second outcome uxorilocality (i.e. the bride stays in her place of birth after marriage and the groom moves away). The last category is for households where both the groom and the bride stay living at their birthplace (ambilocal or bilocal). It is plausible to assume that if they both live at their birthplace after marriage, they are most likely virilocal (due to the prevalence of virilocal marriage customs) and this should be taken into account when looking at the results.

Binomial logit

In the binary model, the base category looks at individuals who live at their birthplace at marriage relative to those who have moved away from their birthplace (the base category) independently of where the spouse lives. Therefore, it does not depict uxorilocality, virilocality, neolocality or ambilocality. It simply shows whether the child stays or relocates at marriage.

If this analysis would be applied to a developed country, one would perhaps doubt the credibility of the postmarital residence variable depicting old age support, as modern technology allows for transfers and travel as needed. However, we believe that in conditions of rural Ethiopia it is a convincing proxy to use. In our sample, grooms and brides who live away from their birthplace after marriage mostly move to another

village in the same region. Distances between villages and even within villages are considerable and modes of transport are limited. Therefore, it makes a very big difference for parents whether their child stays living close to them when they become elderly. Moreover, in prevalently rural areas, subsistence farming is the main source of livelihood and therefore physical presence of the children is much more important for old age welfare relative to its importance in the developed world. Table 3.1 depicts the different forms of postmarital residence patterns and the amount of observations for each category. As can be seen from the table, we only have 26 uxori-local households in the sample. Therefore, even though we report the results for this category, we will take them with caution.

Table 3.1: Postmarital Residence Patterns

Postmarital Residence	Bride Stays	Bride moves	Total
Groom stays	235	174	409
Groom moves	26	97	123
Total	261	271	532

Independent Variables

Human Capital

Education

The education variable represents the years of schooling acquired during childhood. We also account for literacy programmes which we register as an equivalent to one year of education. Similarly to chapter 2, this variable was generated from two rounds, the round 1994 and the round 1997. Also, the average age of the individuals in our sample is 35 for females and 43 for males, which implies that the education choices were already most likely finalised for these individuals at the time of the survey. Therefore, they represent the individual's accumulated schooling experience.

Wage employment and Farming experience

The dataset provides information on the years of wage and farming experience of the individuals in the dataset. We generate a dummy variable for the grooms

and brides which is one if they have had any farming or wage employment experience before their marriage. It is interesting to insert this variable in the analysis as different forms of human-capital are very likely to be important determinants in postmarital residence options. More experience leads to better labour market opportunities and diversifies the options for potential postmarital residence. If the latter applies, more human-capital could lead to children migrating away from their nuclear family after marriage.¹⁷

Transfers

This variable depicts the non-human-capital investments provided to children. They take the form of inheritance or net transfers which are measured in Ethiopian Birr. Inheritance accounts for bequests of land or livestock. Brides mostly inherit livestock and grooms mostly inherit land.

Net transfers represent the parental net costs of providing transfers to children. More precisely, in the case of the brides, this variable depicts the difference between the bequests and gifts that her parents give to her and the bride price they receive from the groom or groom's family.¹⁸ In the groom's case, the net transfers account for the inheritance and gifts that the parents endow him with and the bride price that his parents pay to the bride's parents at marriage. In regards to the gifts, the data provides information on the gifts that the respondents and their spouses received at marriage from their parents, relatives or friends. We only focus on gifts provided by the parents to the couple as we are interested in understanding the decision-making of the parents only. It is therefore a gift transfer at marriage provided to the next generation, from the parents to the new couple. Gifts and bride prices predominantly

¹⁷In the brides' regression, we cannot control for wage employment due to the limited amount of observations for this variable. Less than 10% of brides in our sub-sample have experience in wage employment. However, this is not a problem, farming or educational experience is more important in conditions of rural Ethiopia. Wage employment is very rare in rural Ethiopia and both grooms and brides acquire less than a year of wage employment.

¹⁸Bride prices are gifts provided to the parents of the brides by the groom or his parents. If the bride price is higher than the transfers provided to the daughter, we get negative values.

take the form of livestock, cash or crops.¹⁹

Village Characteristics

In order to control for additional location specific determinants of postmarital residence we include two categorical explanatory variables which depict the soil quality and the wealth of the village of postmarital residence. We have generated these variables by using a research report about the economies in the rural sample (Bevan and Pankhurst, 1996).²⁰ The wealth of the village was assessed by economists working on the sample. This assessment was carried out after taking into consideration various factors determining village wealth such as common property resources, environmental factors, access to land, technology and innovation. We have a choice to either construct a variable for the average household consumption to proxy village wealth or to use the variable from the research report. We prefer to use the latter as it provides a wider socioeconomic depiction of the villages. The village wealth is a categorical variable which records poor villages vulnerable to famine with a zero, mixed villages, i.e. villages which are migration-dependent with category one and rich villages in the last category. The variable depicting soil quality is a dummy, which is one for good soil quality, i.e. lem (good quality soil) or fertile soil conditions in the village and zero otherwise.²¹

We provide the descriptive statistics of our sample in Table 3.2. As it can be seen from the table, postmarital residence is mainly bilocal or virilocal, 44% of the sample households are formed in the place of birth of the bride and groom, 33% are virilocal and the rest are neolocal or uxrilocal. The gap between the average level of education of the brides and grooms is approximately one year and the difference is significant

¹⁹ “In rural Ethiopia...cash crops...make tremendous difference in the wealth status of households” Ezra (2003).

²⁰ This report was written with the cooperation of the Centre for the Study of African Economies, Oxford University and Addis Ababa University.

²¹ We also complemented the information with information from the Village Studies which came with the dataset and which provides extensive information on soil quality. These studies were also the source for Bevan and Pankhurst’s report.

at the 1% level. Only 47% of brides, compared to over 67% of grooms, have acquired some of education.

Table 3.2: Descriptive Statistics of the Sample

Table 3.2: Descriptive Statistics of the Sample						
	Females			Males		
<i>Number of observations</i>	532			532		
<i>Postmarital residence</i>						
	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median
Virilocal (%)	33	-	-	33	-	-
Uxorilocal (%)	5	-	-	5	-	-
Both move away (%)	18	-	-	18	-	-
Both stay at birthplace (%)	44	-	-	44	-	-
<i>Personal characteristics</i>						
Age at the time of the survey	35	12.5	32	43	14.8	40
At least some education (%)	47	-	-	67	-	-
Average years education	1.4	2.3	0	2.6	2.9	2
At least some farming (%)	55	-	-	93	-	-
Average years of farming	6.4	5.2	5	9.8	7.5	8
At least some wage empl.* (%)	2	-	-	13	-	-
Years of wage empl.	0.02	0.12	0	0.13	0.33	0
Number of brothers	2	2	2	2	2	2
Number of sisters	2	1.8	2	2	1.8	2
<i>Parental transfers</i>						
Received inheritance (%)	12	-	-	54	-	-
Value of inheritance	231.1	2066.7	0	1994	6123.4	128.7
Net Transfers	141.6	2715.6	0	2756	6362.8	716.8
Received land from PA (%)	7	-	-	56	-	-
Size of land from PA (ha)	0.02	0.1	0	0.6	4.7	0.1
<i>Parents' characteristics</i>						
Household consumption	564	498.6	419.3	564	498.6	419.3
Educated mothers (%)	2.0	-	-	1.5	-	-
Educated fathers (%)	6.0	-	-	6.0	-	-
Size of father's land (ha)	2.2	5.5	1	2.7	8.4	1
Size of mother's land (ha)	0.4	2.3	0	0.6	4.5	0
<i>Village effects</i>						
Households in richer PAs (%)	22	-	-	22	-	-
Households in villages with good soil (%)	54	-	-	54	-	-

Note: All the monetary values are in 1997 Ethiopian Birr. We report data on first marriages only for monogamous households with no previous marriages.

*employment

Average levels of education in the sample are very low and this is mainly applicable to the generation of the parents. Brides and grooms have on average 1.4 and 2.6 years of education respectively. The average level of education of the parents does not reach even half a year. In addition, only around 8% of individuals in the parents' generation

acquired some education compared to up to 70% in the consequent generation. In terms of other human-capital, a majority of individuals in the sample acquire some farming experience but wage employment is very rare in the sample. This is intuitive due to the important role of subsistence farming in rural Ethiopia. Grooms receive nearly ten times more inheritance than the brides. A significant amount of grooms receives land from the PA. On the contrary, brides do mostly not receive any land from the PA. This is in line with the characteristics of the process of land redistribution in the country which we explained in the introduction and in chapter 2. All the previous statistics illustrate the gender gap in education and asset ownership in the rural sample.

3.3 Findings

Tables 3.3 and 3.4 report the coefficients for the multinomial and the binary logit models (3.1).²² We report the results for both brides and grooms in the dataset. In the case of the brides we do not include land from PA and wage employment experience because there is not enough variation in these variables; less than 10% of brides receive PA land or have wage employment experience.

3.3.1 The Role of Asset Transfers in Postmarital Residence Decisions

Our results confirm our hypothesis, i.e. transfers and human capital investments in children affect the postmarital residence of children.

Brides and grooms who receive more inheritance, gifts and bride prices are more likely to stay at their place of birth with their spouse at marriage. Also, grooms and brides who have more transfers are more likely to engage in a virilocal or uxorilocal

²² Appendix 4 provides the results for the 2sls regressions which predict education and transfers.

marriage relative to both moving away. The effect is stronger and more significant in the third category.

Table 3.3: The Determinants of Postmarital Residence: Multinomial Logit Estimates with Robust Standard Errors

Dependent Variable: Postmarital Residence	BRIDES			GROOMS		
Category	1	2	3	1	2	3
Number of observations	337	337	337	332	332	332
Independent variables	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
1. Transfers from parents: Inheritance						
Education (predicted value)	0.116 (0.355)	0.472 (0.649)	-0.320 (0.287)	-0.789* (0.407)	-1.287** (0.617)	-1.292*** (0.384)
Inheritance (predicted value)	0.711* (0.367)	0.812 (0.541)	1.127*** (0.360)	0.527* (0.271)	0.815** (0.379)	0.826*** (0.246)
2. Transfers from parents: Net transfers						
Education (predicted value)	0.125 (0.364)	0.460 (0.624)	-0.348 (0.305)	-0.690* (0.403)	-1.228* (0.652)	-1.194*** (0.382)
Net transfers (predicted value)	0.001*** (0.000)	0.001 (0.001)	0.002*** (0.000)	0.000* (0.000)	0.000 (0.000)	0.0001** (0.000)
Sibling composition						
Number of brothers	0.050 (0.116)	-0.162 (0.180)	0.082 (0.100)	0.099 (0.147)	0.249 (0.213)	0.218 (0.137)
Number of sisters	0.077 (0.135)	0.086 (0.182)	0.001 (0.117)	0.056 (0.126)	0.256 (0.187)	0.106 (0.112)
Other human capital						
Year of marriage	-0.003 (0.018)	0.020 (0.025)	0.019 (0.018)	0.026 (0.019)	0.039 (0.026)	0.051*** (0.019)
Farming experience dummy	1.059* (0.542)	1.640* (0.854)	1.088** (0.523)	-2.110* (0.109)	-2.673* (1.599)	-2.862*** (1.024)
Wage employment dummy	- (0.640)	- (1.010)	- (0.601)	-1.071* (0.640)	-0.674 (1.010)	-1.588*** (0.601)
Parents' wealth and human capital						
Land owned by the mother (hectares)	-0.599* (0.326)	-0.153 (0.139)	-0.324* (0.181)	-0.097*** (0.034)	-0.795 (0.537)	-0.067 (0.046)
Land owned by the father (hectares)	0.001 (0.001)	-0.069 (0.061)	-0.073** (0.030)	0.050*** (0.017)	-0.133 (0.146)	-0.010 (0.029)
Log of household consumption	-0.543 (0.403)	-1.152* (0.613)	0.282 (0.358)	-0.128 (0.370)	-0.325 (0.480)	0.459 (0.358)
Child-previous marriages father	-0.530 (0.439)	-0.719 (0.692)	-0.447 (0.404)	-0.124 (0.457)	-0.990 (0.845)	-0.450 (0.431)
Land received from the PA	- (0.037)	- (0.979)	- (0.037)	-0.117*** (0.037)	-0.601 (0.979)	-0.131*** (0.037)
Village effects						
Wealth 1	5.053*** (0.870)	2.685*** (0.984)	3.818*** (0.631)	5.056*** (0.929)	2.754*** (1.075)	4.207*** (0.745)
Wealth 2	3.156*** (0.749)	0.744 (1.272)	1.673*** (0.649)	3.980*** (0.728)	1.581 (1.129)	2.684*** (0.628)
Soil quality dummy	-2.048*** (0.613)	-0.185 (0.962)	-1.280** (0.570)	-2.066*** (0.534)	-0.167 (1.000)	-1.472*** (0.497)
Pseudo R squared	0.263	0.263	0.263	0.279	0.279	0.279
Log pseudo-likelihood	-296.36	-296.36	-296.36	-285.30	-285.30	-285.30
Wald χ^2	177.67	177.67	177.67	2256.21	2256.21	2256.21
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: *significant at 10% level, ** significant at 5% level, *** significant at 1% level

Base category: Both groom and bride move away

1-outcome for virilocal marriages; 2-uxorilocal marriages; 3-bilocality

Brides-Net Transfers = inheritance+gifts-bride price

Grooms- Net Transfers = inheritance+gifts+bride price

We also generate a regression with predicted net transfers instead of inheritance and report the coefficient on the transfers. The rest of the results are qualitatively similar. We also controlled for ethnicity.

