

# **Human Capital Development in Rwanda:**

Effects of Education, Social Protection and Rural Development  
Policies

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# **Human Capital Development in Rwanda:**

Effects of Education, Social Protection and Rural  
Development Policies

De ontwikkeling van menselijk kapitaal in Rwanda  
Effecten van beleid met betrekking tot onderwijs,  
sociale zekerheid en rurale ontwikkeling  
(met een samenvatting in het Nederlands)

Proefschrift

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*Dedicated to my dear family, living and deceased, with deep gratitude for their support.*

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## Preface

Six years ago I started my PhD trajectory on *Human Capital Development in Rwanda: Effect of Education, Social Protection and Rural Development Policies*. I was very excited to work on this topic because I believed, and I still believe that an effective and productive workforce targeted by the Rwanda's long-term plan known as "Vision 2020", is in the hands of educated Rwandans. However, my motivation and determination to complete the PhD research often met challenges. As I studied children's schooling from different angles, it took me a long time to understand all schooling mechanisms. Time was not always on my side. To some extent writing my PhD dissertation was a stressful and lonely experience with many ups and downs.

The materialisation of the dissertation could not have been possible without the assistance from others. I would like to express my sincere gratitude to my supervisors, Pieter Hooimeijer and Annelet Broekhuis. With their continuous encouragement, timely and brilliant guidance I could complete my PhD project. Pieter was a great supervisor, someone with whom I discussed models and amendments to several draft chapters. I learned a lot from his unexpected questions that forced me to think deeply and make my argumentation more clear. Annelet who picked up me at the Schiphol Airport at my first arrival, is the one who opened the first door to my PhD journey. She introduced me to the academic environment at Utrecht University. At several occasions she pushed me to be ambitious and often helped me to look to questions that I faced from various scientific perspectives. I hope our collaboration in research will continue.

The past six years would not have been the same without all IDS (International Development Studies) and Rwandan colleagues who supported me in my journey. My special thanks go to Dieudonné Muhoza and Pierre Claver Rutayisire whom I found already on track and not to forget Ignace Kabano, my colleague and best friend. We started the PhD journey in the same year and he was helpful in many ways. I will always remember how he taught me to bike after arrival in The Netherlands. I wish to thank my other colleagues at IDS: Rizki Pandu Permana, Femke van Noorloos, Dinu Abdella, Antony On'gayo, Ty Pham, Tram Nam Tu, Suseno Budidarsono, Ari Susanti, Phuc Nguyen, Raziah Ahmed, Joris Schapendonk and George Schoneveld for having accepted to share with me their experience and knowledge.

I also would like to express my sincere gratitude to Wendy, Marianne, Tibisay, Annemarie and Erika, the administrative staff at Utrecht University. Their professionalism

and dedication when handling logistic and administrative issues inside or outside Utrecht University made my time at Utrecht University an unforgettable one. I deeply appreciate the assistance and support of the technical personnel of the Human Geography & Planning Department. May Jeremy Raynor who did the language editing of the second and third chapters of my PhD dissertation find here my special thanks as well.

Special persons that I want to mention are my beloved parents, brothers/sisters and in laws. Their ongoing understanding and support kept me running towards the finish line. Others who deserve to be recognised are my best friends, Vincent Ntaganira, Jean Paul Vuguziga and their respective families. They were always there for me when I was away from home. Many thanks to Pastor Emmanuel Bizimana, Patient Gumiliza, Patrick Runesha, Emmanuel Munyamugisha, Bede Niyongere, Appolo Mbabazi, Jean Hakizimana and their respective families, Guillaume Bizimana, Tugrul Temel & Kayo, Stive Niyungeko & Arielle Iteriteka, Nassim Munyabuliza & Nico Clements, Celestin Irumva and his brother & sisters for their moral assistance and friendship during my stay in the Netherlands.

The last six years were not my best years as a husband and father, except for the final writing period when I worked nearby my lovely wife Honorine Uwicyeza, my sons Umberto Andy and Jeffeson Beta and my daughter Tetero. It was sometimes difficult to explain why I was absent from home for a long period but they understood me. Without their daily smiling faces, prayers and encouragement, I could not have completed this project. My heartfelt thanks to them. I want to repeat to them that I always take them as a wonderful golden present that God has offered me. Now, without doubt, I assure you that, the migratory process is over. *Your wandering husband/father will try to be always at home. Thank you for your patience and understanding when I was in search of science.*

This type of research is impossible without financial support. I have been fortunate to find funds needed at various occasions. I would like to thank the William and Flora Hewlett Foundation, and The Netherlands Organization for Scientific Research (NWO/WOTRO) for their generous support. I also want to thank the Government of Rwanda through my own institute, the University of Rwanda, for the opportunities that they gave me, for both doing research and attending conferences.

I owe a special thanks to my colleagues of the Faculty of Economics and Management (FEM) for having encouraged me to finish my PhD. I will never forget how they willingly accepted to often work extra-hours while I was on study leave. Finally I would like to thank the National Institute of Statistics for Rwanda (NISR) that provided me the secondary data that I used in different chapters, and my 5 undergraduate students, Innocent Abaho, Clarisse

Dusabimana, Irma Girimbabazi, Denis Kamugisha and Erska Kato who collected primary data used to complete the fourth chapter of this thesis. My research captured some of the challenges young Rwandans face within their household lives. I promise them that in my future research, I will continue to let their voices be heard.

People who helped me are numerous. I cannot mention them all. Everyone who in one way or another helped me to accomplish my PhD dissertation I do thank from the bottom of my heart. May God bless you all.



# 1 Introduction

*‘Our progress as a nation can be no swifter than our progress in education. The human mind is our fundamental resource.’* John Fitzgerald Kennedy, 35<sup>th</sup> US President (1961-63).

## 1.1 Background to the study

Rwanda faces many development constraints: poverty, scarcity of land, high fertility and absence of mineral resources. Given these key structural bottlenecks, the Rwandan government has decided to switch from an economy based on subsistence-oriented agriculture to a modern service-oriented economy by focusing on investment in the quality of the nation’s principal asset: its people. This is captured most clearly in Rwanda’s Vision 2020 which was established in 2000. Rwanda’s Vision 2020 has its origins in internal debates held over the course of 1998 and 1999 to address Rwanda’s multi-faceted social, political and economic challenges (Hayman, 2007). According to the Vision 2020 document: ‘Apart from raising the general welfare of the population, improvements in education and health standards will be crucial for providing an efficient and productive workforce’ (GoR, 2000, p.13). One major microeconomic structural problem that contributes to the macroeconomic situation facing Rwanda is the low level of human resource development, especially in literacy and skills development (MINEDUC, 2003). Investing in education is also important in order to achieve the second Millennium Development Goal (MDG), while education in itself is a powerful driver of progress towards also achieving the other MDGs (Bruns *et al.*, 2003). Indeed, education is not just an instrument, but also an outcome of poverty reduction and economic development. One question which emerges, however, is whether the MDGs are enough to bring about the socio-economic transformation necessary to achieve the priorities outlined in Vision 2020.

Primary and basic secondary education are a priority within the framework of the international education targets, but are only one of a set of priorities for the education sector in Rwanda. In light of its broader vision of transforming Rwanda into a knowledge-based economy, the Government of Rwanda (GoR) is looking well beyond these medium-term goals towards a further horizon (Hayman, 2007). For instance, while other developing countries tried to achieve universal primary education by 2015 (MDG2), Rwanda targets to achieve universal secondary education, in the form of 12 Years of Basic Education (12YBE). There is an increasing consensus that the completion of primary school and the subsequent

participation in secondary education or vocational training makes the difference between depending on subsistence agriculture and informal trade, or being able to become a socially, economically and geographically mobile member of the modern labour force (Lloyd & Blanc, 1996; Strode, Wylde, & Murangwa, 2007).

Given these challenges, this study has three main objectives: first, to uncover the effects of (educational) policies on the educational achievement of youth, second, to show how poverty reduction strategies are related to the educational investments of households and third, to identify the remaining barriers to furthering the human capital of the nation.

## **1.2 Human Development Strategy in Rwanda: Vision 2020 and after**

Immediately after the genocide of 1994 there was general disarray and bewilderment. However, the country's leadership provided tangible, firm direction and thrust, derived from a clear vision of the future (Obura, 2003). After 1994, the main concerns were for securing the nation, rebuilding the economy, growing enough food, building roads, providing housing, educating the children, providing health care and ensuring justice was done. As the economy recovered from a low base in the aftermath of the genocide and associated conflicts (1996-2000), real GDP grew at over 10% per year (GoR, 2007).

By 2000, Rwanda moved from recovery to sustainable development and needed to find new sources of growth (UNDP, 2007). The government set up the Vision 2020 as a long-term framework for Rwanda's development, presenting the key priorities and providing Rwandans with a guiding tool for the future (GoR, 2000). The aim of Vision 2020 is to address the challenges for the country from a people-centred perspective. According to the Vision 2020 document, human resources will be improved, so that Rwanda can become a knowledge-based economy (GoR, 2000). Therefore, the long-term aspirations of the vision will translate into medium-term programmes of the National Poverty Reduction Strategy Paper (PRSP) as well as the National Investment Strategy (GoR, 2000).

Introduced at a critical time when the country was still struggling with the aftermath of the war and genocide, the first PRSP was implemented from 2002 to 2005 with aims to manage the transitional period of rehabilitation and reconstruction (GoR, 2012). The PRSP-1 recognized that education is connected to poverty in several ways. First, lack of education is a poverty characteristic itself, as there is evidence that completing primary education may increase incomes by about 40% and improve both agricultural productivity and small enterprise development, thus clearly reducing poverty. Second, primary education has

beneficial effects on the health situation, as particularly girls' education has an impact on child mortality, morbidity and fertility rates (Bigsten & Yanagizawa, 2005). Education was a priority for action under the PRSP-1 because improvement in basic education is a significant factor in the reduction of poverty (MINEDUC, 2003). The 2002-2005 period not only marks the return of political stability in Rwanda but also positive socio-economic performance, which authors (Banya & Elu, 1997; Mukudi & Keiler, 2010) qualified as important factors for a successful implementation of education policies.

The Rwandan government first took steps to facilitate the enrolment of children in primary schools. In October 2002, a remedial programme has been introduced for out-of-school and drop-out children (Kanamugire & Rutakamize, 2009). An important step was the fee free primary education (Bigsten & Yanagizawa, 2005). The above-mentioned education policies and the food-for-schooling programmes are among the major interventions geared towards increasing the participation of disadvantaged groups in primary education. At the end of the first PRSP, it was evident that, overall, progress was made. However, the social policies failed to address the poor adequately. From 2001-2006 the economy was growing at an average rate of 6.4% per year yet inequality widened from 0.47% to 0.51% as measured by the Gini-coefficient in the same period (GoR, 2012).

Having made great strides in managing the transitional period of rehabilitation and reconstruction, some priorities were redefined to boost Rwanda's economic development and speed up the transformation into a middle income country. To refocus on equitable growth and sustainable development, it was suggested to label the PRSP-2 the 'Economic Development and Poverty Reduction Strategy' (EDPRS-1). The EDPRS aims to consolidate and extend the strong achievements in human development (GoR, 2007). In the social sector, economic development and poverty reduction policies were aiming at rural development as an important priority (Evans *et al.*, 2006; Ansoms, 2008). Various policy measures have been re-labelled and re-packed under the term 'Social Protection' (Ansom, 2008). The sector planned to provide social assistance to the most needy and to support the able-bodied to progress out of vulnerability and poverty into more sustainable means of self-support. The objective is to achieve effective and sustainable social protection for the poor and vulnerable (GoR, 2007).

After achieving almost universal primary enrolment due to different programmes implemented during the PRSP-1, Rwanda faced the challenge to also achieve universal primary completion for all boys and girls, especially from poor families. Rwanda was at a crossroad in its human capital development process. Should the Government continue with

extending its education policy or would it be better to rely on the more general poverty reduction policy geared at augmenting the so-called Social Protection (SP) of the population? The EDPRS-1 emphasis was on increasing the coverage and the quality of Nine Years Basic Education (9YBE), strengthening technical and Vocational Education and Training (TVET), and improving the quality of tertiary education (GoR, 2007). The extension of free education to secondary lower level in 2009 was one of the actions to reduce barriers to secondary education but also to reduce the primary school dropout and to increase the completion rates. The nine-year programme is intended to equip children with sufficient knowledge and skills to lead productive lives, thus addressing poverty reduction on an individual and societal basis (Hayman, 2007).

However, it is in rural rather than urban areas that poverty is most prominent and severe (Ansoms, 2008). To address this challenge, the Rwandan government (GoR) strives to increase economic opportunities for the rural poor and to raise their incomes through Land Use Consolidation (LUC) and its attached Crop Intensification Programmes (CIP). The main programmes include: the intensification of sustainable production systems in crop cultivation and animal husbandry; building the technical and organisational capacity of farmers; promoting commodity chains and agribusiness; and strengthening the institutional framework of the sector at central and local level. Given the limited availability of land, the shift from subsistence agriculture (low value added) toward agri-business (high value-added) will have to be accompanied with changes in land use (GoR, 2007).

### **1.3 Theoretical framework**

Both poverty reduction and the achievement of Education for All (EFA), feature prominently among the Millennium Development Goals (MDGs). There are sound intuitive, theoretical and empirical reasons to believe that certain synergies exist between them (Rolleston, 2009). However, while the 2015 deadline for Millennium Development Goals (MDGs) approaches, the question emerges whether the universal primary education for all is enough to bring about the socio-economic transformation necessary to reduce the poverty in the long run. Vandemoortele (2005) states: “the MDGs can be seen as either an agreed agenda, a minimalistic agenda or an incomplete agenda for human development”. Indeed, policy positions would suggest that it is rather post-basic levels of education and training which are likely to have the greatest impact on poverty reduction in the long run (Akoojee and McGrath, 2005; Palmer, 2005; Wedgwood, 2005; Hayman, 2007).

However, Palmer (2008) states that policy attention should shift to an examination of the enabling environments in which education can lead sustainably to poverty reduction and economic growth. Policies should move beyond an education-centric approach, because the impact of education systems is inseparable from the environments in which they are embedded (King, 2009). To ensure the smooth sustainability of human capital investment, policy makers need to demonstrate to their peoples that investment in 6-7 years of basic education or beyond for all their children does have a clear economic and labour market pay-off (Palmer *et al.*, 2007).

Policy-makers also need to understand the issues related to household's decision to enrol children in school because it is well established in developing country contexts that household welfare levels are a key determinant of children's school enrolment, completion and attainment (Drèze & Kingdon, 2001; Filmer & Pritchett, 1999). The relationship between household human capital stocks, household welfare levels and household investment in human capital play a central part in the intergenerational transmission of both privilege and poverty (Rolleston, 2009).

In analyses of the determinants of school participation in rural north India, Drèze and Kingdon (2001) found that the 'household' variables tend to perform better than the 'school' or 'village' variables, not surprisingly since the household variables are more versatile indicators of the circumstances of a child.

Figure 1 summarizes the factors that influence the probability to enrol children in school and the probability that a family invests in child's education, focusing on household decision-making at the micro level, and education policy and economic development and poverty reduction strategies as enabling factors at macro level.

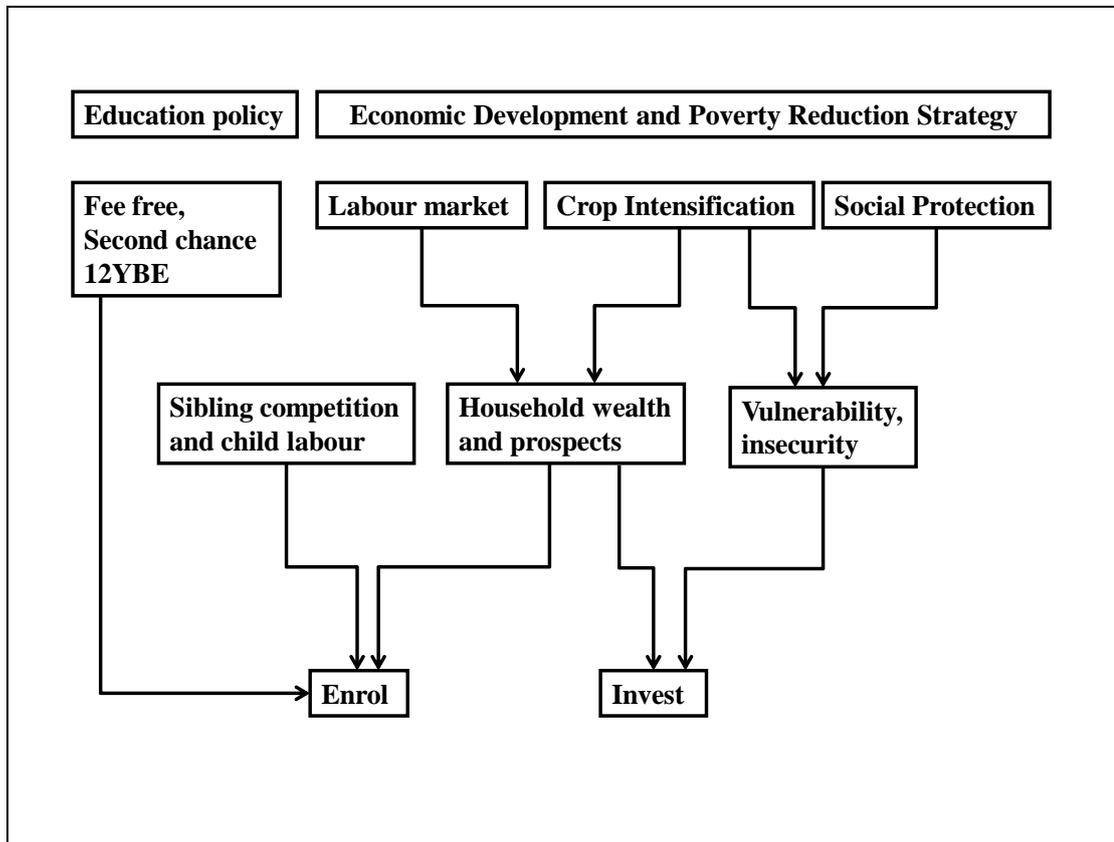


Figure 1: Theoretical framework

Departing from the home economics model, limited household resources are important constraints, but parents/caretakers education level, gender roles as well as cultural practices can also be barriers to enrolment and attendance. First of all, parents/caretakers make a trade-off between the direct and indirect costs of schooling and the benefits of child labour for the child and the family. Uninterrupted school attendance reduces the time the child has for productive activities at home or in the labour market. For poor households the opportunity costs of time spent at school are high. A lack of parental support is linked to poverty in more than one way. For instance, parents do not have time to follow school careers intensively while struggling to make ends meet.

Parents in subsistence-oriented rural communities often think that it is more important to involve children in economic activities and equip them with the basic life skills for future

survival, than to send them to school for formal education, in particular if the parents themselves have limited educational training. Instead of going to school, these children do domestic chores, work in the family business or are sent out to work.

The effect of having young siblings on education achievement will differ depending on the level of poverty. Taking care of young siblings is one of the domestic chores and is supposed to be an impediment to the school enrolment, due to resource dilution and sibling competition. One or more children have to drop out or are kept away from school to enable a brother or sister to enrol. The larger the number of siblings, the higher the probability that a child enrolls later, repeats classes and/or drops out earlier. Orphans are extra vulnerable as they are often called to replace the absent mother or father. Girls are expected to suffer more from these effects, in particular if they are maternal orphans..

When it comes to expenditure on child education, the household is faced with two constraints: scarcity of (financial) resources and costs of other, competing, basic needs such as expenditure on food, water, health, clothing and housing. The most important reason why poor children do not enrol in schools is that their parents cannot afford to pay the direct and indirect expenses that school attendance incur. For instance, unexpected health expenses in case of illness of one of its members force them to make impossible choices, such as whether to buy medicines or keep their children in school. Poverty is more than lack of money, but makes households more vulnerable to shocks, like crop failure, disease and other disaster.

To deal with these various types of insecurity, the households first rely on their own assets, but may need to use their social network or other external support. Livestock (or its products like milk, calves ...) acts as liquid asset buffer against shocks, or provides income to cover extra expenses for instance for the purchase of expensive school uniforms or school books. Transfers between relatives frequently help poor families to overcome their financial problems, and therefore buffer educational inequality. Besides financial support from relatives, households can appeal for support from NGOs, churches or government funds. Health insurance schemes help to reduce health risk and having a health insurance can lead to higher livelihood security and as a result to a higher propensity to invest in children's education.

If households consider the decision to send a child to school as an investment, they take into account the expected future returns. If rates of return to education are high – meaning that education pays off with better opportunities: better paid jobs and more successful private initiatives, households may choose to invest in education in order to increase the earning capacity and other benefits in the future. The absence of a demand for

skilled labour, particularly in rural areas, will contribute to regarding education a waste of time and resources.

Household's decisions to enrol their children and invest in the completion of their education are highly dependent on the wider context. A combination of compulsory enrolment and fee free schooling for 12 years might simply not be enough. Economic development and poverty reduction policies could enter this decision making as these could lead to a rise in waged employment, to reduced vulnerability by protection from shocks. Yet to understand the effects and effectiveness of these policies one should disentangle how these are moderated by the factors at household level.

#### **1.4 Overview of the study**

As we have seen above, the provision and impact of human capital development need to take account of the wider economic, social and political environment. While the three following chapters consider the primary school enrolment, its completion and the secondary school enrolment with regards to gender, siblings and school fee-free or related policies effects, the two last chapters particularly focus on development strategies expected to enabling the family's investment in child education.

Using a logistic regression analysis on data from Integrated Household Living Conditions Survey (IHLCS) of 2000 and 2005, the second chapter, "**Free education in Rwanda: just one step towards reducing gender and siblings inequalities**" provides the effects of Rwanda's free education policy. As the data allowed comparing the situation before and after the abolition of primary school fees established in September 2003, the chapter assesses how the elimination of school fees increased the enrolment in primary education for boys and girls from poor families in particular. It further investigates who profited from the free education policy in Rwanda, in addition to discover remaining barriers to school attendance in primary education, and to determine which groups of children should be targeted by future policies. The chapter points how the elimination of school fees was a first step, but clearly not a big enough one. Once the remaining barriers to enrolment in primary are known, there is necessity to know the driving factors for completion for the ones who managed to enrol in primary schools.

Enrolment is a first step, but completion of the primary level and progress beyond, are determinants of the success in Education for All. The third chapter, "**sibling and gender effects on youngsters' second chance to complete primary education in Rwanda**",

analyses overage primary school attendance in Rwanda and the potential to qualify to sit the leaving exam after reaching the age of 14. As the regression of dropout on characteristics for the 13-17 years teenagers without a primary school certificate would lead to biased results because the ones who have finalised their primary school in time will not be included in the sample, the Heckman probit method was used on data from the Integrated Household Living Conditions Surveys 2000 and 2011 to control for sample selectivity. This chapter identifies the teenagers who, since the introduction of free education and the associated policies, get a second chance to complete primary school, by looking at conditions of poverty, household composition and the position of the pupil within the household (sibling and gender effect). Within a context of limited resources, the presence of young siblings could affect their older brothers or sisters, but the effect can differ depending on the gender of elder's and the absence of one or both parents. We also checked other economic, demographic and geographic factors with a potential to be detrimental to a second chance to complete primary school.

As post-basic levels of education are likely to have the greatest impact on poverty reduction in the long run, the fourth chapter offers the “**secondary school admission in Rwanda: inequalities in accessing good secondary education**” that prevail in Rwanda after the extension of free education policy to lower secondary level (Nine Years Basic Education ‘9YBE’). Applying a regression analysis on attending secondary schools by using characteristics for the 13-17 years teenagers with a primary school certificate would lead to biased results because, the ones who are still attending primary school with a second chance to complete it later will not be included in the sample. Therefore, to control for sample selectivity, we perform a Heckman probit analysis on data from the Integrated Household Living Conditions Surveys 2005 and 2011. The chapter teases out the probability to access secondary school before and after the introduction of 9YBE system. In addition the chapter estimates the leading parameters for admission to public/government subsidised secondary school, private or 9YBE.

However, the development of human capital depends on more than educational policies. For instance a lack of added value in the labour market of a completed education might negatively affect the trade-off between the costs and returns related to older pupils (Buchmann, 2000). The two last chapters adopt a multilevel approach to focus on employment opportunities and land use consolidation differentiation at the district-level, controlling for household characteristics. They point to the (potential) impact of specific

policy measures included in the Rwandan government's social protection and rural development strategies.

The fifth chapter addresses the question of whether the “**poverty reduction programmes foster education expenditure**”. The chapter investigates to what extent various social protection interventions implemented during the first phase of the country's Economic Development and Poverty Reduction Strategy (EDPRS-1), have an impact on the amount of family expenditure on education. In addition, this chapter analyses the effect of the presence of under school age children on household education expenditure and tests the validity of the resource dilution hypothesis. Finally, the chapter checks the effect of district employment opportunities and school quality on household education investments.

The sixth chapter focuses particularly on the land use consolidation policy, to conclude on how the “**rural development policies affect investment in primary education by farmers in Rwanda**”. This chapter analysis to what extent Land Use Consolidation - Crop Intensification Programmes (LUC-CI Programmes) have an impact on farmer's expenditure on education. Effects at two levels are expected. Firstly, those farmers who are directly involved in the LUC-CI programmes are expected to spend more on education. Secondly, farmers that live in districts with a higher percentage of land under LUC-CI Programmes and consequently with more economic activities and services linked to the CI Programme, might be more confident about future job opportunities and therefore also invest more in their children's education.

Overall, the five chapters illustrate how the ongoing policies stimulate a path of human capital development that could play a key role in providing solutions to local challenges in Rwandan's livelihood profiles. On the basis of these findings, the conclusion of the study pleads for creating enabling environments that provide a possible return on education investments in order to build a strong foundation for the country's socio-economic development.

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## **2 Free Education in Rwanda: just one step towards reducing gender and sibling inequalities**

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*'Education is the most powerful weapon which you can use to change the world'*. Nelson Mandela, anti-apartheid revolutionary and President of South Africa (1994-1999)

### **Abstract**

In 2003, Rwanda introduced free education as part of government policy to improve school enrolment in general and the attendance of deprived children in particular. However, in addition to school fees, other factors hamper school careers of children. Shifts in attendance were analysed using binary logistic regression on data from the 2000 and 2005 Integrated Household Living Conditions Surveys. The results show that although the policy has been very successful, the objective has not been achieved. We find a strong effect of the sibling position of the child in the household and its relation to the household head. Substantial numbers of orphans/foster children in Rwanda do not profit from the free education policy and part of the children leave before completing school, in particular girls. Free education is only one step towards a more equitable distribution of educational opportunities.

### **Keywords**

Free education, sibling complementarity, gender, school attendance, Rwanda

## 2.1 Introduction

Most developing countries will probably achieve universal enrolment in primary education for boys and girls in 2015, and will thus meet Millennium Development Goal 2. This, however, does not apply to countries in sub-Saharan Africa. Although they are making impressive progress, there is still a long way to go (UN, 2010) as they started off farthest from the desired target (Easterly, 2009). Rwanda is one of the few sub-Saharan countries where the gap between objective and result is very small (UNDP, 2010). In Rwanda, the enrolment rates have been historically high; at 90 percent, the challenge is to identify and help the last 10 percent of the school age children that is yet to enrol in primary school (WB, 2004). The Rwandan government targeted achieving universal primary education in 2010, and nine years of basic education for all children in 2015. As stated in its Vision 2020 policy document (MINECOFIN, 2000), the government aims to transform Rwanda's agricultural-based economy into a knowledge-based economy, for which human resource development is of vital importance. The government emphasises gender equity in all segments of society and the economy, meaning that boys and girls should equally enrol in education.

Several measures have been taken to implement this policy. One was the abolition in 2003 of fees for primary education, which removed one of the obstacles to accessing education. According to Grogan (2009), the elimination of school fees is a recent phenomenon in Africa because Malawi eliminated fees in 1994, Uganda in 1997, Tanzania in 2000, and Cameroon, Burundi, Ghana, Rwanda and Kenya in 2003. In all countries in which UPE (Universal Primary Education) was instituted, the elimination of the direct costs of schooling created an instantaneous large increase in school enrolment (Deininger, 2003; Grogan, 2009). The aggregate increases in enrolment after the elimination of fees reflect both increases in school attendance among the primary school-age population and among adults and teenagers attending school for the first time (Grogan, 2009). In opposite to these results, Bold *et al.* (2011) recently found that the nationwide abolition of public school fees in Kenya in 2003 did not lead to an increase in net public enrolment rates, but rather led to a dramatic shift toward private schooling.

Our contribution to the debate on achieving universal primary school attendance has three objectives: to investigate who have profited from the free education policy in Rwanda, to discover remaining barriers to school attendance in primary education, and to determine which groups of children still fall by the wayside and should be targeted by future policies.

We therefore constructed two datasets of individual, household and community characteristics taken from the 2000-2001 and the 2005-2006 *Enquête Intégrale sur les Conditions de Vie des ménages* (EICV; Integrated Household Living Conditions Survey)<sup>1</sup>, which allowed us to compare the situation before and after the abolition of primary school fees established in September 2003. This period also marks the return of political stability in Rwanda and of positive socio-economic performance, factors that are important for a successful implementation of education policies (Banya & Elu, 1997; Mukudi & Keller, 2010). We first present a theoretical elaboration of the constraining and enabling factors for the school attendance of girls and boys in primary education. This is followed by a brief introduction to the reconstruction of the educational system in Rwanda, as well as subsections on data, methodology and selected variables. We then present and discuss the results of the modelling. We end the paper with our conclusions and several policy implications.

## **2.2 Barriers to and inducements for primary school attendance**

The assumption that poor parents/child caretakers are responsive to reductions in school costs can be linked to various socio-economic theories. Departing from the home economics model and the human capital framework (Becker, 1991; Jensen & Nielsen, 1997; Buchmann, 2000), it can be argued that poor parents/caretakers make a trade-off between the direct and indirect costs of schooling and the benefits of child labour<sup>2</sup> for the child and the family. Admassie (2003) highlighted that uninterrupted school attendance reduces the time the child has for work at home or in the labour market.

Even moderately poor parents with land to work or a business to run keep their children at home instead of hiring external labour (Basu & Tzannatos, 2003). In such cases, the opportunity costs of time spent at school are high. In this approach, poverty and a lack of financial resources are seen as barriers to school enrolment and ongoing attendance. The number of hours that children work determines their school attendance: children who work long days on tea plantations or in brick factories<sup>3</sup> cannot attend school, while children who do domestic or productive work for only a short time each day, or who work seasonally or only when needed, can.<sup>4</sup> Besides: parents in subsistence-oriented rural communities often think that it is more important to involve children in economic activities and equip them with the basic life skills for future survival, than send them to school for formal education (Admassie, 2003; ILO, 2005).

The absence of a demand for skilled labour, particularly in rural areas, contributes to this and has been identified as a contextual labour market condition that influences the educational decisions of parents (Buchmann, 2000; Ravinder, 2009; Kim, 2009).

The assumption that poor parents need to be encouraged to send their daughters to school is related to the gendered division of labour within the household and to adverse cultural practices in society and the labour market (Buchmann, 2000; Colclough *et al.*, 2000; Ravinder, 2009). Girls are given domestic chores because their parents want to train them to become good future wives and mothers. Persistent discrimination against girls may also mean that parents, particularly in rural areas, do not attach the same value to educating their daughters as they do to their sons (Colclough *et al.*, 2000; Ersado, 2005). Girls leave the family earlier than boys to marry, after which the fruits of their labour go to their families-in-law. Investments in the education of girls also give lower returns in a labour market where women earn less than men (Kim, 2009). Thus, besides poverty, labour market conditions, gender roles and cultural practices can also be barriers to enrolment and attendance.

The number of siblings and the sibling position of a child within the household can also inhibit ongoing school attendance as a result of resource dilution (Buchmann, 2000) and sibling complementarity (Basu & Tzannatos, 2003). Unless there is increased income, the addition of another child results in less real income per household member: the share for basic needs such as food and clothes in the available income per child increases at the expense of the financial means available for education (Huggins, 2007; Dao, 2012). This can imply that one or more children have to drop out or are kept away from school to enable a brother or sister to enrol. Instead of going to school, these children do domestic chores, work in the family business or are sent out to work. The larger the number of siblings, the higher the probability that a child enrolls later, repeats classes and/or drops out earlier (Dao, 2012). The presence of young children in households has a negative effect on attendance of older children. Conversely, attendance of school age children is higher if the household has members between 14 and 18 years of age (Buchmann, 2000; Boockmann, 2010). It also turned out that especially girls suffer from sibling complementarity. The presence of older sisters in one's sibling group has a particularly strong positive effect on schooling, indicating that these older girls are withheld from school to free up or generate resources for their younger siblings' education (Salem, 2007).