Table 3.4
Logit Estimates with a Binary Response Variable with Robust Standard Errors

Dependent Variable: Postmarital Residence	BRIDES	GROOMS
<i>Number of observations</i>	337	332
<i>Independent variables</i>	<i>Coeff.</i>	<i>Coeff.</i>
1. Transfers from parents: Inheritance		
Education (predicted value)	-0.289* (0.171)	-0.826*** (0.299)
Inheritance (predicted value)	0.649*** (0.213)	0.515** (0.218)
2. Transfers from parents: Net transfers		
Education (predicted value)	-0.347* (0.179)	-0.755** (0.307)
Net transfers (predicted value)	0.001*** (0.000)	0.0001*** (0.000)
Sibling composition		
Number of brothers	0.008 (0.071)	0.113 (0.103)
Number of sisters	-0.044 (0.071)	0.028 (0.091)
Other human capital		
Year of marriage	0.018* (0.010)	0.027* (0.015)
Farming experience dummy	0.221 (0.306)	-1.711** (0.723)
Wage employment dummy	-	-0.948* (0.495)
Parents' wealth and human capital		
Land owned by the mother (hectares)	-0.106 (0.089)	-0.061** (0.029)
Land owned by the father (hectares)	-0.065** (0.026)	0.034** (0.013)
Log of household consumption	0.425* (0.232)	0.314 (0.278)
Child-previous marriages father	0.008 (0.269)	-0.020 (0.371)
Land received from the PA	-	-0.092*** (0.028)
Village effects		
Wealth 1	0.819** (0.373)	3.439*** (0.551)
Wealth 2	0.006 (0.438)	2.742*** (0.541)
Soil quality dummy	0.140 (0.258)	-1.729*** (0.396)
Pseudo R squared	0.14	0.29
Log pseudo-likelihood	-201.90	-129.74
Wald χ^2	47.42	89.66
Prob> χ^2	0.0001	0.0000

Notes: *significant at 10% level, ** significant at 5% level, *** significant at 1% level

Base category: Bride or Groom moves away; 1-Bride or grooms stays at birthplace

Brides-Net Transfers = inheritance+gifts-bride price

Grooms- Net Transfers = inheritance+gifts+bride price

We only report the net transfer effect and education effect in the net transfer regression, the rest of the results are qualitatively the same.

These results support our hypothesis that if parents invest more in their children, the children are more likely to live close to them at marriage and therefore probably more likely to provide them with financial or non-financial old age support. This result is confirmed in both the binary and the multinomial logit specification.

Interestingly, the effects are stronger in the case of the brides, suggesting that at the margin, inheritance and gift investments in the females increase old age support benefits more than they do in the case of the grooms. In addition, the fact that transfers to children increase the odds of being in an uxori-local or viri-local marriage relative to both moving away from their parents might mean that when parents invest more, they are more likely to control the postmarital residence of their child and take part in arranging the marriage. We have also checked for some parental intervention effects in order to see whether perhaps if the parent is involved in deciding about the child's marriage, the child is more likely to stay with the parent after marriage relative to moving away. We looked at whether this variable has an effect in the postmarital regression function and we found no significant effect.

In order to get a better insight, we looked at tabulated values of postmarital residence categories in relation to parental choice of spouse.²³ Households where the groom's parents have decided about the choice of his spouse are the ones that are mostly viri-local or ones where both the groom and the bride stay at their birthplace after marriage. Therefore, asset transfers seem to increase the control that parents have over the postmarital residence of their children and their old age support. Also, average welfare in terms of consumption is similar in viri-local households or ones where the grooms and brides stay at their birthplace. Uxori-local households and ones where the groom and bride have moved away from their birthplace are poorer in terms of household consumption. This evidence suggests that viri-local households

²³The ERHS asks the respondents who chose their spouse for marriage and the answers were: head, head's parents, spouse, spouse's parents, elders or friends. We generate a dummy if parents decided about the choice of spouse.

and households with postmarital residence close to the parents are better off in terms of welfare.

The positive effect of bride's inheritance on brides marrying off to a virilocal marriage might mean that parents secure her welfare by providing her with more inheritance and matching her with a richer groom (as virilocal households are richer). However, this conclusion would need more analysis which is beyond the scope of this chapter.

Human-Capital Investments

Tables 3.3 and 3.4 suggest that grooms who have a higher stock of human-capital in terms of education, farming or wage employment experience are less likely to become virilocal, uxorilocal or live at their birthplace with their spouse. As human-capital investments increase labour market opportunities, this result is plausible. Educational investments have the same effect on female's postmarital residence patterns but this is only significant in the binary regression. In the bride's regression we could not control for wage employment due to only a very small amount of brides having some wage employment experience²⁴. However, we did look at farming experience effects. The results on the farming experience of the brides show that brides who have some farming experience before marriage are more likely to stay at their birthplace or to engage in a virilocal marriage. This might be due to the fact that in contrast to males, labour market opportunities for women in rural Ethiopia are quite limited. In addition they are an attractive source of household productive labour either for their family or for their in-laws.

Therefore, our results indicate that childhood human-capital investments increase the likelihood of a child moving away relative to staying. The finding is more robust in the case of the grooms.

²⁴Overall, in rural Ethiopia wage employment is very rare so this is not a problem.

We also find that grooms who have married more recently are more likely to stay at the birthplace with their spouse relative to moving away.

Parental Wealth, Customs and Village Effects

Land ownership of parents

We find that parental land ownership has a significant effect on postmarital residence patterns. Brides whose fathers own more land are less likely to stay at their birth place relative to moving away. In the groom's case, higher land ownership of the mother decreases the probability of him engaging in a virilocal marriage rather than moving away; grooms whose fathers own more land are more likely to stay at their birth place relative to moving away. This seems to signal, once again, that children from richer families tend to engage in virilocal marriages. In addition, this finding might be a result of bargaining powers (given by land ownership) exerting parental preferences. Also, fathers and sons specialise in similar farming activities and therefore if the father owns more land, sons are more likely to stay living with them upon marriage.²⁵

Land from the Peasant Association

Our results also suggest that grooms who receive more land from the PA of their postmarital residence (the new PA) are less likely to stay at the PA were they were born, suggesting that they move to other villages which will provide them with land at marriage. Land acquisition is an important determinant of postmarital residence decisions. Acquisition of Land from PAs leads to better prospects in the marriage market. In some cases, individuals (mostly grooms) receive land from the Peasant Association when they marry or after they marry.²⁶ This suggests that some grooms move to another PA before or at marriage in order to acquire land and therefore

²⁵Similarly to chapter 2, we have also done another specification with the ratio of mother's land to father's land and found no significant effect.

²⁶Often Peasant Associations allocate land to households after their formation (Fafchamps and Quisumbing, 2002).

increase their attractiveness in the marriage market.²⁷ Also, soil quality and wealth in the new PA are additional factors affecting postmarital residence patterns.

Customs

Due to the high diversity of ethnic groups in the dataset and in order to control for customs which may be affecting postmarital residence patterns in the sample, we include a control for ethnicity. The omitted variable is Tigray. Our results confirm that customs play an important role in postmarital residence patterns. Brides and grooms who belong to the group of south-central ethnicity (Gedeo, Gamo, Wolaita and Kembata) are more likely to live with their spouse at their place of birth relative to those from Tigray. Amharic brides are also more likely to stay at their birthplace at marriage.

3.4 Concluding Remarks and Further Research

This chapter simultaneously analyses the relationship between parental transfers to children and the postmarital residence of children in rural Ethiopia. By doing so, we intend to see whether the predominant virilocal patterns in the country are related to gender bias in parental investments. This may result in parents investing more in their sons relative to their daughters to secure their old age welfare. We use postmarital residence as a proxy for old age support to parents and look at how childhood investments and investments at marriage affect postmarital residence.

We test our hypothesis using a sample from the Ethiopian Rural Household Survey 1997. Our empirical results show that human-capital and non-human-capital investments affect postmarital residence patterns of children. We find that grooms and brides who receive more transfers from their parents are more likely to stay at their

²⁷Often previous ancestry to a village or locality is enough to claim land and be entitled to receive it from the PA at marriage. This is another reason why people marry at a very early age (Kidane, 1989, pp. 516-517).

place of birth after marriage. Due to the fact that postmarital residence patterns in rural Ethiopia are prevalently virilocal, our findings explain one of the potential causes of the existent gender gap in parental investments. This is due to the fact that virilocal marriages lead to the transfer of childhood investments and female productive labour from the bride's family to the groom's family at marriage. Our results also show that human capital investments increase the probability of children moving away relative to them staying at their birthplace at marriage. Contrary to asset transfers, according to our findings human capital transfers do not induce old age support.

In addition to our principal findings, our results suggest that customs and community characteristics such as wealth, land provided by the Peasant Associations and soil quality are additional important factors affecting postmarital residence decisions. Also, brides with richer fathers in terms of land ownership are more likely to move from their birthplace at marriage and grooms with richer fathers are more likely to stay.

Our findings provide some explanation for the existing gender bias in asset transfers in rural Ethiopia. The next possible area to explore, if the data becomes available, is to incorporate the role of remittances from children to parents into the analysis. In addition, an examination of postmarital residence in connection to different forms of household specialization would give a useful insight into the determinants of intra-household investments and postmarital residence decisions.

Even though perceptions about education expressed in the sample show that individuals in the sample consider educational investments as necessary, in rural conditions with weak credit and labour markets, asset transfers seem to be of higher importance for securing future welfare of children and parents relative to educational investments. Our results provide important findings for better informed policy choices in terms of land redistribution, human-capital investments and old age support.

Chapter 4

Education and Farming Decisions in Rural Ethiopia: The Role of Ability, Family Welfare and Gender

Abstract

This chapter examines household choices between education and the employment of children in farming. We explore the idea that the ability of a child affects these choices. In addition, we look at how household wealth and the gender of a child affect parental decisions regarding children's time-allocation. We model education and farming choices jointly using data from rural Ethiopia. The data is limited in terms of the measure of ability it provides, but our analysis still gives a useful insight into the potential role of ability in parental decisions about the allocation of children's time to education and farm work. Our results suggest that the ability of a child is an important determinant of household demand for schooling and farm work. In the long-term, children with higher ability acquire more schooling and work less. The latter only applies to boys as farming decisions regarding girls are independent of their ability. Child labour and schooling differs by gender with girls having less schooling and farming experience relative to boys. Household composition and household welfare are two additional factors affecting household time allocation decisions. Our findings on the effect of ability give some explanation to the existing gender bias in rural Ethiopia and provide further insights into household child work decisions in rural Ethiopia.

JEL classification: D13, I21, J22, O15, Q12

Keywords: Ability, Child work, Schooling.

4.1 Introduction

Ethiopia is a country marked by poverty, low levels of schooling with a persistent gender gap and one of the highest incidences of child labour in the world. According to the ILO (The International Labour Organisation) and the Ethiopian Child Labour Survey 2001 (ECLS), 52% of Ethiopian children aged 5-7 were economically active in 2001. The primary reasons for not attending school in rural Ethiopia include the lack of household resources to finance schooling, the need for children to work in order to support household consumption and production needs and taking part in household chores (ECLS 2001, Bhalotra 2003). Overall, 89% of children in rural Ethiopia are involved in elementary agricultural and related activities such as herding cattle and helping adults in farming (ECLS, 2001). Moreover, only 1% of children and less than 10% of adults work outside the household for wages or in-kind payment, which shows the importance of subsistence farming for rural households (Cockburn and Dostie, 2007).

Parental decisions regarding the time-allocation of children amongst schooling and child work have a significant impact on the future welfare of children, their marital prospects and overall well-being. This chapter is an attempt to understand some of the underlying and fundamental factors affecting parental decisions about children's time allocation and human-capital investments in rural Ethiopia. We study child work¹ and schooling determinants in rural Ethiopia with a focus on the role of ability.

The existing literature on child labour offers an extensive analysis of the determinants of child labour including the role of poverty, household composition, household size, parental education, individual and community characteristics (studies for Africa include: Glewwe, 1996; Heady, 2003, Nielsen , 1998; for Latin America: Patrinos and

¹We use the terms "child labour" and "child work" interchangeably. However, in our analysis we use data on farming experience accumulated prior to the first marriage. It therefore represents farm work at home during childhood and early adulthood.

Psacharopoulos, 1995; Psacharopoulos, 1997; Ray 2002; for Asia: Rosati and Rossi, 2003; Phoumin, 2008). However, in this field, there are only a few studies of rural Ethiopia and they do not analyse the role of child ability.

Admassie (2000, 2003) provides descriptive statistics about child work and schooling trends in rural Ethiopia. Admassie (2002) analyses different individual, household and community determinants and their effect on the specialisation of Ethiopian children in terms of different activities (specialising either in work, in schooling, in no activity (idleness); or in combining both work and schooling). His paper also studies the role of poverty, siblings and asset composition and his results are in accordance with our findings in terms of the poverty-child work link.²

Cockburn (2001) and Cockburn and Dostie (2007) study the effect of household asset profiles and poverty on child work and school participation in rural Ethiopia. Cockburn and Dostie (2007) is an extension to Cockburn (2001) from a cross-section to a panel of three rounds. Cockburn and Dostie (2007) conclude that household asset accumulation in the form of land and small livestock in rural Ethiopia encourages child work and withdrawal of children from school.³ In line with our findings, these papers support the poverty-child labour link.⁴ We extend their findings by analysing the role of ability in child work-schooling decisions.

According to Bhalotra and Tzannatos (2003) and Bhalotra (2003), a paper by Bhalotra and Angeriz (2002) studies the effect of ability on child work in Ghana. We have not been able to view this paper because it is not published. However, Bhalotra and Tzannatos (2003) and Bhalotra (2003) report that Bhalotra and Angeriz (2002) look at the effects of ability on work and schooling choices in Ghana using a bivariate

²Another paper from Admassie (2002) finds further support for the poverty-child labour link on a study of a panel of Sub-Saharan African countries.

³Cockburn (2001 WP) finds that household ownership of small livestock, permanent crops and land increase child work. The author suggests that the land effect exists because children in rural Ethiopia specialise in land-intensive herding activities. On the other hand, oxen, bulls, ploughs, land quality and proximity to a source of water decrease child labour.

⁴Haile et al. (2007) also studies the determinants of market activities and schooling of children in rural Ethiopia.

probit. They find that children with higher ability are more likely to go to school and boys with higher ability are less likely to engage in work activities. Their findings are also in line with our results for rural Ethiopia.

Ability is also an important determinant of human-capital investments in children (Becker and Tomes, 1976; Becker and Tomes 1979; Becker 1993; Ayalew, 2005; Kim 2005; Akresh et al., 2010). More able children are more likely to learn faster, obtain better schooling outcomes and accrue the benefits of schooling in terms of future employment. Therefore parents in financially constrained households may look at ability as a signal of higher returns to their limited investments. Consequently, they may opt to invest more in the human-capital of children that are more able.

Problems with access to specific data on ability and with measuring ability seem to have hindered research on the role of ability in child labour studies (Bhalotra and Tzannatos, 2003). In this chapter, we aim to contribute to this research gap. In addition, we use the Ethiopian Rural Household Survey (ERHS), a dataset that has hitherto not been used for this type of analysis.

We model accumulated years of child work and schooling simultaneously. Child work and schooling are measured by the years of education and farming that adult married individuals have acquired prior to their first marriage. Therefore, these variables capture the work and school experience that the individuals accumulated during their childhood.⁵

We construct two ability variables based on quiz questions asked in the ERHS 1997. One is based on a dummy for correct answers to a question about mathematical abilities (we refer to it in the text as maths ability) which asks the respondents how much livestock is needed to transport a certain amount of cargo. The other combines the maths ability measure with two others, which ask knowledge about the person's

⁵Decisions of work and school acquired prior to marriage are most likely taken by parents. Admassie states that children's participation in work activities in Sub-Saharan Africa "is primarily dictated by the decision of their parents" (Admassie, 2000, pp. 258).

surroundings (knowledge about the country’s Prime Minister at the time of the survey and whether they know if a man has ever walked on the moon). The dummy for the latter has a value of one if at least two out of three questions are answered correctly. When choosing ability measures in relation to education, it is important to have a measure which is independent of schooling effects. We believe that the mathematical measure is not correlated with education and can be used as a variable showing innate ability. Individuals can remember facts from school, but they cannot find correct analytical solutions just from learning at school without using their innate ability. We use the quiz ability measure as a robustness check and we focus primarily on the effects of the maths ability. However, part of the latter also relates to questions about the surroundings of the person and it is therefore also most likely uncorrelated with schooling. In addition, the individuals in the dataset are adults at the age of the quiz and have most probably finalised their schooling a while before the quiz was taken. Therefore, even correct answers to the question about the moon signal innate ability. We are aware of the limitations of using a limited amount of ability measures, but we are constrained by the availability of data. Despite this, our analysis will provide some insight into the role that ability plays in parental decisions about the schooling and working experience of their off-springs.

Our results show that ability matters when parents allocate their children between farming and schooling activities. Children with higher ability acquire more years of schooling and those with lower ability gain more farming experience. However, the latter only applies to males. Poverty is another crucial factor motivating the need for child work in rural Ethiopia. Gender, sibling composition and community characteristics are additional variables which determine child labour and schooling decisions in rural Ethiopia.

The chapter is organised as follows. The next section presents the empirical model. Section 3 provides a detailed description of the variables used and section 4 reports

the results. Finally, we conclude in section 5.

4.2 The Model

We look at the determinants of education and child work demand in rural Ethiopian households with a focus on the role of ability. Schooling and working choices are measured by the years of education E_i and farming experience F_i acquired by the individuals during their childhood prior to their first marriages. These choices are estimated using a seemingly unrelated regression model (SURE) with White heteroskedasticity-corrected standard errors.⁶

We have a system of two equations:

$$E_i = \alpha_1 + \alpha_2 A_i + \alpha_3 \mathbf{X}_i + \varepsilon_i \quad (4.1a)$$

$$F_i = \beta_1 + \beta_2 A_i + \beta_3 LandF_i + \beta_4 LandM_i + \beta_5 \mathbf{X}_i + \varepsilon_j \quad (4.1b)$$

$$i = 1, 2, \dots, n$$

where A_i is the ability of the individual in household i ; $\mathbf{X}_i$ is a vector of individual and household level characteristics such as age, education of parents and parental wealth. We also control for regional differences by including regional dummies.

We include land ownership of the father $LandF_i$ and mother $LandM_i$ as additional variables in the farming regression. We choose variables for the model by gradually testing exclusion restrictions using Wald tests for the joint significance of a group of variables or tests of single variables excluded.

Our model specification allows the error terms of the education and farming equations, ε_i and ε_j respectively, to be correlated. This system of equations is gender

⁶We correct the standard errors in a SURE framework by using MLE estimation. Once the errors are corrected, the MLE estimator is similar to the FGLS estimator (Greene, 2008).

specific, i.e. we generate one set of equations for the females and one for the males. In addition, we generate another specification with a gender dummy in order to look at gender effects. Allowing for non-zero correlation of the error terms of the equations we have:

$$Cov[\varepsilon_i \varepsilon_j'] = \sigma_{ij} \quad (4.2)$$

Equation (4.2) illustrates the non-diagonal structure of the errors variance-covariance matrix of the education and farming equations under cross-equation correlation. We use maximum likelihood estimation to obtain the vectors of all the coefficients $\hat{\beta}$, error variances and covariances in the model $\hat{\sigma}_{ij}$. The maximisation process starts with obtaining the log likelihood function for computing these.

The joint probability density function for n normally distributed random variables $x_1, x_2, \dots, x_n$ with a mean μ and variance σ^2 is (Greene, 2008):

$$f(x_1, x_2, \dots, x_n | \mu, \sigma^2) = \left(\frac{1}{2\pi\sigma^2} \right)^{n/2} \prod_{i=1}^n \exp \left[-\frac{(x_i - \mu)^2}{2\sigma^2} \right] \quad (4.3)$$

To obtain the estimates of the variances and the coefficients for our model, the log likelihood function is used in our SURE model. Thus, given m equations, the education regression E_i , farming regression F_i and $Y_i = E_i, F_i$, the log-likelihood function for the model is:

$$\ln L = -\frac{n}{2} \ln 2\pi - \frac{n}{2} \ln \sigma^2 - \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^m \frac{(Y_{ij} - \mathbf{X}\beta)'(Y_{ij} - \mathbf{X}\beta)}{\sigma^2} \quad (4.4)$$

where $\mathbf{X}$ denotes a vector of all the explanatory variables in the regressions and β is the vector of coefficients. From here, the maximisation of the log-likelihood function with respect to β and σ^2 (which is a priori corrected for cross-equation correlation)

yields the efficient MLE estimators of the coefficients and the variances:

$$\hat{\beta} = [\mathbf{X}' \hat{\Omega}^{-1} \mathbf{X}]^{-1} [\mathbf{X}' \hat{\Omega}^{-1} \mathbf{y}]; \text{ where } \hat{\Omega} = \sum \otimes \mathbf{I} \quad (4.5)$$

$$\hat{\sigma}_{ij} = s_{ij} = \frac{\boldsymbol{\varepsilon}_i \boldsymbol{\varepsilon}_j'}{n} \quad (4.6)$$

where the error variance-covariance matrix and its components e and f for the education E and the farming F equations respectively are:

$$\sum = \begin{bmatrix} \sigma_{ee} & \sigma_{ef} \\ \sigma_{fe} & \sigma_{ff} \end{bmatrix} \quad (4.7)$$

where σ_{ij} denotes the ij th element of $\sum$ and in (4.5) it is multiplied by the identity matrix $\mathbf{I}$ (Greene, 2008).

Also, the heteroskedasticity robust adjustment is done to the covariance matrix. Finally, the MLE estimators are obtained using iteration between equations (4.5) and (4.6) until convergence is achieved (Greene, 2008; Zellner, 1962; Oberhofer and Kmenta, 1974)⁷.