Another barrier is the lack of parental support: children living in households without their natural parents are more often deprived of this support (Thurman, 2008). There is evidence that orphans and foster children are less likely to be enrolled in school than children

who live with their biological parents (Bhalotra, 2003). Thomas (2010) confirms this finding for Rwanda, and also reports that the extent of schooling deprivation of orphans depends on their family relation to the caretakers, the household type (single or double headed) and the gender of the household head. These relationships are rather complex. Orphans, for instance, are more disadvantaged in a household headed by a couple than in a single-headed household, contrary to the situation of children who live with natural parents. Taking care of children below primary school age is supposed to be an impediment to the school enrolment of particularly full and maternal orphans (Thomas, 2010). Case and Ardington (2006), Evans and Miguel (2007) also concluded that there is a substantial decrease in school participation after the death of a parent and that the death of the mother is more detrimental than that of a father, as male headed household will more often rely on children for household chores. The impact of household type and gender of the household head on children's education achievements is again partly linked to poverty, as female-managed households have less resources than households managed by a couple or male head (Vinck, 2006; Musick and Mare, 2006).

However, it can also be linked to effects of inter-generational education concern (transmission of resources) and the gender aspect therein. Educated parents understand the importance of schooling and are more willing to allocate resources for the education of their children. According to Glick and Sahn (1999), mother's education has a positive impact on the education of daughters, while father's education favours the education of both sons and daughters. Thus, the presence of both parents in the household as well as having educated parents promotes the school attendance of the children.

The poverty index may not be a sufficient indicator of the purchasing power of a household, as in many African societies transfers between relatives frequently help poor families to overcome their financial problems. In sub-Saharan Africa, fosterage and the extended-family system redistribute resources across families in ways that buffer educational inequality (Kobiane *et al.*, 2005; Dao, 2012).

School attendance is also linked to other factors, such as place of residence, availability and accessibility of schools, and quality of education. Parents consider low-quality education a waste of time (Jensen and Nielsen, 1997), while large distances to school can be a constraint particularly for very young children and girls (Bommier and Lambert, 2000; WB, 2004; Nonoyama *et al.*, 2010). There are differences in school attendance between rural and urban children (UN, 2010). These effects, however, relate to wider rural and urban differences, such as educational level of parents, labour market conditions and

household income (Kim, 2009; Nonoyama *et al.*, 2010). To get a clear picture of the barriers to primary school attendance, to explore those who profited of free education and to identify deprived groups of children, geographical and community variables as well as socio-economic and cultural variables at household level must be taken into account.

### **2.3 Reconstruction of the educational system**

Rwanda's achievements in the field of enrolment in primary education are remarkable. Years of unrest and civil war, which culminated in the 1994 genocide and massive population movements, left Rwandan society disrupted and the country's infrastructure destroyed or heavily damaged (Uvin, 2001; Bridgeland, 2009). The people, and particularly the children, were severely traumatised (Dyregroy *et al.*, 2000).

After 1994 the new government immediately decided to make the reconstruction of the educational system a spearhead of policy. Schools had to be built or rebuilt (only 648 of the country's 1836 schools were still operational) and teachers had to be trained and reintegrated, as many teachers had been killed, were now living abroad as refugees or were displaced within the country. It was estimated that more than half of all qualified primary school teachers were unavailable (Obura, 2003). In addition, the population had to be convinced that schools were safe places again. A large number of Rwandan schools, although financed by the government, are linked to religious institutions, in particular the Roman Catholic Church (WB, 2004; Bridgeland, 2009). During the massacres, people had believed that schools and churches were safe havens, but mass killings had occurred in those places.

Finally, special attention had to be paid to the many vulnerable children who had lost one or both parents.<sup>5</sup> Rwanda has one of the world's highest rates of orphanhood (De Walque, 2009; Thomas, 2010). It was estimated that 85,000 households were headed by a child, 90% of them girls, when the hostilities came to an end (Obura, 2003; Okech and Torres, 2005). As more men than women were killed, fled the country or became prisoners accused of participating in the killings, the number of female-headed households increased. For the children in such households, going to school was often not an option, given the financial constraints and household chores they had to do, which included regular trips to prison to feed their confined parents (SCF, 1999). In 2000, of all children of primary school age (7-13 years), slightly less than 40% had only one or no parents at home (WB, 2004).

By gradually increasing the budget for education to 25.6% of total spending in 2001,<sup>6</sup> the government was able to reconstruct the educational sector so well that it has been praised

by international institutions such as the World Bank and UNESCO. Net enrolment in primary education exceeded 90%, gender equity in this enrolment was nearly accomplished and the deprivation of orphans was drastically reduced (Obura, 2003; WB, 2004). With regard to survival to the end of the cycle, Rwanda's performance is respectable: its estimated 73 percent compares well with the rate in other low-income countries and with its own record of 44 percent in 1990–91. Yet this rosy situation is unlikely to persist, given the exceptionally high rate of grade repetition in the system—about 34% in 2000–01, or more than three times that of a decade earlier (WB, 2004). Over 2000 schools were operational, although only half of them could be called 'permanent structures'. The percentage of qualified teachers was expanded substantially, but double shifting at schools was necessary to meet the demand for education; consequently, the teacher pupil/ratio was high and increasing.

The Rwandan government and its principal development partners in the education sector<sup>7</sup> concluded that extra efforts were necessary to achieve MDG 2 and to improve the quality of education. According to the Poverty Reduction Strategy Paper (2002), 27% of children of primary school age were not attending classes regularly. Completion rates for primary education were below 50% and considerably fewer girls than boys took the final examinations (Ersado, 2005; De Walque, 2009).

To improve access to education, the New Constitution (which was adopted in 2003) made education at the primary level free and mandatory for all children. Primary school fees of RWF 300<sup>8</sup> per term were abolished and replaced by a capitalisation grant to the schools, and several pilot schemes started to provide school lunches and run school farming programmes to encourage households to enrol their children. In 2002, the UN World Food Programme (WFP) launched a school canteen and food-for-education programme in food-insecure districts in the southern and eastern provinces. In collaboration with the government and several donors, this programme provided meals to 160,000 pupils for 4 years and gave 28,800 girls in grades 4 through 6 a monthly take-home ration of vegetable oil. The sale of this oil was expected to cover school costs and increase school attendance by girls (WFP, 2004).

Several ministries set about tackling the issue of the inequality of girls and orphans in school attendance. For example, the Ministry of Local Government, Information and Social Affairs, together with UNICEF and the Ministry of Education, formulated the National Policy for Orphans and Other Vulnerable Children (NP-OVC), which emphasised the integration of OVCs and gender issues as important policy targets in development programmes, the national

budget and poverty reduction strategies (MINALOC, 2003). Special funds for genocide victims made it possible to improve the living conditions of this section of the population.

Despite the progress, the quality of the primary school system was far from perfect. According to the IMF (2005) in its 2003 country annual report, the quality of primary education in Rwanda suffered from a shortage of qualified teachers, a heavy curriculum and a lack of appropriate educational material. The availability of schools also allowed room for improvement (WB, 2004).

## **2.4 Data and methodology**

The 2000 and the 2005 Integrated Household Living Conditions Survey (hereafter EICV) conducted by the National Institute of Statistics for Rwanda provide socio-demographic data on the members of 13,320 households,<sup>9</sup> and on the households' services and amenities. According to Megil (2005), the EICV is approximately self-weighting within a stratum. The basic weight for each sample household was equal to the inverse of its probability of selection (calculated by multiplying the probabilities at each sampling stage).

The sampling frame of cells within each stratum had been ordered geographically in a serpentine manner before the segments were selected systematically with probability proportional to size (PPS) where the measure of size for each segment/cellule was based on the number of households from the sampling frame; sample households are selected at the second stage within each segment/cell (NISR, 2007).

The dependent variable in our analysis ('children in the age category 8-14 years<sup>10</sup> who had not yet completed primary education at the time of the survey') was taken from these two datasets. The children were identified by 'age', 'highest level of education attained' and 'had or not attended school during the 12 months preceding the survey'.<sup>11</sup> Of the 11,199 cases appropriate for our study, 50.4% were collected during the 2000 survey and 49.6% during the 2005 survey. Only 2% (228) of the target children had already completed primary school<sup>12</sup>, 89.9% (10,268) were still attending primary school and 8.1% (931) had not attended school during the 12 months preceding the survey.

As the objective was to explore who profited from the free education policy introduced in September 2003, a separate analysis was made for 2000/01 and 2005/06 respectively before and after the free education policy. Besides the combined set was used to check if the changes between the two years were significant by including interaction effects with the variable year of the survey.

A logistic regression analysis was carried out to verify the underlying reasons for not attending school. The model describes the log odds that a child aged 8-14 had attended school in the year preceding the EICV of 2000 or 2005. It presents the relative influence of the independent variables on the odds of being attending primary school: a negative  $\beta$  coefficient means that the odds are reduced. The data available for our analysis did not allow the inclusion of quality of the school in terms of educational materials or quality of the teaching staff<sup>13</sup> as a barrier to school attendance, but distance to school was taken into account as a geographic factor. Place of residence was used as an indicator of school facilities and the returns (labour market conditions) on education costs. To measure the differential crowding out effect of having younger siblings for boys and girls we constructed a combined variable of gender and sibling position, bearing in mind that children without siblings could be a mixed group of foster children, afterthoughts, the only child or the only surviving child. Although the data also contains information on the number of hours spent at household chores we did not include that variable in the model to avoid endogeneity. It is plausible that to keep a child away from school and putting them to work for several hours a day is basically one decision made by the parent.

## **2.5 Descriptive analysis of the research population**

The table 1 reports the descriptive statistics of the independent variables which start with the variables at community level (place of residence and distance to school), followed by variables at the household level and then variables at the individual level. The table 1 presents children who have or have not been to school during the 12 months preceding the surveys according to year of the survey. Rwanda is a predominantly poor, rural society: most people live in scattered homesteads in the hills and agriculture is their main activity. These features are reflected in the characteristics of the children in the datasets: four out of five live in the countryside, and two out of three are member of a household of cultivators, fisher folk or cattle keepers. Thirteen percent of school age children from rural areas were out of school in 2000 and 12% of those coming from a farm. Between 2000 and 2005, however, these percentages decreased partly as a result of the abolishment of fees and a massive program of poverty reduction. Children in urban centres are privileged compared to children in rural areas in terms of the availability<sup>14</sup> and quality of schools and diversified future job opportunities. The better endowed schools are in the capital. According to the World Bank (2004) Report on Education in Rwanda, children in half of the rural households have to walk

for more than 30 minutes to get to school; in urban centres, this applies to only 20% of households. The Bank experts emphasised that the differences are even more pronounced within provinces.

**Table 2.1: Descriptive statistics on the independent variables influencing the nonattendance at school for children aged 8-14 years during EICV 2000/01 and 2005/06**

Variables	2000/01 Survey			2005/06 Survey		
	Observations	Not attend school (%)		Observations	Not attend school (%)	
<b>Total</b>	5.649	678	(12)	5.550	253	(5)
<b>Residence</b>						
Rural	4.749	613	(13)	4.395	200	(5)
Other urban centre	378	41	(11)	562	30	(5)
Kigali	522	24	(5)	593	23	(4)
<b>Distance to school</b>						
< 1/2 km	2.402	235	(10)	2.965	136	(5)
1/2-2 km	1.887	235	(12)	1.572	61	(4)
> 2 km	1.360	208	(15)	1.013	56	(6)
<b>Occupation household head</b>						
Farm activities	5.106	634	(12)	2.170	95	(4)
Nonfarm activities	543	44	(8)	3.380	158	(5)
<b>Poverty<sup>15</sup></b>						
Non-poor	2.060	166	(8)	2.190	86	(4)
Poor	1.075	129	(12)	1.112	48	(4)
Extremely poor	2.514	383	(15)	2.248	119	(5)
<b>Financial transfers received</b>						
None	1.623	189	(12)	951	44	(5)
< RWF 5000 (< \$10)	2.606	330	(13)	1.674	92	(6)
> RWF 5000 (> \$10)	1.420	159	(11)	2.925	117	(4)
<b>Education of household head</b>						
None	4.167	515	(12)	1.976	78	(4)
1-5 years primary education	512	60	(12)	1.836	63	(3)
Primary school +	970	103	(11)	1.738	112	(6)
<b>Presence of parents in household</b>						
Both	2.756	282	(10)	3.264	94	(3)
Father only	259	49	(19)	211	19	(9)
Mother only	1.620	196	(12)	1.299	62	(5)
Neither	1.014	151	(15)	776	78	(10)
<b>Age</b>						
8-10 years	2.293	85	(4)	2.492	43	(2)
11-12 years	1.627	171	(11)	1.576	64	(4)
13-14 years	1.729	422	(24)	1.482	146	(10)
<b>Gender &amp; position among sibling</b>						
Male with old sibling	908	127	(14)	992	62	(6)
Female with old sibling	984	123	(13)	975	43	(4)
Male with old & young sibling	1.533	171	(11)	1.561	53	(3)
Female with old & young sibling	1.577	150	(10)	1.605	58	(4)
Male with young sibling	59	9	(15)	25	5	(20)
Female with young sibling	136	26	(19)	19	6	(32)
Male without sibling	224	38	(17)	181	16	(9)
Female without sibling	228	34	(15)	192	10	(5)
<b>Time spent on chores per week</b>						
< 14 hours	4.535	462	(10)	3.266	148	(5)
> 14 hours	1.114	216	(19)	2.284	105	(5)

We divided distance to school into three groups: nearly half of the children in the total survey sample lived in communities<sup>16</sup> with at least one primary school (distance 0.5 km or less), a second lived in communities with at least one primary school in a neighbouring community (0.5-2 km distance) and a third had more than a 30-minute walk to school (>2 km). The non attendance of children living at a distance to school of more than 2km was 15% in 2000 and 6% in 2005.

Rwanda is a low-income country: it had a per capita GDP of \$200 at the beginning of the millennium. More than half of the population lived on an income below the poverty line; according to the Ministry of Finance and Economic Planning (MINECOFIN, 2006; MINECOFIN, 2007), these Rwandans consumed less than RWF 250 (<\$50 cents) per adult equivalent per day. The extremely poor had to get by on less than RWF 125 (<\$25 cents) in 2000 and RWF 175 (\$30 cents) in 2005 per day. In these poor households, over 70% of total consumption is spent on food, which illustrates the lack of means left for clothes, housing, school fees and uniforms (up to RWF 11,000=\$21) or health insurance cards (RWF 1000 approximately less \$2 per family member). School attendance has gone up in each category between 2000 and 2005, but particularly in the category of extremely poor.

Solidarity between family members in Rwanda is high, as shown by the large number of households that had received transfers in cash or kind during the 12 months preceding the surveys. For the two periods, the households of 70% of the children had received assistance from outside. Nearly half of the households had received transfers<sup>17</sup> amounting to more than RWF 5000 (less \$10) per year.<sup>18</sup> Remarkably, non-poor households received assistance more often than extremely poor households, and the value of rural to urban flows were on average less than a quarter of those in the opposite direction.

The impact of the genocide and the prevalence of HIV/AIDS among the adult population are reflected in the large number of children with no parents (16%). Siaens *et al.* (2003) stated in 2003 that as the country has emerged out of conflict, the AIDS pandemic has begun to take a heavy toll of human lives, contributing significantly to adult mortality. The children with no parents were either full orphans or lived with relatives for reasons other than the death of their parent(s). Fostering out children in order to enable them to go to primary school is not a common practice in Rwanda, like in some countries in West Africa, and most of them will be orphans. They are expected to be more deprived from education than children in other households. The variable presence of parents in the household together with the educational level of the head of the household was used to test whether girls and boys benefit

differently from educated parents/caretakers. More than half of the children came from households with an uneducated head. In a quarter of the cases, the head had at least completed primary school. Fifteen percent and ten percent of double orphans were not at school for 2000 and 2005 while the dropout was 10% and 3% for non orphans in the same years. Finally, the older the child the higher the probability to drop out, as is clearly illustrated in the distribution according to three age groups.

## **2.6 Results**

We built separate models for the 2000/01 and 2005/06 datasets, because the two years characterized the periods before and after the introduction of the free education policy in Rwanda. To find out whether children with or without siblings had gained significantly higher chances of attendance over time, we combined gender and the position among siblings in the household as one independent variable. This helped to establish whether the position among siblings has a differential impact on attendance for boys and girls.

An evaluation of other attendance constraining factors during the period 2000-2005 allowed us to identify groups of children who profited from the free education and those who need specific attention of the government to fully achieve MDG 2. We expected negative effects of the presence of younger siblings, living on a farm and of a large distance to school. Positive effects on education - according to the literature - could be: living in urban areas, educational level of household' head and income transfers from relatives. However, some of the constraining and enabling factors turned out not to be significant in their contribution to the school attendance and were dropped from our final model presented in table 2. The factors that did not show up are: residence area, education level of household' head and his/her occupational status. Even after controlling for distance to school, we expected a positive effect of living in urban areas (and especially in the capital) rather than rural areas, because urban labour markets are more diversified and offer a better return on investments in educating one's children. However the models show that children living in Kigali do not have higher odds ratios than children from rural areas. The same holds for the educational level of the head of the household, or his/her economic activities. We expected that people with a better education would be keener to send their children to school, like parents who do not work in the agricultural sector. However, the results of all these analyses turned out not to be statistically significant.

The idea that income transfers between family members promote school attendance, is not confirmed by our analysis. The results are not significant and the odds ratios in both 2000/01 and 2005/06 are close to 1. We checked whether households with school aged children received more transfers than others but again the effects were very limited. Transfers help to alleviate the worst poverty in general, but were not used specifically to have children attending primary school.

To investigate the robustness of the final model with respect to possible interaction effects, we tested the interaction effects of gender and presence of parents, gender and poverty, and gender and distance to school. None of these showed up as significant in the model. To test the hypothesis that the introduction of free education in 2003 in Rwanda did lead to improved school attendance of the poor in particular, the right hand column of table 2 shows whether the parameters are significantly different between the years.

The constant in each model reflects the starting point for the 2000/01 and 2005/06 surveys in our reference category of non-deprived boys aged 8-10 years from non-poor, complete families, with older sibling(s) and living at a distance to school of less than 0.5km away. The  $\text{Exp}(B)$  of the constant gives this category's odds of attending primary school. The odds of attending school for boys in this group are 112 to 1 in 2005. Also in 2000, most of the boys in this group went to school, although their odds were lower (55 to 1) compared to 2005.

The other variable's  $\text{Exp}(B)$  give the odds ratios for categories that deviate from the reference category. Multiplying these by the constant gives an idea of their odds of attendance. Table 2 shows that in 2000 compared to the reference category, coming from a poor or an extremely poor family reduced the odds of attending school, the ratios are 0.646 and 0.471 respectively for children from poor and extremely poor families making their odds 36 to 1 and 26 to 1. In 2005 (Table 2) the odds for children of poor families are equal to those from non-poor families. The odds for the children from extremely poor families were also better in 2005; their odds ratio in that year is of the same magnitude as the ratio for children from poor families 5 year before.

School attendance of the poor and very poor clearly improved in the period 2000-2005. Despite the policy to pay specific attention to vulnerable children and particularly orphans, the models show that the attendance of children who had lost both parents did not improve between 2000 and 2005. The odds ratios are smaller in 2005. Orphans even lagged significantly further behind other children in 2005 than in 2000.

The gender of the child combined with its sibling position did have a significant impact on school attendance, and again these effects are stronger in 2005 than in 2000.

Being the youngest in the household has the expected positive effect at least for girls, although the odds ratio is not significant in 2000, it is in 2005. Being the oldest has the expected negative effect on school attendance for both boys and girls but more so for girls than for boys. The effect is much stronger in 2005, the odds of attending school being 172 to 1 for girls that are the youngest and 14 to 1 for those being the oldest in the family. Despite the successful efforts of the Rwandan administration to promote gender equality in all aspects of society, girls are still valued and treated differently from boys within the family.

**Table 2.2: Binary logistic regression model of school attendance in 2000/01 and 2005/06**

Variables in the equation	2000/01 survey					2005/06 Survey					Shift
	B	S.E.	df	Sig.	Exp(B)	B	S.E.	df	Sig.	Exp(B)	
Child of non-poor family (Ref. Cat.)			2	0,00				2	0,01		
<b>Child of poor family</b>	<b>-0,44</b>	<b>0,13</b>	<b>1</b>	<b>0,00</b>	<b>0,65</b>	-0,08	0,19	1	0,69	0,93	***
<b>Child of extreme poor family</b>	<b>-0,75</b>	<b>0,11</b>	<b>1</b>	<b>0,00</b>	<b>0,47</b>	<b>-0,46</b>	<b>0,16</b>	<b>1</b>	<b>0,00</b>	<b>0,63</b>	***
Father & Mother present (Ref. Cat.)			3	0,00				3	0,00		
<b>Father only present</b>	<b>-0,71</b>	<b>0,18</b>	<b>1</b>	<b>0,00</b>	<b>0,49</b>	<b>-1,17</b>	<b>0,27</b>	<b>1</b>	<b>0,00</b>	<b>0,31</b>	
Mother only present	-0,11	0,11	1	0,29	0,89	<b>-0,40</b>	<b>0,18</b>	<b>1</b>	<b>0,03</b>	<b>0,67</b>	
<b>Neither</b>	<b>-0,40</b>	<b>0,17</b>	<b>1</b>	<b>0,02</b>	<b>0,67</b>	<b>-1,74</b>	<b>0,22</b>	<b>1</b>	<b>0,00</b>	<b>0,18</b>	***
Male with old sibling (Ref. Cat.)			7	0,14				7	0,00		
Female with old sibling	0,19	0,14	1	0,18	1,21	<b>0,42</b>	<b>0,21</b>	<b>1</b>	<b>0,04</b>	<b>1,53</b>	
Male with old & young siblings	-0,02	0,14	1	0,92	0,99	-0,07	0,21	1	0,74	0,93	
Female with old & Young siblings	0,14	0,14	1	0,32	1,15	-0,17	0,21	1	0,42	0,84	
Male with young sibling	-0,30	0,41	1	0,47	0,74	<b>-1,71</b>	<b>0,57</b>	<b>1</b>	<b>0,00</b>	<b>0,18</b>	***
<b>Female with young sibling</b>	<b>-0,57</b>	<b>0,28</b>	<b>1</b>	<b>0,04</b>	<b>0,57</b>	<b>-2,10</b>	<b>0,55</b>	<b>1</b>	<b>0,00</b>	<b>0,12</b>	***
Male without sibling	-0,24	0,25	1	0,34	0,78	0,55	0,33	1	0,09	1,74	
Female without sibling	0,06	0,26	1	0,82	1,06	<b>1,23</b>	<b>0,38</b>	<b>1</b>	<b>0,00</b>	<b>3,41</b>	***
Distance less 0.5km (Ref. Cat.)			2	0,00				2	0,08		
Distance 0.5-2km	-0,19	0,10	1	0,07	0,83	0,25	0,16	1	0,13	1,28	***
<b>Distance higher than 2km</b>	<b>-0,40</b>	<b>0,11</b>	<b>1</b>	<b>0,00</b>	<b>0,67</b>	<b>-0,19</b>	<b>0,17</b>	<b>1</b>	<b>0,26</b>	<b>0,83</b>	
8 to 10 years			2	0,00				2	0,00		
<b>11 to 12 years</b>	<b>-1,09</b>	<b>0,14</b>	<b>1</b>	<b>0,00</b>	<b>0,34</b>	<b>-0,82</b>	<b>0,20</b>	<b>1</b>	<b>0,00</b>	<b>0,44</b>	
<b>13 to 14 years</b>	<b>-2,14</b>	<b>0,13</b>	<b>1</b>	<b>0,00</b>	<b>0,12</b>	<b>-1,86</b>	<b>0,18</b>	<b>1</b>	<b>0,00</b>	<b>0,16</b>	
<b>Constant</b>	<b>4,00</b>	<b>0,19</b>	<b>1</b>	<b>0,00</b>	<b>54,75</b>	<b>4,71</b>	<b>0,26</b>	<b>1</b>	<b>0,00</b>	<b>111,48</b>	

Hosmer-Lemeshow Test chi-square=8.988, df=8, p=0.343 for 2000/01 and Hosmer-Lemeshow Test chi-square=12.123, df=8, p=0.146 for 2005/06

The right hand column shows whether the differences over time are significant at the 5% level.

The negative effect of distance to school was estimated in 2000 with a ratio of 0.669 (37 to 1) while its significance disappeared in 2005. However, for the distance 0.6 to 2 km the

improvement in attendance between 2000 and 2005 was significant, pointing at the impact of the reconstruction of school buildings policies.

In order to access secondary education, one needs to complete primary education. The last variable in our model shows that this is still problematic in Rwanda. Drop-out rates rise sharply after age 10, which can be seen from the very low odds ratios of attendance for 11 to 12 year-olds and particularly 13- to 14-year-olds. For the latter group, the ratios are 0.118 for 2000 (6 to 1) and 0.155 for 2005 (18 to 1). The test whether variables had significantly different effects between the years, shows significant improvement in attendance for both the poor and the very poor and for those living at the medium distance from school. The more negative outcome for children from one-parent families and orphans is only significant for the orphans. The stronger negative effect of having young siblings in 2005 also differs significantly from the effects in 2000, for both boys and girls. Females without sibling have clearly improved in attendance.

The conclusion here is that although the government has been very successful in getting children to school, it is less successful in keeping them in school until they have completed their primary education. There might be several explanations for this. It could be a cohort effect, as the higher age group might have left school at a time when the conditions for enrolment were less favourable. Returning to school is harder than staying at school. If this is true, the problem will fade away. However, it could also be that the higher economic value of older school-aged children (an effect not captured by our other variables) leads to a different trade-off between school and gainful employment. This trade-off could be influenced by the quality of the educational programme and the added value in the labour market of a completed primary education. This issue calls for further research.

## **2.7 Conclusion, discussion and policy implications**

In the first few years of the new millennium, the Rwandan government continued to increase the enrolment in primary education of boys and girls in general and of girls from poor families in particular. Our results show that the effort has been very successful for the majority of primary school-aged children. Nevertheless, the objective had not been achieved fully by 2005. Foster children and orphans are still discriminated against. Besides, increased attendance at younger ages to achieve MDG 2 is not sufficient, as some older boys and girls are kept away from school to work in or outside the homestead. Extra policy measures and

programmes are necessary to facilitate the completion of primary education by children above the age of 10, with specific attention paid to the oldest girls in the family and foster children.

Poverty leading to resource dilution when family size increases and sibling complementarity are probable causes for keeping children away from school and making them work. The elimination of school fees was a first step, but clearly not a big enough one. The estimated costs (2002) of RWF 11,000 (\$21) per child per year were still a great deterrent to enrolling a child in school. Even the Ministry of Education (MINEDUC, 2003) recognised that the main financial support at that time for children attending school is the family (90.6%), followed by the state (4.5%) and then other organisations. Subsidies for school uniforms for children from extremely poor and incomplete families could be a policy option. Experiments in Kenya illustrated that giving school uniforms to poor children reduced school absenteeism (Evans and Miguel, 2007). School uniforms could perhaps be bought by schools and loaned to families for a nominal fee. It should be discussed whether the advantages of compulsory school uniforms are more important than achieving full school enrolment and completion in a country that has so many poor parents/caretakers. The World Food Program (WFP) started the school feeding program (SFP) in Rwanda in 2001. In 2005, the Rwanda SFP was targeted to 12 drought-prone, food-insecure districts. Attendance rates in WFP assisted schools increased from 73 to 95% in 2006 (Lamberts, 2009). From January 2008 to December 2012, WFP extended its program targeting 290,000 students in 300 schools, at a cost of \$4.5 million per year. In response to government's policy shift to include free education to nine years of basic education (9YBE), WFP has raised its target to 350,000 across the country. Nutritious food is provided as a daily cooked meal in primary schools, and starting in 2010, WFP also provided a monthly take-home ration of vegetable oil for host families of orphans and vulnerable children (OVC) (Gelli *et al.*, 2007). The Rwandan government aims at the implementation of a general school feeding programme by 2012, when the WFP support (the government's partner in feeding school children) will be phased out. The assessment of local production for school meals in Rwanda is the first step towards having parents and local communities take over WFP school-feeding programmes (USDA, 2009). The latest news on this topic, however, is that - after the ending of the WFP program - schools will ask parents to pay RWF 4700 (around \$8) for a period of 3 months or the authorities will ask a support from residents for the meals distributed at school if the program is to continue (Dusabemungu, 2012). As our analyses showed that the very poor have lower

odds of attendance, requesting a contribution of parents might introduce a new barrier for this group in particular, and finding ways of exempting them from charges might be called for. Enforcing the laws on compulsory primary education and the prohibition of child labour and apprenticeships by children under the age of 15 who have not completed primary education could possibly also contribute to achieving MDG 2. The education situation of orphans has deteriorated in Rwanda. This is a problem that will not disappear when the victims of the disturbing events of the 1990s have grown up as long as people continue to fall victim to HIV/AIDS. Particularly orphans of parents who died of this disease are stigmatised and receive less community support (Thurman *et al.*, 2008). A grant given to the orphan him- or herself to cover the cost of uniforms and books or as reward for actually attending school, would be preferable to providing the orphan's household with general financial support. There are also clear limits to what policies might achieve. Several authors have concluded that when enrolment in primary education is close to universal, as it is in Rwanda, the enabling factors hardly contribute to even higher attendance rates, although they might play a role in the completion of primary school and therefore also in the enrolment in secondary education. Bold *et al.* (2011), Behrman and Skoufias (2006) found this to be the case for Kenya and Mexico. In the evaluation of PROGRESA<sup>19</sup> in Mexico, Coady (2003) found that this programme increased the enrolment rates by 0.74-1.07 percentage points for boys and 0.96-1.45 percentage points for girls. However, our analyses showed that constraining factors are of importance to specific groups and policies may be devised to target these groups in particular to increase their efficiency. Yet we are aware that achieving universal completion of primary education depends on more than educational policies. We agree with Buchmann (2000) that a lack of added value in the labour market of a completed education might negatively affect the trade-off between the costs and returns related to older pupils. Education is not just an instrument, but also an outcome of poverty reduction and economic development. Further research into the driving factors for completion rather than just attendance is needed.

## NOTES

1. The objectives of the EICV are to provide information on poverty and living conditions in Rwanda and to monitor changes over time as part of the ongoing monitoring of the Poverty Reduction Strategy and other Government policies. In Rwanda, the EICV is a nationally representative household survey and is carried out once every five years, with EICV1 having been carried out over twelve (12) months period in 2000/2001 (6420 households) and was repeated with slight modifications in 2005/2006 (6900 households). The content of the EICV2 questionnaire is broadly similar to that of the previous survey.
2. We refer to all reproductive and productive work of children.
3. Estimate for Rwanda: 400,000 child workers, of whom 120,000 were involved in the worst forms of child labour and 60,000 were domestic workers (Eloundou-Enyengue & Williams, 2006).
4. ILO defines child labour by the effect it has on the child. In brief, the work or activities done by children should not interfere with their education or harm their physical or mental health (Owuamanam & Alowolodu, 2010).
5. Prevalence of HIV/AIDS also added to this situation.
6. However, the share allocated for primary education decreased from 70% to 45 % in favour of tertiary education during the same period.
7. UK, USA, Netherlands, Belgium, Sweden and Germany.
8. RWF 300 per term is just less than \$2 per year (\$1 = RWF 537 in Oct. 2003), a small sum compared to the cost of a school uniform and educational material (RWF=Rwandan Francs).
9. A household generally consists of a group of people living in the same accommodation and recognising one person as its head; it may include related and unrelated members, and range from a single individual to multiple families.
10. The official entrance age for lowest level education in Rwanda is 7 years. The structure of Rwandan education system is: 6-year primary cycle, a 3-year common basic program (TC-lower secondary) cycle, a 3-year upper secondary cycle, and a 4-year higher education cycle in most fields. As the question regarding attendance was asked on previous 12 months, during the survey, the 7 years children old for primary enrolment were 8 years and the 13 years old children for grade 6 of primary level were 14 years old during the surveys period. ILO (2006) reported that the minimum age for apprenticeship is 14 years in Rwanda.
11. We did not exclude children who had missed only some classes.
12. The 2% (119 cases in 2000/01 and 109 cases in 2005/06) who completed primary school were excluded in our analysis because some of them were attending secondary school (when our analysis focused on primary or dropped out after completing primary school). The decline in completion from 119 in 2000 to 109 in 2005 is maybe due to a strong increase in enrolment because this is similar to the Boockmann (2010) estimates for Tanzania.
13. Only data on the quality of the school premises were available.
14. Particularly concerning secondary, higher education and diversity of primary education.