For comparison and robustness checks we also provide OLS estimates since the correlation of the unobservables between the schooling and working equations is found to be negative but insignificant.⁸ However, estimating the model using MLE brings efficiency gains compared to OLS and it will allow us to perform cross-equation com-

⁷We thank Isabel Canette, the Senior Statistician for StataCorp for her valuable comments on the Stata procedure.

⁸We use the Lagrange multiplier statistic from Breusch and Pagan (1980) to test for cross-equations correlation of m equations, given the ij th residual correlation coefficient r_{ij}^2 :

$$LM = N \sum_{i=1}^m \sum_{j=1}^{i-1} r_{ij}^2.$$

It has a χ^2 distribution with $\frac{1}{2}m \times (m-1)$ degrees of freedom. We do not reject the null hypothesis and therefore the errors of the equations are not correlated (Breusch and Pagan, 1980; Greene, 2008).

parisons of the coefficients.

4.2.1 Data and Variables of Interest

After the presentation of our model we now describe the data that we use for testing our hypothesis, which states that ability is a determinant of child work and schooling parental decisions. We use a sub-sample of 1,064 individuals in 532 households from the 1997 round of the ERHS.⁹ These individuals are adults at the time of the survey, with average ages of 35 and 43 for females and males respectively. We select a sub-sample of individuals in their first marriages who provide information on their premarital history, including the years of schooling and farming experience they accumulated during their childhood. Because we analyse the childhood farming and education experience of these individuals, we will refer to them as children in the remainder of the chapter. Summary statistics of the sample can be seen in Table 4.1. In our sample, 55% of females and 93% of males have at least a year of pre-marriage farming experience, with males acquiring on average 3 to 4 more years relative to females. If we look at educational attainment, we can see that 47% of females and 67% of males have some education (we also include literacy programmes as one year of education). Average levels of education are low with girls acquiring on average 1.4 and boys 2.6 years of schooling. When describing the sample, it is noteworthy to mention that in rural Ethiopia, adult women specialise in domestic work and men specialise in farm work. Children's main activities include fetching firewood, water and herding animals (Admassie, 2002; Cockburn and Dostie, 2007). Children's activities are very time intensive, as Admassie's paper denotes: "rural children could be subjected to excessively long hours of work...some children are forced to work up to 80 hours per

⁹The first and second chapters, pp.13 and pp.30 provide an in depth specification of the dataset, including the areas it covers and the socio-economic and cultural settings of the sample. Chapter 3, pp. 65 specifies the main characteristics of the sub-sample of households with first marriages, the same sub-sample that we use in this chapter.

week, which implies that they may have to work for more than 12 hours a day” (Admassie 2002, pp. 19). In addition, children start working at a very early age.¹⁰

Table 4.1: Descriptive Statistics of the Sample

	Females			Males		
<i>Number of observations</i>	532			532		
	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median
<i>Human capital</i>						
Age at the time of the survey	35	12.5	32	43	14.8	40
At least some education (%)	47	-	-	67	-	-
Average years of education	1.4	2.3	0	2.6	2.9	2
At least some farming (%)	55	-	-	93	-	-
Average years of farming	6.4	5.2	5	9.8	7.5	8
<i>Personal characteristics</i>						
Number of brothers	2	2	2	2	2	2
Number of sisters	2	1.8	2	2	1.8	2
<i>Parents' characteristics</i>						
Parental wealth (index 1-5)	3.0	0.8	3	3.0	0.8	3
Educated mothers (%)	2.0	-	-	1.5	-	-
Educated fathers (%)	6.0	-	-	6.0	-	-
Size of father's land in hectares	2.2	5.5	1	2.7	8.4	1
Size of mother's land in hectares	0.4	2.3	0	0.6	4.5	0

Note: All the monetary values are in 1997 Ethiopian Birr. We only consider first monogamous marriages.

Table 4.2 shows the average levels of schooling and farming experience of males and females depending on their ability. We use both measures of ability explained in the introduction. A dummy variable for high ability individuals takes a value of one and zero otherwise. The table shows that farming and education experience varies depending on the ability of individuals, underlying the importance of analysing the role of ability. On average, individuals with higher ability have less farming experience and more schooling experience and vice versa. However, girls' farming does not seem to differ depending on their ability. Also, when we look at ability outcomes distinguished between people with and without education, ability patterns do not seem to strictly follow educational patterns.

¹⁰In rural Ethiopia, “12% of children have started participating in work by the age of 4; by the age of 7, 80% of children have started to participate in work.” Also, “over 45% of children between the ages 8 and 11 years and over 35% of those in the next age category (12-15) reported work as their primary activity” (Admassie, 2003, pp. 15).

Table 4.2: Ability and Human Capital

<i>Ability</i>	Schooling		Farming	
	Males	Females	Males	Females
<i>Quizz Ability-1*</i>	3.2	2.8	8.6	6.3
<i>Quizz Ability-0*</i>	1.9	1.2	11.2	6.4
<i>Maths Ability-1*</i>	3.0	2.0	8.9	6.4
<i>Maths Ability-0*</i>	2.1	1.3	10.8	6.3
<i>Ability</i>	Schooling		No schooling	
<i>Quizz Ability-1*</i>	196 (56%)	77 (32%)	73 (42%)	58 (21%)
<i>Quizz Ability-0*</i>	144 (42%)	161 (67%)	91 (52%)	213 (76%)
<i>Maths Ability-1*</i>	201 (58%)	48 (20%)	73 (42%)	26 (9%)
<i>Maths Ability-0*</i>	140 (40%)	190 (78%)	92 (53%)	249 (89%)

*A dummy depicts correct answers if it is 1 and 0 otherwise. Number 1 depicts high ability individuals, 0 represents low ability individuals. Percentages denote the proportion of all the educated or non-educated individuals-males or females.

As an example, 56-58% of all the males in the sample who have some education are of higher ability compared to 40-42% of those who are not educated. In the female sample 20-32% of educated females are of higher ability compared to 9-21% in the non-educated group. Therefore we see that a significant number of males and females who have no education are of higher ability, supporting our assumption about the exogeneity of ability in the education regression.

Dependent Variables

Farming and Education

Our dependent variables represent the years of accumulated farming and schooling experience acquired by the individuals prior to their first marriage.

It is common practice in the literature of child labour to model child work, schooling and other activities of children in a variable which either represents participation decisions between child work and schooling in the form of a binary outcome or to model various activities in a categorical outcome variable (Nielsen, 1998; Psacharopoulos, 1997; Admassie, 2002; Cockburn and Dostie, 2007; Haile et al., 2007) or to look at the intensity of child work measured by the average hours spent working in a day or week (Bhalotra and Heady, 2001; Ray, 2000; Ray, 2002). We use years of farming as a measure of the total child work experience accumulated during childhood. This

allows us to look at the long term effects of ability and other household and regional characteristics on the number of years of schooling and child work.

Explanatory Variables

Child ability

We use two dummy variables depicting the ability of individuals. The ERHS 1997 questionnaire provides a quiz which was taken by the respondents-the brides and grooms in the sample. This questionnaire asks the following questions:

- *Who is the Prime Minister?*

- *Has a man ever walked on the moon?*

- *If you want to take 300 kg of grain to the market and you know that one donkey can take a load of 75 kg, at least how many donkeys will you need to take all the grain in one trip?*

We generated one variable which is a dummy with value one if the person answered correctly to at least two of the questions and zero otherwise (the *quiz ability* variable). In addition, we generate a dummy for correctly answering the last question (the *maths ability*). This way, the observations with dummy values of one depict the more able individuals and zeroes represent the less able whose answers were incorrect.

We take ability as exogenous in the education and farming regressions. The exogeneity in the farming regression is a plausible assumption as we do not expect child work per se to affect innate ability of a child. It can have a detrimental effect on educational outcomes, but it will not change innate ability.

However, depending on the ability measure used, ability can be potentially endogenous in the education regression. This would be the case if we take a measure of ability which is determined by education. We perform the augmented Durbin-Wu-Hausman regression test (Baum et al., 2003; Trivedi, 2005) by predicting the residuals from running ability on all the exogenous variables in the model and consequently inserting them in the education equation in (4.1a). The errors are insignificant for

both measures of ability. Therefore, statistically, the ability measure is exogenous. However, one could argue that the exogeneity of ability is still in doubt as we might be measuring educational effects.

Even though our data is limited in the ability measures it provides, we use variables which we believe are independent of education and therefore reflect innate ability. The questions asked in the quiz are answered by individuals who have already completed their education. Prime Ministers have changed since the individuals in our sample were children. Therefore, people who know the Prime Minister of the country at the time of the survey show that they have awareness of recalling information they have heard and/or read. The latter shows that they are more able relative to individuals who answered incorrectly to this question. In regards to the second question, even though individuals might have learned it at school, answering correctly to this question many years after schooling shows innate ability and a capability of recollecting information from years ago. Also, answering correctly to the mathematical question (maths ability) is most probably a signal of innate ability. The answer to this question requires solving skills. Therefore, even if the individuals answering have learned mathematics at school, being able to answer correctly years after school shows innate ability. We therefore believe that this measure is independent of education. We also provide results on the quiz ability variable in order to check the robustness of our findings. If we would analyse the ability of children who are undertaking education at the time of the quiz, endogeneity would be a bigger problem for our analysis.

Due to the fact that we use a sample of adult individuals, we assume a high correlation between childhood and adult ability and therefore stability of ability through time (Schwartzman et al., 1987; Deary et al., 2000; Larsen et al., 2008).

Household Welfare

In our model, we also control for a variety of individual and family background characteristics. These include the wealth of parents evaluated by the individual in a scale of one to five; one being very poor and five very rich.¹¹

We expect that children from richer households will have more years of schooling and less years of farming experience. If this is so, we find some support for Basu-Van's luxury axiom which states that parents are altruistic and will only send children to work if the household falls below the poverty line (Basu and Van, 1998).

In order to separate the income effects from the effects of other wealth sources, we include household asset ownership in the model. We insert the land size owned by the father and the mother. Including both variables will allow us to see possible income and substitution effects. Higher income or wealth should lead to children working less (Basu and Van, 1998). However, the effect of assets can be two-fold. On one hand, more assets may lead to an income effect, so the household becomes richer and buys more leisure or schooling and/or employs external labour if needed, leading to a decrease in child work. On the other hand, if labour markets are imperfect, the higher marginal product associated with additional land can lead to an increase in the demand for child work. Also, if the additional land is of low fertility and it is not accompanied by additional or better technologies, harvesting this land will increase the demand for child work even more relative to an increase in fertile land. Higher ownership of low quality land will lead to an increase in marginal productivity of child work, but this increase will be lower relative to high quality land, leading to a higher demand for child work. Therefore, both the latter and the former will result in a substitution effect away from leisure and schooling and towards more child work. We

¹¹Admassie (2002) uses different wealth proxies. These include household assets, variables such as materials for building the house and variables depicting participation of household members in off-farm and income generating activities. Cockburn (2002) and Cockburn and Dostie (2007) use real household food expenditure to measure household income or wealth. For our sample, the data provides this measure. We have also tried using household expenditure as stated in the previous chapters and the results are qualitatively similar.

therefore look at the sign of the land variable to see whether there is a predominant income or substitution effect.

Household Size and Sibling Composition

Other important variables which may affect parental decisions in relation to children's activities include the number and gender of siblings. Families with an additional child can experience two types of effects. Firstly, a consumption effect which will result in an increase of financial constraints due to additional household members increasing household demand for consumption goods. A similar effect can emerge when the additional sibling demands child caring services. Both, the former and the latter will result in higher child labour demand.

On the other hand, if there is labour substitution among siblings, having more siblings would mean that some children can specialise in work and others in schooling. This could lead to lower levels of work for some children. Also, a higher amount of siblings can translate in diminishing marginal returns to child work which would translate in a similar effect. In addition, siblings can often work as support networks in income generation and skill acquisition.