15. The poverty line was calculated on the basis of the level of household consumption including purchases but also on consumption from other sources like own production and payments received in kind. The approach used follows standard international practices by adjusting for differences in prices faced by households (price deflator) and by taking into account the household composition (household size measured in terms of adult equivalents). Given the prices in January 2001, the poverty line was set at RWF 64,000 (\$120) per adult per year, and an extreme poverty line (below which households could not even afford the basic food consumption basket, even without spending anything on non-food items was RWF 45,000 (\$85) per adult per year. For January 2006 prices these poverty lines translate into RWF 90,000 (\$170) and RWF 63,500 (\$120) per adult per year respectively (McKay & Greenwell, 2007).

16. A community generally means a 'cell' in the Rwandan administrative structure, because the question on distance to school was put to the coordinator of the cell. A cell (*Akagari* in Kinyarwanda) is the smallest administrative unit in Rwanda and hence closest to the people.

17. Transfers have three components: transfers in cash, in food, in other goods and miscellaneous. The transfers are coming from parents, son/daughter, brother/sisters, spouse/wife, in laws, other family or not related persons. The senders are living in the same countryside, Kigali Capital, other centers, other countryside, adjacent countries and few of them are living in other African country or in rest of the world. Most of the transfers are annually or monthly and only few of them are on a daily or weekly basis.

18. RWF 5000 is just less \$10 per year (\$1 = RWF 537 in Oct. 2003).

19. PROGRESA is a Mexico' Government program introduced in August 1997 as a key component of its poverty alleviation strategy. PROGRESA is an acronym for "Programa de Education, Salud y Alimentacion" or the "Education, Health and Nutrition Program" (Coady, 2003).

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### **3 Sibling and gender effects on youngsters' second chance to complete primary education in Rwanda**

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*'Education is the passport to the future, for tomorrow belongs to those who prepare for it today'.*

Malcolm X, American human rights activist 1925-1965

#### **Abstract**

Rwanda has made a huge effort to arrive at universal primary education, but many youngsters do not qualify to sit the leaving exam before they reach the age of 14. Using the Heckman probit model on data from the Integrated Household Living Conditions Surveys 2000 and 2011, this study explores the school careers of 12,539 children in the age group 13–17 years who got a second chance to complete primary school. The combination of extreme poverty and having younger siblings or being an orphan or foster child, still leads to very high dropout rates regardless of gender. To improve its completion rate for primary education, Rwanda should put more emphasis on disadvantaged children from larger families.

#### **Keywords**

primary education, sibling competition, poverty, resource dilution, gender, Rwanda

### **3.1 Introduction**

Rwanda faces many development constraints: poverty, scarcity of land, high fertility and absence of mineral resources. Given these constraints, the Rwandan government has decided to switch from an economy based on subsistence-oriented agriculture to a modern service-oriented economy by focusing on investment in the quality of the nation's principal asset: its people. Investing in education is also important in order to achieve the second Millennium Development Goal (MDG), while education in itself is a powerful driver of progress towards also achieving the other MDGs (Bruns, Mingat, & Rakotomalala, 2003). Completed primary education is pivotal, as it is a prerequisite for enrolment in secondary education or in vocational education, which will enable youngsters to become skilled workers.

There is an increasing consensus that the completion of primary school and the subsequent participation in secondary education or vocational training makes the difference between depending on subsistence agriculture and informal trade, or being able to become a socially, economically and geographically mobile member of the modern labour force (Lloyd & Blanc, 1996; Strode, Wylde, & Murangwa, 2007). Nations that have attained universal primary education (UPE) and have almost achieved universal secondary education, continue to rank high in per capita income (Mukudi, 2004; Cigno, 2011). Seen in this light, the Rwandan pursuit of modernity has to be linked with the development of a labour force that acquired formal knowledge while still at school, and hence with greater investment in education (Banya & Elu, 1997).

The Rwandan government first took steps to facilitate the enrolment of children in primary schools a decade ago. The abolition of school fees in 2003 and the introduction of food-for-schooling programmes are among the major interventions geared towards increasing the participation of disadvantaged groups in primary education (Nkurunziza, Broekhuis, & Hooimeijer, 2012). In October 2002, Rwanda set up a remedial programme to enable dropouts who desire to get back into the formal system, to do so as easily as possible (Kanamugire & Rutakamize, 2009). In the same year, the UN World Food Program launched a school canteen and a food-for-education programme in food-insecure districts in the country's southern and eastern provinces.

In 2009, the free education policy was extended in two steps to 12 years in an attempt to achieve six years of primary and six years of post-primary education for all by 2015. This

extension of free education might have a positive impact on primary school retention and completion rates, because the Rwanda country report states, “There is [...] evidence that parents are more likely to keep their children in school if the children will be able to continue into the secondary phase” (UNDP, 2010, p.25).

Although the free education and associated policies have increased enrolment and reduced dropout rates, achieving UPE proved unrealistic. The problem has shifted from non-enrolment to dropping out before completion. The Rwanda Education for All (EFA) profile reported that primary school completion remains a major challenge, with just 54 percent of school-aged children reaching the end of the cycle in 2008 and the repetition rates remain almost five percentage points above the Fast Track Initiative (FTI) benchmark of 10% (UNESCO, 2012). Repetition puts a greater burden on households, especially poor households, and increases the chances of dropout, thus, hindering a smooth educational career of a part of the youth (UNESCO, 2009). In addition, repeating school years consumes a substantial share of the financial resources allocated to primary education. For Africa as a whole, Dembélé and Oviawe (2007) estimated that grade repetition and drop out before completion are estimated to consume about 25% of the financial resources allocated to primary education.

The Rwandan school system has been unable to properly absorb the large influx of new pupils resulting from high fertility and increased/prolonged enrolment. The total fertility rate remained as high as 6.1 till 2005, and only declined to 4.6 in 2010 (NISR, 2011). The number of schools and teachers did not increase proportionally. The pupil classroom ratio increased steadily from 70 in 2007 to 85 in 2010 (Ministry of Education, 2012). Classrooms are overcrowded, which reduces the educational quality and makes schools less attractive to children and their parents. To meet the demand for schooling, some schools introduced double shifts – one in the morning and one in the afternoon – while others applied parallel streams (Sifuna, 2007; Nungu, 2010).

The objective of this study is to identify the teenagers who, since the introduction of free education and the associated policies, get a second chance to complete primary school, by looking at conditions of poverty, household composition and the position of the pupil within the household (sibling and gender effect). We use data from the 2000 and 2011 Integrated Household Living Conditions Surveys (IHLCS), the contents of which are broadly similar. This allows us to compare the situation before and after the introduction of free education and the associated policies. We first present a theoretical elaboration of the constraining and enabling factors for the completion of primary education. This is followed

by subsections on data, methodology and selected variables. We then present and discuss the results of the modelling. We end by presenting our conclusions and several policy implications.

### **3.2 Theoretical framework**

As Rwandan children officially commence their education at the age of 7 years and undergo a primary cycle of 6 years, children in the 14–17 years group age who are still at primary school are classified as ‘overage’ children. Despite the remarkable progress in getting children in developing countries into basic education, sustained educational access remains problematic in the poorest regions of the world (UNESCO, 2011). Continuation rates to the last primary grade in sub-Saharan Africa average out at 70.3%, meaning that nearly a third of the children drop out of the system (UNESCO, 2011). Whatever is the cause of overage pupils (later entrance, repeated classes or resuming the school career after dropping out), being an ‘old’ pupil intersects with polarized student gender identities in various ways that discourage remaining in school for girls in particular (Dunne & Ananga, 2013). Dropping out of school is often a process rather than the result of a single event, however, and therefore has more than one proximate cause (Hunt, 2008).

A child’s educational attainment is a result of a wide spectrum of factors at various levels: the child’s personal capabilities and characteristics, the household resource allocation decisions, the accessibility and quality of the school system, and labour market conditions (Al-Samarrai & Reilly, 2000; Sabates, Akyeampong, Westbrook, & Hunt, 2010; Akresh, Bagby, de Walque, & Kazianga, 2012). At household level, the educational career of a child is a function of the costs, the expected future returns of the schooling, the number of siblings and the child’s position among them, and the household poverty level.

The relation between schooling and poverty links up with a third factor: child labour. Poor households sometimes withdraw their older children from school in order to work as part of their coping strategy to meet costs and generate resources to support the schooling costs of the younger children (Hunt, 2008). Cash revenues earned by a child can form a necessary addition to the total household resources, or even a substantial part of the resources of poor households (Rena, 2009; Sabates *et al.*, 2010). Poor children can easily enrol in school, but as they grow older, the opportunity costs of education become larger, increasing the pressure to drop out (Sabates *et al.*, 2010). Various mechanisms contribute to this

tendency. Even without school fees, other direct costs (e.g. uniforms, books) cannot be avoided. Children from poor households therefore have a greater chance of an interrupted formal education (Basu & Tzannatos, 2003; Ananga, 2011).

The reasons for pupils leaving school are closely tied to the local economy and culture, as well as to health challenges (Colclough, Rose & Tembon, 2000; Leach, Fiscian, Kadzamina, Lemani & Machakanja, 2003; UNDP, 2010). In the sphere of the local economy, Ananga (2011) reported that “Specific work-related tasks – for example, full-time childcare and work at peak agricultural times – often clash with school hours” (p.6). In the cultural sphere of subsistence farming communities, families feel that it is important to involve children in productive activities and household tasks and equip them with the basic life skills useful for their future as adults (Admassie, 2003). Even if children go to school, they still have to do household chores and work on the farmstead or help their parents run their small enterprises (Munene & Ruto, 2010). Girls are involved in time consuming activities such as cooking, washing and childcare to prepare them for their future role as housewives and mothers (Admassie, 2003). When this unpaid household work is taken into account, girls work more hours than boys (Basu & Tzannatos, 2003).

A lack of parental support is linked to poverty in more than one way. For instance, parents do not have time to follow school careers intensively while struggling to make ends meet (Ministry of Education, 2003). The low appreciation of child education and lack of interest could also relate to the parents’ own limited educational training (Ersado, 2005; Lloyd, Mete, & Grant, 2009). The higher the education of the parent, the greater the chances of: increased access, regular attendance, and lower dropout rates (Connelly & Zhen, 2003; Duryea & Arends-Kuenning, 2003). The absence of follow-up on or interest in children’s school career results in higher dropout rates or repetition of classes.

Our focus is particularly on the effects of resource dilution or sibling competition for schooling. The effect of having young siblings on the school attendance of older brothers and sisters in the case of limited household income has two non-exclusive major components. The presence of young siblings could push their older brothers out of school to assist in the family’s economic activities, and push older sisters out of school to perform domestic chores at home (Greenspan, 1992). This sibling competition is probably more linked to moderate poverty than extreme poverty, as in very poor families all the children have to work, whereas in non-poor families all the children go to school (Basu & Tzannatus, 2003). In moderately poor families, siblings have to compete for the limited household resources, which are insufficient to pay for the education of all the children (Downey, 1995). In the case of

resource dilution, children opt for or have to step down for younger siblings to be educated by entering the labour market (Greenspan, 1992; Owuamanam & Alowolodu, 2010).

Findings from previous research differ on the gender aspect in these matters, but a general tendency is that girls are more discriminated against than boys for various reasons. In Ghana, dropout rates are significantly higher and educational attainment levels lower for girls with younger siblings compared to boys with younger siblings (Lloyd & Gage-Brandon, 1994). However, in a review of seven other sub-Saharan countries, significant negative relationships were found in only two nations, namely Kenya and Namibia (Lloyd & Blanc, 1996), while “The Lesotho country report observes that boys tend to drop out earlier than girls” (UNDP, 2010, p.24).

Diluting parental resources is less problematic if the extended family system and the practice of fosterage redistribute resources across families in ways that buffer educational inequality (Isiugo-Abanihe, 1985; Akresh, 2005). Within a context of limited resources and economically valued alternative roles for children, extended family networks in sub-Saharan Africa have probably enabled a greater number of children to be educated than would otherwise have been possible had biological parents alone borne the full private cost of their children’s education (Lloyd & Blanc, 1996).

Family structure is related to educational attainment in more than one way (Ginther & Pollak, 2004). Children from intact families receive, on average, more psychological support or more social, cultural and economic resources than children in blended or single-parent families. A parental death reduces in particular the primary education of girls under the age of 12 years (Evans & Miguel, 2007). “The death of the mother may leave children especially vulnerable, even among those who continue to live with their father and who experience no reduction in household income” (Case, Paxson, & Ableidinger, 2004, p.485). The effect on schooling of double orphanhood and amount of household chores is even greater than the sum of the effects of a maternal and a paternal death (Ainsworth & Filmer, 2002; Bicego, Rutstein, & Johnson, 2003; Siaens *et al.*, 2003; Case *et al.*, 2004). This less advantaged position of orphans and foster children compared to own-children relates to the saying ‘Charity begins at home’ and Hamilton’s rule that adult caretakers are less likely to invest in children who are more distantly related (Case *et al.*, 2004).

In many sub-Saharan countries, rural children are less likely than urban children to attend school and are more likely to drop out (Sabates *et al.*, 2010). Income differentials between rural and urban societies are probably part of the reason for this disparity, along with

structurally inadequate provisioning of school facilities and transport services (Al-Samarrai & Reilly, 2000; Hunt, 2008).

The literature review above shows that there is no single cause responsible for dropping out of school, and that some of the effects of having younger siblings on education achievement are debatable. Firstly, the effect can differ depending on the level of poverty, and can even be absent not only in non-poor households but also in extremely poor households. Second, the argument that girls suffer more from these effects finds limited support in empirical evidence and rests on the assumption that household chores are more important than other forms of child labour. Third, the effects are confounded by a number of other factors that are correlated with smaller families, such as urban living, shorter distance to school and the educational level of the parents.

This paper adds to the growing literature on the problem of overage children in primary education and on the causes of school dropout and repeat classes. We focus on children who did not have a second chance to complete primary school, by elaborating poverty, sibling and gender effects and comparing the situation before and after the introduction of free education, remedial programmes and related policies in Rwanda. We expect that having young siblings compromises the school career of overage children from poor or extremely poor families. By combining the gender of the pupil and the presence of parents in the household, we expect to find higher dropout rates for girls who are maternal orphans and for boys who are paternal orphans. We also checked other economic, demographic and geographic factors to find the ones that are detrimental to the second chance to complete primary school.

### **3.3 Data and methodology**

The analyses presented in this paper rely on two sources of data: the Integrated Household Living Conditions Surveys (IHLCS) 2000/01 and 2011 conducted by the National Institute of Statistics of Rwanda (NISR) in order to monitor the results of poverty reduction policies. Together, these two surveys provide basic socio-demographic data on 100,551 household members as well as on their economic activities, their amenities and their use of services. Our sample (n=12,539) from these datasets included all children aged 13 to 17 years.<sup>1</sup> Most of them (74.0%) are sons or daughters of the household head. The children were identified by questions related to ‘age’; ‘completion of primary education status’ and ‘status of school attendance during the last 12 months preceding the interview’.

In the case of a primary school cycle of six years and a legal enrolment age of seven years, three exclusive possible situations can occur when children are 14 years old. A child could:

1. have completed primary school (21% of the selected group had done so);<sup>2</sup>
2. still be attending primary school (50%) because of late entrance, repetition of classes or having retaken class after a dropout period;
3. or have dropped out of school before completing year 6 or have never been to school at all (29%).

Regressing dropout on characteristics for the 13–17 years old children without a primary school certificate would lead to biased results, as the ones who have finalized their schooling in time will not be included in the sample. Therefore, we performed a Heckman probit analysis to control for sample selectivity and provide asymptotically efficient estimates for all the parameters.

To highlight the effect of having younger siblings on delayed completion or dropping out, we combined the position of the child among all children in the household<sup>3</sup> with the family poverty level into one variable in the outcome model, while we kept them separated in the selection model. Although gender inequality seems non-existent at the national level, we combined gender and the parental co-residence status to detect whether the absence of one or both parents has a differential impact on completion of primary school for boys and girls.

To control for differences between the two datasets and to estimate the development over time, we established two separate analyses by year of survey and added an extra column to highlight the type of changes over time.

Tables 1a and 1b present the descriptive statistics of primary school attainment predictors of our research population. The tables show that although the level of completion of primary education did not change between 2000 and 2011 (table 3.1 b), the share of those without a certificate who got a second chance increased substantially (table 3.1 a).

**Table 3.1: Descriptive statistics on completion of primary education for overage children in 13–17 years age group**

**Table 3.1a: Dropout without certificate of primary school**

<b>Predictors</b>	<b>IHLCS 2000</b>	<b>IHLCS 2011</b>
Total	<b>N=2,017</b>	<b>N=1,545</b>
	<b>%</b>	<b>%</b>
Total	<b>60.8</b>	<b>23.7</b>
<b>Child age</b>		
13 years	32.0	6.4
14 years	47.8	12.5
15 years	68.2	19.1
16 years	84.3	37.6
17 years	90.4	59.4
<b>Education level of household head</b>		
Primary and over education level	61.7	22.4
Up to 5 years primary	68.9	22.9
No education level	59.8	25.9
<b>Residence area</b>		
Urban areas	65.1	33.0
Rural areas	60.0	22.6
<b>Poverty and Position among siblings</b>		
Non poor with old sibling	54.0	26.8
Non poor with young & old siblings	44.9	20.2
Non poor with young sibling	61.2	27.1
Non poor without sibling	67.3	31.4
Poor with old sibling	55.9	21.7
Poor with young & old siblings	59.8	17.8
Poor with young sibling	62.0	16.0
Poor without sibling	70.7	31.1
Extremely poor with old sibling	65.5	21.3
Extremely poor with young & old siblings	58.2	24.4
Extremely poor with young sibling	63.7	22.5
Extremely poor without sibling	69.7	28.8
<b>Gender and presence of parents</b>		
Male with both	52.3	17.9
Male with mother	60.8	27.5
Male with father	59.8	19.2
Male with none	71.9	41.4
Female with both	57.7	15.1
Female with mother	59.4	23.7
Female with father	60.7	27.1
Female with none	71.9	37.8

**Table 3.1b: No certificate of primary school**

<b>Predictors</b>		
<b>Total</b>	<b>N=3,445</b>	<b>N=6,513</b>
	<b>%</b>	<b>%</b>
Total	<b>79.5</b>	<b>79.4</b>
<b>Child age</b>		
13 years	91.9	94.3
14 years	84.6	88.7
15 years	80.0	80.5
16 years	68.8	69.4
17 years	68.2	62.4
<b>Education level of household head</b>		
Primary and over education level	71.2	68.2
Up to 5 years primary	76.5	84.7

No education level	82.2	85.3
<b>Residence area</b>		
Urban areas	60.5	59.4
Rural areas	84.7	82.8
<b>Position among siblings</b>		
Old sibling	68.5	72.9
Young & old siblings	78.5	79.8
Young sibling	81.9	82.0
No sibling	82.6	80.4
<b>Family poverty level</b>		
Child from non-poor family	68.6	70.9
Child from poor family	83.7	86.3
Child from extremely poor family	90.1	91.1
<b>Occupation status of household head</b>		
Head in non-farm activities	63.8	67.7
Head in farm activities	81.7	81.8

### 3.4 Results

We built separate models for two years (table 3.2) to check the effect of different policies on the retention of children in primary education. To test the hypothesis that the introduction of free education and associated programmes in 2002/03 improved the chances that especially the poor would have a second chance to complete their primary school education, the right-hand column in table 3.2 shows whether the parameters are significantly different between the years. The selection model estimates the probability of not having a primary school certificate, as this is the population at risk for dropping out after age 13. The test of independence shows that control for selectivity bias is appropriate in both years. The  $\chi^2=8.10$  ( $p<0.01$ ) in 2000 and the  $\chi^2=30.00$  ( $p<0.01$ ) in 2011 (at the bottom of table 3.2). In the selection model, the intercepts indicate that among the reference category (13-year-old youngsters from an urban non-poor family, whose household head is involved in non-farm activities with at least a primary education level, with older sibling(s) only) most of the children do not have a certificate of primary school. The magnitude of the reference category's impact on status of not having a certificate is slightly higher in 2011 than in 2000, indicating that timely completion (at age 13) has dropped over the years (the shift over time is significant at the 0.01 level). After age 15 we find significantly lower chances of not having a certificate in 2011 compared with 2000, indicating that the second chance is effective in generating larger proportions of certification. Access to good schools is certainly of importance in educational attainment. In rural areas, the probability of not completing primary school is much higher in 2000 and 2011 than in towns. Single children and children with younger siblings have higher probabilities of not completing primary education in time, but the effects are less strong in 2011. The effects of poverty on non-completion have not

changed over the years and the effect of limited education of the parents is stronger in 2011 compared to 2000.

The intercepts in the outcome models provide evidence that the reference category (13-year-old male youngsters from a complete non-poor family with older sibling(s) only, whose household head has at least a primary education level) is most likely to remain in primary school, and hence to complete it later. The chances of still attending primary school are higher in 2011 compared to 2000.

For 2011 – eight years after the introduction of free education and nine years after the introduction of the remedial programme – this result indicates a net increase in the use by overage children of a second chance to complete primary education.

Our main variable of interest was the combination of poverty and siblings. Before we interpret the parameters, it should be noted that we avoided using the variable ‘time spent on housekeeping chores’. We did so for two reasons. As the questionnaire refers only to work at home, we might have missed other jobs that could hamper completion or cause dropping out. More important, however, is the endogeneity problem: children who are not at school are supposed to spend more time on housekeeping chores than those at school.

Given this limited control, the results of the sibling effect are striking, yet somewhat different for the years. For 2000, irrespective of the position of the child among its siblings, the dropout rate was high according to the poverty level, but shows a decreasing trend. The effect of having younger siblings shows up for all poverty levels but with a much higher effect on dropout rates for extremely poor and poor households. Poverty itself is a strong determinant of completion of primary school. Children from extremely poor families with older siblings have a higher probability of dropping out than the reference category of children with older sibling from non-poor families, hence less chance of a later completion. Yet if the first group has younger siblings, the chances of dropping out are much higher in both in 2000 and 2011.

In 2011, regardless of the household poverty level, the dropout effect of having younger siblings shows up only in non-poor and extremely poor families. Having younger siblings decreases tremendously the chances of completing primary education for non-poor and extremely poor youngsters. For the moderately poor teenagers, the overall chances of completion are slightly better than they are for the extremely poor, even when they have younger siblings in 2011. Among the non-poor, those with one or more younger siblings have significantly higher dropout rates in 2000 and even 2011. Not having siblings creates higher dropout rates regardless of the poverty level only in 2000 and shows up only for extremely

poor teenagers in 2011. The effects are probably related not to resource dilution but to being put to work at an earlier moment in life.

Orphanhood is another impediment to completing primary education, as it strongly increases the chances of dropping out. Double orphans regardless of gender are particularly disadvantaged, and the difference between the two periods is small. The results support the hypothesis of the complementary gender of the child to the single parent in 2011. Girls without a mother and boys without a father have higher chances of dropping out in 2011. The loss of the mother does not have a significantly greater effect for girls than the loss of the father for boys.

The Heckman probit models show the expected outcome of the education level of the household head on child schooling. In particular, if the head did not finalize primary school, the dropout rates are much higher in 2000 but show a decreasing trend afterwards. Parents/Caretakers with an education, even if only up to 5 years of primary school, show the expected results in more often sending their children to school.

The test whether variables had significantly different effects between 2011 compared to 2000 shows a significantly increased likelihood that children from poor families with younger and older siblings and children from extremely poor households with older siblings or young siblings would have a second chance to complete their primary education. The more negative outcome for children from non-poor families with younger brothers or sisters disappears in the 2011 sets compared to the one from 2000. The stronger negative effect of being the only child in 2011 also doesn't differ significantly from the effects in 2000. Girls in a complete family clearly have an improved second chance to complete primary school in 2011 compared to 2000.

**Table 3.2: Heckman probit sample selection bias model: primary school completion**

	IHLCS 2000			IHLCS 2011			
Number of observations	4,335			8,204			
Censored observations	890			1,691			
Uncensored observations	3,445			6,513			
Wald chi2(24)	369.65			596			
Prob > chi2	0.000			0.000			
Log pseudo likelihood	-3,739.5			-6,236.12			
<b>Dropout of primary school</b>							
Outcome model	B	S.E	Sig. level	B	S.E	Sig. level	Shift over time
13 years (Ref. Cat.)							
14 years	0.352	0.065	**	0.313	0.065	**	n.s
15 years	0.841	0.081	**	0.528	0.064	**	**
16 years	1.239	0.137	**	0.981	0.067	**	*
17 years	1.480	0.154	**	1.381	0.082	**	n.s
Primary and over education level (Ref. Cat.)							
Up to 5 years primary	0.338	0.106	**	0.167	0.048	**	n.s
No education level	0.081	0.062	n.s	0.239	0.050	**	n.s
Non poor with old sibling (Ref. Cat.)							
Non poor with young & old siblings	-0.091	0.124	n.s	0.107	0.078	n.s	n.s
Non poor with young sibling	0.310	0.111	**	0.308	0.070	**	n.s
Non poor without sibling	0.296	0.131	*	0.006	0.085	n.s	n.s
Poor with old sibling	0.239	0.188	n.s	-0.025	0.103	n.s	n.s
Poor with young & old siblings	0.478	0.135	**	0.175	0.093	n.s	**
Poor with young sibling	0.590	0.127	**	0.152	0.089	n.s	**
Poor without sibling	0.585	0.176	**	0.224	0.119	n.s	n.s
Extreme poor with old sibling	0.530	0.154	**	0.010	0.106	n.s	**
Extreme poor with young & old siblings	0.441	0.120	**	0.418	0.083	**	n.s
Extreme poor with young sibling	0.730	0.116	**	0.488	0.078	**	**
Extreme poor without sibling	0.623	0.156	**	0.314	0.129	*	n.s
Male with both (Ref. Cat.)							
Male with mother	0.194	0.081	*	0.308	0.062	**	n.s
Male with father	0.170	0.143	n.s	-0.034	0.139	n.s	n.s
Male with none	0.492	0.105	**	0.636	0.070	**	n.s
Female with both	0.173	0.067	*	-0.114	0.052	*	**
Female with mother	0.176	0.073	*	0.201	0.062	**	n.s
Female with father	0.274	0.148	n.s	0.418	0.142	**	n.s
Female with none	0.554	0.096	**	0.557	0.065	**	n.s
Constant	-1.283	0.131	**	-2.095	0.092	**	**
<b>No certificate of primary school</b>							
Selection model	B	S.E	Sig. level	B	S.E	Sig. level	Shift over time
13 years (Ref. Cat.)							
14 years	-0.298	0.084	**	-0.459	0.067	**	n.s
15 years	-0.548	0.080	**	-0.848	0.064	**	**
16 years	-0.937	0.081	**	-1.189	0.064	**	*
17 years	-0.912	0.080	**	-1.377	0.064	**	**
HH with primary and over education level (Ref. Cat.)							
HH with up to 5 years primary	0.037	0.095	n.s	0.457	0.041	**	**
HH without an education level	0.144	0.062	*	0.489	0.046	**	**
Old sibling (Ref. Cat.)							

Young & Old siblings	0.188	0.074	*	0.184	0.049	**	n.s
Young sibling only	0.417	0.071	**	0.311	0.048	**	n.s
No sibling	0.581	0.087	**	0.303	0.062	**	**
Urban areas (Ref. Cat.)							
Rural areas	0.476	0.057	**	0.486	0.047	**	*
Child from non-poor family (Ref. Cat.)							
Child from poor family	0.324	0.067	**	0.400	0.046	**	n.s
Child from extreme poor family	0.590	0.060	**	0.625	0.047	**	n.s
Head in Non-farm activities (Ref. Cat.)							
Head in Farm activities	0.175	0.070	*	0.163	0.046	**	*
Constant	0.236	0.103	*	0.452	0.077	**	**
/athrho	0.670	0.235		0.846	0.154		
Rho	0.585	0.155		0.689	0.081		
Wald test of Indep.(rho=0): chi2(1)=8.10; Prob>chi2=0.004				30.00	0.000		

n.s: stands for not-statistically significant. Significant level: \* means significant at 5%; \*\* means significant at 1% or less.

### 3.5 Conclusion and policy implications

We expected to find that free education, remedial and food-for-schooling programmes had made a considerable contribution to keeping Rwandan children at school after the statutory age of 13. The results indicate that these policies have indeed increased the likelihood that children, and especially girls, make use of a second chance to complete primary school. Targeting girls rests on the assumption that they are more disadvantaged. There are several indications in the literature that this might be the case in sub-Saharan Africa. Particularly the older daughters in large poor families are assumed to drop out of school in order to take care of their younger siblings.

Our results support the assumption that having younger siblings severely compromises the school career of teenagers in non-poor or extremely poor families. Having younger siblings pushes older siblings in extremely poor families and to a lesser extent in poor families to the labour market to complement the household resources. Rwandan rural families have on average small landholdings as their only economic asset, and need additional non-agricultural income to overcome the resource dilution effect especially for female-headed households. This is in line with the conclusion of the World Food Program (2006) that the most urgent domestic responsibility of older children is not taking care of younger children, but of helping their families to make ends meet. This might also explain why single children turned out to be more disadvantaged: being the family's only source of extra income probably means that they need to start working at an earlier age and get fewer chances to complete their schooling. Again this was particularly true for boys and girls

without parents. This refutes the hypothesis of Basu and Tsannatos (2003) that sibling competition for schooling is associated particularly with moderately poor living conditions and less with non-poor or extremely poor conditions. We did find a strong effect of sibling competition among children in extremely poor living conditions, on top of the effect of extreme poverty on schooling for each sibling status.

The household's poverty level and the child's position among his/her siblings are by far the most dominant factors that constrain the child's chances of completing primary education in 2000 but the sibling effect decreased and even disappeared for the moderate poor in 2011. Abolishing school fees, running remedial programmes and providing pupils with food are not enough. The absence of a poverty effect on dropout in 2011 for those without younger siblings is related to poverty reduction strategies applied by the government,<sup>4</sup> but can also be attributed to the local authorities' willingness to supervise the parents who fail to give children their basic rights, including education.<sup>5</sup>

The other factors that hamper school success – such as orphanhood and living in a rural area – turn out to be very strong, even after controlling for poverty. Among the fraternal orphans, boys have higher dropout rates than girls. Among the maternal orphans, girls have higher dropout rates than boys. Yet our overall findings on gender suggest that the policy focus on gender equity is successful. This result is supported by the data on the 2011 Primary Leaving Exams: girls made up 54% of the 167,166 registered candidates (Kwizera, Ngabonziza, Rwembeho, & Nkurunziza, 2011).

Rwanda would do well to concentrate on affirmative action and proactive policy interventions to promote the completion of primary education particularly by orphans and by children from extremely poor and poor families and from rural areas. Free education combined with enforcing the laws on mandatory school attendance and the prohibition of child labour under the age of 15 are steps towards reducing the dropout rate, but their effectiveness depends on successful poverty reduction strategies.<sup>6</sup> The policies should specifically continue to target children from poor families and orphans.

A major restriction of our analysis is that we could not measure the effect of school quality directly. However, other evidence on a lack of quality due to overcrowding is clearly available. The current policy of stimulating enrolment has contributed to this overcrowding, as many now continue their primary education after age 13. There is little evidence so far, however, that this also leads to higher completion rates. Efforts to ensure and maintain education quality in primary education are facing serious challenges.

Between 2005 and 2011, the fertility level of Rwandan women dropped substantially. At the macro level, this means that the growth in the influx of new pupils in primary education will slow down in the near future; at the micro level of the individual child, it means less sibling competition and resource dilution. We have shown that this has a positive effect on children in non-poor and extremely poor households in particular, helping them to complete their schooling and continue into secondary education or vocational training. In the longer run this may prove to be a virtuous cycle, as educational attainment leads to increased fertility control through later marriage and the spacing and limiting of births, helping to meet the qualitative rather than just the quantitative demand for education.

## NOTES

1. Rwanda ratified Convention No. 138 (the Minimum Age Convention) in 1981 and Convention No. 182 (the Worst Forms of Child Labour Convention) in 2000. The legal minimum working age in Rwanda is 18 years, but the law allows children below this age to work if they have their parents' permission. Children are not allowed to work at night. The minimum age for apprenticeship is 14 years (ICFTU, 2004).
2. Of the children who completed primary school, 71.3% continued into secondary education in 2000 and 85.8% in 2011.
3. A household generally consists of a group of people living in the same accommodation and recognising one person as its head; it may include related and unrelated members (Nkurunziza, Broekhuis, & Hooimeijer, 2012, p.4).
4. At the national level, consumption poverty fell from 58.9% in 2000/01 to 56.7% in 2005/06, and then to 44.9% in 2011. This partly reflects much faster growth in the second five years, and partly reflects the inequality, which fell in the second five-year period after rising slightly in the first five-year period (National Institute of Statistics of Rwanda, 2012).
5. 'If you don't take your children to school, we shall punish you', was a warning message from the mayor of Rwamagana District in Eastern Province (New Times Editorial Cartoon of the day, 2010. Retrieved from <http://www.newtimes.co.rw/news/index.php?i=14788&a=46497>)
6. Rwanda chose to tackle poverty in general through its poverty reduction interventions, labelled as Social Protection Policy. Ubudehe classification launched nationwide in 2005 was the first step towards analysing the poverty characteristics of the village and highlighting the major problems among the community and the poorest households in need of targeted support (Kayira & De Laminne de Bex, 2011). The second step was a Vision 2020 Umurenge project (VUP) launched in 2008, which, through its financial services component, enables loan beneficiaries (most of whom are landless or other vulnerable categories) to move out of extreme poverty on a sustainable basis and to prevent people who are slightly above the extreme poverty line from falling into poverty themselves (Devereux, 2011). The 'One cow per family' programme and community-based health insurance are two of the policies that are associated with Ubudehe Classification and have multiplier effects.