We also control for gender in order to look at possible gender bias in the allocation of children's time towards farming and schooling. We further control for parental education to look at the effect of parental schooling on decisions about farm employment and schooling of children. Finally we include regional dummies to control for location effects such as labour markets (most likely informal) or infrastructure.

4.3 Results

We report our findings in Tables 4.3, 4.4 and 4.5. Table 4.3 provides the estimation results from the regression with the maths ability for the whole sample and Tables 4.4

and 4.5 for the females and the males respectively.¹² Each one shows the seemingly unrelated regression model and the OLS estimates. We only conclude findings which are robust across all the specifications. Since the second chapter of our thesis analyses the determinants of education, we focus here on the results of the farming regression and mention the education results mainly with regards to ability effects.

4.3.1 Ability Effects

In each of our equations, ability shows a positive and significant effect on education. This applies to both measures of ability; the *quiz ability* and the *maths ability*. On the other hand, the ability effect on farming experience is only significant in the case of the males. Also, when we compare the ability effects on farming relative to education, the coefficients in the male regression are higher for farming and this difference is statistically significant. Children’s contribution to income in rural Ethiopia is quite substantial, ranging between 4-7% of household income (Cockburn, 2002). On the other hand, returns to education in terms of household crop output have been found to be significant as well (Weir and Knight, 2007). These findings suggest that both education and farming are important in terms of increasing household production output and consequently household welfare.

When we focus on gender specific-equations, the finding that ability of the girls is not significant may be a sign of gender bias. Based on our coefficients, parental decisions about the allocation of a girl’s time towards farming are independent from their ability and therefore their potential higher returns to schooling relative to girls with lower ability. On the other hand, we do not look at the effect of ability on accumulated household work experience, a task that is predominantly done by girls

¹²We perform two regressions, one with the “maths ability” and one with the “quiz ability”. We report the results from the “maths ability” regression. All the other variables in both regressions are the same. We insert the effect of the quiz ability measure in the same table. The results on the rest of the explanatory variables are qualitatively similar independently of which ability measure we use.

in rural Ethiopia. This is due to data limitations. Research including the role of household work can shed more light on the question of gender bias in parental demand for child work. Summarising the ability effects, our results confirm our hypothesis that the ability of the child is an important determinant of parental decision-making regarding child's work and schooling activities. These findings are in line with Bhalotra and Angeriz (2002) who studied the effect of ability on child work in Ghana.

4.3.2 Household Welfare

Household Wealth

The ERHS asks the individuals to rate the prosperity of their parents. They rank them in five categories, ranging from very poor to very rich. We use this variable as a proxy for household welfare. Our estimation results show that children whose parents are relatively richer have higher levels of education and lower levels of farming experience. The effects are significant for the whole sample, i.e. for both boys and girls. The strongest coefficient is found for the last category, i.e. very rich households. To some extent our results support Basu-Van's luxury axiom. According to our coefficients, poverty is the most important variable determining child labour in rural Ethiopia. Also, the effects are stronger in the male sample. Our findings are in line with Admassie (2002) who finds support for the poverty-child labour link.¹³ In spite of the high returns to child work, our results suggest that Ethiopian parents are altruistic (in the sense of Becker, 1993) towards their children in terms of caring for their long-term well-being and their human-capital. Our findings contribute to the debate on the poverty-child labour link, which has also been studied for other developing countries. There are many studies which support the poverty-child labour link (Patrinos and Psacharopoulos, 1995 for Paraguay; Bhalotra and Heady, 2001 for

¹³Also, Cockburn and Dostie (2007) conclude a poverty-child labour link. However, their effects are only, according to the authors significant for the girls, and only at the 20% level.

the case of boys in Ghana; Ray 2000 for Peru; Rosati and Rossi, 2003 for Pakistan; Phoumin, 2008 for Cambodia).

Table 4.3: The Determinants of Schooling and Farming: OLS and Seemingly Unrelated Regression

<i>Dependent Variable</i>	<i>Schooling</i>		<i>Farming</i>	
<i>Methodology</i>	SUREG	OLS	SUREG	OLS
<i>Independent Variables</i>	Coeff.	Coeff.	Coeff.	Coeff.
<i>Human capital</i>				
Quiz ability	1.029*** (0.212)	1.247*** (0.206)	-1.508*** (0.526)	-1.508*** (0.532)
Maths ability	0.737*** (0.193)	0.829*** (0.178)	-0.848* (0.475)	-0.848* (0.480)
<i>Sibling composition</i>				
Female	-0.734*** (0.196)	-0.621*** (0.188)	-2.838*** (0.517)	-2.838*** (0.522)
Number of brothers	0.015 (0.057)	0.024 (0.045)	0.028 (0.127)	0.028 (0.129)
Number of sisters	0.147** (0.060)	0.137*** (0.052)	0.242* (0.136)	0.242* (0.138)
<i>Parental characteristics</i>				
Parental wealth-poor	0.687 (0.472)	0.449 (0.381)	-1.749 (1.897)	-1.749 (1.916)
Parental wealth-average	0.855* (0.439)	0.672* (0.355)	-1.613 (1.840)	-1.613 (1.858)
Parental wealth-rich	0.990** (0.479)	0.633 (0.387)	-2.497 (1.903)	-2.497 (1.923)
Parental wealth-very rich	2.289** (0.937)	2.342*** (0.734)	-4.780** (2.175)	-4.780** (2.197)
Land owned by the father (hectares)	-	-	0.009 (0.031)	0.009 (0.031)
Land owned by the mother (hectares)	-	-	- 0.055 (0.068)	- 0.054 (0.068)
Education of the parents	0.150** (0.064)	0.202*** (0.064)	0.028 (0.116)	0.028 (0.117)
<i>Personal characteristics</i>				
Age	0.000 (0.007)	0.007 (0.006)	0.140*** (0.025)	0.140*** (0.025)
Number of observations	740	994	740	740
Log-likelihood/R squared	-4120.5	0.16	-4120.5	0.20
Wald χ^2 /F-stat	234.67	14.23	234.67	6.34
Prob> χ^2 /Prob>F	0.0000	0.0000	0.0000	0.0000

Note: *significant at 10% level, ** significant at 5% level, *** significant at 1% level. We also control for region.

On the other hand, another group of studies does not find a significant effect of household welfare on child labour (Jensen and Nielsen, 1997 for Zambia; Psacharopoulos, 1997 for Bolivia; Patrinos and Psacharopoulos 1997 for Peru; Rossi and Rosati, 2003 for Nicaragua). Bhalotra's and Tzannatos' (2003, pp.28-29) denote that "one

of the most striking findings that emerge in surveying the empirical literature on child labour is that both its unconditional and conditional correlation with household poverty is small, and often insignificant.

Table 4.4: The Determinants of Schooling and Farming: OLS and Seemingly Unrelated Regression: Females

Dependent Variable	Schooling		Farming	
	SUREG	OLS	SUREG	OLS
Independent Variables	Coeff.	Coeff.	Coeff.	Coeff.
<i>Human capital</i>				
Quiz ability	0.767** (0.391)	1.379*** (0.388)	0.011 (0.763)	0.010 (0.783)
Maths ability	0.464[†] (0.300)	0.647** (0.267)	0.400 (0.611)	0.400 (0.628)
<i>Sibling composition</i>				
Number of brothers	0.027 (0.080)	0.026 (0.052)	0.091 (0.164)	0.091 (0.169)
Number of sisters	0.190** (0.079)	0.142** (0.066)	0.060 (0.158)	0.060 (0.162)
<i>Parental characteristics</i>				
Parental wealth-poor	-0.277 (0.900)	-0.320 (0.584)	-3.034 (2.488)	-3.034 (2.555)
Parental wealth-average	-0.160 (0.873)	0.003 (0.562)	-2.602 (2.432)	-2.602 (2.497)
Parental wealth-rich	0.405 (0.925)	0.063 (0.591)	-3.106 (2.404)	-3.106 (2.467)
Parental wealth-very rich	1.388 (1.238)	1.849** (0.912)	-4.117* (2.462)	-4.117^{††} (2.527)
Land owned by the father (hectares)	-	-	0.000 (0.034)	0.000 (0.035)
Land owned by the mother (hectares)	-	-	-0.065 (0.055)	-0.065 (0.056)
Education of the parents	0.098 (0.073)	0.222** (0.091)	-0.259 (0.183)	-0.259 (0.188)
<i>Personal characteristics</i>				
Age	0.014 (0.010)	0.018** (0.008)	0.090*** (0.029)	0.090*** (0.030)
Number of observations	275	501	275	275
Log-Likelihood/R-squared	-1393.72	0.13	-1393.72	0.20
Wald χ^2 /F-stat	116.70	5.34	116.70	2.12
Prob> χ^2 /Prob>F	0.0000	0.0000	0.0000	0.0000

Note: *significant at 10% level, ** significant at 5% level, *** significant at 1% level. We also control for region.
[†] p=0.122; ^{††} p=0.150

Asset ownership

Ownership of assets is another potential determinant of child work. Land ownership disaggregated by parents can potentially explain substitutability of work between

parents and children and potential income and substitution effects.

Table 4.5: The Determinants of Schooling and Farming: OLS and Seemingly Unrelated Regression: Males

Dependent Variable	Schooling		Farming	
Methodology	SUREG	OLS	SUREG	OLS
Independent Variables	Coeff.	Coeff.	Coeff.	Coeff.
<i>Human capital</i>				
Quiz ability	1.089*** (0.251)	1.167*** (0.247)	-1.874*** (0.626)	-1.874*** (0.636)
Maths ability	0.859*** (0.252)	0.962*** (0.250)	-1.326** (0.635)	-1.325** (0.645)
<i>Sibling composition</i>				
Number of brothers	0.021 (0.079)	0.030 (0.078)	0.053 (0.173)	0.053 (0.176)
Number of sisters	0.122 (0.082)	0.134 (0.083)	0.344* (0.191)	0.344* (0.194)
<i>Parental characteristics</i>				
Parental wealth-poor	1.342*** (0.508)	1.161** (0.494)	-1.087 (2.657)	-1.087 (0.270)
Parental wealth-average	1.510*** (0.447)	1.309*** (0.441)	-1.108 (2.558)	-1.109 (2.598)
Parental wealth-rich	1.403*** (0.522)	1.226** (0.515)	-2.000 (2.680)	-2.000 (2.721)
Parental wealth-very rich	2.955** (1.401)	2.713* (1.401)	-6.061* (3.198)	-6.062* (3.247)
Land owned by the father (hectares)	- (0.087)	- (0.088)	-0.004 (0.040)	-0.004 (0.041)
Land owned by the mother (hectares)	- (0.087)	- (0.088)	-0.050 (0.086)	-0.049 (0.088)
Education of the parents	0.171** (0.087)	0.170* (0.088)	0.240* (0.125)	0.240* (0.127)
<i>Personal characteristics</i>				
Age	-0.004 (0.010)	-0.000 (0.009)	0.165*** (0.034)	0.165*** (0.034)
Number of observations	465	493	465	465
Log-Likelihood/R-squared	-2676.72	0.12	-2676.72	0.16
Wald χ^2 /F-stat	127.54	6.46	127.54	3.19
Prob> χ^2 /Prob>F	0.0000	0.0000	0.0000	0.0000

Note: *significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Our results suggest that in our sample there is no income or substitution effect, or that in total both cancel out.¹⁴ Admassie (2002) and Cockburn and Dostie (2007) find that in the current sample of children in the ERHS, land size has a negative effect on schooling and a positive effect on child labour. However, Haile et al. (2007) finds

¹⁴We also performed a regression with total parental land and the effects were insignificant as well.

that land has no effect on child labour in line with our results. Admassie (2002) and Cockburn and Dostie (2007) study a different sample and they study participation decisions in a certain time period, whereas we study accumulated schooling and farming experience.