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## **4 Secondary school admission in Rwanda: inequalities in accessing good secondary education**

Manuscript submitted

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### **Abstract**

Rwanda arrived at almost universal enrolment in primary education as early as 2005 with 92% of all children 8-13 in school. In 2009 the government introduced a fee-free and compulsory cycle of three years of lower secondary education and extended the capacity by introducing the so-called Nine Years of Basic Education (9YBE) programme in which primary schools were selected to also offer secondary education. The rationale of these education policies is to reduce inequality in the access to a proper education. This paper analyses whether this has been successful in two steps.

First, by applying a Heckman probit analysis on data from 2005/06 and 2011, the research teases out the probability to access secondary school before and after extension of the fee-free education policy to the lower secondary level, while controlling for the probability to complete primary education before. The results show that primary completion rates reflect high levels of inequality, with lower rates for children missing parents, from rural areas, and from disadvantaged households. The ones that enter secondary education are therefore a selective group. Yet after controlling for this selectivity we find that overall access to secondary education has improved and that, older pupils, children from poor families and from rural areas have gained more.

In the second step, using data on 1,519 students from 20 secondary schools, we analysed whether the new 9YBE school types cater more for the needs of disadvantaged youngsters than the existing public and private school. Using Chi-squared Automatic Interaction Detection and a Generalised Ordered Logit model, we analysed the recruitment of these three types of schools. Private schools and 9YBE schools offer access to those whose grades are insufficient to enter a public school, for youngster from wealthy and disadvantaged families respectively. Youngsters with good grades but from poor families often 'choose' for 9YBE schools, even if the youngster could have been admitted to a public school, which are presumed to be of better quality.

In all, the 9YBE programme is an important step in reducing inequality, yet does not eliminate other factors than just talent in educational achievement.

## **Keywords**

inequalities, school admission, free education, good secondary school, Rwanda

### **4.1 Introduction**

In April 2000, the participants in the World Education Forum in Dakar, Senegal, committed to the achievement of education for all (EFA), for every citizen and for every society (Unesco, 2000). From that commitment, educational systems should be designed so as to remove barriers of any nature whether economic, gender or geographic, that prevent bright students from lower economic backgrounds from taking advantage in born capacity, which accelerate them to social promotion (Buchmann & Hannum, 2001; Wanja, 2014).

With the deadline for the EFA goals fast approaching, there is ongoing debate on the sufficiency of primary education for children who managed to complete primary school thanks to the universal commitment on EFA. The current economic climate and competitive job market have made obtaining more than primary certificate more important than ever. Lewin and Caillods (2001) indicate that the poor transition from primary to secondary school level has remained a matter of concern in most countries in Sub-Saharan Africa. In many countries there are simply not enough places in secondary schools and so authorities screen children through public examining or by using other methods (Wanja, 2014).

The literature on transition rates from primary to junior secondary level indicates that gross enrolment rates vary widely from country to country. Rwanda is one of the few Sub-Saharan country who managed to boost the number of lower secondary students by 25% within a year by an introduction of a Nine Year Basic Education (9YBE) cycle and an elimination of fees for lower secondary school in 2009 (Unesco, 2012).

While the best performing students are granted direct access to public or government-subsidised boarding schools, the less achieving students are admitted in 9YBE or in private schools (WB, 2011). As the high prevalence of boarding facilities in public or government subsidised schools constitutes an additional cost for families, poor families also have the 'choice' to keep their children in 9YBE even when they are best performers. The private school is a choice of the parents who have the capacity and the willingness to support the related costs. It is likely that the creation of 9YBE schools and a change in admission procedures for secondary schools alone do not diminish all existing inequalities in schooling opportunities for Rwandan children.

The main objective of the study is first, to analyse the determinants of the odds to access secondary school before and after introduction of 9YBE programme and second, to determine whether the three types of secondary schools in Rwanda differ in their admissions and cater for the need of disadvantaged youngster. While school performance is expected to be leading factor in admission to public/government subsidised schools, we expect that the home environment could be the leading factor in student admission in private or 9YBE schools for the less performing students, and we also expect that students from a disadvantaged background will proceed in 9YBE more even if they have better grades.

By applying a Heckman probit analysis on data from IHLCS 2005 and IHLCS 2011, the paper teases out the probability to access secondary school before and after the introduction of 9YBE system. CHAID and Generalised Ordered Logit analyses, applied to data collected from 1,519 students from 20 secondary schools of 5 districts in Rwanda, will estimate the mechanisms underlying the admission in each type of secondary school. After this introduction, the second section gives the overview of the relevant theories and the third of Rwanda's education system. After that, the data and methods used in this analysis are described, and the results and conclusions of the research are presented.

#### **4.2 Theoretical model on barriers to secondary school admission**

In a simplified model, transitions from one level of education to the next depend, on the one hand on the availability of school places within realistic reach (geographical and economically), and on the other hand, on family and individual decisions by students (WB, 2008). The transition is a consequence of dynamic interrelationships between family decisions about education, commonly referred to as demand and the availability of school places, commonly referred to as supply (Buchmann & Hannum, 2001). The family and the individual decisions depend on a series of structural factors: students must be adequately prepared by previous schooling, and going to school must be considered beneficial both by the individual student, his/her family, and the community (WB, 2008). While there are wide variations in the economic and social benefits that secondary education delivers to individuals and to societies, a robust body of evidence suggests that this variation will be strongly affected by the quality and the distribution of opportunities to learn and by labour market conditions. For instance, a high unemployment rate among the educated youth might reduce the school attendance for next generations (Verspoor & SEIA Team, 2008).

Many of the performance problems at the secondary level have their roots at the primary level because rapid expansion of primary enrolments created much pressure to develop the secondary school system (Verspoor & SEIA Team, 2008). Poor previous schooling may lead to students enrolled in secondary education not being able to achieve according to what is demanded or, unsatisfactory quality of primary schooling may lead to potential students being rejected who under different circumstances would have qualified, especially if there are tests or entrance examination on which entrance is decided (WB, 2008).

Beside the availability of school places and the quality at primary school, it is well known that growing up in poverty is associated with obstacles that can affect later educational attainment (Ashtiani & Feliciano, 2012). Many poor children remain out of school; of the poor children that make it to primary school few make it into lower secondary education or beyond, the inequities getting larger the higher the level of education (Verspoor & SEIA Team, 2008). The resources of a child's residential household in particular the education of the household head and the household standard of living are determining factors in explaining differences among children schooling (Lloyd & Blanc, 1996).

For children who do complete primary school, the household standard of living interacts with the costs of secondary schooling, which can be prohibitive. For instance, if boarding schools constitute the majority of secondary schools, their cost makes them quite inappropriate as a model for mass schooling (Verspoor & SEIA Team, 2008). Secondary schools are often located in urban areas, limiting access for those from rural poor households who cannot afford the cost of transport (Unesco, 2012). The precise patterning of the transportation and mobility constraints experienced by school children, and the ways in which transport factors interact with other constraints, varies from region to region (Porter *et al.*, 2011).

There is significant evidence that family factors are important for educational outcomes in the developing world (Buchmann & Hannum, 2001). Socioeconomically advantaged parents can secure better education for their child, not only because they may use a wide array of resources, but also and perhaps more important, because they have personal experiences that make them value education higher (Lucas, 2001). Also in Africa, parents are increasingly using private tutoring to enhance the chances of their children to pass the secondary entrance examination and improve their performance once admitted (Verspoor & SEIA Team, 2008).

As long as a particular level of schooling is not universal, parents use their advantages to secure that level of schooling. Once that level of schooling becomes nearly universal, parents will use their advantages to secure quantitatively similar but qualitatively better education (Lucas, 2001). Some studies have demonstrated how multiple factors-labour market conditions, the family economy, parental beliefs and preferences - inform educational decisions (Parish & Willis, 1993; Buchmann, 2000). In general, higher levels of education are associated with an easier transition to work. With excess demand and concerns about the quality of instruction, social values and safety in government schools, many parents enrol their children in private schools (Verspoor & SEIA Team, 2008).

In conclusion the argument is that if access to secondary education is improved by removing economic (school fees) and geographical (distance) barriers, thus reducing socioeconomic inequities, new dividing lines can arise if more wealthy household try to secure better quality education for their children.

### **4.3 Overview of Rwanda's education system**

Rwanda's Vision 2020, issued in 2000, specifies the long-term development objectives for the country and seeks to transform Rwanda from a low-income agriculture-based economy to a knowledge-based, service-oriented economy by 2020. Rwanda with few natural resources, considers its population as its fundamental resource and banks on it for its future development (GoR, 2000). Since 2003, significant priority was given to reform primary education. The abolishment of school fees in primary school in 2003 and the school feeding programme are examples of policies which helped to increase access to primary education (Nkurunziza *et al.*, 2012). Enrolment in primary education has improved impressively since 2003. In 2010–11 the proportion of the youth aged 7 to 12 years in primary school was already 92% (NISR, 2014).

By 2009, thanks to amongst others the fee-free policy, the bulge of primary school leavers started to put pressure on the existing secondary education infrastructure. At that time (2008), Rwanda had 689 secondary schools with almost equal shares of public, government subsidized, and private schools (WB, 2011). Most of the secondary schools are taking boarding students only; hence, costs for accommodation and food have to be added as barrier for children from poor families. All secondary schools charged parents with a form of school fee in addition to other education expenses and thus, secondary education catered primarily to the wealthier layers of society.

To reduce this inequality, the government, in 2009, extended its fee-free education policy to lower secondary level (S1-S3) in order to facilitate enrolment of all primary school graduates in post-primary education, especially those from low income groups. Since 2009, education is compulsory and in principle for free for in total nine years (GoR, 2013). But, in reality education costs still exist as parents have to pay for school uniforms, school materials, mock exam fees, registration fees and contributions to the Parent Teacher Association (PTA) etc. (Williams, 2013).

In order to create more places for students at secondary level and to increase efficiency, a number of strategies were adopted. The establishment of schools locally known as Nine Years Basic Education schools (9YBE) was one of them. With support by local communities through ‘*Umuganda*’<sup>1</sup> and funds of development partners, a large scale school building programme was executed to provide the infrastructure for larger numbers of pupils in existing primary schools (Paxton, 2012).

The organisational set-up of the curriculum and the way of final (P6) grading were changed as well. Subject specialism for primary school teachers was introduced and the number of core courses in the curriculum decreased from 9 to 5 in years P1-P3 and from 11 to 6 in years P4-P6. Together with the double shift system (morning or afternoon classes), these measurements were taken to make 9 years of compulsory basic education available, affordable and deliverable (GoR, 2008). The exams were still taken at the end of primary school, but instead of allocating a pass-fail grade on basis of which access to lower secondary was decided, the results of the P6 exam are now seen as an objective measure of a pupil’s attainment (Paxton, 2012) at the end of primary school. The measure of attainment, divided in Grade I up to Grade VI<sup>2</sup>, is intended to support further continuation of schooling. The system of grades was adopted to harmonize with other member States of the East African Community (EAC) as part of the efforts to integrate regional education systems. All children are allowed to continue afterwards their education regardless the result of their P6 examination. The new created 9YBE schools gave them the possibility to do so relatively close by their family home and without costs for boarding. Since 2012, students who have completed 9YBE are entitled to 3 more years of education either in a general secondary (GS) school, teacher training college (TTC), or a technical and vocational education and training programme (TVET).

With the 9YBE policy, all primary schools with a 9YBE component are now required to implement ‘double shifting’– this entails a heavy workload and little preparation time for teachers which undermines teachers’ effectiveness in content delivery (VSO Rwanda, 2012).

In 2008, 36% of teachers in lower secondary school were qualified. In public schools 20.8% of the teachers have a diploma or degree. In government subsidised schools this is 28.1% and in private schools 51.07%. Most of private schools are located in Kigali or other urban centres. The concentration of teachers with higher qualifications at private schools also implies that urban schools are being considerably better staffed than rural ones (WB, 2011).

In term of education quality, compared to the students admitted in public or government subsidised and private schools, the students attending 9YBE schools are doubly disadvantaged. First the schools are less staffed and attract the less performing students from primary schools. Second, the students are living at home, rather than boarding which provides a better environment for learning. For example, many school children in lower secondary schools still have to walk over 5 km to go to school, some do not attend classes during the rainy season, and lunches are not provided. Teachers and parents believe that quality in 9YBE schools is lower than that in other schools (VSO Rwanda, 2014). The share of the private sector in secondary education in Rwanda is high compared to other African countries.

Summing up is it to be expected that the introduction of the 9YBE schools will have facilitated access to secondary education in particular in rural areas where secondary schools were traditionally absent and for children from disadvantaged families because school costs are lower. Following this argument we also expect that not just private schools, but also the public schools will be less accessible to disadvantaged children as the traditional public school are still in urban locations and charge higher contributions for boarding and other costs. Even if the child is successful in achieving the grades that give access to these schools, economic and geographical barriers may force them into 9YBE schools.

#### **4.4 Data and methodology**

The first analyses presented in this paper use the Integrated Household Living Conditions Surveys (IHLCS) of 2005/06 and of 2011, conducted by the National Institute of Statistics of Rwanda (NISR) in order to monitor the results of poverty reduction policies. These large and representative datasets contain socio-demographic data on households, including the enrolment of all the children in various levels of education and the completion of these levels. It therefore allows us to see whether the access to secondary education has changed between 2005/6 and 2011, after the extension of the secondary education with 9YBE schools.

Unfortunately the surveys do not distinguish between the various types of secondary schools and therefore do not allow analyses of differential access to public, private or 9YBE schools. Therefore separate data were collected in September 2011 on 1,519 students of 20 secondary schools in five Rwandan districts.<sup>3</sup> This dataset will be used to analyse the differences in admission between the three types of schools.

#### **4.4.1 Integrated Household Living Conditions Surveys in 2005 and 2011**

Together, the two IHLCS surveys provide basic socio-demographic data on 103,183 household members as well as on their economic activities, their amenities and their use of services. Our sample (n=9,957) from these datasets included all children aged 14 to 17 years.<sup>4</sup> The children were identified by questions related to ‘age’; ‘completion of primary education status’ and ‘status of secondary school attendance after completion of primary school’.

Three exclusive possible situations can occur when children are 14 years old. A child can:

1. still be attending primary school (because of late entrance, repetition of classes or having retaken class after a dropout period), have dropped out of school before completing year 6 or have never been to school at all. In 2005 81.4% and in 2011 74.5% of the selected group (14-17) were in this category.
2. have completed primary school but did not (yet) continued education in a secondary school. Of the 18.6% that had completed primary school in 2005, 27.5% were not in secondary education. Of the 25.5% with completed primary education in 2011, only 10.2% was not enrolled.
3. have completed primary school and continued in secondary education (72.5% in 2005 and 89.8% in 2011 of the ones who completed primary school);

The more detailed descriptive statistics are presented in Table 4.1 a en b. The first table shows that the percentage with a certificate was 18.6% in 2005 and 25.5% in 2011. It also shows that these percentages are lower for disadvantaged children (e.g. orphans, from poor families, from rural families, of farmers) in both years. Another striking figure is that girls had higher levels of completion in 2005 and that the difference with boys has increased over time. In nearly all categories (except for the full orphans) the share of children that could enter secondary school has increased over time.

The percentage of these that actually do enrol in secondary education (Table 4.1 b) has increased from 72.5% to 89.8%. The most striking outcome is that children from disadvantaged background seem to have caught up with the more advantaged to a large extent. Girls and boys do equally well.

**Table 4.1: Descriptive statistics sample from IHLCS 2005 and IHLCS 2011 of all children age 14-17 years**

**Table 4.1 a: Percentage of children that have a certificate of primary school**

	<b>IHLCS 2005</b>	<b>IHLCS 2011</b>
Total	<b>N=644</b>	<b>N=1654</b>
	<b>%</b>	<b>%</b>
Total	<b>18.6</b>	<b>25.5</b>
<b>Predictor</b>		
<b>Child age</b>		
14 years	7.8	12.9
15 years	13.3	19.9
16 years	24.4	31.1
17 years	28.8	40.3
<b>Education level of household head</b>		
No education level or up to 5 primary level	12.5	19.3
Primary completed	21.7	30.6
More than primary level	48.2	57.3
<b>Residence area</b>		
Urban areas	35.0	47.4
Rural areas	13.3	21.8
<b>Presence of under school age siblings</b>		
No under school age siblings	22.2	29.4
Presence of under school age siblings	14.2	20.3
<b>Presence of parents</b>		
Both	18.2	25.7
Father only	18.4	23.5
Mother only	18.5	25.6
None	25.0	22.9
<b>Family poverty level</b>		
Child from extreme poor family	8.1	11.9
Child from poor family	14.7	17.6
Child from non-poor family	28.9	35.0
<b>Occupation status of household head</b>		
Head in farm activities	14.9	22.0
Head in non-farm activities	32.6	47.5
<b>Gender of child</b>		
Male child	18.0	22.9
Female child	19.1	28.0

Source: Prepared by the Authors on basis of data provided by the Integrated Household Living Conditions Surveys 2005/6 & 2011

**Table 4.1 b: Percentage of children who completed primary school and are attending secondary school**

	<b>IHLCS 2005</b>	<b>IHLCS 2011</b>
Total	<b>N=467</b>	<b>N=1494</b>
	<b>%</b>	<b>%</b>
Total	<b>72.5</b>	<b>89.8</b>
<b>Child age</b>		
14 years	76.1	78.6

15 years	69.6	85.8
16 years	71.3	91.0
17 years	74.1	96.4
<b>Education level of household head</b>		
No education level or up to 5 primary level	65.1	86.9
Primary completed	74.8	92.5
More than primary level	81.8	95.8
<b>Residence area</b>		
Urban areas	78.9	93.7
Rural areas	67.1	89.1
<b>Presence of parents</b>		
Both	72.0	90.4
Father only	69.0	93.4
Mother only	74.1	89.6
None	74.3	91.7
<b>Family poverty level</b>		
Child from extreme poor family	51.9	83.7
Child from poor family	64.9	89.1
Child from non-poor family	78.9	91.6
<b>Presence of under school age siblings</b>		
No under school age siblings	74.9	90.6
Presence of under school age siblings	68.0	89.9
<b>Occupation status of household head</b>		
Head in farm activities	68.9	89.4
Head in non-farm activities	78.8	93.1
<b>Gender of child</b>		
Male child	72.5	89.0
Female child	72.5	91.4
<b>Type of primary school frequented</b>		
Public school	71.1	88.8
Private school	89.2	98.3
government subsidized school	69.1	89.4

Source: Prepared by Authors on basis of data provided by the Integrated Household Living Conditions Surveys 2005/6 & 2011

Applying a regression analysing attending secondary schools by using characteristics for the 14–17 years old children with a primary school certificate would lead to biased results, as the ones who are still attending primary schools with a second chance of completing primary later will not be included in the sample. Therefore, we performed a Heckman probit analysis to control for sample selectivity and provide asymptotically efficient estimates for all the parameters.

Although gender inequality seems non-existent at the national level, we combined gender and the parental co-residence status to detect whether the absence of the father, the mother or both parents has a differential impact on completion of primary school for boys and girls.

To control for differences between the two datasets and to estimate the development over time (which we assume is due to the 9YBE policy), we established two separate

analyses by year of survey and added an extra column to highlight the type of changes over time. The actual models are presented in the result section below (see table 4.3).

#### **4.4.2 Data for CHAID and Generalised Ordered Logit analyses**

Due to the lack of information in IHLCS regarding the type of secondary schools, a survey was designed in 2011 to elicit basis information on the educational and household background of junior secondary school students. Using a questionnaire capturing socio-demographic information (age, gender, residence, father's education, poverty level, presence of under school age siblings, etc...), the survey was conducted among 1,519 (884 female and 635 male) students of S1 and S2 (between age 12 and 22 years) in 20 secondary schools from five districts of Rwanda) in order to evaluate the differences in recruitment between the three type of schools in socio-demographic characteristic of their students.

The districts were selected on their potential to have the three types of schools. As a result, Huye in Southern Province, Nyarugenge in Kigali City, Karongi in Western Province, Musanze in Northern Province and Nyagatare in Eastern Province were selected. After a classification of all secondary schools into public/government subsidized, private or 9YBE, one public, one private and two 9YBE schools were randomly selected for each district and finally, all students of S1 and S2 were taken as the sample population. Only students from S1 and S2 were selected because they were the two first batches of the 9YBE generation when the data were collected.

The descriptive statistics in Table 4.2, show large differences in admission between the public and private schools on the one hand, and 9YBE schools on the other. The school population in the 9YBE is clearly from less wealthy families, has to rely on support from others to attend school and is more from rural backgrounds. The public schools only allow students in with Grades I or II and more than 80% are boarding schools. The popularity is high as almost 75% indicate that this school was their choice when in primary school, while this is only 20% for both the private and the 9YBE schools. At first sight, the private and 9YBE schools seem to be an alternative for those with worse grades, private school for boys and 9YBE for girls in particular. A more detailed multivariate analysis however, will uncover more subtle mechanisms (see the result section).

**Table 4.2: Socio-demographic characteristics of students at public/government subsidised, private and 9YBE schools (in %)**

<b>Family &amp; Child characteristics</b>	<b>Public school</b>	<b>Private school</b>	<b>9YBE</b>
<b>P6 National exams (P6NE) Marks</b>			
Grade I	81.9	22.5	21.9
Grade II	17.6	39.0	36.8
Grade III and more	0.5	38.6	41.3
<b>Family monthly income</b>			
Below 5,000 Rwf	15.7	7.2	39.2
Above 5,000 Rwf	84.3	92.8	60.8
<b>Health insurance status</b>			
With health insurance	96.2	96.6	81.2
No health Insurance	3.8	3.4	18.8
<b>Child home residence</b>			
Rural area	41.0	31.4	64.7
Urban area	59.0	68.6	35.3
<b>Presence of parents</b>			
Both	79.8	79.7	61.9
Father only	2.6	3.4	6.5
Mother only	14.5	9.7	21.9
None	3.1	7.2	9.7
<b>Responsible for school fees and other education needs</b>			
Parents	82.6	81.8	67.4
Relatives	5.2	6.8	13.4
Government	3.1	3.0	3.9
NGOs	9.0	8.5	15.2
<b>Time spent on domestics work during primary schooling</b>			
0 hour	20.0	23.7	7.8
Below 1h	43.6	53.0	34.6
1 hour and more	36.4	23.3	59.9
<b>Number of younger siblings</b>			
0-5 young siblings	91.9	94.9	89.5
5-10 young siblings	8.1	5.1	10.5
<b>Gender</b>			
Male	27.1	58.5	44.4
Female	72.9	41.5	55.6
<b>Child age</b>			
12-15 years	76.2	44.1	46.5
More 15 years	23.8	55.9	53.5
<b>Time to secondary school</b>			
Boarding	81.0	57.2	0.0
Up to 30 minutes	9.8	25.8	48.1
More than 30 minutes	9.3	16.9	51.9
<b>Was the school your choice in P6NE</b>			
Yes	72.4	20.8	19.8
No	27.6	79.2	80.2
<b>Levels</b>			
Senior I	55.0	48.7	52.1
Senior II	45.0	51.3	47.9
<b>Did you ever repeat classes in primary?</b>			
Yes	45.5	48.7	63.2
No	54.5	51.3	36.8
<b>What means of transport did you use to travel to primary schooling?</b>			
Walk to primary school	71.7	68.6	95.2
Primary school accessed by other means of transport	28.3	31.4	4.8

Source: Primary data collected in 2011

The Chi-squared Automatic Interaction Detection (CHAID) and Generalised Ordered Logit (GOL) methods were applied to find the factors with the strongest effect to predict the admission into public/government subsidized, private or 9YBE schools.

At each step, CHAID (Chi-squared Automatic Interaction Detection) chooses the predictor that has the strongest interaction with the type of school frequented by a student after P6 National exams (P6NE). Categories of each predictor are merged if they are not significantly different with respect to the dependent variable.<sup>5</sup> A minimum number of 40 children was used to give more opportunities to the CHAID to select better socio-economic background variables predicting the student's admission in secondary schools. The aim of the Generalised Ordered Logit (GOL) analysis, is to determine the magnitudes of the predictors of the student's admission in one of the three types of secondary schools. The GOL can estimate models that are less restrictive than the proportional odds models whose assumptions are often violated, and more parsimonious than those estimated by a non-ordinal method, such as multinomial logistic regression (Williams, 2006). As all independent variables are categorical, they were recorded as dummy variables.

#### **4.5 Results - Heckman Probit analysis of enrolment in secondary education**

To test the hypothesis that the introduction of 9YBE policy in 2009 improved the chances that especially the poor would have a chance of admission in secondary education, the right-hand column in table 4.3 shows whether the parameters are significantly different between the years. The selection model estimates the probability of completing primary school, as this is the population at risk for entering secondary education after age 13. The test of independence shows that control for selectivity bias is appropriate in 2005 years while it is not significant in 2011. The  $\chi^2=6.68$  ( $p<0.01$ ) in 2005 and the  $\chi^2=1.52$  ( $p>0.05$ ) in 2011 (at the bottom of table 4.3).

Rho ( $\rho$ ) is the correlation between unobserved determinants of probability to attend secondary school ( $\varepsilon_i$ ) and unobserved determinants of having a certificate of primary school ( $\mu_i$ ) (Persson & Tabellini, 2004).

**Table 4.3: Heckprobit model for 2005 and 2011**

<b>Probit model with sample selection</b>	<b>EICV 2005</b>			<b>EICV 2011</b>		
Number of observations	3.467			6.490		
Censored observations	2.823			4.836		
Uncensored observations	644			1.654		
Wald chi2(11)	19,50			40,63		
Prob > chi2	0,11			0,000		
Log pseudolikelihood	-1.690,46			-3.323,28		

<b>Outcome model: Attended secondary school after completing primary school</b>							<b>Shift over-time</b>
	<b>B</b>	<b>S.E</b>	<b>Sig.</b>	<b>B</b>	<b>S.E</b>	<b>Sig.</b>	
14 years (Ref. cat.)							
15 years	-0,218	0,197		<b>0,330</b>	<b>0,137</b>	**	**
16 years	-0,261	0,197		<b>0,584</b>	<b>0,158</b>	***	***
17 years	-0,209	0,209		<b>1,060</b>	<b>0,192</b>	***	***
Child from extreme poor household (Ref. cat.)							
Child from poor household	<b>0,294</b>	<b>0,166</b>	*	0,223	0,162		n.s
<b>Child from non-poor household</b>	<b>0,567</b>	<b>0,156</b>	***	<b>0,254</b>	<b>0,134</b>	*	*
Number of repeated primary's years	0,006	0,017		<b>-0,281</b>	<b>0,062</b>	***	**
Log(transfers received)	0,028	0,053		0,084	0,061		n.s
Male child (Ref. cat.)							
Female child	-0,065	0,102		0,084	0,093		n.s
Both parents (Ref. cat.)							
Father only	-0,168	0,185		0,274	0,255		*
Mother only	0,014	0,124		-0,119	0,106		n.s
None	-0,112	0,247		-0,056	0,321		n.s
Child from urban areas (Ref. cat.)							
Child from rural areas	<b>-0,483</b>	<b>0,142</b>	***	-0,163	0,130		**
Child without under school age sibling (Ref. Cat.)							
Child with under school age sibling	-0,120	0,132		-0,027	0,105		n.s
<b>Intercept</b>	<b>1,146</b>	<b>0,412</b>	**	<b>0,759</b>	<b>0,398</b>	*	***

<b>Selection model: Have a certificate of primary school</b>							
14 years (Ref. cat.)							
<b>15 years</b>	<b>0,404</b>	<b>0,093</b>	***	<b>0,366</b>	<b>0,057</b>	***	n.s
<b>16 years</b>	<b>0,794</b>	<b>0,087</b>	***	<b>0,800</b>	<b>0,056</b>	***	n.s
<b>17 years</b>	<b>0,974</b>	<b>0,088</b>	***	<b>1,144</b>	<b>0,057</b>	***	**
HH not educated or up to 5 primary (Ref. cat.)							
<b>HH with primary completed</b>	<b>0,349</b>	<b>0,070</b>	***	<b>0,332</b>	<b>0,046</b>	***	n.s
<b>HH with more than primary level</b>	<b>0,764</b>	<b>0,084</b>	***	<b>1,013</b>	<b>0,064</b>	***	**
<b>Number of times repeated primary class</b>	<b>-0,229</b>	<b>0,028</b>	***	<b>-0,359</b>	<b>0,020</b>	***	***
<b>Log(transfers received)</b>	<b>0,112</b>	<b>0,027</b>	***	<b>0,155</b>	<b>0,026</b>	***	*
Male with both parents (Ref. cat.)							
Female with both parents	-0,040	0,076		0,019	0,048		n.s
Maternal orphan male	<b>-0,255</b>	<b>0,144</b>	*	-0,178	0,130		n.s
Maternal orphan female	-0,035	0,134		0,185	0,122		*
Paternal orphan male	0,042	0,091		<b>-0,132</b>	<b>0,062</b>	**	***
Paternal orphan female	-0,073	0,089		0,036	0,061		n.s
<b>Double orphan male</b>	<b>-0,312</b>	<b>0,177</b>	*	<b>-0,443</b>	<b>0,165</b>	***	n.s
Double orphan female	-0,301	0,208		-0,229	0,191		n.s
Child from urban areas (Ref. cat.)							
<b>Child from rural areas</b>	<b>-0,398</b>	<b>0,067</b>	***	<b>-0,554</b>	<b>0,053</b>	***	n.s
Child without under school age sibling (Ref. Cat.)							
<b>Child with under school age sibling</b>	<b>-0,385</b>	<b>0,063</b>	***	<b>-0,351</b>	<b>0,041</b>	***	n.s
Frequented public primary schools (Ref. cat.)							
<b>Frequented private primary school</b>	<b>0,673</b>	<b>0,120</b>	***	<b>1,197</b>	<b>0,062</b>	***	***

<b>Frequented government subsidized primary school</b>	<b>0,184</b>	<b>0,070</b>	<b>***</b>	<b>0,166</b>	<b>0,042</b>	<b>***</b>	<b>***</b>
<b>Intercept</b>	<b>-1,539</b>	<b>0,171</b>	<b>***</b>	<b>-0,894</b>	<b>0,148</b>	<b>***</b>	<b>**</b>
/athrho	-0,583	0,238	**	-0,202	0,166	n.s	
Rho	-0,525	0,173		-0,199	0,160		

Wald test of Indep. Eqns.(rho=0): Chi2=6,68 Prob>chi2=0,009 Chi2(1)=1,52 Prob>chi2=0,218

\*Significant at 10%, \*\* Significant at 5%, \*\*\* Significant at 1%, n.s: Not significant.

In the selection model, the intercepts indicate that among the reference category (14-year-old boys from a complete family headed by a parent without primary education, from an urban area, without under school age sibling(s), and who frequented public primary school) most of the children do not have a certificate of primary school. The magnitude of the reference category's impact on status of not having a certificate is significantly lower in 2011 than in 2005, indicating that timely completion (at age 14) has increased over the years (the shift over time is significant at the 0.01 level). Because the other parameters are calculated as deviations from this reference category, this means that in each category completion has increased, unless the deviation becomes less positive or stronger negative over time.

The selection model shows that apart from the overall higher level of completion, inequalities persist over time. Students from families with primary education or higher have the same or even better chances to complete primary school in 2011 as in 2005. Male paternal orphans even find their chances decrease over time. Double orphan males are particularly disadvantaged, and the difference between the two periods is too small. Students from rural areas still lag behind those from urban areas in 2011 (-0.554 compared to -0.398 in 2005). For teenagers aged 16 and over we find significantly lower chances of not having a certificate in 2011 compared to 2005, indicating that the second chance is effective in generating larger proportions of certification. Children with under school age siblings have higher probabilities of not completing primary education in time. As a proxy of family wealth, attending private primary school is likely to affect the probability of having a primary school certificate and the probability is stronger in 2011 compared to 2005. Access to good schools is certainly of importance in educational attainment. While class repetition is contributing to the high drop out of primary school before graduating, the transfers received contribute to the probability of having a primary school certificate and the situation has slightly changed overtime.