4.3.3 Gender Effects

The female dummy coefficient in table 4.3 suggests that girls accumulate less farming and schooling experience relative to boys. Our finding in relation to schooling is a sign of the educational gender bias in rural Ethiopia. The result regarding farming is most likely a consequence of household work specialisation in rural Ethiopia. Girls specialise in house work and boys in farm work. However, girls do other activities complementarily to housework, including farming. Our results are in line with Haile et al. (2007) and Admassie (2002). Haile et al. (2007) focuses on market activities of children and finds that boys are more likely to engage in market work and more likely to attend school compared to girls. Admassie (2002) finds that male children are less likely to specialise in work and more likely to specialise in schooling or combine work and school. The schooling effect found in Admassie supports our findings. The effect of work is different in his case. This may be because Admassie does not disaggregate work into farming, domestic and other work but includes them all in one category. In addition, he focuses on a different sample of individuals.

Apart from the effects of the main variables of interest, our results provide some noteworthy evidence on the effects of sibling composition, parental education, and regional characteristics on child schooling and farming. We find that females who have more sisters acquire more years of schooling (which is in line with our findings in chapter 2) but female siblings do not affect farming outcomes of girls. However, males who have more sisters have higher levels of farming experience, which suggests that females generate a consumption effect by affecting household financial constraints. The

latter leads to an increase of male child work. Once again, having a dependent variable measuring household work (such as cleaning and helping with raising children) would expand our picture on sibling effects in terms of possible substitution effects among the labour of female siblings.¹⁵

We find that joint parental education¹⁶ has a positive effect on schooling of both males and females. In another specification where we use separate education of father and mother, we also find that mother's schooling decreases the farming experience of females. Parents with higher education levels are more likely to appreciate children's education relative to non-educated parents. Having better educated parents could therefore lead to more schooling. However, in settings with subsistence farming as the main activity of most households, two effects could take place. On one hand, at low levels of education (most parents have very little education, less than half a year), more parental education may lead to the increase of household labour productivity and farming output (Weir and Knight, 2007). In conditions of poverty, most households employ their children in farm work. However, more educated parents might perhaps wait for the child to gain some education which allows them to start contributing to the household labour later in their childhood, leading to less years of farming experience. On one hand, education of parents will increase marginal productivity of labour, which together with high levels of poverty and dependence on subsistence farming, will lead to more child work. On the other hand, higher parental education will lead to more schooling and therefore less accumulated child work. Our results are similar to Cockburn's and Dostie's (2007) and Admassie's (2002) findings. In Cockburn and Dostie (2007), the effect of parental education on child work is insignificant in

¹⁵Within this context, both Admassie (2002) and Cockburn and Dostie (2007) find that a higher number of infants in the household increases work and decreases schooling of children. Cockburn and Dostie conclude no effect of females on schooling and work, but find that boys who have more brothers work less and acquire more schooling. They therefore conclude that there is a labour substitution effect between male siblings.

¹⁶We use joint parental education due to the low levels of education and the very low incidence of education in the sample. This way we gain more variation in the education variable. However, we also run another specification to check the effects of mother's and father's education separately.

most specifications of their model, while parental education has a significant effect on schooling of both boys and girls. Admassie (2002) finds that higher levels of education of the household head increase the education of boys and decrease the likelihood of boys and girls specialising in work.

Regional effects are also significant. We find that individuals from the Amhara, Oromiya or Southern regions accumulate more schooling and less farming experience relative to individuals from Tigray. Children in the Tigray region have on average more years of farming and less schooling. Sample households in the Tigray Region are vulnerable to famine and one of the main cash sources in the region is cattle (Admassie, 2002; Bevan and Pankhurst, 1996). Due to the latter and the fact that cattle herding is one of the main (farming) activities performed by children in rural Ethiopia, Tigray children have more farming experience. In addition, our finding is in line with Admassie (2002) who finds that children in famine vulnerable areas are more likely to combine work and schooling and less likely to specialise in schooling.

4.4 Concluding Remarks

The literature on the impact of child ability on parental decisions regarding child labour is scarce. Our analysis is intended to contribute to this gap in the literature. We provide evidence for our expectation that parents will allocate children amongst schooling and farming in a way that more able children will acquire more schooling and less farming experience relative to less able children. In addition, we find that the ability of girls does not have an effect on their farming experience, which might be a signal of gender bias. However, the latter conclusion needs further research involving data on domestic work performed by girls.

We test our hypothesis by using the ERHS and applying a seemingly unrelated regression model which is complemented by and compared to an OLS estimation with

years of farming experience and schooling as the dependent variables. In addition to our main finding on the effect of ability, we also find that sibling composition, parental education, household wealth and locality are significant factors affecting school-work decisions in rural Ethiopia.

Our results suggest that policies focused at targeting children with lower abilities in poverty constrained households could lead to increased aggregate levels of education. Taking into account the positive externalities of primary education and the high social returns to low levels of education, PAs could implement ability tests to target cash transfers to children who would otherwise not receive education or who would receive lower levels of education relative to their more able counterparts. However, we understand that implementing this is a complex issue which needs further rigorous research.

Over the past two decades, many national and international policy efforts were targeted at increasing educational levels and decreasing child labour in rural Ethiopia.¹⁷ Some have been successful, but many of them did not come to full effect. One of the problems is that many of them do not account for factors specific to the rural parts of the country (Bhalotra, 2003). Therefore, a further understanding of fundamental factors influencing schooling and child work in rural settings is very important to be able to generate successful policies and further evaluate their effects. Our chapter addresses this by providing an explanation of some factors affecting child activities in rural Ethiopia and possible sources of gender bias in education and child work.

¹⁷These include Ethiopia's Labour Proclamation no. 42/1993 setting the minimum age for work at 14 and working conditions; ratification of the ILO Convention no. 138 on Minimum Age for Employment (1999); the Protection of Basic Services Program (2007) and the General Education Quality Improvement Program (2009).

Chapter 5

Conclusion and Policy Implications

5.1 Concluding Remarks and Findings

Using household survey data, we analyse intrahousehold resource and time allocation in rural Ethiopia with a focus on educational investments, child work and asset transfers from parents to children. The first part of this research, chapter 2, explores the idea that parental decisions about children's bequests and education are two simultaneous decisions related by a substitution mechanism. In addition, it analyses other determinants of education including sibling composition, household welfare and individual and parental background characteristics. Our results confirm our hypothesis for the females in the dataset but not for the males. Bequests to girls crowd out educational investments. However, perhaps due to strong customs of patrilocal descent in inheritance patterns (Ezra, 2003; Fafchamps and Quisumbing, 2005), educational outcomes of grooms are unaffected by bequest endowments. Amongst other determinants of education, we find that in households with higher welfare, more female siblings and higher levels of parental education, parents invest more in the education of their children.

The consequent chapter tests whether virilocal postmarital residence patterns,

which are exercised by most households in rural Ethiopia, contribute to the existing gender bias in asset and human-capital investments. Parents whose children live close to them after marriage are more likely to receive old age support from their children. Therefore, we hypothesise that one of the motives for parental human-capital and non-human-capital investments is the old age security motive which is affected by postmarital residence patterns. We develop a postmarital residence regression which analyses education and asset transfers to children. The findings in this chapter confirm our hypothesis that human-capital and non-human-capital investments are related to the choice of postmarital residence of children. Controlling for community effects, parental wealth and other household and individual characteristics, children who receive higher bequests are more likely to settle in a postmarital residence close to their parents. This shows that virilocal patterns of postmarital residence may be working against gender equality in investments. In virilocal marriages, parents lose the returns to investments in girls due to the transfer of physical and human capital from the bride's to the groom's family which happens in such marriages. We also find that educational investments cause grooms and brides to migrate away from the family at marriage. This result is more robust for the grooms, who move perhaps due to increased labour market opportunities. Also, more educated grooms are more likely have a higher variety of skills applicable to labour markets in different locations. These findings suggest that inheritance is the main transfer positively affecting the likelihood of parents receiving old age support from their children. This might, to some extent, explain the low levels of educational investments and the importance of asset transfers in the sample studied.

The last chapter in this analysis examines parental decisions about children's time allocation in farm work and schooling, while focusing on the role of ability. We hypothesise that due to low average household welfare in the rural areas which we examine, parents may have to make decisions about children's time allocation not only based

on wealth, asset ownership, household or community characteristics, but also based on the child's ability. Returns to educational investments in better endowed children are higher relative to returns to investments in children with low ability. Moreover, it is very likely that education requires more ability relative to farming. Therefore, in order to maximise the returns to their limited investments, parents in poverty constrained households may opt to provide more schooling to and demand less farm work from the better endowed children. We confirm this hypothesis for the education of both male and female children and for the farming of male children. However, in terms of farming, girls with higher innate ability do not necessarily accumulate less farming experience in their childhood because the demand for girls' farming is independent of their ability. In order to conclude that this is a sign of gender bias, we would have to include an analysis of housework and child care services, which are the main tasks in which girls specialise. However, the data for these variables is not yet available.

5.2 Policy Implications

Our analysis shows that education and asset transfers to children are two types of investments which are at the heart of parental household resource allocation decisions in rural Ethiopia. Moreover, they not only affect future income welfare and marriage prospects of children, but also old age security prospects of parents. Education is an important tool for increasing farming productivity in rural Ethiopia (Weir and Knight, 2007) and both inheritance and education increase child welfare not only through increased labour market opportunities but also through improved marriage market prospects. The scarcity of public redistributions of land to households in recent years and the assortative matching character of the marriage market in rural Ethiopia have lead to marriage markets working as one of the sources of low income mobility which is exacerbated by parental investments (Fafchamps and Quisumbing, 2005). Factors

such as high poverty levels in the country, large distances to school, marriage customs and cultural perceptions of the role of females lead to a difficult position of women in terms of access to school, labour markets, land acquisition and divorce options. This is exacerbated by the type of household gender specialisation in rural Ethiopia characterised by time-intensive female labour which translates into higher opportunity costs of schooling for females relative to males. Finally, the high incidence of child work at a very early age, which is characterised by longer working hours for girls, works to the detriment of children's education. These findings underline the importance of initiatives aimed at targeting areas of economic development in rural Ethiopia in terms of schooling outcomes, old age support, child work and gender equality in access to assets.

Our work shows that poverty is a very important driver of parental decisions about schooling, child work and bequests. The latter gives support for poverty alleviation policies such as cash transfers or school food vouchers for poverty constrained families. These policies have been successful in countries like Brazil, Mexico or Bangladesh (Bolsa Escola in Brazil, Progreso in Mexico, Food for Education Programmes in Bangladesh), and if they are adapted to local customs¹ and followed by considerable planning with further evaluations, they might work in rural Ethiopia as well. These types of programmes not only work as motivation mechanisms, but they also lead to a decrease in opportunity costs of schooling.

Another important finding in this research is that women are often discriminated in land access or their rights to household property in case of divorce or widowhood. Due to the latter and the prevalence of virilocal postmarital residence patterns, any asset transfers that they receive from their parents and that they bring to their marriage can be potentially lost. The Family Code of Ethiopia has been revised in 2000 to introduce clauses for the protection of female land ownership and female rights to

¹This can be done by providing gender specific services due to the fact that often parents take girls out of school due to worries of them being abducted for marriage or getting pregnant.

participate in household decisions making. However, customs still seem to prevail in terms of policy implementation in many areas (The World Bank, 2009). Further improvements in policies such as Land Rights Certification Programmes and changes in divorce contracts leading to equal division of property upon divorce, may lead to an increase in gender equality in educational and asset investments which will translate in higher returns to parental investments. Also, the implementation of legal acts targeting gender can play a very important role in limiting and eliminating discriminatory practices which will lead to a change in the attitudes towards the position and role of females in the country.

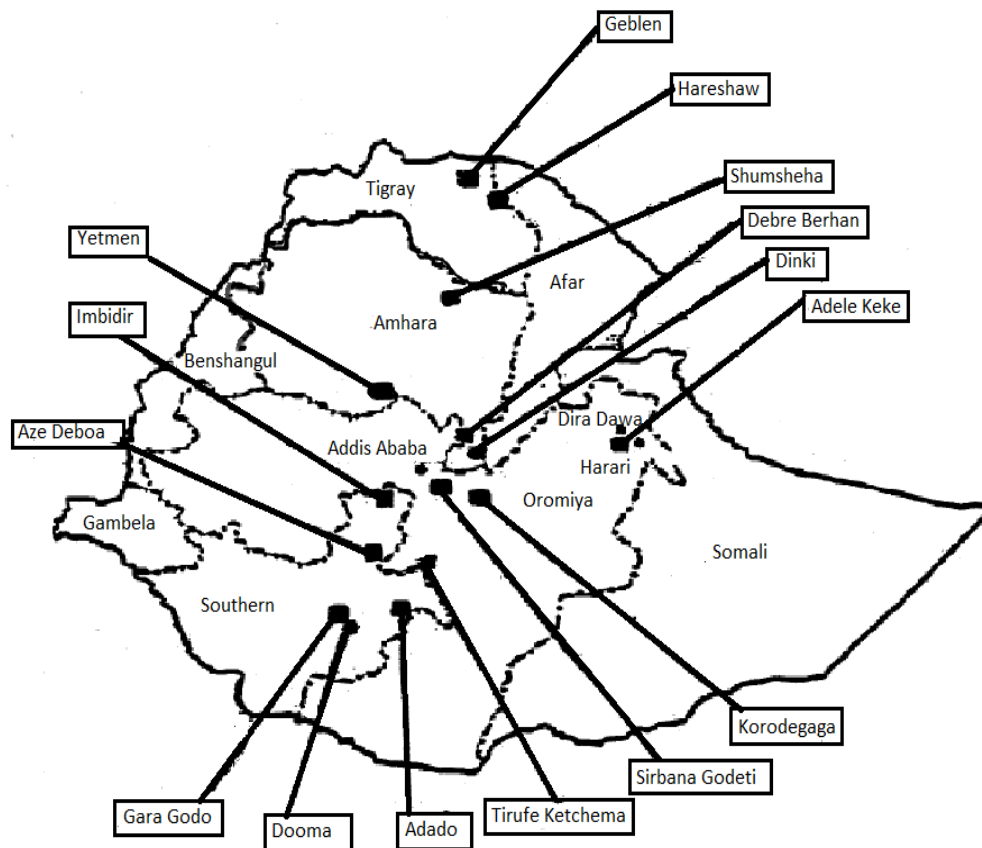
We find that old age support motives and the lack of old age security mechanisms also affect childhood investments in rural Ethiopia. Initially, the development of micro-credit and informal networks of mutual support based on common responsibility can play an important role in disentangling parental old age support needs from childhood investments.

Our results also show that individual's ability affects parental decisions about time allocation amongst education and farm work. Children with higher ability accumulate more education and less farming experience in their childhood. This gives grounds for schools to implement programmes to monitor children's ability at the time of school entrance, evaluate the progress of less able siblings in each family and induce parents to prolong the stay of less able children at school at least until the end of primary schooling. As it is widely known in the education literature, primary school returns are significant not only at the individual level, but more so for society as a whole. Parents can be induced with cash transfers or other motivation mechanisms.

The policies suggested above are only potential initiatives which need to be empirically tested and followed by considerable planning and evaluation, which is not in the scope of this analysis.

Appendix 1

Regional Map of Ethiopia and Survey Sites



Source: Bevan and Pankhurst: Ethiopian Village Studies. Oxford University, University of Addis Ababa and IFPRI. June 1996.

Appendix 2

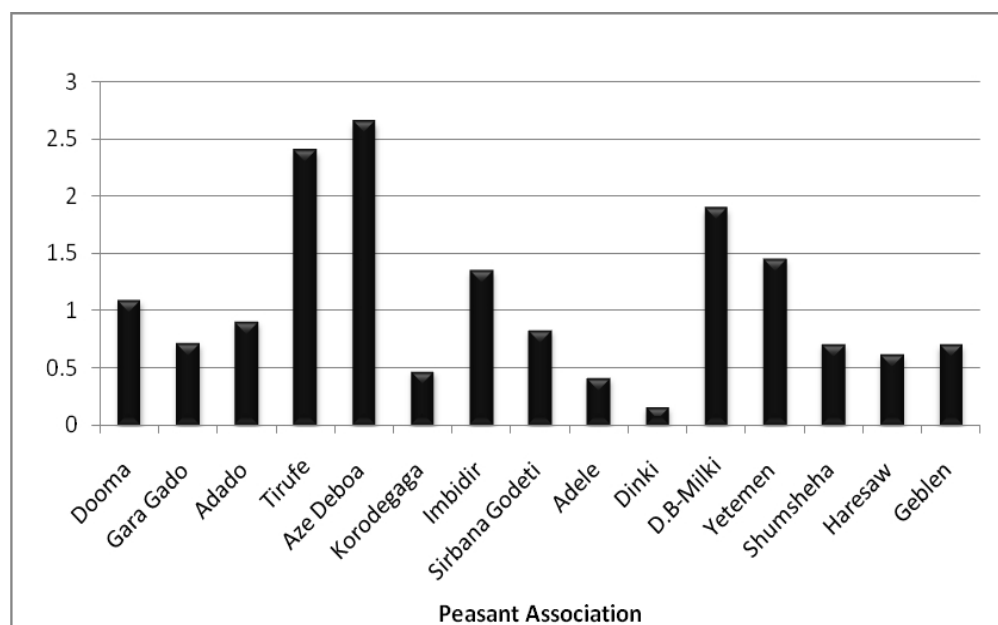
Education, Inheritance and Household Consumption

Distribution of education across the sample

BRIDES		GROOMS	
Percentage of the population with some education		Percentage of the population with some education	
Tirufe	4.5%	Adado	5.5%
Shumsheha	3.6%	Tirufe	4.7%
Aze Deboa	3.4%	Aze Deboa	4%
Average years of education		Average years of education	
Aze-Deboa	2.66	Tirufe	3.54
Tirufe	2.41	Aze Deboa	3.53
D.B.-Milki	1.91	Imbidir	3.08

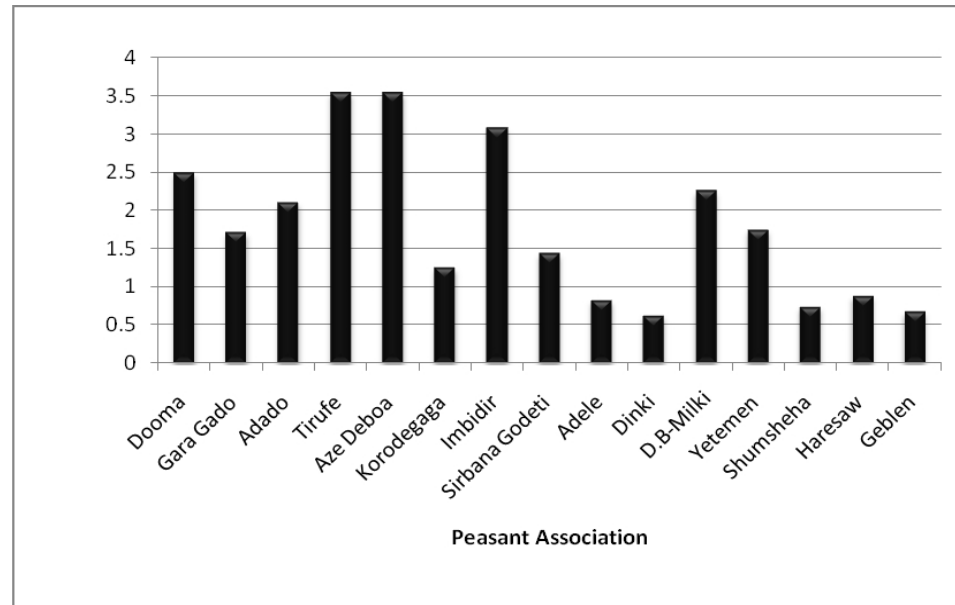
Note: Percentages represent the proportion of individuals with some level of education in the villages-PAs with the highest incidence of education. The average values depict villages with highest average years of schooling across individuals.

Graph 1: The distribution of the average years of education across PAs-Brides

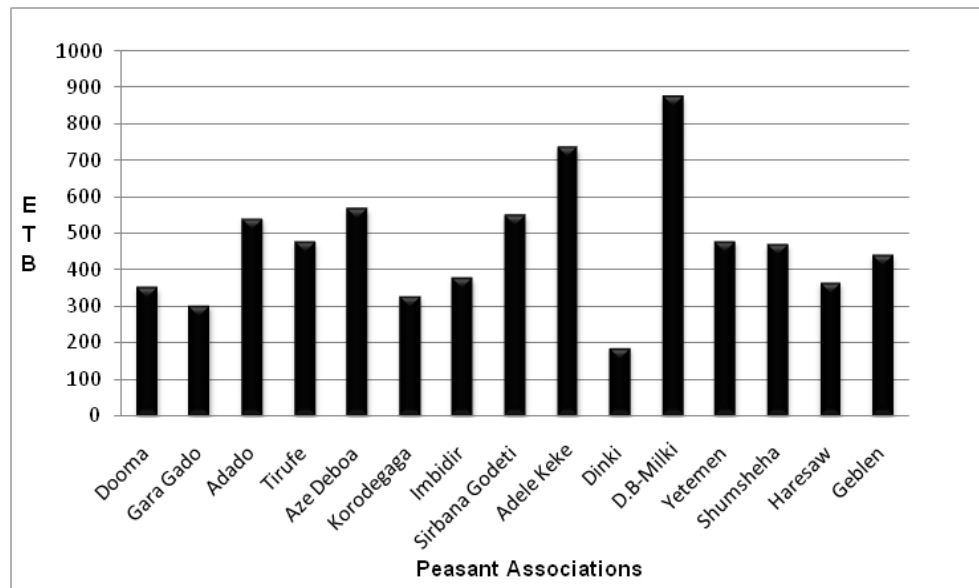


Note: From left to the right the PAs go from the South to the North of the country

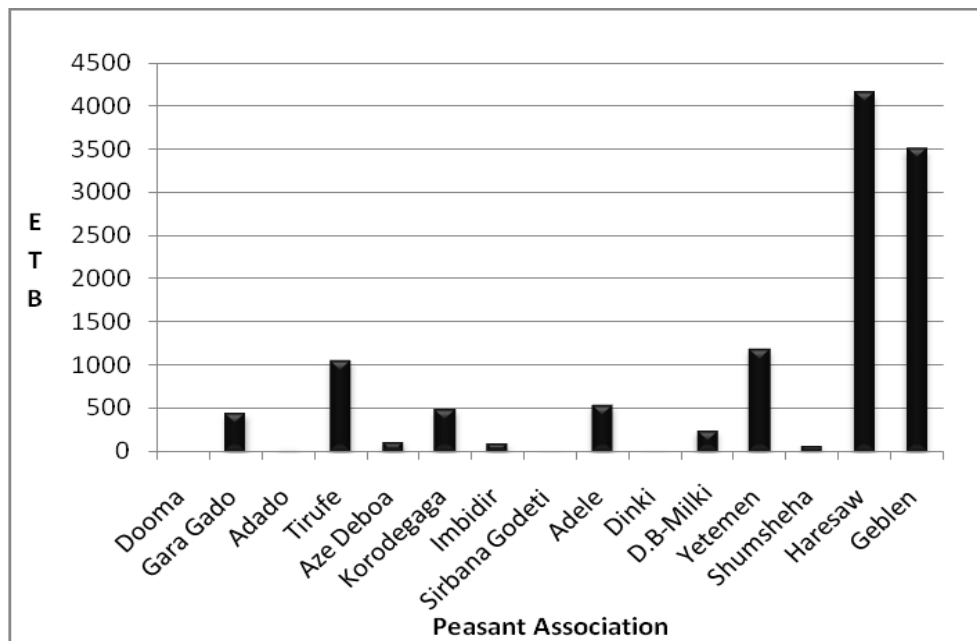
Graph 2: The distribution of the average years of education across PAs-Grooms