The intercepts in the outcome models provide evidence that the reference category (14-year-old male youngsters from a complete and extreme poor family, from urban area and without under school age sibling) is more likely than not to attend secondary schools after graduating in primary. The results for this category are striking, as their chances of attending secondary school are lower in 2011 compared to 2005.

For 2011, two years after the introduction of 9YBE policy, the results indicate that pupils aged 15 and over have significantly higher chances of attending secondary education in 2011 compared to 2005, indicating that the 9YBE policy is effective in boosting secondary school attendance. The effect of the poverty of the household on secondary attendance seems to become smaller over time as the parameter for the non-poor dropped from 0.567 to 0.254 and is now only significant at the 0.10 level. The most striking result however is the increase in the attendance of children from rural areas. The parameter dropped from -0.483 to -0.163, a significant improvement, indicating that the difference between urban and rural areas is close to disappear. Motherless children are doing better in 2011 than in 2005.

In 2011, the number of repeated primary school years shows up while it was not the case in 2005. The more pupils with a primary school certificate repeated school years, the less likely they will attend secondary education. Entry into secondary education has become more performance based and less driven by disadvantage.

Given these results, it is plausible that the policy on 9YBE has been instrumental to reduce the role of disadvantage in the access to secondary education. The fact that older students, students from rural areas and from poorer families have better access is fully in line with the instruments that have been applied (building schools in rural areas, abolishing school fees, allowing a second chance in primary education). Yet, the results of the selection model show that social inequality remains an issue in completing primary education. After controlling for this selection effect the access to secondary education is less an issue.

#### **4.6 Results - admission to one of the three type of secondary schools**

The IHLCS questionnaire does not provide information on the type of schools, which is why we ran our own survey. On the basis of these data on 1,519 students enrolled in 20 secondary schools during the 2011 school year, the CHAID analysis and then the Generalised Ordered Logit method (GOL) were used to tease out the factors that contribute to making a distinction between the pupils admitted in public/government subsidized, private or 9YBE schools.

##### **4.6.1 Chi-squared Automatic Interaction Detection (CHAID) analysis**

Eleven independent variables were specified, but only five were included in the final model by the CHAID method (see figure 2). The predictors *Child gender*, *Number of young*

*siblings, Health insurance status, Family monthly income, Responsible for school fees and other education needs and the Presence of parents* did not make a significant contribution to the model, so they were automatically dropped from the final model.

Using the CHAID method, *P6NE marks* is the strongest predictor of the type of secondary school frequented by a child after a P6 national exam. The ones with Grade 1 results (Node 1 in figure 2) are overrepresented in public schools (58.7% as opposed to 27.6% for all). This node is subsequently split into the ones that had their secondary school as the first choice or not. Very few made a positive choice (Node 4) for either a private school (3.5%) or a 9YBE (20.4%). This node is further split up on the basis of the number of hours spent on household chores. Of the ones that were able to spend all their time on education (Node 10), 90.2% go to a public school. Of the ones that were engaged in household chores (Node 11) 41.7% have 'chosen' to go to a 9YBE, making this school type an alternative for talented students that cannot be missed at their parental home.

For those with Grade I that were not admitted to the school of their first choice (Node 5) both private and 9YBE schools are an alternative. This node is split further on the basis of the age of the student. In particular students over 14 (Node 13) are not admitted to public schools (10.3%). Students that needed a second chance in primary education or have been repeating classes seem to be less welcome at the public schools.

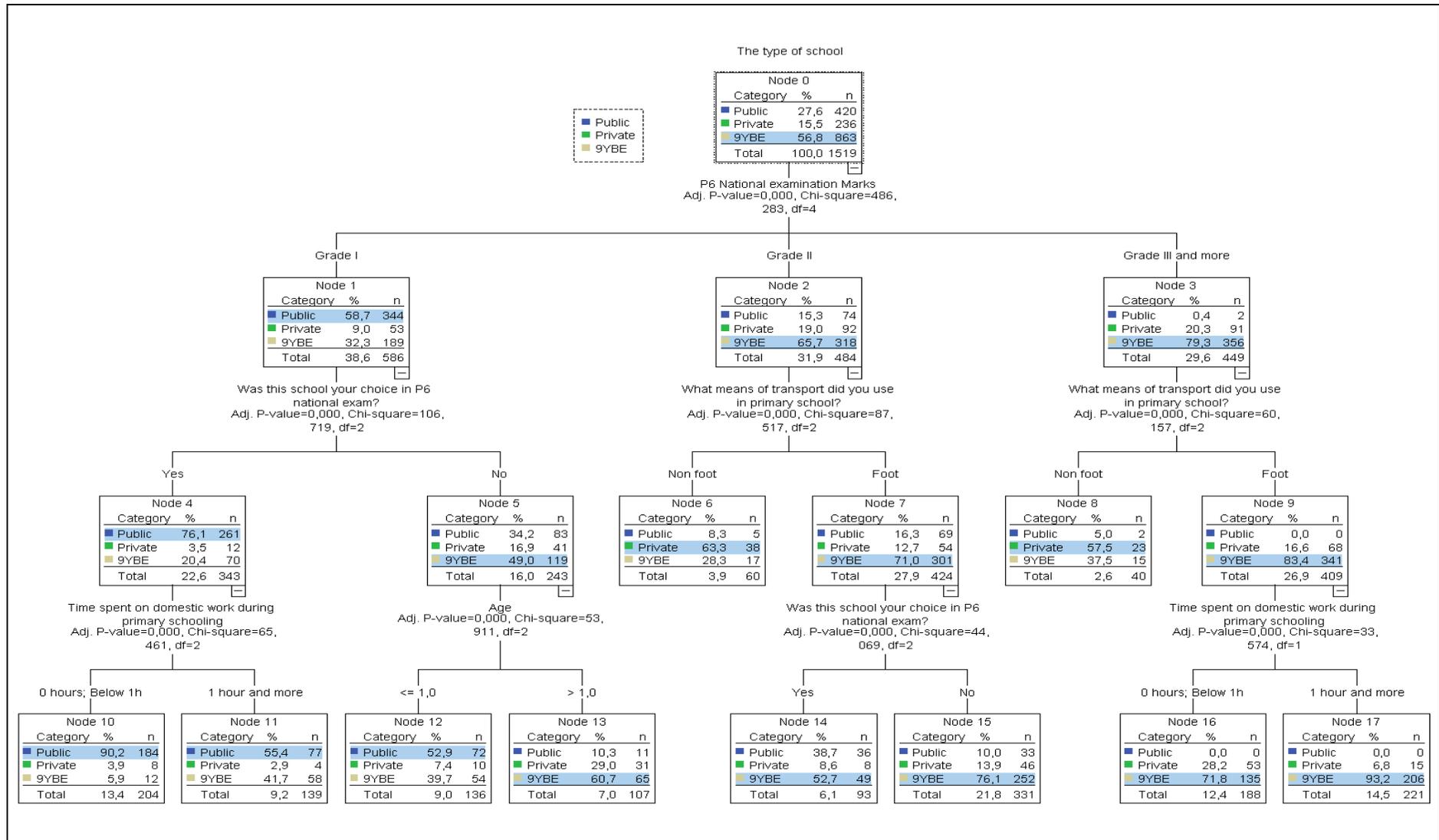
For students with Grade II results (Node 2) the socioeconomic position of the parents is probably decisive in the 'choice' for a private or a 9YBE school. This node is split on the basis of the means of transportation to get to primary school. The ones that had to go on foot (Node 7) go to 9YBE schools (71.0%), the ones that could use other forms of transportation (being brought or public transport) go to private schools (63.3%).

The same phenomenon occurs among the students with Grade III or higher (Node 3). They do not have access to public schools at all. Depending on the means of transportation they go to private schools (57.5%) if they had other forms (Node 8), or to 9YBE schools (83.4%) if they had to go on foot (Node 9) or even as much as 93.2% if they are also involved in doing household chores (Node 17).

The risk analysis (at the bottom of Figure 2) provides a quick evaluation of how well the model works. For the data in use, the risk estimate of 0.275 indicates that the category predicted by the model (public, private, 9YBE admission) is wrong for 27.5% of the cases. So the 'risk' of misclassifying a student is approximately 28%.

Overall results show that public schools are being favoured and that private schools are an alternative for students from more wealthy families that are not admitted to a public school.

The 9YBE schools seem to serve two purposes. They also cater for the needs of those that are not admitted to public school because of their grades or their age, but also show up as a choice for talented students that have to combine secondary education with home duties.



Estimate Risk: 0.275, S.E.:0.011

Figure 2: Tree diagram for admission into secondary schools in Rwanda

## 4.6.2 Generalised Ordered Logit analysis

The CHAID uncovers the underlying structure in the data, but it doesn't identify the contribution of each predictor to explain the admission in each type of secondary school. Generalised Ordered Logit Model (GOLM) provides a way of calculating the relative importance of the predictors.<sup>6</sup>

The Ordered Logit model treats the variable school type as ordinal and we have defined the hierarchy as 1) 9YBE school 2) private school and 3) public school. The model estimates the log odds that students go to a private or public school rather than a 9YBE school (2+3 over 1) and the log odds to go to a public school rather than a 9YBE or private school (3 over 1+2).

**Table 4.4: Generalised Ordered Logit Model (GOLM)**

Number of observations							1.519
LR chi2(15)							929,940
Prob>chi2							0,000
Pseudi R2							0,317
Log likelihood							-1.002,321
<b>Type of secondary school</b>	<b>Private or Public</b>			<b>Public school</b>			
<b>Predictors</b>	<b>Coef.</b>	<b>S.E</b>	<b>Sig.</b>	<b>Coef.</b>	<b>S.E</b>	<b>Sig.</b>	
<b>Gender</b>							
Male (Ref. cat.)							
Female	0,291	0,129	**	0,735	0,147	***	
<b>Monthly Household income</b>							
Below 5000 Rwf (Ref. cat.)							
More than 5000 Rwf	0,742	0,159	***	0,401	0,168	**	
<b>Grade from P6NE</b>							
Grade III and more (Ref. cat.)							
Grade II	0,436	0,166	***	3,648	0,721	***	
Grade I	2,209	0,166	***	5,651	0,716	***	
<b>Time per day spent on domestic works during primary schooling</b>							
More than 1 hour (Ref. cat.)							
Less 1 hour	0,630	0,138	***	0,630	0,138	***	
0 hours	1,539	0,223	***	0,746	0,222	***	
<b>Means of transport used for going to school during primary schooling</b>							
By foot (Ref. cat.)							
Other means	1,645	0,208	***	0,612	0,193	***	
<b>Have you ever repeated any primary class?</b>							
Yes (Ref. cat.)							
No	0,297	0,122	**	0,297	0,122	**	
<b>Have you a health Insurance?</b>							
Yes (Ref. cat.)							
No	-1,383	0,251	***	-1,383	0,251	***	
Intercept	-2,676	0,207	***	-6,591	0,733	***	

Wald test of parallel lines assumption for the final model: Chi2(3)=3,66; Prob>chi2=0,3007

\*. Significant at 10%, \*\*. Significant at 5%, \*\*\*. Significant at 1%.

The global Wald test of 3.66 (P. value=0.301) indicates that the final model does not violate the parallel lines assumption. The intercepts of the model have no substantive meaning in the population at large as we took a stratified sample with a predetermined number of students from each school type. This sample is not representative for the distribution of all students in the population. The aim of the analysis is to identify the relative weight of each predictor within our sample.

The intercepts indicate for our sample that among the reference category (male children from household with a monthly household income below 5,000 Rwf (<US\$10), who got grade III and more in P6 national exam, who were spending more than 1 hour per day on domestic works during primary schooling, who went to primary school on foot, who have repeated at least one primary school year but have a health insurance) most of the children are less likely to be admitted to private or public schools than to 9YBE schools. The log odd of -2.676 corresponds to an odd (Exp -2.676) of 0.07, indicating that for every hundred students that go to 9YBE schools only 7 go to either a private or public school. The odds of going to public school is even lower, for every thousand student that go to 9YBE or private schools only one student goes to a public school.

As expected the grades are highly decisive in 'escaping' the 9YBE schools. The log odds for female students with grade I from relative poor household that have not repeated primary school classes are close to zero for both entering private or public secondary schools ( $-2.676 + 0.292 + 2.209 + 0.297 = 0.122$ ) and entering public schools ( $-6.591 + 0.753 + 5.651 + 0.297 = 0.109$ ) meaning that their chances in getting a better education are fifty-fifty.

Poverty is clearly related to entering 9YBE rather than private or public schools. If your parents have a higher income (+0.742) and you do not have to perform home duties (+1.539) and you do not have to walk to school (+1.645), your chances to get into a private or public school are much higher. Poverty is of less impact on the admission to public schools versus 9YBE or private school.

Again, the analyses show that performance in primary school is decisive in being admitted to public schools but also that poverty hampers the access to these institutions. Private schools are an alternative to those that can afford the costs. A positive aspect might be that 9YBE schools also attract talented students, yet only from a poor background.

## 4.7 Conclusion and discussion

The Rwandan government, with the support of donors and local communities, has gone into great effort to extend the educational opportunities in the country and to provide more equal opportunities for children from disadvantaged families. After the abolishing of school fees for primary education and the remedial programme to provide a second chance for those that have not gone to school before or dropped out at an earlier stage, the next step has been to provide three years of secondary education for all, the so-called Nine Years of Basic Education. This required the building of new schools, in particular in rural areas and state funding, as the existing public and private secondary schools were predominantly located in urban areas and charged school fees. The question whether this policy has been successful in providing access to children from the less wealthy strata of the population requires detailed scrutiny, both from a theoretical and methodological perspective.

From a theoretical point of view the access to secondary education cannot be isolated from the performance of the primary school system as this provides the capabilities for students to enter the next level of education. As long as the group that completes primary education is selective with respect to parental resources and geographical location, access to secondary education is bound to be inequitable. From a methodological point this selectivity bias is also pertinent, because the ones from disadvantaged backgrounds that do enter secondary education, might have unobserved characteristics (e.g. higher grades) that improve that chances of getting in, thus underestimating the effect of the background on the access to the next level.

Using the Heckman selection model in analysing the changes in access, we could show that existing patterns of disadvantage (poor families, the need to perform home duties, rural residence and the presence of younger siblings in the household) are still very pertinent in defining the completion rates in primary education, even though the remedial programme helps children to finalise school at a later moment in adolescence. Yet, after controlling for the selectivity we could also show that the access to secondary education has become more equal over time. In 2011 children from poor families and from rural areas had a more equal chance to enrol in secondary school and also orphans were shown to have better access, than in 2005. It is plausible that the provision of schools for 9YBE has been instrumental in providing these better chances.

A second nuance from theory is that when a certain level of education becomes more universally available, the more well-to-do parents will shift their attention to schools that

provide a better quality in education. Our first analysis shows that in primary education, children in private schools have higher completion rates. The more extensive analyses of the admission to three types of secondary schools (9YBE, private and public) further elaborate this mechanism. Access to the most preferred type of secondary school (the traditional public boarding school) is restricted by two mechanisms: the first being the performance at primary school (exemplified by timely completion and high grades), the second the level of socioeconomic disadvantage (exemplified by means of transportation and the necessity to contribute the household livelihood). Talented children from poorer background also go to 9YBE schools when they cannot overcome the economic and geographical barriers to the traditional public school. Children from more well-to-do families that are not admitted to the traditional public school opt for private schools instead. Given the distinction in quality (as measured by the qualification of the teachers and the time allotted to instruction) between the 9YBE and the private and public school it is fair to conclude that the inequities in secondary education have shifted from having access to the next level to having access to better schools at that level.

Despite the efforts and expenses of the Rwandan government, the educational pipeline from primary into secondary and beyond still has major leaks and new mechanism arise through which the reproduction of social class occurs (see also Ashtiani & Feliciano, 2012). Yet, with only two 9YBE generations, it is still too early to fully evaluate the implementation of these strategies and their sustainability. Further work may be needed to establish the shift in the factors that might encourage or hinder the poorest groups' transition to upper secondary level and assess whether the current policies by the government are adequate and whether 9YBE education provides enough quality to make this transition.

### **Acknowledgements**

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## NOTES

1. '*Umuganda*' is a Rwandan tradition of collective community work.
2. Grade I (excellent: 85-100%= scare boundary: 10.5-11), Grade II (very good:65-84%=scare boundary: 6.5-10.4), Grade III (satisfaction: 45-64%=scare boundary:2.5-6.4), Grade IV (Pass: 40-44%=scare boundary:1.5-2.4), Grade V (Insufficient: 35-39%=scare boundary:0.5-1.4) and Grade VI (Unclassified: 0-34%=scare boundary: 0-0.4).
3. Survey conducted by Innocent Abaho (in Nyagatare District of Eastern Province), Clarisse Dusabimana (in Karongi District of Western Province), Irma Girimabazi (in Huye District of Southern Province), Denis Kamugisha (in Musanze District of Northern Province) and Erska Kato (in Nyarugenge District of Kigali City) and supervised by main author.
4. For an entry age of 7 years in P1 and primary program of 6 grades, the 13 to 17 years old children were expected to be attending secondary schools.
5. IBM Corporation, (2011) 'IBM SPSS Decision trees 20'. Retrieved from <http://www.csun.edu/sites/default/files/decision-trees20-64bit.pdf>
6. To come up with a more parsimonious model, we used the constraints option by 'autofit' and 'gamma' options. While the 'autofit' option provides an empirical means of identifying where assumptions may be violated, the 'gamma' option indicates the extent to which the proportional odds assumption is violated by the variable (Williams, 2006).

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## **5 Do Poverty Reduction Programmes Foster Education Expenditure? New Evidence from Rwanda**

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*'If you think education is expensive, try ignorance'*. Derek Bok, American educator and 25<sup>th</sup> President of Harvard University

### **Abstract**

The Rwandan government has implemented various education policies that contribute to higher enrolment in education, but has become aware that these policies might be less effective for children from poor families. This study investigates the contribution of poverty reduction programmes on education expenditure of households. Using a multi-level regression analysis, combining district data on labour markets with detailed expenditure data on 7,230 households, we tease out the effects of several social protection programmes. The results show that access to health insurance and to waged work are positively related, while direct financial or in kind support are negatively related to paying into the children's schooling. Non-agricultural employment opportunities in particular seem to stimulate education investments. Reducing the vulnerability of households might provide more equal access to these opportunities.

### **Keywords**

poverty reduction, education expenditure, resources dilution, employment opportunities, Rwanda.

## 5.1 Introduction

The Government of Rwanda has implemented various policies to stimulate enrolment of children in education with a specific emphasis on improving the gender balance. Among others, fee-free education has been extended from six years to nine years for all and an extra three years for those successful in the first nine. In many respects these policies have met success. Attendance in primary education is close to 100% for both boys and girls, and the completion rates by girls are above those of boys (Table 5.1). The decrease of gender inequality is supported by the data on the 2011 Primary Leaving Exams: girls made up 54 per cent of the 167,166 registered candidates (Kwizera, Ngabonziza, Rwembeho and Nkurunziza, 2011). Yet the overall completion rates at age 12 are still below 50% and the youth literacy rate (80% for 15-19 years old) is not exceptional for Sub-Saharan Africa and is closer to South than to East Asia (Nabalamba and Sennoga 2014). This raises a wider concern that not everyone benefits from education as a development path, which has also been forcibly expressed for India by Corbridge et al. (2013) and Drèze and Sen (2013). Nkurunziza et al. (2012) found for Rwanda, that despite improvements, in particular children from very poor and from large households had lower chances of educational enrolment up to 2006. More generally it turned out that Rwanda's development policy was less suited to target the very poor (Ansoms 2008). The government decided to introduce a Social Protection Policy that provides various forms of support for the poorest. This raises the question to what extent these policies have also provided better results when it comes to education.

This contribution adds to this debate on the role of poverty reduction strategies in the educational domain in several ways. First, many studies have used educational attainment as a proxy for educational demand (e.g. Puskar, 2003). We focus on education expenditure instead of educational attainment because it directly measures the willingness of parents to pay for their children's education (Vu, 2012) in a context of scarce resources. Accordingly, we investigate to what extent various Social Protection interventions have an impact on the amount of family expenditure on education, controlling for other variables like the number of under school age children in the family, that define this expenditure. Second, we acknowledge that education expenditure is more than just out-of-pocket costs as these should also be seen as an investment that enables access to better paid job opportunities. This is a reason why expenditure is higher in urban than in rural areas. Yet, rather than including urban rural differences we have chosen to specify this opportunity structure at the district level and to include this in a multilevel model, controlling for the fact that poor people tend to live in poor

areas. For the analyses we use a dataset of 7,230 households taken from the 2011 Integrated Household Living Conditions Survey (IHLCS)<sup>1</sup> conducted by the National Institute of Statistics of Rwanda (NISR)<sup>2</sup> and district data from other secondary sources. The aim of the research is to show the effect of poverty reduction measures on education expenditure within the wider context of economic development.

The next section provides an overview of the background of the study while the third section motivates the hypotheses on the predictors of household education expenditure. The fourth section explains the methodology and presents the sample population. The fifth section gives the results of the multilevel regression analysis, followed by a discussion and conclusion in the last sections.

## **5.2 Background: Rwanda Vision 2020**

Despite a positive economic development trajectory of more than a decade, Rwanda still remains a poor country (Siegel et al., 2011). Even if the situation has improved to some extent, many Rwandans continue to live at levels below the poverty line (NISR, 2012<sup>a</sup>, p.17). Besides, Rwanda has a high population density (467 people per square kilometre) and a young population. Due to a high fertility level, which remained as high as 6.1 children per women until 2005, two out of three Rwandans are under the age of 25 (Ruberangeyo et al., 2011). The fertility level dropped recently - thanks to among others improved access to family planning facilities (Muhoza, 2014), but, with 4.3 children in 2012, it is still twice the level common in East-Asian countries. The Rwandan population will continue to grow as a result of its current age composition. It will take some time before the country can profit from the so-called demographic dividend as countries in Asia and Latin America already did (Gribble and Bremner, 2012; Drummond et al., 2014).

The aim to reduce population growth was only one of the outcomes of many internal debates held at the end of the 1990<sup>s</sup> to address Rwanda's multi-faceted social, political, and economic challenges (Hayman, 2007, p.372). The main policy objectives were presented in the strategic policy paper locally known as Rwanda Vision 2020. The aim of the Rwanda Vision 2020 was to transform Rwanda's agricultural-based economy into a knowledge based one within two decades. To achieve those objectives the government has applied various development strategies amongst others to reduce poverty, to educate the youth and to offer the population better access to (reproductive) health facilities. It was acknowledged that, in order to succeed, these strategies must pay serious attention to reducing gender disparities (King

and Mason, 2001; Zuckerman, 2001). Table I illustrates that currently, in quantitative terms, a gender balance has been achieved in school enrolment and in completion rates. Several policies have contributed: the abolishing of school fees; school feeding programmes in food insecure districts; community pressure against non-attendance through the establishment of a Parents Teachers Association (PTA) committee at each school; and support to orphans and other vulnerable children (Nkurunziza et al., 2012). Rwanda now invests 22.1 per cent of its budget in education, a bit above the Fast Track Initiative (FTI) benchmark of 20 per cent (UNESCO, 2012<sup>a</sup>).

**Table 5.1: Primary school enrolment and its completion status in 2011**

Gender	Age group	Attend primary school (%)	Age group	Completion of primary school (%)
	8-10 years	2,774 (98.8)	13-15 years	440 (17.5)
Male	11-12 years	1,694 (98.6)	16-17 years	549 (35.5)
	8-10 years	2,764 (99.4)	13-15 years	561 (22.4)
Female	11-12 years	1,791 (98.6)	16-17 years	661 (41.6)

Source: Prepared by the authors on basis of the information provided by the 2011 Integrated Household Living Conditions Survey (IHLCS 2011).

Rwandan children officially start their formal education at the age of 7 years and undergo a primary cycle of 6 years before entering the lower secondary level of 3 years followed by a higher secondary level of 3 years. Since 2003, significant priority was given to a reform of the education system. As a result, enrolment in primary education has improved impressively since 2005–06. In 2010–11 the proportion of youth aged 8 to 12 years in primary school was over 98 per cent (Table 5.1). In order to create more places for students at secondary level and to increase efficiency, a number of strategies were adopted. The establishment of schools locally known as Nine Years Basic Education schools (9YBE), was one of them. Tuition is fee free and privately organised schools (through churches in particular) receive government funding.

Privately funded schools are a choice of the parents who have the capacity and the willingness to support the related high costs. In 2013 only 3 percent of the primary school pupils attended a privately funded school, for secondary school students this percentage was 17 percent (MINEDUC, 2014).

Lessons learned from the evaluation of the first Vision 2020 strategy (2002-2005) indicate that despite the fact that this strategy did indeed provide policies for enhancing development and growth, the chosen implementation was less suited to target the (very) poor (Ansoms, 2008). After 2005, economic development and poverty reduction policies were re-

focused on equitable and sustainable growth, with rural development as an important priority (Evans et al., 2006; Ansoms, 2008). In the second strategy, various policy measures have been re-labelled and re-packed under the term ‘Social Protection’ and the adoption of a special Social Protection Policy at the end of 2005 paved the way for reducing the inequality by targeting poor people in particular (GoR, 2007). This approach is expected to be a prerequisite for making poverty reduction successful (Sebates-Wheeler and Roelen, 2011).

The Social Protection instruments, which essentially comprise different programmes such as the Vision 2020 *Umurenge* Project (VUP), are geared to support the poor. One Cow Per Family (OCPF) as well as the Community Based Health Insurance (CBHI), were applied to enable poor and vulnerable people to control the forces that condition their lives.

The Vision 2020 *Umurenge* Project knows various types of support for the poor. The beneficiaries for each type are selected on basis of a locally determined *Ubudehe*<sup>3</sup> classification<sup>4</sup>. The direct financial support (VUPDS) are monthly payments to the poorest households that have no or insufficient land (less than 0.25 hectares) and no able-bodied members who can work. The support through public works (VUPPW) gives poor households with able-bodied members access to paid activities (every two weeks) in employment guarantee schemes. Another type of support increases the access of poor households to financial services (VUPFS) and is helping them to become familiar with the banking system and to deal with financial institutions (Siegel et al., 2011; Kindness, 2011),

The One Cow per Poor Family programme-locally known as ‘*GIRINKA*’, launched in 2006, provides poor households with a dairy cow (through a gift or loan) and has various goals. First, it seeks to reduce malnutrition through increasing milk consumption of the rural poor. Second, it provides manure for soil fertility improvement on the land of the beneficiaries, or an opportunity to produce biogas for cooking. Third, it promotes social cohesion through a system where the first born calf is passed on to another household in need. Finally, it should create opportunities for earning an additional income and contribute to a feeling of self-confidence (Bucagu, 2013).

The introduction of the Community Based Health Insurance system (CBHI) enables low-income households to manage their financial risks and reduce their vulnerability in the face of financial shocks due to health problems (Ahuja and Jutting, 2004). Based on household subscription, the CBHI - locally known as ‘*Mutuelles de santé*’, was reinitiated as a pilot project in 1999. Its’ up-take accelerated sharply in 2004-2005 with the adoption of a national policy on *Mutuelles* and a roll-out of the schemes with the financial and technical support of the development partners (Twahirwa, 2008). Initially the *Mutuelles* covered the

costs of all services and drugs provided by the local health centres and of services in district hospitals, but already in 2006, a co-payment of Rwf200 (US\$0.33) per visit at the health centres was introduced. In July 2011, the flat annual premium of Rwf1,000 (US\$1.66) per household member, was replaced by a stratified system<sup>5</sup> for the annual premiums according to the *Ubudehe* poverty classification. This was in order to ensure the financial sustainability of the *mutuelles* scheme<sup>6</sup> while still taking equal access for all members of society to health facilities into account (Binagwaho et al., 2012).

Crucial for achieving Vision 2020 will be to properly link education policies with economic development and labour market policies. The Government of Rwanda [GoR] (2000) argued that the emergence of a viable private sector that develops into the principle growth engine of the economy is absolutely key to its development. It was estimated that it will be necessary to create 1.4 million jobs outside the agricultural sector by 2020. A growing demand for educated labour can stimulate parents to invest in their child's education. 'To attract foreign investors, the government of Rwanda has strengthened the country's institutional position by implementing new business reform legislation containing arbitration laws and regulations to fight bankruptcy' (KPMG, 2012, p.7). Besides, it has reduced administrative barriers by the establishment of the Rwanda Development Board (RDB). The RDB functions as a 'one-stop' investment services centre where potential investors can get assistance to obtain required approvals, certificates, work permits, tax incentives and land registrations. 'As a result of these reforms, Rwanda recorded a major improvement in *Doing Business*, jumping from the 150<sup>th</sup> to the 58<sup>th</sup> position between 2007 and 2010' (Economisti Associati et al., 2011, p.7).

### **5.3 Hypotheses on household education expenditure**

One can view education conceptually as both consumption and investment. If education expenditure is viewed as consumption, household schooling decisions are determined by interaction of social, cultural and economic factors working through power relations within the household (Al-Samarrai and Peasgood, 1998). According to its socio-economic and demographic position, the household is faced with two constraints: scarcity of (financial) resources and costs of other competing basic needs such as expenditure on food, water, health, clothing and housing. We expect that poor and extreme poor households will have more difficulties in dealing with these constraints and consequently spend less on education per

child than non-poor households. Important confounding factors with a possible (opposite) impact in this matter are family size and family support.

In large families, children have to compete for the limited parental resources and probably not every child can enjoy education. This interaction between sibling size and parental resources - known as resource dilution (Downey, 1995) – results in less money spent for education per child as the sibling size increases. In many African societies, transfers between families and family members are frequent, which could help poor families to increase consumption or to pay for their child's education. Researchers have argued that in sub-Saharan Africa, in particular the extended-family system and the practice of fosterage redistribute resources across families in a way that buffers educational inequality (Lloyd and Blanc, 1996; Akresh, 2005). Therefore we expect that transfers between families could contribute to either higher average expenditure on education (in case of receipts) or lower expenses (in case of donations to others).

Besides financial support from family members or other private persons, several other sources of funding exist in particular for special groups of children in Rwanda. Different Ministries (Ministry of Local Government [MINALOC], Ministry of Education [MINEDUC] and Ministry of Gender and Family Promotion [MIGEPROF]), local and international NGOs, churches, in collaboration or individual, have programs focusing on vulnerable children like orphans, street-children, HIV- infected children, and children from HIV-AID infected parents. This support can include payments of educational costs (World Bank, 2011; Ruberangeyo et al., 2011; Paxton and Mutesi, 2012). For children in high education and from poor families, the Government provides school bursaries in the form of loans that must be partially reimbursed after graduation.

If households consider the decision to send a child to school also as an investment, they take into account the expected future returns. If rates of return to education are high – meaning that education pays off with better opportunities: better paid jobs and more successful private initiatives, - households may choose to invest in education in order to increase the earning capacity and other benefits in the future (Tilak, 2002). The current labour market situation in terms of available jobs that require educated workers is expected to have a positive influence on education expenditure. This will be in particular the case as parents or other household members themselves are already educated and profit from their training. We expect that households with caretakers that have attained upper secondary education will spend more on educating their children, as is found in other studies (Kreft and De Leeuw, 1998; Handa et al., 2004; OECD, 2011).

The kind of relation between children and caretakers could also have an impact on the expected balance between costs and profits of investments in education. This balance between current costs and future returns is probably negative in case of orphans and foster children who are less likely to be enrolled in school than children who live with their biological parents (Bhalotra, 2003; Siaens, Subbarao and Wodon, 2003).

Considering education as an investment could mean that for some families, the opportunity costs of schooling can be high even under a fee-free schooling regime, due to the loss of family earnings from child labour. However, the most important reason why poor children do not enrol in schools is that their parents cannot afford to pay the direct and indirect expenses that school attendance incur (Caillods et al., 2009). The absence of adequate resources hampers learning, and discourages enrolment and continuation to higher grades (Van der Berg, 2008).

The main research hypotheses for this study are based on the assumption that the Rwandan Social Protection policy as part of the poverty reduction strategies, contribute to decreasing extreme poverty and vulnerability. It is expected that self-resilience and livelihood security increases thanks to the existence of programmes such as VUP, OCPF and CBHI that provide for (indirect) food and income support (Sweetman, 2011). A higher social security is expected to contribute to higher investments (expenditure) in education, in other words in the quality of children (Lee, 2004).

The expected contribution of participation in a health insurance programme needs some further motivation. Unexpected health expenses in case of illness of one of its members reduce the available household budget for food, education, farming expenses and others (Wang, Zhang and Hsiao, 2006). We expected that households protected from catastrophic health spending by having a CBHI, are more confident to invest in the education of their children compared to households without this insurance. In addition the chance to seek for medical care doubled when Rwandese had a *Mutuelles* (Lu et al., 2012), which could indicate that having a CBHI contributed to lower indirect costs and reducing the poverty trap of being ill (McIntyre et al., 2006)

The rates of return to education can be analysed from both the demand and supply side of the labour market. For employers, the improvement in education will build a more productive and efficient workforce. For workers, the availability in a district of employment for the better educated is a sign of higher future returns on household education expenditure.<sup>7</sup> Consequently, we expected higher education expenditure with increasing formal sector employment at district level. The effects of employment opportunities in the public and

formal sectors on household' education expenditure is compared to the effect of wage labour in the agricultural sector. Besides, this distinction points at rural-urban differences, because wage labour on farms is predominant in rural districts, while the other two types of employment are mainly established in urban districts.

#### **5.4 Data and methodology**

The IHLCS 2011 conducted by the NISR provides socio-demographic and economic data on the members of 14,308 households. We selected the households that had at least one child fulltime at school during the 12 months preceding the survey as research population (7,230 households).

The dependent variable in our analysis is the Average Household Education Expenditure per Child (AHEEC)<sup>8</sup> which equals the total household education expenditure divided by the number of children at school. The household education expenditure combines school tuition and registration fees, parent contributions, costs for school uniforms, books and other supplies, school transportation, eventual boarding costs and other schooling expenses. We prefer to use the log transformation of the AHEEC instead of its value in Rwandan francs (Rwf)<sup>9</sup> first because its convenience of transforming a highly skewed variable in one that is more approximately normal distributed and second, because it allows us to use the percentage changes in the AHEEC.

To test the hypotheses elaborated on in the previous section, a multilevel model is required. The hypotheses examine the effect of level 2 variables (like the employment opportunities at district level) on the outcome variable (household education expenditure per child) while controlling for other level 1 variables (household characteristics). The logical consequence of this approach is that the variable 'education' measures different things, depending on the level of analysis. If the intra-class correlation is not significantly different from zero, no district differences exist for the variable of interest (Kreft and De Leeuw, 1998).

The chosen predictors of the AHEEC are thus classified at household or at district level. The data for the district level (in total 30 districts) are taken from the Rwanda Education Statistics (GoR, 2012<sup>a</sup>) and the IHLCS3 Thematic Report on Economic Activity (NISR, 2012<sup>b</sup>).

Table 5.2 presents the descriptive statistics of the variables used in the model and the accompanying average education expenditure. The results give a picture of the characteristics

of the sample population. We add a further clarification below for only those variables with a specific classification.

**Table 5.2: Descriptive statistics**

<b>Categorical Variables</b>	Observations N=7,230 (%)	Mean of AHEEC (US\$)	Standard deviation of mean
<b>Occupation of household' head (HH) head</b>			
Farm activities	6,528 (90.3)	8.55	0.63
Non-farm activities	702 (9.7)	34.90	0.84
<b>Family poverty level</b>			
Non poor family	3,540 (48.9)	18.02	0.73
Poor family	1,682 (23.3)	7.00	0.51
Extreme poor family	2,008 (27.8)	4.43	0.49
<b>Number of under school age children</b>			
None	3,052 (42.2)	17.41	0.75
1 Child	2,023 (28.0)	7.64	0.60
2 Children	1,656 (22.9)	5.60	0.52
3 Children	451 (6.2)	5.17	0.47
4 children	47 (0.7)	5.51	0.52
5 Children	1 (0.0)	0.69	
<b>Type of children supported by family</b>			
Son/daughter of HH	6,266 (86.7)	7.57	0.60
Son/daughter of HH and other children	964 (13.3)	52.83	0.73
<b>External intervention in child education</b>			
Family without external intervention	3,650 (50.5)	7.65	0.59
Family with external intervention	3,580 (49.5)	12.70	0.74
<b>Household CBHI Status</b>			
Family without CBHI	1,971 (27.3)	7.06	0.63
Family with CBHI	5,259 (72.7)	11.09	0.69
<b>VUP Public works (VUPPW)</b>			
Family out of VUP Public works	7,136 (98.7)	9.88	0.68
Family into VUP Public works	94 (1.3)	5.23	0.51
<b>VUP direct support (VUPDS)</b>			
Family out of VUPDS	7,179 (99.3)	9.75	0.68
Family into VUPDS	51 (0.7)	7.92	0.63
<b>VUP Financial Services (VUPFS)</b>			
Family out of VUPFS	7,121 (98.5)	9.75	0.68
Family into VUPFS	109 (1.5)	11.19	0.54
<b>One Cow for Poor Family (OCPF)</b>			
Family out of OCPF	6,022 (83.3)	9.86	0.69
Family received a cow	466 (6.4)	10.04	0.65
Family received other animal <sup>14</sup>	742 (10.3)	9.18	0.65
<b>Education level of HH</b>			
HH non-educated or up to 5 primary	4,906 (67.9)	8.11	0.63
HH with primary completed	1,867 (25.8)	11.58	0.68
HH with more than primary school level	457 (6.3)	38.36	0.80
<b>Presence of parents</b>			
Both parents presents	4,980 (68.9)	8.81	0.64
Father only	377 (5.2)	11.85	0.74
Mother only	1,858 (25.7)	12.50	0.75
Double orphans	15 (0.2)	16.63	0.95
<b>Type of school and level of education</b>			
Child at public primary school	3,694 (51.1)	8.18	0.56
Child at private primary school	3,127 (43.3)	7.41	0.63
Child at public secondary school	1,023 (14.2)	49.76	0.57
Child at private secondary school	953 (13.2)	66.97	0.60
Child at public university school	85 (1.2)	270.93	0.52
Child at private university school	58 (0.8)	449.64	0.49

<b>Continuous variables</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean (S.D)</b>
Log (Transfers received)	0	7.40	39.81 (0.68)
<b>School quality at district level</b>			
Class-size in primary	65	114	85 (8.31)
<b>Employment status at district level</b>			
Percentage of wage farm employment	2.7	22.7	10.18 (4.19)
Percentage of public sector employment	3.2	16.8	9.07 (3.01)
Percentage of formal private employment	0.4	18.7	2.64 (3.68)

The family poverty level is calculated on the basis of the household consumption expenditure including purchases, but also consumption from other sources like own production and payments received in kind.<sup>10</sup> This measurement of poverty differs somewhat from the one used for the implementation of the social protection policy that is based on the resource constraints of *Ubudehe* classifications. The mean of the annual AHEEC estimated at US\$4.43 for an extreme poor family can appear to be small, but in reality this amount is very high for a family who is struggling to survive with less than US\$1.25 per day.

We distinguish between households that pay all education costs by themselves and the ones that receive also external funding from relatives outside of the household or from nonrelated persons and institutions. To avoid endogeneity problems in our analysis, we checked whether the received transfers<sup>11</sup> were meant for child's schooling.

For the employment status, we used the percentages of wage workers in the agricultural sector, and percentages of employees in the public and formal private sector.

The multilevel linear model examines separate linear regression models in each district, followed by an examination of the relation between the parameters of the models and district characteristics. Thus, this multilevel regression decomposes the total variances into within-district and between-district components. Following Peugh (2010), the question of whether a multilevel model is needed in our case becomes: 'to what extent is the AHEEC variation present at district level?'. Answering this question involves the calculation of the intra-class correlation (ICC) and of the design effect statistics. Using the AHEEC from the IHLCS dataset, we can reasonably expect the AHEEC to vary across households within a district due to household differences in financial resources and motivation.

## 5.5 Results

Table III presents the estimates of the multilevel linear regression analysis. Model 1 shows only the intercept and model 2 the results of the predictors of the household

expenditure on education on two levels. On district level we dropped the class-size in primary schools and employment opportunities in the public sector. Those variables proved not to be significant. All household characteristics are binary except the transfers received and the number of under school age children which are continuous. The average household education expenditure per child (AHEEC) increases or decreases according to the sign and magnitude of each parameter.

A hypothesis test of random variance is useful to assess the necessity of hierarchically structured data. The results from Model 1 (Table 5.3) shows that the null hypothesis ( $H_0: \sigma_e^2 = 0$ ) is rejected, suggesting that some significant covariance exists among households in districts. With the existence of covariance, applying traditional regression models violates the assumption of independence of observations and increases type I errors (Kreft and De Leeuw, 1998).

**Table 5.3: Estimates for multilevel linear regression of average household education expenditure as a function of household and district characteristics**

Fixed Effect	Model 1		Model 2	
	Estimate	S.E	Estimate	S.E
<b>Intercept</b>	3.80 ***	0.06	3.47 ***	0.06
<b>Household characteristics</b>				
Household' head (HH) in farm activities (Ref. cat.)				
Household' head (HH) in Non-farm activities			0.14 ***	0.02
Number of under school year child			-0.04 ***	0.01
Non-poor family (Ref. cat.)				
Poor family			-0.15 ***	0.01
Extreme poor family			-0.26 ***	0.01
<b>External interventions and social protection programmes</b>				
Log (transfers received)			0.05 ***	0.01
Family without external intervention in education cost (Ref. cat.)				
Family with external intervention in education cost			-0.03 ***	0.01
Family without CBHI (Ref. cat.)				
Family with CBHI			0.04 ***	0.01
Family out of VUPPW (Ref. cat.)				
Family into VUPPW programme			0.09 **	0.04
Family out of VUPDS (Ref. cat.)				
Family into VUP direct support			-0.11 *	0.06
Family out of VUPFS (Ref. cat.)				
Family into VUP financial services			0.05	0.04
HH out of OCPF and without other animal (Ref. cat.)				
HH got one cow from Gov. or NGO			-0.05 ***	0.02
HH got other animal than cow			-0.01	0.02
<b>HH head education level and presence of parents status</b>				
HH non-educated or up to 5 primary (Ref. cat.)				
Household' head with primary completed			0.05 ***	0.01
HH head with more than primary education level			0.16 ***	0.02
Both parents presents (Ref. cat.)				
Double orphan			0.20 *	0.11
Mother only			0.01	0.01
Father only			0.03	0.02
<b>Control variables</b>				

HH supporting their son/daughter only (Ref. cat.)			
HH supporting both sons/daughter and other children	0.52	***	0.02
Child at public primary school (Ref. cat.)			
Child at private primary schools	-0.03	***	0.01
Child at public secondary schools	0.54	***	0.02
Child at private secondary schools	0.70	***	0.02
Child at public university schools	0.64	***	0.05
Child at private university schools	0.75	***	0.06
<b>Employment status at District level (continuous variables in %)</b>			
Percentage of wage farm employments	<b>-0.01</b>	<b>***</b>	<b>0.004</b>
Percentage of Private formal employments	<b>0.02</b>	<b>***</b>	<b>0.005</b>

Random Effect	Variance Component	S.E	Variance component	S.E
Residual within district variance $\sigma_e^2$	0.397	0.007	0.165	0.003
Residual between district variance $\sigma_{u0}^2$	0.088	0.023	0.053	0.019
Variance of wage farm employment $\sigma_{u2}^2$			0.000	0.000
$\sigma_{u0j}$			-0.004	0.002
Deviance	13,963.8		7,587.6	
Number of parameters	2		18	

Model 1= model with intercept only, Model 2= model with household and district characteristics, \*\*\* Significance at 1%, \*\*Significance level at 5%, \*Significance at 10%, S.E: Std error.

The intercept only or unconditional model, estimates the intercept as 3.80 (US\$10.44), which is the average of education expenditure per child across all households and districts. The between-district variance symbolized by  $\sigma_{u0}^2$ , is estimated as 0.088,  $p < 0.001$ . The within-district variance symbolized by  $\sigma_e^2$ , is estimated as 0.397,  $p < 0.001$ . Following Hox (2010), the intra-class correlation (ICC), calculated by  $\rho = \sigma_{u0}^2 / (\sigma_e^2 + \sigma_{u0}^2)$ , is 0.18. Thus, 18 per cent of the variance of the AHEEC occurred across districts, which is high. Since the intercept-only model contains no explanatory variables, the residual variances represent unexplained error variance. The intra-class correlation measures the degree of similarity within the same district (Muthén and Satorra, 1995). Given the results in our model, the ICC indicates the need for a multilevel approach for the chosen dependent variable.

The covariance between the regression coefficient for household characteristics and the intercept is very small ( $\sigma_{u0j} = -0.004$ ) and obviously not significant. The deviance in Table III is a measure of model fit. When we add predictor variables, the deviance is expected to go down (Hox, 2010) which is the case in model 2. The deviance drops from 13,963.8 in the unconditional model to 7,587.6 in the model with household and district predictors of household education expenditure. Compared to model 1, model 2 shows a better fit: having  $(D_1 - D_2) = 6,376.2$  with  $(m_2 - m_1) = 16$  degrees of freedom and a P-value below 0.001.<sup>12</sup>

Testing the hypotheses on household education expenditure we see in the model, that families increase their education expenditure by 0.5 per cent (US\$0.55)<sup>13</sup> when they receive 1

per cent more transfers or increase them by 4.2 per cent (US\$0.49) when they have a health insurance. The families are forced to reduce the expenditure in education by 4.3 per cent (US\$0.46) for each additional under school age child; by 15.3 per cent (US\$1.43) when they are poor, by 26.1 per cent (US\$2.18) when they are extreme poor, and remarkably by 5.2 per cent (US\$0.54) when they profit from the one cow per family program. The household education expenditure increases by 9.1 per cent (US\$1.11) for families involved in employment schemes (VUP public works) but decrease by 10.8 per cent (US\$1.06) when the family receives direct financial support.

When other factors are controlled for, on average, household with a head in non-farm activities invests 14.3 per cent (US\$1.88) more in education of the children compared to the ones whose household heads are involved in farm activities. The more educated the household head, the higher the investments in children's education. The proportion of investment in education of the two distinguished groups is respectively 5.2 per cent (US\$0.61) and 16.3 per cent (US\$2.20) higher compared to investments of a household' head without a completed primary education.

As expected, the expenditure increases substantially when a child in the household proceeds to higher education levels. Also the differences in costs between public and private schools shows up in the expenditure made. Finally the results indicate that (the few) double orphans in the sample still profited from special support given to this group.

Model 2 includes also the employment sector composition at district level. The increase of wage farm workers in a district by one unit decreases the household education investment per child by 1.1 per cent (US\$0.12), while an increase of formal sector employees in a district by one unit, increased the household education investment by 2.3 per cent (US\$0.26).

## **5.6 Discussion**

After the reconstruction period in the late 1990s, Rwanda has been on a positive development trajectory ever since. With assistance of its donors, the Government of Rwanda implemented various development policies amongst others to improve the health and education level of the population and to reduce poverty. According to Malmberg (2008), efficient policies that promote health, increases in education and improvements in infrastructure can be pivotal for a shift towards more favourable demographic trends.

The achievements are positive: almost all children regardless of gender enrol in primary education and the last two Demographic and Health Surveys showed decreasing mortality levels and a fast increasing number of women using modern contraceptives. Regarding the transition from primary to lower secondary level, Rwanda is one of the few Sub-Saharan countries that managed to boost the number of lower secondary students by 25 per cent within a year by the introduction of a Nine Year Basic Education (9YBE) cycle and the elimination of fees for lower secondary school in 2009 (Unesco, 2012<sup>b</sup>).

To achieve the Millennium Development Goal number 2, universal completion of primary education, further policy steps had to be taken after the introduction of free education in 2003. In this contribution we analysed the impact of special programmes for enhancing the ‘social protection’ of very poor families on the investments of these households in the quality of their children, notably by sending them to school.

Applying a multilevel linear regression method on a dataset of households of the 2011 household survey showed the impact of some direct poverty reduction measures on family education expenditure. The impact of poverty on household education investments is illustrated by the large gap between the education expenditure of the poor and of the extreme poor compared to that of non-poor families. Poor people may consider education as a positive investment but the costs are still too high even within a fee-free education context. Our results are quite similar to the conclusion of others (Glewwe and Jacoby, 2004; Megumi, 2010; Quang, 2012; Ulusoy and Yolcu, 2013) that there is a positive and significant relationship between changes in wealth and an increase in educational expenditure.

Our results also show that access to basic health services and access to waged work in employment schemes are related to a modest increase of household education expenditure. In contrast, getting direct financial support or an animal for free is negatively related to the education expenses made by the households involved. Given the methodology adopted one should be careful in interpreting these outcomes as cause and effect and it is too early to tell whether the various policies are indeed effective or detrimental. Yet most of the coefficients seem plausible in the light of other evidence.

The health insurance coverage was added in the model because empirical evidence shows that CBHI not only has a strong impact on access to health care, but is also associated with a higher degree of financial risk protection (Saksena et al., 2011). The stratified system for annual premiums according to the *Ubudehe* poverty classification has provided equal access to health facilities and hence, decreased the utilization gap between poor and wealthier families. Lower incidence of catastrophic income shocks due to illness and related health care

expenditures are associated with a significant increase of household budget available for food, asset accumulation and education expenditures. This might account for the positive relation between CBHI participation and the education expenditures of households.

The same line of reasoning can be applied to the positive sign of the employment schemes. According to Siegel et al. (2011), public works can reduce vulnerability, build resilience and increase incomes and food security in a virtuous cycle that links social protection with disaster risk reduction/food security (anti-erosive ditches, radical terraces and valley dams) and climate change.

Access to waged work provided in public employment schemes gives a regular income every two weeks. Since all VUP beneficiaries have their own bank accounts, they can benefit from a range of financial and insurance services, including savings (which are voluntary but highly encouraged) and access to subsidized credit. Savings are used for basic consumption needs, health insurance, school fees and investments in small livestock which are also a form of 'self-insurance' against negative impacts of different hazards (Kindness, 2011). Again, more secure household budgets will allow for more investment in schooling.

Public works programmes (VUPPW) have a double dividend because they create off-farm employment. In a country like Rwanda where almost 90% of active working population is employed in agriculture and the median land size per household is less than one hectare, non-agricultural employment opportunities like VUPPW seem to provide an alternative to on-farm labour. If education expenditure is viewed as consumption, the non-agricultural employment opportunities form an important part of household income diversification and risk reduction strategies (see also Ellis and Freeman, 2004). For rural landless and near-landless households income flows are fluctuating and unpredictable in particular as almost all farming is rain-fed. Most of those households will/depend heavily on non-agricultural income sources (Madaki and Adefila, 2014).

It is plausible that reducing risks of income shocks by a health insurance (Binagwaho et al., 2012) or access to regular paid work and credit make parents more confident to spend money on the education of their children.

That still leaves us with the question why direct financial support has a negative rather than a positive effect on education expenditure. This is in line with the findings of Devereux (2011) that poverty reduction strategies like the VUP programmes have short-run effects and a limited multiplier effect for the beneficiaries. Households that receive direct financial support have no land or less than 0.25 hectare and their members are unable to work because of age, disability or illness. For this type of household, expenditure for basic needs such as

food, cloths, housing, have a higher priority than expenditure on education. Devereux (2011) states that transfers might be too small, have a limited duration, or are given erratically. Under those conditions, households can meet their immediate needs but are not able to improve their livelihood activities in a sustainable way, neither will they develop confidence that their income is stable or will increase in the future. Consequently, conditions that are expected to foster education expenditures are not met.

The negative effect of the one cow policy on household education expenditure is more difficult to read. Households that qualify for this program must have access to 0.75 hectare of land, of which a third is pasture, and also must have or construct a cowshed. The negative score on education expenditure of these households probably points to extra costs that getting a cow may imply, such as purchase of fodder and veterinary care. In case the produced milk is consumed by household members and not sold, the objectives of the *GIRINKA* programme can be met only partly. It will take time before the household can make extra money out of cattle ownership. Allocating land to fodder production can also be an impossible option as it could compromise the own food production. Fodder availability differs strongly among participating farmers due to differences in available land size and its productivity (Bucagu, 2013) and collecting sufficient fodder for free in densely populated areas is not always an option. Evaluations of the one cow per family policy showed that it can contribute to poverty alleviation (Rutareka, 2011), but it does not lead to more household investments in education as our analysis indicates.

The hypothesis of resources dilution is confirmed by a decrease of household education expenditure per child for each addition of an under school age child in a household. The effect of this dilution can materialize as a dropout of an older sibling, but also by a reduction of expenses on school items or by a change of type of school attended. In a situation with limited resources, the presence of young siblings could push their older brothers out of school to assist in the family's economic activities, and push older sisters out of school to perform domestic chores at home (Greenspan, 1992). In Rwanda, both mechanisms seem to occur. By combining gender and the parental co-residence status, Nkurunziza et al. (2014) found that girls without a mother and boys without a father had higher chances of dropping out. As we analysed the average expenditure on education per child in the household (total expenditure divided by number of school-aged children) we were unable to see whether households spent more on their sons than on their daughters. In the African context, the dilution of parental resources is less problematic as the extended family system and the practice of fosterage redistribute resources among family members and buffer educational

inequality (Akresh, 2005). Yet, one should be aware that many (very) poor people also have (very) poor siblings and our analyses show that many children are left without extended family support.

Our analysis confirmed that the education level of caretakers positively affects the education expenditure. The willingness to allocate resources for the education of their children is also stronger among parents that work outside the agricultural sector. Together these findings support the hypothesis that the household invest more in education when it expects and is familiar with possible future returns. This is in line with the conclusion of Quang (2012) in Vietnam that households where the household heads have a higher level of education or with professional jobs, enhances the probabilities of educational expenditure.

Not surprisingly, the availability of formal employments in the district pushes the household to invest more in the education of children. If education expenditure is viewed as investment, households take into account the expected future returns. In line with the results of Wiggins and Hazell (2011), who show that unskilled labour like construction, pottering, agriculture and many personal services, provide low returns while skilled labour such as medicine, teaching, accounting and administration give high-returns activities, we conclude that the presence of non-agricultural job opportunities foster educational expenses.

## **5.7 Conclusion**

The Rwanda Vision 2020 targeted a creation of 3.2 million off-farm jobs for the year 2020. While state and donor funds must contribute to this aim, the backbone of the process should be the investments of a growing middle class of Rwandan entrepreneurs. In addition to its success to attract foreign direct investment, the Rwandan government launched in 2012 a *HANGA UMURIMO*<sup>14</sup> Program (HUP) with a purpose to nurture an entrepreneurial culture among Rwandans and foster the emergence and growth of a locally based business class (GoR, 2012<sup>b</sup>). More attention is also given to Technical and Vocational Education and Training (TVET) policy geared to provide the economy with qualified and competitive workers needed to achieve the targets formulated in the Rwandan Vision 2020 (GoR, 2008).

McCord (2013) argues that the attempt to reconcile many policy objectives is likely to result in sub-optimal performance in each, making policies ineffective in the long run. This raises the question whether Rwanda should continue to apply social protection policies, or aim exclusively for the growth of non-agricultural employment.

In the light of our findings, transforming the economy and extending employment in non-agriculture will certainly help parents to diversify their strategies to meet their numerous needs and would also convince them of the future returns of education investments. Yet the price of increased inequality could be high. We have shown that poverty alleviation instruments which help to reduce the vulnerability of extreme poor households, in establishing subsistence security and protection against financial shocks should continue as well if one would want to provide more equal access to a proper education. Combined with a further reduction of the fertility rate the social protection policies could help poor households to invest more in the education of the children in the short run, hoping that they too will benefit from a further diversification of the national economy in the longer run.

## NOTES

1. The IHLCS surveys are designed to monitor poverty and living conditions in Rwanda as part of the ongoing monitoring of the Poverty Reduction Strategy and other Government policies. The Rwandan IHLCS is a nationally representative household survey and is carried out once every five years. IHLCS1 was carried out in 2000/2001 (6,420 households) and was repeated with slight modifications in 2005/2006 (6,900 households) and in 2011 (14,308 households).
2. **Non standard abbreviations:** PRSP: Poverty Reduction Strategies Programme; EDPRS: Economic Development and Poverty Reduction Strategies; VUP: Vision 2020 *Umurenge* Programme; CBHI: Community Based Health Insurance; OCPF: One Cow per Poor Family; SP: Social Protection policy; GoR: Government of Rwanda; PTS: Parents-Teachers Committee; OVC: Orphans and other Vulnerable Children; 9YBE: Nine Years Basic Education; FTI: First Tract Initiative; HH: Household Head; VUPDS: VUP Direct Supports; VUPPW: VUP Public Works; VUPFS: VUP Financial Services; AHEEC: Average Household Education Expenditure per Child; NISR: National Institute of Statistics of Rwanda; Rwf: Rwandan Francs; ICC: Intra-class Correlation.
3. In their villages, people are empowered to discuss the characteristics of poverty and their role in poverty reduction. This process was named *Ubudehe* by reference to the Rwandan culture of mutual assistance and conviviality whereby people would come together to address problems facing them so as to work for their development. In a remote past, Rwandan people resorted to *Ubudehe* mainly in agricultural and house building activities. (Rwanda Governance Board (RGB). Retrieved from <http://www.rgb.rw/ru/main-menu/innovation/ubudehe.html>)
4. The *Ubudehe* classification has 6 categories where the first are the extreme poor families, 2<sup>nd</sup> are the very poor families, the 3<sup>rd</sup> are the poor families, the 4<sup>th</sup> are the resourceful poor families, the 5<sup>th</sup> are the food rich families and 6<sup>th</sup> are the money rich families.
5. Under the new CBHI policy, individuals from the poorest two categories pay the annual contribution of Rwf 2,000 (US\$3.31) and that contribution is paid for by Government and its partners, individuals in category 3 and 4 pay Rwf 3,000 (US\$4.97) per year and members of the richest two latest categories pay Rwf 7,000 (US\$11.59).
6. In addition to CBHI, the the Rwandaise d'assurance maladie (RAMA), currently known as Rwanda Social Security Board (RSSB), the Military Medical Insurance (MMI) are also the other large public health insurance schemes (Saksena et al., 2011). The benefit package of these schemes is generally considered to be superior to the CBHI. CBHI remains the most prominent and diversified scheme in terms of population coverage.
7. Internationally, one additional year of education adds approximately 10% to a person's wage, at the mean of the distribution (Psacharopoulos and Patrinos, 2004).
8. We avoid to use the total household education expenditure because this will vary by the number of children at school, the level of education attended and the type of school frequented by the child.
9. The exchange rate USD to Rwandan francs was estimated to 1USD=604.14 Rwf in December 2011.
10. Given the prices in January 2001, the poverty line was set at RWF 64,000 (US\$120) per adult per year, and an extreme poverty line was RWF 45,000 (US\$85) per adult per year. In 2001 prices, these

lines correspond to Rwf 118,000 (US\$221) and Rwf 83,000 (US\$156), respectively in 2010 (NISR, 2012<sup>a</sup>).

11. Transfers received are remittances from family members or non-related persons residing out of the household.
12. Suppose that two models ( $M_1$ ,  $M_2$ ) have deviances by  $D_1$  et  $D_2$ , with  $m_1$  and  $m_2$  parameters. The difference of the deviance ( $D_1 - D_2$ ) can be used as a test statistic having a chi-squared distribution with  $(m_2 - m_1)$  degrees of freedom (Cho, 2003).
13. The absolute numbers in US dollars presented here are provided by ten power of the logarithm values of AHEEC giving its value in Rwandan francs multiplied by an exchange rate and finally the absolute numbers are the values for the categories that deviate from the intercept' value of US\$4.83.
14. '*HANGA UMURIMO*' is a Kinyarwanda word which means '*Creation of Employment*' in entrepreneurship perspective.

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## **6 Rural development policies and investment in primary education: farmers in Rwanda**

Manuscript submitted

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*'Education is not a way to escape poverty - It is a way of fighting it.'* Julius Nyerere, first President of Tanzania 1964-1985

### **Abstract**

Rwanda should be aware that education for all will only contribute to development if enabling environments that provide a possible return on education investments are created. This article evaluates the contribution of rural development policies on primary education expenditure by farmers, taking into account labour market conditions. The results indicate that land use consolidation and associated policies for breaking the poverty cycle of farmers add to willingness of families to invest in their children's education. The strong linkages of farmer's investment in child education to the availability of formal employment in the district send a clear message that the sustainability of the current achievements in education will depend on employment expansion as projected in Development Policy Papers.

### **Keywords**

land use consolidation, primary education, poverty, farmers, Rwanda.

## 6.1 Introduction

Education is not only known as a right but also as a pathway for development (King *et al.*, 2007). Thanks to international commitment and agreements, many poor countries have been encouraged to focus on education for all (EFA) goals. This focus has already resulted in the largest cohorts of young school leavers ever recorded in some countries. Yet, this achievement has generated an intense debate about ‘Education for what?’ If there is no change in employment opportunities, will families still invest in their younger children when the education investments of this last decade have not lead to improved economic outcomes for the older ones? (King, 2009).

This study enters the debate on the basis of a major policy shift in Rwanda. The country can claim considerable achievements in universal enrolment and gender equality and will be one of the very few countries in Africa that will have reached almost all the Millennium Development Goals (MDG) by 2015 (Michel, 2013). However, almost 90% of Rwanda’s active working population is employed in agriculture and this sector still represents about 45% of its GDP. It is in rural rather than urban areas that poverty is most prominent and severe (Ansoms, 2008). The dependence on subsistence farming creates a huge challenge to provide jobs for the thousands of young people who have been persuaded to enter and complete nine years of basic education. To address this challenge, the Rwandan government (GoR) now strives to increase economic opportunities for the rural poor and to raise their incomes through Land Use Consolidation (LUC) and its attached Crop Intensification Programmes (CIP).

The effects of these rural poverty reduction strategies can influence farmers’ decisions to invest in educating their children in several ways. More secure household budgets will allow for more investment in schooling. Besides, education will help the children who choose to remain in farm activities, to acquire technical skills for more productive farming practices like mechanization and intensification. In the somewhat longer run educating farmers’ children will facilitate their intake into non-farm employment (Reardon *et al.*, 2001), thus reducing the conflicting interests in land between family members.

This study analysis to what extent Land Use Consolidation - Crop Intensification Programmes (LUC-CI Programmes) have an impact on farmer’s expenditure on education. Effects at two levels are expected. Firstly, those farmers who are directly involved in the LUC-CI programmes are expected to spend more on education. Secondly, farmers that live in

districts with a higher percentage of land under LUC-CI Programmes and consequently with more economic activities and services linked to the CI Programme, might be more confident about future job opportunities and therefore also invest more in their children's education. To address these questions multilevel regression and propensity score matching methods are applied on a dataset of 5,800 farmers with at least one child enrolled in primary school. The data are taken from the 2011 Integrated Household Living Conditions Survey conducted by the National Institute of Statistics for Rwanda (NISR) and district data are taken from other secondary sources.

## **6.2 Agrarian reform in the Vision 2020 strategy**

The government of Rwanda pursues a development road formulated in its strategic policy plan Vision 2020 to achieve the MDGs and other economic objectives. According to this strategic plan Rwanda heads to become a middle income economy in which its population is healthier (increase of the average life expectancy to 55 years), more educated and generally more prosperous (poverty level decrease to 30% and a per capita income increase to 900 US\$) by the year 2020 (GoR, 2003<sup>a</sup>). To achieve those goals various policies are already formulated and implemented since the start of the new millennium. The Rwandan population got access to health care through the establishment of community health centres and a community-based health insurance system (Saksena *et al.* 2011, Lu *et al.*, 2012). Schooling of youngsters was encouraged by abandoning school fees for 9-years of basic-education (Unesco, 2012) and three different programmes (one cow per poor family, direct financial support and public works) geared to strengthen the social security of the very poor contributed to poverty reduction among the most vulnerable groups in the society (Nkurunziza *et al.*, 2014). Seen the importance of the agricultural sector for the country's economy, also for this sector development strategies were unfolded.

Bizoza and Havugimana (2013) estimated that in average, the agricultural land size per household is less than 0.5ha, which, according to the Government (GoR, 2004), is below the size of an economically viable farm. Policies aiming at the improvement of land use and of land management are therefore regarded key to reduce poverty among the many Rwandan small-holders (Bizoza and Havugimana, 2013). In the emergency situation created by the massive return of refugees after the 1994 genocide, regrouping human settlement (locally known as *Imidugudu*) represented a first solution to population pressure on land and to poor

land management (Van Leeuwen, 2001; GoR, 2009; Dawson, 2013). According to the Government (GoR, 2009, p.13), ‘this type of settlement should in the long run become the dominant mode of settlement and development of the national territory’.

In 2008 the Rwandan government adopted a new policy for the agricultural sector that strives for productivity increase for both food and cash crops through LUC-CI Programmes characterised by mono-cropping and regional specialisation (Ansoms *et al.* 2010; Alinda and Abbott, 2012). The rising expenditure for the agricultural sector - from 4.2% in 2008 to 10% of the total government budget in 2011 (Ali *et al.*, 2012), reflects its priority status within the government policy. This 10% of the total budget allocated to agriculture should be sufficient to achieve an annual growth of 6% in agricultural gross domestic product (GDP) and a reduction of the poverty rate by 25% points over the 1999 rate (Diao *et al.*, 2010).