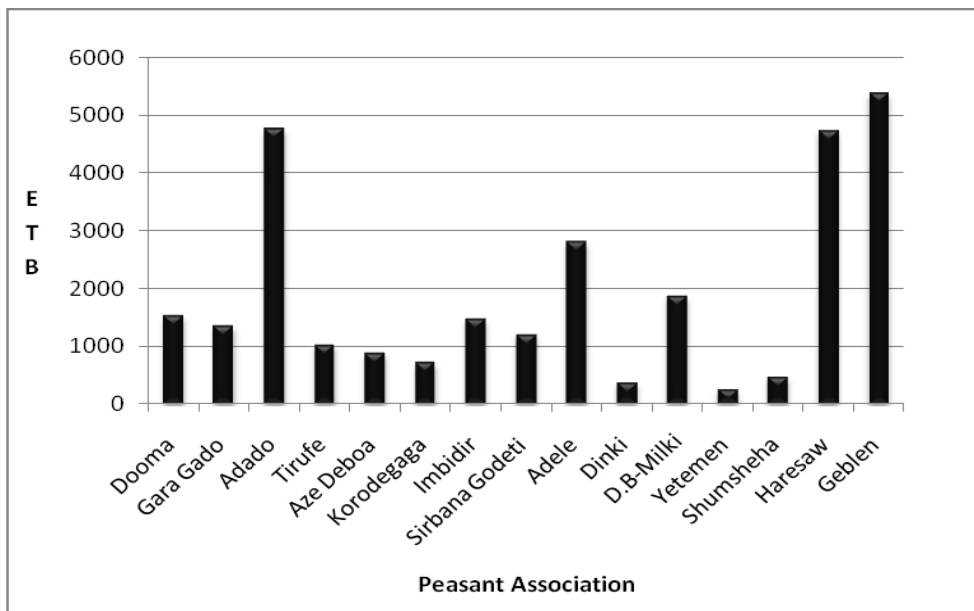
Graph 3: Average monthly total household consumption: distribution across PAs



Graph 4: Inheritance Distribution-Brides



Graph 5: Inheritance distribution-Grooms



Appendix 3

Instrumenting Equations-Chapter 2

Instrumenting Equations				
Dependent variable: Inheritance (log+1)		BRIDES		GROOMS
Independent variables		Coeff.		Coeff.
Instruments				
Spousal Inheritance (log+1)		0.085*** (0.023)		0.310*** (0.062)
Postmarital Residence (Brothers)		1.379*** (0.433)		-0.161*** (0.060)
Exogenous variables				
Number of brothers		0.025 (0.033)		-
Number of sisters		0.023 (0.038)		-0.074 (0.05)
Number of adults in the household		-0.133 (0.157)		0.680** (0.267)
Parental intervention		1.055*** (0.321)		0.198 (0.239)
Land owned by the father (hectares)		0.002 (0.012)		0.013 (0.013)
Land owned by the mother (hectares)		0.064* (0.034)		-0.010 (0.020)
Log of household consumption		0.096 (0.076)		0.498*** (0.128)
Child-previous marriages father		-0.070 (0.152)		0.219 (0.260)
Child-previous marriages mother		0.025 (0.232)		0.236 (0.395)
Education of the parents		-0.042 (0.028)		-0.010 (0.101)
Age		0.017*** (0.006)		0.010 (0.007)
Number of observations		1304		1075
Adj. R squared		0.10		0.16
F-stat		6.08		14.36
Prob> F		0.0000		0.0000
		F-stat	(p-value)	F-stat
Joint F-test of IVs		8.30	0.000	12.30
				0.000

Note: *significant at 10% level, ** significant at 5% level, *** significant at 1% level
We also control for regional differences.

Appendix 4

Prediction of Transfers and Education-Chapter 3

Instrumenting Equation for Inheritance				
Dependent variable: Inheritance (log+1)		BRIDES		GROOMS
Independent variables		Coeff.		Coeff.
Instruments				
Spousal Inheritance (log+1)		0.113* ** (0.028)		0.386*** (0.087)
Endogenous variable				
Education*		-0.192 (0.137)		-0.178 (0.569)
Exogenous variables				
Number of brothers		-0.035 (0.040)		-0.173* (0.090)
Number of sisters		0.046 (0.048)		-0.073 (0.111)
Number of adults in the household		-0.152 (0.174)		0.645 (0.543)
Land owned by the father (hectares)		0.001 (0.000)		-
Land owned by the mother (hectares)		0.150*** (0.042)		-
Joint Parental Land (hectares)		-		-0.005 (0.004)
Log of household consumption		0.240* (0.127)		0.479 (0.304)
Child-previous marriages father		-0.265 (0.167)		0.695* (0.372)
Age		-0.007 (0.006)		0.002 (0.012)
Number of observations		525		522
R squared		0.14		0.16
Wald χ^2		79.51		111.64
Prob> χ^2		0.0000		0.0000
		F-stat	(p-value)	F-stat (p-value)
Joint F-test of IVs		3.82	0.051	4.506 0.034

Note: *significant at 10% level, ** significant at 5% level, *** significant at 1% level

We also control for regional differences.

*Education is instrumented with parental education.

Instrumenting Equation for Education

Dependent variable: Years of Education		BRIDES	GROOMS
Independent variables		Coeff.	Coeff.
<i>Instruments</i>			
Parental Education	0.141* (0.074)	0.194** (0.092)	
<i>Endogenous variable</i>			
Inheritance (log+1)*	-0.359 (0.245)	-0.078 (0.142)	
<i>Exogenous variables</i>			
Number of brothers	0.003 (0.049)	-	
Number of sisters	0.169** (0.070)	0.104 (0.082)	
Number of adults in the household	0.036 (0.230)	0.800** (0.326)	
Land owned by the father (hectares)	0.003*** (0.000)	-	
Land owned by the mother (hectares)	0.054 (0.045)	-	
Joint Parental Land (hectares)	-	0.004 (0.003)	
Log of household consumption	0.681*** (0.157)	0.427** (0.176)	
Child-previous marriages father	-0.031 (0.263)	0.199 (0.305)	
Age	0.003 (0.008)	-0.004 (0.009)	
Number of observations	525	522	
Adj. R squared	0.072	0.10	
Wald χ^2	1616.98	71.38	
Prob> χ^2	0.0000	0.0000	
	F-stat/ χ^2	(p-value)	F-stat/ χ^2 (p-value)
Joint F-test of IVs	5.14	0.000	12.90 0.000
Overid: Score χ^2	3.72	0.446	0.021 0.884

Note: *significant at 10% level, ** significant at 5% level, *** significant at 1% level

We also control for regional differences. In the case of the grooms, mother's and father's land is insignificant but joint land becomes significant in the first stage regression of inheritance. Therefore we use joint parental land in the case of the grooms. For the brides both options are insignificant.

*Inheritance is instrumented with spousal inheritance (as the first instrument for both males and females), brothers (in the groom's case) and ethnicity (in the bride's case).

Instrumenting Equation for Net Transfers

Dependent variable: Inheritance (log+1)	BRIDES	GROOMS		
Independent variables	Coeff.	Coeff.		
Instruments				
Spousal Transfers(log+1)	-0.014 (0.027)	0.045 (0.139)		
Child-previous marriages father	-461.97** (178.95)	1716.335** (728.09)		
Endogenous variable				
Education*	47.55 (352.5)	-1088.97* (646.5)		
Exogenous variables				
Number of brothers	11.03 (77.7)	-254.45* (152.5)		
Number of sisters	-8.924 (68.81)	221.49 (209.2)		
Number of adults in the household	-418.39** (165.9)	1368.25* (802.15)		
Land owned by the father (hectares)	-0.651 (1.302)	-		
Land owned by the mother (hectares)	-38.19* (22.90)	-		
Joint Parental Land (hectares)	-	5.218 (7.401)		
Log of household consumption	114.22 (278.55)	1413.40*** (529.82)		
Age	0.386 (6.243)	37.99** (18.95)		
Number of observations	525	522		
R squared	0.09	-		
Wald χ^2	45.10	35.88		
Prob> χ^2	0.0000	0.0006		
	F-stat	(p-value)	F-stat	(p-value)
Joint F-test of IVs	3.81	0.052	4.46	0.035

Note: *significant at 10% level, ** significant at 5% level, *** significant at 1% level
We also control for regional differences.

*Education is instrumented with parental education

Appendix 5

Marginal Effects-Chapter 3

Multinomial Logit

Dependent Variable: Postmarital Residence						
	BRIDES			GROOMS		
Category	1	2	3	1	2	3
Independent variables	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
1. Transfers from parents: Inheritance						
Education (predicted value)	0.073	0.018	-0.105	0.061	-0.001	-0.175
Inheritance (predicted value)	- 0.028	0.001	0.152	-0.035	0.000	0.108
2. Transfers from parents: Net transfers						
Education (predicted value)	0.083	0.018	-0.115	0.061	-0.001	-0.172
Net transfers (predicted value)	0.000	-0.000	0.0001	-0.0001	-0.000	0.000
Sibling composition						
Number of brothers	0.000	-0.007	0.014	-0.018	0.000	0.035
Number of sisters	0.017	0.002	0.013	-0.007	0.000	0.016
Other human capital						
Year of marriage	-0.004	0.000	0.005	-0.003	0.000	0.008
Farming experience	0.052	0.023	0.076	0.105	- 0.000	-0.228
Wage employment	-	-	-	0.017	0.001	-0.221
Parents' wealth and human capital						
Land owned by the mother (hectares)	-0.084	0.007	0.019	-0.008	-0.002	0.002
Land owned by the father (hectares)	0.012	- 0.001	- 0.017	0.013	-0.000	-0.011
Log of household consumption	- 0.158	- 0.034	0.175	-0.109	-0.001	0.136
Child-previous marriages father	- 0.044	- 0.010	- 0.018	0.053	-0.001	-0.088
Land received from the PA	-	-	-	-0.001	-0.001	-0.010
Village effects						
Wealth 1	0.469	- 0.018	0.119	0.330	-0.002	0.189
Wealth 2	0.427	- 0.032	- 0.192	0.364	-0.002	-0.173
Soil quality dummy	- 0.258	0.036	0.017	-0.180	0.003	0.005

Base category: Both groom and bride move away

1-outcome for virilocal marriages; 2-uxorilocal marriages; 3-bilocality

Binary Logit

Dependent Variable: Postmarital Residence	BRIDES	GROOMS
<i>Independent variables</i>	Coeff.	Coeff.
1. Transfers from parents: Inheritance		
Education (predicted value)	-0.068	-0.111
Inheritance (predicted value)	0.153	0.069
2. Transfers from parents: Net transfers		
Education (predicted value)	-0.083	-0.120
Net transfers (predicted value)	0.0002	-0.000
Sibling composition		
Number of brothers	0.002	0.015
Number of sisters	-0.010	0.004
Other human capital		
Year of marriage	0.004	0.004
Farming experience	0.052	-0.138
Wage employment	-	-0.158
Parents' wealth and human capital		
Land owned by the mother (hectares)	-0.025	-0.008
Land owned by the father (hectares)	-0.015	0.004
Log of household consumption	0.100	0.042
Child-previous marriages father	0.002	-0.003
Land received from the PA	-	-0.012
Village effects		
Wealth 1	0.191	0.467
Wealth 2	0.001	0.228
Soil quality dummy	0.033	-0.230

Base category: Bride or groom moves away; 1-Bride or groom stays

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