LUC-CI programmes allow the participating farmers to benefit from many services such as: field demonstrations, post-harvest handling and storage facilities, application of irrigation and mechanization, delivery of seeds and fertilizers, marketing of crops, access to loans and other financial facilities (Kathiresan, 2011; Ekise *et al.*, 2013, Bizoza and Havugimana, 2013; Mbonigaba and Dusengemungu, 2013; Kiptot *et al.*, 2013). Farmers also benefit from membership of agricultural cooperatives that provide financial, commercial and psychological-social support (Willoughby and Forsythe, 2011).

LUC-CI Programmes have been adopted with more success in the Eastern Province compared to the rest of the Rwanda. Consolidation programs in valleys involving maize and rice production appear to be more successful (Musahara *et al.*, 2013) than consolidation on farms with hillside land, where radical terracing has to be done before the implementation of LUC-CI Programmes can start. The cultivation area under LUC-CI Programmes has increased from 28,788 hectares in 2007 to 254,000 hectares in 2010 (Kathiresan, 2011), of which only 10,000 hectares on hillsides and 6,000 hectares of marshlands have been sustainably developed (WB, 2012).

The World Bank (2012) reported that in Rwanda food security was attained in 2010, and poverty was reduced by about 14% between 2000/01 and 2010/11. The poverty reduction can be attributed partly to improved agriculture production, increased numbers of agribusinesses and increased farm wages. Since 2001, maize yields have improved from 1.6 to nearly 5 tons/hectare; rice yields from 3 to 6.3 tons/hectare; and potato yields from 17 to nearly 20 tons/hectare.

The Rwanda Vision 2020 targeted a creation of 3.2 million off-farm jobs for the year 2020. While state and donor funds must contribute to this aim, the backbone of the process

should be the investments of a growing middle class of Rwandan entrepreneurs. In addition to its success to attract foreign direct investment, the Rwandan government launched in 2012 a *HANGA UMURIMO*<sup>1</sup> Program (HUP) with a purpose to nurture an entrepreneurial culture among Rwandans and foster the emergence and growth of a local based business class (GoR, 2012<sup>a</sup>). More attention is also given to Technical and Vocational Education and Training (TVET) policy geared to provide the economy with qualified and competitive workers needed to achieve the targets formulated in the Rwandan Vision 2020 (GoR, 2008).

The issue of land reform and LUC-CI Programmes in Rwanda is debated, more recently also in relation to the new theme of land grabbing (Higgins, 2012; Musahara *et al.*, 2013). Part of the authors writing on land reform and LUC-CI Programmes in Rwanda contested the expected beneficial effects of consolidation on land use, because it could have a negative impact on farmers' well-being; could lead to future land conflicts, or could enlarge inequity in the Rwandan (rural) society (for instance Blarel *et al.* 1992; Pottier, 2006; Ansoms, 2008). Other authors support the positive effect of land use consolidation on agricultural productivity and evaluated it as conditional to some other interventions in the agricultural sector. They point at positive experiences in other countries or at the evaluation of the implementation of LUC-CI Programmes in certain Rwandan regions (see a.o. Kathiresan, 2011; Bizoza and Havugimana, 2013; Bizoza and Byishimo, 2013; Ekise *et al.*, 2013). The two viewpoints differ in the type of reasoning. The pessimistic views assess the impact of land consolidation mostly by theoretical argumentation; the optimistic views assess the impact of LUC by empirical analyses done in many places over the world as well in Rwanda and by taking also into account results of other incentives provided under strategic plans for agricultural modernization. This contribution does not aim at an evaluation of the LUC-CI Programmes policy as such. The focus of this study is on the effect of LUC-CI Programmes on farmers' investments in education of their children.

### **6.3 Hypotheses**

The willingness of parents to invest in education of the children depends on many factors. An important contextual constraint in developing countries is the lack of demand for (skilled) labour in local, regional and national labour markets (Buchman, 2000; Colclough *et al.*, 2000; Ersado, 2005), which causes a low expectation about future returns of education investments among parents. As access to land is problematic in Rwanda, an increase in availability of opportunities for wage labour could convince farmers to invest more in education of children

to enlarge their chances on the labour market. The implementation of LUC-CI Programmes could theoretically facilitate a growth of waged labour. It is expected that the agricultural production shall increase, which should have effects on other sectors in the rural economy through forward and backward linkages with enterprises geared to input (seeds, fertilizer, equipment) and service delivery and with enterprises for processing, storage and transport of produce (Irz *et al.*, 2001). This could lead to more available jobs. Mellor and Karas (2002) estimated that an achievable rate of agricultural growth of somewhat over 5 percent per year will increase employment growth considerably faster than population growth.

Even subsistence farmers are expected to benefit from intensification of agriculture through job opportunities created on other farms and in enterprises such as collection centres, packing houses, and processing units. Such off-farm employment provides a way to diversify income resources of a farmer's household, which can give individuals and households more capabilities to improve their livelihood security and to raise their living standards (Ellis, 1998; Cypher and Dietz, 2009). Furthermore, plot consolidation reduces income inequalities between rural households (Kimhi, 2009). At the same time it creates new risks for participating farmers: they become more vulnerable for fluctuations in prices for inputs, and in market prices for their produce. In addition they have to leave their traditional production pattern geared to spreading risks by multi-cropping and diversification of crops. Developing strong farmers' co-operatives could reduce those risks. Membership of a co-operative not only facilitates the adoption of modern inputs, increased intensification and commercialization of farm produce, but also higher revenues and farm income by collective trade actions (Herhofstadt and Maestens, 2013).

If LUC-CI Programmes contribute to higher productivity and additional regional employment this policy shall have a positive effect on the demand for labour and expectations of parents on future returns of education. This study will test the hypotheses that (1) the more district land is under LUC-CI Programmes, the higher the investments of farmers are in primary education, and (2) that farmers who adopted new crops invest more in education than farmers who did not.

In choosing to send their children to school, rural parents also consider – next to labour market conditions - a trade-off between the household's current income and current consumption situation (Efanga and Nwokomah, 2013). In Sub-Saharan Africa, small landholders are poor and have to deal with various types of insecurity. Almost all farming is rain-fed, which means that production fluctuates widely over the years and between seasons, which makes income flows uneven and unpredictable (Watkins *et al.*, 2001). In particular

farmers with small lots face budget insecurity. Vulnerability to ill health is an additional insecurity for poor people (Hulme and Shepherd, 2003). Illness can mean a potential loss of income for self-employed people and extra expenditures for health care and medicines. There are examples of parents who even indicated that education charges frequently force them to make impossible choices, such as whether to buy basic medicines or keep their children in school (Watkins *et al.*, 2001). Without insurance against unexpected health expenditures for household members, investment in education by poor farmers is expected to be more unlikely.

Various paths can be followed by farmers to protect the family against subsistence insecurity and income drops. Besides the already mentioned risk spreading through diversification of income sources or within the production system, they create savings and store produce to protect themselves from future shocks of bad harvests. In an emergency situation, they will first of all rely on their own assets. Livestock for instance, is considered as a crucial asset and a safety net for unexpected or necessary expenditures. Livestock (milk, calves) acts as liquid asset buffer against shocks (Ellis, 1998; Hulme and Shepherd, 2003; Randolph *et al.*, 2007; Herrero *et al.*, 2013), but also provides income to cover extra expenses for instance for the purchase of expensive school uniforms or school books. In addition, households also maintain their social networks (social capital) as an option for help to cover incidental or unexpected expenditures (Ellis, 2000). In many African societies, frequent transfers between family members help poor families to increase consumption or to pay for their child's education (Lloyd and Blanc, 1996; Akresh, 2005; Lu, 2009). Finally, they can make an appeal for support or subsidies from ministries, churches and NGOs, which include payments of educational costs for special vulnerable groups of children in Rwanda (Nkurunziza *et al.*, 2014). For this study it is expected that having more land, keeping livestock, having a health insurance and receiving external support, leads to higher livelihood security and as a result to a higher propensity to invest in children's education.

In situations of population pressure on resources, the impact of resource dilution is potentially immense for farmer households: each extra (under) school age child could have a pronounced negative influence on the average education expenditure per child in a family (Downey, 1995; Lu, 2009). Consequently the investment in education will decrease with the number of other (school) children in the family.

Educated parents will assess the returns of education against their own attained labour position. Parents who have not been to school themselves have less commitment to their child's desire to be in school (Lay, 2012; Williams, 2013), and have less time to assess how their children are doing in school due to their struggle to make ends meet (GoR, 2003<sup>b</sup>).

Finally, another constraint on investment in education is the quality of schools. Bad schools without sufficient equipment and with overcrowded classes do not contribute to convincing poor parents that spending their meagre resources on such sub-standard education shall pay off (Watkins *et al.*, 2001). Serious quality problems still exist in the contemporary Rwandan educational system due to its rapid quantitative expansion and inability to uphold quality characteristics (Knutsson, 2012). It is expected that more educated household heads invest more in education compared to the less educated ones, and that a lack of quality of schools in the district will hamper education investments by parents. The next section presents the data and the methodology used to tease out the effect of each covariate on investment by farmer families in their children's education.

#### **6.4 Data and methodology**

The 2011 Integrated Household Living Conditions Survey conducted by the NISR provides socio-demographic and economic data on 68,398 households members from 14,308 households<sup>2</sup>. The households selected for this study are the 5,800 farmers who have at least one child fulltime enrolled in primary school during the 12 months preceding the survey. The data at district level (30 districts in total) are taken from the Rwanda Education Statistics (GoR, 2012<sup>b</sup>), the EICV3 Thematic Report on Economic Activity (NISR, 2012<sup>a</sup>) and from the EICV3 Thematic report on Agriculture (NISR, 2012<sup>b</sup>).

The dependent variable in the analysis is the average Farmer's Primary Education Expenditure per Child (FPEEC) which is the total farmer education expenditure (direct and indirect costs) divided by the number children in primary school. The education expenditure includes tuition and registration fees (if any), contribution to parent's associations, costs for school uniforms, books and other supplies, transportation costs, and boarding costs. The log transformation of the FPEEC is used instead of its value in Rwandan francs (Rwf), to reduce the skewedness of the variable and because the log value allows the interpretation of the coefficient as an elasticity; representing the percentage change in the dependent variable when the independent variable increases by one unit.

The predictors concern household and district variables. The proportion of formal private sector employment (varying from 0.0 to 0.19), the proportion of land consolidation (min=0.01 and max=0.43) in 2010, and the proportion of qualified teachers (min=0.62 and max=1) are used as education enabling variables at district level. At household level seven

categorical and three continuous variables are chosen for the analysis. Table 6.1 presents the descriptive statistics.

**Table 6.1: Descriptive statistics**

Categorical variables	Observations N=5,800 (%)	Mean of FPEEC (in log.)	S.D of mean
Household level			
Farmer poverty level			
Extreme poor farmer	1,829 (31.5)	3.28	0.42
Poor farmer	1,485 (25.6)	3.42	0.38
Non poor farmer	2,486 (42.9)	3.53	0.38
Farmer land size and its status in adoption of new crop due to crop regionalisation			
Farmer with <0.3ha and no adoption of new crops	1,257 (21.7)	3.36	0.47
Farmer with <0.3ha and adoption of new crops	246 (4.2)	3.34	0.38
Farmer with 0.3ha up to <1ha and no adoption of new crops	1,798 (31.0)	3.40	0.39
Farmer with 0.3ha up to <1ha and adoption of new crops	486 (8.4)	3.44	0.33
Farmer with more 1ha and no adoption of new crops	1,378 (23.8)	3.48	0.36
Farmer with more 1ha and adoption of new crops	635 (10.9)	3.49	0.39
Status of raising livestock in farmer			
Farmer without livestock	1,508 (26.0)	3.37	0.48
Farmer with livestock	4,292 (74.0)	3.44	0.37
Household residence areas			
Farmer in Urban area	411 (7.1)	3.51	0.54
Farmer in Rural area	5,389 (92.9)	3.42	0.39
Farmer' health insurance status			
Farmer without health insurance	1,640 (28.3)	3.37	0.41
Farmer with CBHI and other type of health insurance	4,160 (71.7)	3.44	0.40
Status of external support for child' education			
Parent only	3,026 (52.2)	3.42	0.38
Parent and external intervention	2,774 (47.8)	3.43	0.43
Farmer head' education level			
No education and up to 5 primary	4,084 (70.4)	3.40	0.40
Primary completed	1,459 (25.2)	3.46	0.40
More than primary level	257 (4.4)	3.56	0.43
Continuous variables at household level			
Household level	Minimum	Maximum	Mean (S.D)
Number of older sibling at other education level	0	5	0.26 (0.63)
Number of under school age sibling	0	5	1.05 (0.98)
Log of transfers received	0	6,85	4.56 (0.64)
District level			
	Minimum	Maximum	Mean (S.D)
Proportion of formal private employment	0.00	0.19	0.02 (0.02)
Proportion of land consolidation	0.01	0.43	0.13 (0.11)
Proportion of qualified primary teachers	0.62	1	0.91 (0.09)

The variables land size and participation in LUC- CI Programmes are combined in one variable. According to NISR (2012<sup>c</sup>), less than 0.3 hectare is judged as insufficient to meet the

needs of any farmer household. This variable is a proxy for vulnerability based on land size. The family poverty level is calculated on the basis of the household consumption expenditures including purchases, but also on consumption from other sources like own production and – gifts or subsidies received in kind. Households that consume less than Rwf 118,000 (US\$ 195.3) per adult equivalent and per year (NISR, 2012<sup>c</sup>) are classified as poor. For the health insurance status, two categories are distinguished: having insurance or not. From the households in the sample that have a health insurance, 98% is insured through the Community Based Insurance System<sup>3</sup>.

As hierarchical variables (district and household variables) are used in the analysis, multilevel regression modelling is applied instead of an ordinary least-squares regression to avoid deflated standard errors (Ansoms *et al.*, 2010). From a substantive point of view multilevel models allow testing hypotheses on the effect of higher level (contextual) variables on individual decision making, like the hypothesized effect of a large district proportion of land in LUC-CI programmes on the investment in education, also among those that do not participate in the programmes.

In analysing the effect of participation in the programme at individual level using the multilevel model other methodological issues need to be dealt with. If farmers would have the choice to enter the program the resulting effect on expenditure could be endogenous. They might decide on both choices at the same time. Yet the LUC-CI program is not something a farmer can select or refuse. Decision making is at a higher level of the district and the community. The participation can be considered as a natural experiment in which some are ‘treated’ and others are the control group. But even then selection does occur and there is no randomisation.

Propensity Score Matching (PSM) is one of the methods to reduce this bias. The PSM determines if the investments in child education (outcome) between farmers participating in LUC-CI Programmes (treated subjects) and those who do not (control subjects), are statistically different by using treated and control subjects who are as similar as possible.

The dependent variable in the PSM is whether or not the farmer participated in LUC-CI Programmes. This involves matching participating farmers (1,470 farmers=25.3%) with non-participating farmers (control group of 4,330 farmers=74.7%) and the outcome is the average farmer’ investment in child education. To reduce potential bias and identify the impact of participating into LUC-CI Programmes on farmer’ investment in child education as accurate as possible, a large vector of control variables like child and household’ characteristics is used (Stürmer *et al.*, 2006; Bai, 2013). PSM estimators differ in the way the

neighbour for each treated individual is defined and also in the weights assigned to these neighbours (Caliendo and Kopeinig, 2005). The following matching algorithms have been used to estimate the propensity scores to match control households to treated households.

The most straightforward matching estimator is the Nearest Neighbour (NN) matching; the individual from the control group that is closest in terms of propensity score is chosen as a matching partner for a treated individual. However, if the distance to the nearest neighbour is large, the NN matching leads to poor matches. Therefore radius matching has been applied using a tolerance level of 0.001 (calliper) on the distance. NN and radius matching have in common that not all observations from the comparison group are used to construct the counterfactual outcome of a treated individual. Kernel matching (KM) is non-parametric matching estimator that use weighted averages of all individuals in the control group to construct the counterfactual outcome.

## 6.5 Results

The multilevel linear regression estimators are presented in Table 6.2 where model 1 is the intercept only model and model 2 shows the results of the predictors of the farmer' education expenditure for two levels (household and district level). Some predictors like transfers received and number of old sibling(s) at household level and proportion of qualified teachers at district level were dropped from the final model because they didn't show up as significant. The variable residence area (urban vs. rural) dropped out of the model when the % of formal employment in the district was included.

A test of random variance to assess the necessity of hierarchically structured data) shows that the null hypothesis ( $H_0: \sigma_e^2 = 0$ ) is rejected, suggesting that some significant covariance exists between households in districts. The intercept only model estimates the intercept as 3.45 (US\$4.70), which is the average annual education expenditure per farmer's child in primary school child across all households and districts. The between-district variance ( $\sigma_{\mu 0}^2$ ) is 0.028 (  $p < 0,01$ ) and the within-district variance ( $\sigma_e^2$ ) is 0.147 ( $p < 0,01$ ). The intra-class correlation ( $\rho = \sigma_{\mu 0}^2 / (\sigma_e^2 + \sigma_{\mu 0}^2)$ ) is 0.158. Thus, 15.8% of the variance of the FPEEC occurred across districts, which is high (Hox, 2010). The residual variance of the intercept-only represents the unexplained variance.

**Table 6.2: Estimates for multilevel linear regression of Farmer' Primary Education Expenditures per Child (FPEEC)**

Fixed Effect	Model 1			Model 2		
	Estimate	Sig. Level <sup>4</sup>	S.E	Estimate	Sig. Level	S.E
<b>Intercept</b>	3.453	***	0.031	3.201	***	0.041
<b>Household level variables</b>						
<b>Position among siblings</b>						
Number of young siblings				-0.024	***	0.005
<b>Farmer poverty level</b>						
Extreme poor farmer (Ref. cat.)						
Poor farmer				0.097	***	0.013
Non poor farmer				0.175	***	0.013
<b>Farmer land size and status on adoption of new crop due to crop regionalisation</b>						
HH with <0.3ha and no adoption of new crops (Ref. cat.)						
HH with <0.3ha and adoption of new crops				-0.005	n.s	0.026
HH with 0.3ha up to <1ha and no adoption of new crops				0.025	*	0.014
HH with 0.3ha up to <1ha and adoption of new crops				0.060	***	0.021
HH with more 1ha and no adoption of new crops				0.053	***	0.016
HH with more 1ha and adoption of new crops				0.047	**	0.020
<b>Status of raising livestock in farmers</b>						
Farmer not raising livestock (Ref. cat.)						
Farmer raising livestock				0.037	***	0.012
<b>Health insurance</b>						
Farmer without health insurance (Ref. cat.)						
Farmer with CBHI or other health insurance				0.021	*	0.011
<b>External intervention status</b>						
Farmer without external intervention for child education (Ref. cat.)						
Farmer with external intervention for child education				-0.061	***	0.017
<b>Farmer' head education level</b>						
Farmer' head without education level (Ref. cat.)						
Farmer' head with primary completed				0.035	***	0.011
Farmer' head with more than primary education level				0.100	***	0.024
<b>District level variables</b>						
Proportion of land consolidation				0.476	**	0.195
Proportion of formal employment				2.938	***	0.637
<b>Random Effect</b>						
	Variance Component	S.E		Variance component	S.E	
$\sigma_e^2$	0.147	0.003		0.137	0.003	
$\sigma_{\mu 0}^2$	0.028	0.008		0.007	0.006	
$\sigma_{\mu j}^2$				0.031	0.062	
$\sigma_{\mu 0j}$				0.004	0.016	
<b>Deviance</b>	5,448.76			4,988.53		
Number of parameters	2			11		

When the district and household variables are included, the deviance drops from 5,448.76 (D1) to 4,988.53 (D2) and the model improvement is significant with  $(D_1 - D_2) = 432.48$  and  $(m_2 - m_1) = 9$  degrees of freedom gives a P-value below 0.001 (Hox, 2010).

The annual FPEEC is estimated at US\$ 2.630 for an extreme poor farmer. This amount appears small, but in reality it is very high for a family who is struggling to survive in a vulnerable social environment with less than US\$ 1.25 per day. Testing the hypotheses of average farmer's education expenditure for a child in primary school, model 2 shows, that farmers invest 9.7% (US\$ 0.66)<sup>5</sup> or 17.5% (US\$ 1.31) more in child education when they are classified poor or non-poor compared to the extreme poor farmers.

Other things being equal, farmers invest 2.5% (US\$ 0.16) or 5.3% (US\$ 0.34) more in child education when they have not adopted new crops and their land size is between 0.3-1 hectare or more than 1ha compared to the nearly landless farmers (less than 0.3 hectare) who have not adopted the new crop linked to crop regionalisation. Farmers with land size from 0.3ha up to less than 1ha or the ones with 1ha and more invest 5.8% (US\$0.38) respectively 4.7% (US\$0.30) more in child education when they cultivate these new crops compared to the nearly landless farmers (less than 0.3ha) who did not.

As expected, the farmers invest 2.1% (US\$0.13) more in the education of their children in primary school when they have a CBHI or other type of health insurance compared to the ones without health insurance. Remarkably the farmers invest 6.1% (US\$ 0.34) less in child education when their child's education is supported by external sources. Effect of external support is probably a sign of a livelihood in situation of unmet need. Farmers who keep livestock have a more secure livelihood and invest 3.7% (US\$0.23) more in primary education of the children compared to the ones without livestock. For each young sibling, the farmers invest 2.4% (US\$ 0.14) less in child education, which confirms the hypotheses of resources dilution and sibling competition found in many studies (ref. Downey, 1995; Nkurunziza *et al.*, 2014). The proportion of investment in child's education for the farmer who completed primary school and the ones with more than primary level is respectively 3.5% (US\$0.22) and 10.0% (US\$0.68) higher compared to the investment of a farmer without a completed primary education.

Model 2 includes also the formal private employment situation and the land consolidation status at district level. The increase of formal private employment proportion in a district by 1% increases the willingness of the farmers to invest 2.9% (US\$0.18) more in child education, while the increase of land use consolidation proportion in a district by 1%, increase the willingness of the farmers to invest 0.5% (US\$0.03) more in child education.

A PSM analysis was used to explore whether the differences in child education between the farmers who participated in LUC (treated) and the ones who didn't (controls) are meaningfully. The results are presented in Table 6.3. The matching algorithms used are radius matching with a calliper of 0.001 and Kernel matching. The matching tests show a significant difference in education investment between the two groups.

**Table 6.3: Average Treatment Effect on the Treated (ATET)**

Estimation method	Number of treated farmers matched	Number of control farmers matched	Differences in child education investment (in log format)	Sig.	S.E	t
ATET radius matching	1,465	4,303	0.024	***	0.004	6.764
ATET Kernel matching	1,470	4,330	0.022	***	0.011	2.045

- Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%; n.s: no significant.

Participating in the LUC programme increases the willingness of farmers to invest about 2.2% (US\$0.22) to 2.4% (US\$0.24) more in child education. In other words, farmers who participated in LUC-CI Programmes can invest more in child education than those that did not participate in the programmes.

## 6.6 Conclusions and policy recommendations

The abolishment of tuition fees and associated measures, and poverty reduction through social protection programs for vulnerable households contributed an increase in enrolment and completion of primary education, and to a decrease of the vulnerability of the poor in Rwanda between 2005 and 2010 (Nkurunziza *et al.*, 2012; Nkurunziza *et al.*, 2014). The success of these policies is indisputable, but despite all measures taken, primary education is still not affordable for the (extreme) poor in general and for poor farmers in particular. If farmers, who represent more than 80% of the active labour population, are experiencing difficulties in sending their children even to primary school, then achieving a knowledge-based society becomes unlikely. In order to address poverty reduction among farmers the government set out a land use consolidation and associated policies to increase agricultural productivity and to create new jobs.

Education expenditure by farmers is not only driven by expected future returns on the investment in children's education and absolute levels of poverty, but also by income security. The analyses in this study show that poverty is indeed a strong predictor for education investments, but also effects were found of improved subsistence security through the

possession of livestock or a health insurance. The particular interest in this paper is the effect of LUC- CI Programmes. It was hypothesized that these programs have a threefold effect on educational expenditure. The programs lead to poverty reduction, to a more secure income from farming for participating farmers and to more non-farming jobs at the level of the community or district and each of these three will stimulate investment. We found empirical support for each of these expectations.

The propensity score matching showed that at the level of the individual household, participation in the LUC-CI programme does indeed lead to significantly higher expenditure in primary education of the children. Yet the magnitude of the effect is limited to a few percent. The outcomes of the multilevel regression analysis both on household and district level indicate that in districts with more land under the new programmes, households are able or confident to spend more on education and that participating households spend more on education than households not in the programme. The effect however, is not the same according to the land size of farmers. In case the available land is less than 0.3 hectares no effect was found, while the participating farmers in the middle group of land size (0.3-1 ha) showed more commitment to education. The fact that farmers with very limited land who cultivate new crops do not invest significantly more (the sign is even negative) in education can be read as an indication that participation in those programmes for this group is risky.

However, availability of formal employment at district level is a stronger predictor of the confidence that investments in education will pay off in the end. The land size is the first asset for subsistence of farmers, keeping livestock makes the livelihood more secured. However, sale of assets like livestock to pay for child education increases the vulnerability of the household; education cost affects the current consumption and education returns can only be expected in long run.

A less-discussed angle here is a long run virtuous cycle of educating farm 'children. The analysis shows that the more educated the household head is, the higher the investments in child education. As educational attainment leads to increased fertility control through later marriage, spacing and limiting of births, educating children from farmers decreases the resource dilution effect and, thus increases the education expenditure per child within farmer households, as our analysis confirmed that the education level of caretakers positively affects the education expenditure.

Spending on education and health not only has direct benefit to individuals but also contributes to economic growth and accelerates structural transformations (Tomich *et al.*, 1995; Timmer, 1995). By investing in education and health, the government enhances the

quality of human resources as a pathway out of poverty for those with little access to land and assets. The results presented strongly suggest that the availability of formal employment in a district is an important determinant of farmer's investments in child education. The strong linkages suggest that expansion of the employment policy as projected in Vision 2020 will give a better return on farmer' education investment, thus sustaining the education of future generations.

## NOTES

1. 'HANGA UMURIMO' is a Kinyarwanda word which means 'Creation of Employment' in entrepreneurship perspective.
2. A household generally consists of a group of people living in the same accommodation and recognising one person as its head; it may include related and unrelated members, and range from a single individual to multiple families (Nkurunziza *et al.*, 2012).
3. For more details on health insurance coverage in Rwanda, see Saksena *et al.* (2011).
4. Model 1=model with intercept only, Model 2=model with both farmers' household and district characteristics, \*\*\* Significance at 1%, \*\* Significance at 5%, \* Significance at 10%, n.s: Not significant, Ref. cat.: Reference category, S.E: Standard Error.
5. The absolute numbers in US dollars presented here are provided by ten power of the logarithm values of FPEEC giving its value in Rwandan francs multiplied by an exchange rate of US\$1=Rwf 604.14 (the exchange rate of Rwf and US\$ on 31<sup>st</sup> December 2011). The absolute numbers are the values for the categories that deviate from the intercept value of US\$2.63.

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## **7 Synthesis and Final Conclusions**

### **7.1 Introduction**

Rwanda has structural development challenges gravely exacerbated by the 1994 Genocide, causing a sharp increase in poverty levels. The 1994-2000 period marks a critical time when the country was struggling with the aftermath of the genocide and associated conflicts. The Rwandan economy was recovering slowly until 2000, when a clear and tangible vision of the future was formulated to address the challenges of the country: Rwanda's Vision 2020. From a people-centred perspective, the long-term framework aims to manage the low level of human resource development identified as the major microeconomic structural problem that contributes to the current macroeconomic situation of Rwanda.

This study had three main objectives: first, to uncover the effects of (educational) policies on the educational achievement of youngsters in Rwanda, second, to show how poverty reduction strategies and rural development policies are related to the educational investments of households and third, to identify the remaining barriers to furthering the human capital of the nation.

This concluding chapter explores the different outcomes of educational and associated policies on the Rwandan journey towards a sustainable human capital development process over the last 10 years. To achieve a universal enrolment, attendance and completion of education, policy makers need to understand the mechanism linking the household decision making at micro level and education policy, economic development and poverty reduction strategies as enabling factors at macro level. Section 7.2 will proceed to discuss the methodology and data used in the separate chapters. Section 7.3 summarizes the main findings per chapter. Section 7.4 will discuss the contribution of this thesis to the general literature about the education and development nexus, and raises a number of concerns regarding the future challenges.

### **7.2 Discussion of data and the methodology**

The study has used the data collected by the National Institute of Statistics for Rwanda (NISR) on the Rwandan Integrated Household Living Conditions of 2000, 2005 and 2011. For the first chapter on enrolment, we have used the data of 2000 and 2005. The analyses of the second chance in primary and access to secondary education have used the 2000 and 2011

data, while for the analyses of the role of social protection and rural development policies we have used the dataset of 2011 only. Further, additional primary data were collected on students admitted in secondary schools and used to analyse the access to good quality education for pupils from disadvantaged backgrounds. The IHLC-surveys have been designed to track micro-economic change at a detailed level and to monitor the implementation of national policies at local level. The very carefully constructed questionnaires, the tools to estimate monetary values for in kind resources and the detailed recording of income transfers provided reliable and detailed data on budgets and expenditure even among the extremely poor. By providing access to the micro-data, the National Institute of Statistics enabled us to calibrate the more elaborate, multivariate statistical models for our research.

In the second chapter a logistic regression analysis was used to determine the groups of children who are still out of school after the introduction of fee-free education policy and who should be object of future policies. In the following chapters, on the second chance and access to the secondary level, the issue of sample selectivity needed to be tackled as the enrolment in these stages depend on the (non-)completion of the previous stage. From a theoretical point of view it is plausible that several factors define both the success at one level and the success in the next. Yet not all of these factors can be observed which leads to biased estimates in the model on (access to) the next level. Using Heckman selection approach we were able to specify probit models that control for this selectivity. The test of the correlation between the residuals confirmed that selectivity is an issue if one wants to identify the leaks in the pipeline of education, moving from one level to the next. The primary data we collected identified a major determinant not measured by the IHLC-survey, the grade pupils achieve in the national exams and the type of secondary schools frequented. The 9YBE programme offered an alternative route into secondary education, reducing the selection effects in the probit models for 2011.

The wealth of data in the IHLC-surveys on the implementation of policies allowed for two different tests of effects of policies on education expenditure. The first test is an experimental design. The data on the participation in Land-use Consolidation and Crop Intensification programme can be considered as the outcome of a natural experiment, because farmers are not free to decide whether or not to participate in the programme. Using Propensity Score Matching we could show that farmers in the programme spent more on their children education than farmers that were not included. Experimental designs have become very popular in development studies, yet are relatively binary in the outcomes. The difference

between the treatment and the control group is either significant or not, and the experimental design does not allow to trace relevant context effects.

The second, more detailed analyses of the effects of these programmes in the multivariate regression model showed that the effect on level of expenditure is moderated by the size of the land holding of the farmers. The effects were clearly absent among farmers with less than 0.3 ha of land. Experimental and multivariate designs serve different purposes, contribute to different insights and deserve equal merit in creating the evidence base.

More generally speaking, multi-level models allow for the inclusion of macro-level context effects on the decision making at the micro level. We could show that a poor opportunity structure at the district level entered the decision making on expenditure at the individual level, also after controlling for individual level occupation and poverty. Policies like the creation of non-farm employment can have collective effects that extend beyond those involved in the programme and multi-level models might help to overcome the individualistic fallacies in micro-economics.

### **7.3 Summary of findings**

The question anyone picking up this thesis may ask is, "Do we really need another research on human capital process?". Indeed, many publications have dealt with different aspects of human capital development, explicitly connecting investment in education to human capital development. This thesis zooms in on the outcomes of micro-level decision making with respect to the enrolment of children in school and to the expenditure on their education within a macro context that concerns public decision making on education, but also on welfare and economic development. The theoretical framework in chapter one (see Figure 1) outlined the basic argumentation. Poverty is more than just a lack of money, and social protection and economic programmes can reduce the vulnerability of households and improve the prospects for their children, which can contribute to meeting the out-of-pockets costs and to the willingness to invest in their future. While there are various findings, some of the key ones are presented below.

#### **7.3.1 Impact of school fee-free policy on enrolment in primary school in Rwanda**

Empirical studies indicate that the elimination of direct costs of schooling creates an instantaneous large increase in school enrolment (Deininger, 2003; Grogan, 2008). The first

study presented in this thesis (chapter 2) reveals that the overall odds of attending school increased significantly after the elimination of school fees. Two years after the abolition of school fees (in 2005), the odds for children from poor families are equal to those from non-poor families. The odds for the children from extremely poor families were also better in 2005. Yet if there are younger siblings in the household school attendance of the older sibling is lower, and these negative effects are stronger in 2005 than in 2000 for both boys and girls. Full and maternal orphans did not profit from the lower costs to attend school. Their attendance rates did not go up.

This chapter illustrates that the abolition of fees for primary education removes one of the obstacles to accessing education. Nevertheless, even within a fee-free education context, the primary school completion is still problematic in Rwanda. The dropout rates rise sharply after age 10. The results reveal stable low odds ratios of attendance for 11 to 12 year-olds and particularly for 13 to 14 years olds pupils.

### **7.3.2 Effects of fee-free education policy on second chance to complete primary school**

The conclusion of the second chapter showed that although the government has been very successful in getting school-aged children to school, it is less successful in keeping them in school until they have completed their primary education. While researchers tend to highlight the positive impact of completion of primary school and participation in secondary education on socioeconomic and geographical mobility of labour force (Lloyd and Blanc, 1996; Strode, Wylde, and Murangwa, 2007), there is growing consensus that, being an old pupil intersects with polarized student' gender identities in various ways that discourage remaining in school (Dunne and Ananga, 2013). The objective of the third chapter was to identify the teenagers who (did not) get a second chance to complete primary school, by looking at conditions of poverty and household composition.

Aware that a child's educational attainment is a result of a wide spectrum of factors at various levels and after controlling for sample selectivity using a Heckman selection analysis, the results show that the overall chances to still attend primary school after age 12 are higher in 2011 compared to in 2000.

For 2000, the dropout rate was high according to the poverty level and higher among children from (extremely) poor that had younger siblings or were the only child. In 2011 overall dropout rates were substantially lower and the effects of poverty and sibling

competition lost their significance. Only the children from extreme poor families and having younger siblings still had a higher relative risk of dropping out.

### **7.3.3 Effects of elimination of school fees on admission to secondary school and the leading parameters in admission to one of the three type of secondary school**

With the deadline for MDGs goals fast approaching, there is ongoing debate on sufficiency of primary education for children. Rwanda decided to extend universal primary education to a mandatory fee-free cycle of secondary education with the Nine Years of Basic Education programme (9YBE). Analysing the effects of this policy in providing access to secondary education should take into account the selectivity in having completed primary education. The Heckman selection analyses showed that completion levels have improved in the period 2005 to 2011, but that existing inequalities in completion rates (lower for orphans, for children with younger siblings and from rural areas) remained over time. Yet, after controlling for these selection effects, the results indicate that from age 15, pupils have significantly higher chances of attending secondary education in 2011 compared with in 2005, indicating that the 9YBE policy is effective in boosting secondary school attendance, in particular for disadvantaged children (from rural areas, from poor families and having younger siblings). For pupils who managed to complete primary school later (at age 16 and 17) chances improved, but if the cause for late completion is that they had to repeat classes, the chance that they will attend secondary education is lower in 2011.

The conclusion that 9YBE schools have been instrumental in providing an alternative for secondary education for disadvantaged children and for children that needed a second chance to complete primary was further corroborated by the analyses of the recruitment of three types of secondary school: the traditional public schools, private schools and 9YBE schools. The public schools admit pupils with the best grades in the exams who completed primary education in time. For those with lower grades and/or higher ages the private school is the alternative if they come from more wealthy families. The 9YBE schools attract pupils from less wealthy families not just the ones with poorer grades, but also with good grades after primary schools. The reason why more wealthy families do not opt for a 9YBE school is probably that the quality (a.o. measured by the share of qualified teachers) lags behind that of private school.

Overall, the results show that public schools are being favoured and, while the private schools are an alternative for students from more wealthy families that are not admitted to a

public school, the 9YBE schools seem to serve the less performing students and the talented students from poor families.

After achieving almost universal primary education due to educational and associated policies, the following question arises: Should the Government continue with extending its education policy or is it better to rely on the more general poverty reduction policy? The section 7.3.4 and section 7.3.5 indicate the impact of the Rwandan social protection and rural development strategies on household education expenditure.

#### **7.3.4 Effects of social protection strategies on the amount of family expenditure on education**

Chapter 5 analyses the effect of vulnerability of poor families on their education expenditure. Families that receive transfers, have a health insurance, and/or are involved in employment schemes (VUP public works) spend more. However, families (are forced to) reduce their education expenditure when they receive direct financial support, and when they participate in the one cow per family program. Furthermore, for each extra under school age child in a household, the household reduces the education expenditure per child through different mechanisms like dropout of older sibling, reduction of expenses on school items or change of type of school attended.

On average households with a head in non-farm activities invest more in education of the children compared to the ones whom household heads involved in farm activities. The more educated the household head, the higher the investments in children's education. As expected, the expenditure increases substantially when a child in the household proceeds to higher education levels. Also the differences in costs between public and private schools shows up in the expenditure made. Further, the research shows that the availability of formal employment in the district pushes the household to invest more in the education of children as a result of future returns when the education expenditure is viewed as investment.

#### **7.3.5 Effects of rural development policies on farmer's expenditure on education**

Empirical evidence presented in other researches indicate that poverty is more prominent in rural rather than in urban areas. Seen in this light and in the Rwandan context, the dependence on subsistence farming in rural areas creates a huge challenge to provide jobs for the large cohorts of young school-leavers who have been persuaded to enter and complete the Twelve Years Basic Education (12YBE).

This raises the question whether rural development programmes like Land-use Consolidation and Crop Intensification contribute to more or less investments in the education of the children. The results of chapter 6 show that farmers invest more when they have adopted new crops, provided that the size of their land size is larger than 0.3 hectares.

Remarkably the farmers who keep livestock also have a more secure livelihood and invest more in primary education of the children compared to the ones without livestock. The proportion of investment in child' education for the farmer who completed primary school and the ones with more than primary level is gradually higher compared to the investment of a farmer without a completed primary education.

A larger share of formal private employment in the district increases the willingness of the farmers to invest in child education. If more of the land in the district is under the Land-use Consolidation, this willingness is also increasing, even after controlling for the direct participation at the individual level. The prospects of non-farm employment in the district, stimulates the investment in educating the children.

## **7.4 Discussion and Future Development**

There is no denying that educational policies can affect children's schooling. However, the theoretical and empirical linkages between poverty reduction programmes or development policies and the household' investments in children' education are less straightforward. The school attendance is not a result of school fees alone, but is driven by various socio-economic factors at both supply and demand sides. This research has shown that while educational policies encourage children to attend school, a sustainable and responsible children' schooling is only achievable through an enabling environment that reduces the family vulnerability and provide a possible return on education investments.

### **7.4.1 Scientific contribution of the research**

While poverty may be considered both as cause and consequence of low levels of education, both (poverty and low levels of education) are also closely linked to and mediated by contextual factors, inside or outside of the household, including local levels of economic development and educational infrastructure (Rolleston, 2009). In Rwanda some of the potential enabling and constraining factors like, transfers between family members, education level of household' head and his/her occupational status turned out not to be significant in

their contribution to school attendance of children. Just two years after the abolition of school fees in 2003, the odds of primary school attendance were higher compared to the ones prevailing before the elimination of school fees (in 2000). This is probably a consequence of the abolition of school fees and associated policies. The negative effect of poverty on attendance has decreased, but other forms of disadvantage remained.

The gender of a child combined with its sibling's position even has stronger effects after the abolition of school fees (in 2005) than before (in 2000). Being the oldest negatively affects the school attendance for both boys and girls, but has stronger negative effects for girls.

When it comes to completion of primary school, poverty itself is still a strong determinant of not completing primary school. Again sibling competition has added negative effects. In 2011 having younger siblings decreases tremendously the chances of completing primary education for non-poor and extremely poor youngsters. Being the only child in the household creates higher dropout rates regardless of the poverty level in 2000 and shows up only for extremely poor teenagers in 2011.

Orphanhood is another impediment to completion of primary education. The results support the hypothesis of the complementary gender of the child to the single parent in 2011. Girls without a mother and boys without a father have higher chances of dropping out, also in 2011. The study showed that constraining factors are of importance to specific groups and policies may be devised to target these groups in particular to increase their efficiency. The free education attracts more children at school but to keep them in school until completion of the final education levels needs more than implementation of education policies alone. The elimination of school fees was a first step, but clearly not one big enough.

The study illustrates that the elimination of school fees in primary and secondary level has been successful for the majority of children, but not for all. While foster children and orphans are still discriminated against, poverty leads to resource dilution when family size increases. The result is that children are kept away from school and sent to work. They also have poorer chances to get a second chance and even if they do manage to complete primary school later have less access to the best secondary school. The metaphor of the leaking pipeline for the educational career of disadvantaged children is still apt. The starting position at age eight is nearly equal for all (close to a hundred percent do attend school). Yet the dropout rates are higher, the options for a second chance lower, completion rate lag behind and access to good secondary schools is constrained for disadvantaged children. Not just

(extreme) poverty, but also orphanhood and sibling completion/resource dilution account for the leaks in the pipeline.

From the theoretical framework of home economics, the contribution of children to the livelihood of the household outweighs the benefits of keeping them in school to get a qualification. Yet the issue is wider than a straightforward cost-benefit analysis. Vulnerable households are faced with impossible choices in case of crop-failure, disease or other shocks, to either spend money on the necessities of life or keeping their children in school. The analyses of the impact of social protection and rural development strategies on the willingness of parents to invest more in child's education showed these mechanisms. The poor and very poor households may consider education as a positive investment but, even within a fee-free education context, due to their high vulnerability level, the costs can still be too high for those groups. The research findings show that health insurance is associated with a significant increase of expenditure in children's education, by reducing the incidence of catastrophic income shocks. In the same way, access to regular paid work and credit make parents more confident to spend more money on the education of their children. However, some poverty reduction instruments like one cow per family or direct transfers, even when they have showed their contribution to poverty alleviation and to reduction of vulnerability, do not lead to more household investment in education. Yet, in general, most of the poverty reduction strategies could help to reduce the vulnerability of the very/poor households, and are complementary to education policy in securing a good education for disadvantaged children.

The research results indicate that despite all measures taken, primary school was still not affordable for the (extreme) poor in general and for poor farmers in particular. While health insurance coverage and a possession of livestock have improved subsistence security of the farmers, the LUC-CI Programmes lead to a more secure income from farming and to more non-farming jobs at community level and each of the three stimulate investment in child education.

If education expenditure is viewed as investment, households take into account the expected future returns. A lack of added value in the labour market of a completed education might negatively affect the trade-offs between the costs and the returns related to the older students and by effect, could reduce the willingness of parents in investing more in children's education. The strong linkages found suggest that the availability of formal employment in a district is an important determinant of farmer's investments in child education.

These conclusions put the debate on the effectiveness of education policies to human capital development of a country in a wider perspective. It is not enough to make attendance

mandatory and to reduce the out-of-pocket cost of enrolment. Poverty is about more than a lack of money. Economic insecurity and vulnerability are structural aspects of poverty and without addressing this vulnerability, household's expenses on education will have to be cut. Even then, the direct returns of not sending the children to school, but putting them to work, will enter the decision making of keeping children in school once they reach the age at which they can contribute to the livelihood of the household. An expected lack of future returns may further reduce the willingness to invest in education, even among those that could afford it.

#### **7.4.2 Future development**

Keeping the enrolment constant under population growth requires a considerable expansion in the number of school places and teachers. However, as educational attainment leads to higher ages of first marriages and an increase of fertility planning through spacing and limiting of births, a continuation of the current reduction of fertility levels will contribute to reduce sibling competition and resource dilution.

With only two 9YBE generations, it was still too early to fully evaluate the implementation of these strategies and their sustainability. We could only analyse the pipeline to the entry into the secondary level. Further work may be needed to identify the factors that might encourage or hinder the poorest groups' transition to upper secondary level and assess whether the current policies implemented by the government are adequate. For instance, do those policies address causes of exclusion in lower secondary among the poor? Is the lack of adequate facilities in 9YBE schools causing a lower transition rate from lower to upper secondary levels or is it lack of interest in further education?

The analysis of rural development policies (Land Use Consolidation and its attached crop intensification programmes (LUC-CI Programme)) reveals that rural development strategies increase economic opportunities for the rural poor and raise their income. The increase of income and thus, the reduction of vulnerability is a stimulus for farmers' decisions to invest in educating their children.

To be sustainable, in addition to the 9YBE and 12YBE policies, Rwanda needs to implement an efficient and effective job creation policy; however, this does not yet appear to be happening. If the jobs continue to be scarce, significant numbers of low-income young adults who managed to complete degrees will be likely to face spells of joblessness and confinement to low-wage labour market, with fewer opportunities for upward social mobility.

The strong linkages between employment availability and household education investments suggest that labour market prospects and future returns of education investments will give a better return on farmer' education investment, thus sustaining the education of future generations.

## **7.5 Final remarks**

The hypothesis underlying this study was that: “the analyses of the impact of education policies on children' school enrolment, attendance and completion need to take into account the wider economic, social and political environment”. Abolition of school fees, implementation of remedial programs, introduction of food for schooling programs, construction of classrooms, enforcing the laws on compulsory primary education and the prohibition of child labour and apprenticeships by children under the age of 15 who have not completed primary education could possibly contribute to achieving MDG 2, but should take the other MDG's into account as well.

On the basis of the above presented findings, this thesis pleads for creating enabling environments that reduces the family's vulnerability and provide a possible return on education investments in order to build a strong foundation for the country's socio-economic development. In other words, achieving a sustainable human capital development depends on more than educational policies. While educational policies attract children at school, to maintain and to sustain the same trend at all education levels also needs poverty reduction strategies, job creation and associated policies. The study teased out the strong achievements within the education sector, but policy makers and partners had other issues to deal with, some successfully, others unsuccessfully.

With the phasing out of WFP support on the school feeding programme in 2012, the government of Rwanda started the implementation of a general school feeding programme up to 12YBE with support of parents and local communities. The feeding programme is aimed at improving the quality of education because spending 7:30 hours (7:00 AM to 2:30 PM) at school without having lunch is challenging to many students. The latest news on this topic however, is that in Camp Kanombe school (Kigali City) with 1,177 students, only 400 students are entitled to a meal (Tabaro, 2014). If this is the situation in Kigali, the situation should be even more critical in rural areas. We agree with the idea that parents should feed their children at school like they do at home. However, requesting parents to provide the means to feed their children (by contributing Rwf4,700 -US\$7- per term in primary school

and Rwf10,000 US\$14.4- in 12YBE) might introduce a new barrier for the very poor and children with young siblings particular.

Efforts to ensure and maintain education quality in primary and secondary schools are facing serious challenges. Abolishing fees attracted more children to school, which required the expansion of education infrastructure, equipments, number of teachers, to mention only a few of the consequences. The government and partners managed to deal with some of them but there is still more work to do in this field. The government should continue with improvement of education quality and by doing this it will avoid to be judged as a provider of education for free, but not educating the youth properly.

A less-discussed angle here is a long run virtuous cycle of educating children. The analysis shows that the more educated the household head is, the higher the investments in child education. As educational attainment leads to increased fertility control through later marriage, spacing and limiting of births, educating children decreases the resource dilution effect and thus increases the education expenditure per child within households. At the macro level, this means that the growth in the influx of new pupils in primary education will slow down in the near future; at the micro level of the individual child, it means less sibling competition and resource dilution.

The fertility rate dropped recently but with 4.3 children in 2012, it is still higher in comparison to the level common in East-Asian countries. The Rwandan population will continue to grow as a result of its current age composition. It will take time before the country can profit from the demographic dividend as countries in Asia and Latin America already have done (Drummond et al., 2014; Gribble and Bremner, 2012).

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## **Samenvatting (summary in Dutch)**

### **De ontwikkeling van menselijk kapitaal in Rwanda Effecten van beleid met betrekking tot onderwijs, sociale zekerheid en rurale ontwikkeling**

Rond 2000 zag de overheid in Rwanda de ontwikkeling van het menselijk kapitaal als een belangrijke beleidsprioriteit. De kwaliteit van het arbeidspotentieel is de belangrijkste pijler waarop de groei van de welvaart kan steunen in het zeer dichtbevolkte land zonder noemenswaardige andere hulpbronnen. Het lage opleidingsniveau van de bevolking was in de ogen van de regering dan ook een structureel micro-economisch probleem dat moest worden aangepakt om tot duurzame vermindering van armoede te komen (MINEDUC 2003, p.15). In het belangrijkste lange termijn plan “Vision 2020” (GoR 2000) stelde de regering dat naast investeringen voor armoede bestrijding, investeringen in onderwijs en gezondheidszorg cruciaal zouden zijn. Niet alleen om de zogeheten Millennium Ontwikkelingsdoelen te bereiken, maar ook om een effectieve en productieve beroepsbevolking te creëren. Deze is nodig voor de transformatie van een economie gebaseerd op voornamelijk zelfvoorzienende landbouw, naar één ook geënt op kennis- en dienstensectoren.

Met deze aanpak wilde Rwanda tevens een ander doel bereiken dat rond het jaar 2000 nog een gevoelig onderwerp was, het promoten van familie planning en het terugdringen van de bevolkingsgroei. De overheid wilde faciliteren dat de Rwandezen makkelijker kunnen kiezen voor minder maar beteropgeleide kinderen.

Het onderwijsbeleid dat vanaf 2002 stapsgewijs is ingevoerd, o.a. het afschaffen van schoolgeld, tweede-kans-onderwijs voor vroegtijdige schoolverlaters en het verstrekken van lunchmaaltijden, lijken succesvol geweest. De kloof tussen het streefniveau van Millennium Ontwikkelingsdoel Twee voor het jaar 2015 en het bereikte resultaat is voor Rwanda relatief klein (UNDP 2010). Meer dan 95 procent van de kinderen begint aan de basisschool en een groeiend percentage van hen doet ook het afsluitende examen. Tevens is het verschil tussen jongens en meisjes in onderwijsparticipatie verdwenen. Daarnaast hoort Rwanda tot de weinige landen in sub-Sahara Afrika die ook de instroom in het voortgezet onderwijs heeft kunnen bevorderen door de eerste fase van dit onderwijs dicht bij huis te organiseren (UNESCO 2012).

Bij de keuze van de ouders of verzorgers om een kind al dan niet naar school te sturen en te investeren in onderwijs, spelen in de eerste plaats sociaal-demografische en economische huishoudkenmerken een belangrijke rol, waarschijnlijk meer nog dan kenmerken van het geboden onderwijs of lokale regionale kenmerken (Drèze and Kingdon 2001). De hoeveelheid en aard van de “livelihood” kapitalen van het huishouden (denk aan opleidingsniveau van de ouders, bezit van vee, steun van familieleden of derden) en het type en de samenstelling van het huishouden (volledige gezinnen versus éénouder of pleeggezinnen; aantal aanwezige kinderen) worden verondersteld van invloed te zijn op die keuze.

Figuur 1 in het inleidende hoofdstuk toont de belangrijkste huishoudkenmerken die naar verwachting de kansen op scholing van de kinderen beïnvloeden. Tevens zijn aspecten van het onderwijsbeleid en de macro-economische context vermeld die in deze studie als belangrijk worden gezien voor de beslissingen over scholing op het micro-economisch huishoudniveau.

Het theoretische kader van deze studie gaat uit van de premisse dat armoede meer inhoudt dan een gebrek aan geld waardoor de directe kosten voor het onderwijs niet betaald kunnen worden. Armoede maakt huishoudens kwetsbaar voor plotselinge tegenslagen zoals een misoogst, verlies van werk of ziekte. Ook al is het schoolgeld afgeschaft, scholing blijft voor arme huishoudens relatief duur. Er zijn zowel directe als indirecte kosten aan verbonden. Zo moeten er kosten worden gemaakt voor een schooluniform, leermiddelen, registratie, rapporten, bijdrage aan de Vereniging van Leerkrachten en Ouders, terwijl het kind niet of minder kan bijdragen aan het huishoudinkomen (de ‘opportunitycosts’ van tijd doorgebracht op school).

Naast economisch beleid gericht op het verhogen van inkomen, draagt beleid gericht op het verhogen van de sociale zekerheid van de armste bevolkingsgroepen bij aan het verminderen van die kwetsbaarheid. De argumentatie is dan dat ouders/verzorgers in een situatie van hogere sociale zekerheid en grotere kansen op werk of inkomen eerder durven te investeren in onderwijs voor hun kinderen dan in een situatie zonder sociale vangnetten of voortuitzichten op betaalde loonarbeid.

Het doel van dit proefschrift is: te onderzoeken wat het gevoerde onderwijsbeleid, in samenhang met beleid gericht op armoedebestrijding, op het verhogen van sociale zekerheid en op rurale ontwikkeling, hebben bijgedragen aan de onderwijsparticipatie van Rwandese kinderen; en te identificeren welke jongeren nog steeds buiten de boot vallen.

De onderzoekseenheid is het huishouden met (leerplichtige) kinderen. Vijfdeelvragen sturen de analyses gepresenteerd in dit proefschrift. Elke vraag heeft een specifiek aspect van scholing als focus: het al of niet naar schoolgaan van het kind, het afmaken van het basis onderwijs, het instromen in secundaire onderwijs of de investeringen in het onderwijs van het huishouden in samenhang met een specifiek gevoerd ander ontwikkelingsbeleid. De secundaire data voor de gemaakte analyses zijn afkomstig uit drie verschillende onderzoeken onder Rwandese huishoudens uitgevoerd door het Nationale Instituut voor Statistiek in Rwanda, de zogeheten Rwandan Integrated Household Living Conditions (IHLCS) Surveys van 2000, 2005/6 en 2011. De primaire data over leerlingen in het voortgezet onderwijs zijn verzameld in 2011 op 20 scholen verspreid over het land.

De resultaten in hoofdstuk twee laten zien dat na de afschaffing van het schoolgeld in 2003 de participatie van leerlingen in het basisonderwijs al in 2005/6 significant was toegenomen o.v. de situatie in 2000; ook onder kinderen afkomstig uit arme of zeer arme gezinnen en in het bijzonder onder meisjes uit deze gezinnen. Voor een groep heel kwetsbare kinderen, namelijk weeskinderen en kinderen uit huishoudens zonder moeder, waren de kansen echter niet verbeterd. De resultaten toonden ook dat onderwijsparticipatie van kinderen met jongere broertjes of zusjes niet was toegenomen. Dit gold zowel voor jongens als meisjes, maar oudere zusjes waren slechter af dan oudere broertjes. Het afschaffen van schoolgeld bleek een goede maar nog geen voldoende stap om alle kinderen te laten instromen én op school te houden tot en met de afsluitende toets.

In hoofdstuk drie wordt deze problematiek nader uitgediept door na te gaan of en zo ja, welke tieners een tweede kans hebben gekregen om de lagere school te voltooien. Nu werd gekeken naar de effecten over een langere periode (2000-2011). Naast het afschaffen van het schoolgeld werden ouders via specifieke programma's (Remedial Programma, verstrekken van maaltijden op school; Food-for-Education Programma) gestimuleerd oudere schoolverlaters alsnog een basisschooldiploma te laten halen. Door de analyses te richten op tieners van 13 tot 17 jaar werd duidelijk dat er in vergelijking tot de situatie in 2000, tien jaar later meer oudere kinderen basis onderwijs volgen. Vooral voor meisjes verbeterde de situatie. Het percentage van deze kinderen dat de school had verlaten zonder diploma was gedaald van 61 naar 24%. Het percentage dat op 13-jarige leeftijd al een diploma had was echter niet verbeterd. Opnieuw werd bevestigd dat armoede de belangrijkste determinant is van voortijdige schoolverlating, gevolgd door het hebben van jongere broers en/of zusjes. In

2000 moesten in allerarmste, maar ook in de niet-arme huishoudens, oudere en jongere kinderen met elkaar concurreren om de beperkte beschikbare financiële middelen. In 2011 gold dit niet meer voor de niet-arme groepen.

Oudere kinderen worden voortijdig van school gehaald om bij te dragen aan het huishoudinkomen. De uitkomst dat het enige kind, ongeacht het geslacht van het kind, in zowel 2000 als 2011 een grotere kans had om de school voortijdig te verlaten wijst eveneens in die richting. Ook het feit dat kinderen op het platteland en kinderen in één-ouder-huishoudens relatief vaker de school niet afmaken dan kinderen uit de stad en uit volledige gezinnen ondersteunt die gedachte. In eenouder gezinnen geldt dat als de vader ontbreekt de oudste zoon de school vroegtijdig verlaat; in geval de moeder ontbreekt dan is het de oudste dochter in het huishouden die niet meer naar school gaat.

In 2009 schafte Rwanda ook het schoolgeld af voor de eerste fase (van drie jaar) van het voortgezet onderwijs en richtte zij mogelijkheden in voor dit type onderwijs bij bestaande basisscholen onder het zogenaamde Nine Years of Basic Education-programma (9YBE). Tevens werd de beoordeling van de afsluitende toets voor het basisonderwijs gewijzigd. Iedere kind krijgt een certificaat met daarop het bereikte niveau vermeld (in vijf categorieën). Door dit 9YBE programma moest de toegang tot secundair onderwijs verbeterd worden voor kinderen in rurale gebieden. Voor de invoering van 9YBE programma bevonden de meeste bestaande scholen voor secundair onderwijs zich in stedelijke nederzettingen waar de leerlingen intern zijn, wat hoge kosten van dit onderwijs meebrengt voor ouders of verzorgers. In hoofdstuk vier is onderzocht wat de eerste resultaten van dit beleid zijn geweest voor de ontwikkeling van de instroom van leerlingen tussen 2005/6 en 2011. Wat is de afkomst van de leerlingen in de drie onderscheiden typen vervolgonderwijs en welk startniveau hebben ze? Net als in het vorige hoofdstuk is allereerst gecontroleerd voor de kansen op het succesvol voltooien van de basisschool. Degenen die naar het vervolg onderwijs gaan zijn immers een selecte groep. Deze leerlingen zijn vaker afkomstig uit niet-arme huishoudens, uit complete gezinnen waarvan het hoofd ook scholing heeft genoten en uit urbane huishoudens. Daarnaast bereiken kinderen die op een prive basisschool hebben gezeten, eerder de eindstreep en hebben ze gemiddeld hogere cijfers voor de eindtoets dan kinderen die onderwijs kregen op openbare basisscholen.

Nadat voor deze selectiviteit is gecontroleerd, laat de analyse zien dat in algemene zin de toegang tot voortgezet onderwijs is verbeterd door het 9YBE programma. Vooral oudere leerlingen, tieners uit arme huishoudens, kinderen op het platteland en zelfs weeskinderen profiteerden van het nieuwe onderwijsaanbod.

Op de private internaten en 9YBE scholen kunnen leerlingen terecht die een minder hoog eindniveau hebben gehaald voor het afsluitende basisschoolexamen. De oudereopenbare internaten voor secundair onderwijs kunnen, gezien het grote aantal aanmeldingen, de leerlingen kiezen die de beste resultaten hebben voor de basisschool eindtoets. Kinderen met goede cijfers afkomstig uit arme huishoudens 'kiezen' echter vaker voor een goedkopere mogelijkheid van een 9YBE school dicht bij huis dan een duurdere private vervolgschool of een openbaar internaat dat onderwijs van een hogere kwaliteit kan leveren (gemeten naar percentage bevoegde leerkrachten). Het 9YBE programma is een belangrijke stap voorwaarts bij het verminderen van de ongelijkheid in de toegang tot vervolgonderwijs. De ongelijkheid in de toegang tot de beste scholen is nog niet opgeheven.

In de laatste twee analyse hoofdstukken wordt bestudeerd wat ontwikkelingsbeleid gericht op armoede bestrijding heeft bijgedragen aan de investeringen in het onderwijs door (arme)huishoudens. Hoofdstuk vijf richt zich op de effecten van strategieën om de kwetsbaarheid van zeer arme huishoudens te verminderen. Zo heeft Rwanda een 'community-based' gezondheidszorgsysteem opgezet en daaraan gekoppeld een ziektekosten verzekering waarvoor de allerarmste gezinnen het minst hoeven te betalen. Er zijn werkgelegenheidsprojecten opgezet en agrarische producenten met enige weide-/grond konden participeren in het "Eén koe per familie programma". Daarnaast ontvingen de allerarmste gezinnen zonder of met weinig landbouwgrond (<0,25 hectare) en zonder een volwassene die in staat is te werken, financiële ondersteuning.

De analyses laten zien dat toegang tot basisgezondheidsvoorzieningen tot betaald werk in werkgelegenheidsprojecten inderdaad een relatie hebben met een bescheiden verhoging van uitgaven voor onderwijs door het huishouden. Ook de aanwezigheid van betaald formeel werk op districtsniveau had een positieve invloed, wat bevestigt dat arbeidsmarktfactoren belangrijk zijn bij de afweging om kinderen onderwijs te laten volgen. Het krijgen van directe financiële ondersteuning en een gratis koe blijken negatief gerelateerd met onderwijsuitgaven; deze huishoudens besparen op de uitgaven per kind naarmate er meer naar school gaan. Voor de huishoudens die financiële ondersteuning krijgen, zijn andere basisbehoefte als voedsel en kleding waarschijnlijk meer urgent dan investeringen in scholing. Deze uitkomst lijkt een bevestiging van de zienswijze van Devéreux (2011) die stelt dat de financiële ondersteuning waarschijnlijk te beperkt van omvang, te onregelmatig en te kortstondig van aard is, om de bestaanszekerheid van de betrokken huishoudens duurzaam te verbeteren. De condities die het

mogelijk maken om in scholing te investeren worden kennelijk niet bereikt met dit programma.

Hoewel ander onderzoek (Rutareka, 2011), laat zien dat Het-één-koe-per-huishouden Programma wel bijdraagt aan armoede bestrijding, leidt het niet tot hogere bestedingen aan onderwijs van kinderen. Het is mogelijk dat de melkopbrengsten van de koe niet wordt verkocht om extra inkomsten te krijgen, maar wordt geconsumeerd door het huishouden zelf, of deels wordt besteed aan het kopen van veevoer of aan noodzakelijke veterinaire verzorging (Bucagu, 2013).

De studie naar huishouduitgaven bevestigde ook de ‘verdunning van uitgaven per kind’ bij toenemend kindertal. Bij elk volgend schoolgaand kind worden de bestedingen per kind minder, tot het oudste kind als uiterste consequentie de school moet verlaten om ook aan het huishoudinkomen bij te dragen.

Het laatste analytische hoofdstuk presenteert de resultaten van een studie naar de onderwijsuitgaven van agrarische huishoudens met als doel de effecten te achterhalen van beleid om de agrarische productie te verhogen en extra werkgelegenheid in rurale gebieden te scheppen. Het betreft de Land-UseConsolidationandCropIntensification programma’s. Verwacht werd dat deze programma’s in drie opzichten een effect zouden kunnen hebben op de onderwijsuitgaven per kind van agrarische huishoudens. Het programma zou leiden tot vermindering van armoede en tot meer inkomenszekerheid voor de deelnemers. Bovendien zou er meer niet-agrarische werkgelegenheid in betrokken districten ontstaan. Elk van deze effecten zou investeringen in onderwijs kunnen stimuleren. Voor al deze verwachtingen werd empirische onderbouwing gevonden. Op het niveau van het individuele huishouden leidt participatie in het LUC-CI programma inderdaad tot significant hogere uitgaven voor basisonderwijs in vergelijking met die van niet-participerende huishoudens. De omvang van het effect is enkele procenten. Het resultaat van de “multilevel” regressie analyse, zowel voor het huishoud- als district niveau, wijst erop dat in districten waar meer land betrokken is bij het LUC-CI programma, de huishoudens in staat zijn of genoeg vertrouwen hebben om meer uit te geven aan onderwijs.

Het effect van deelneming in LUC\_CI programma’s verschilt echter naar de omvang van het landbezit van de huishoudens. Voor huishoudens met minder dan 0,3 hectare land werd geen effect gevonden, terwijl deelnemende huishoudens met 0,3-1 hectare meer investeringsbereid bleken. Het gegeven dat huishoudens met erg weinig land die toch meedoen met het programma en nieuwe gewassen verbouwen, niet significant meer investeren in onderwijs

(het verband is negatief) kan worden opgevat als een indicatie dat deelnemen aan deze agrarische vernieuwing voor deze groep riskant is.

Opnieuw werd, net als in het vorige hoofdstuk, bevestigd dat de mate van aanwezigheid van formele werkgelegenheid in een district een goede voorspeller is voor vertrouwen onder huishoudens dat investeringen in onderwijs zich zullen terugbetalen in de toekomst.

De onderwijsparticipatie van Rwandese kinderen is door het gevoerde onderwijsbeleid enorm verbeterd. Desondanks is er nog een lange weg te gaan voor alle leerkrachten op voldoende niveau geschoold zijn, er voldoende klaslokalen en leermiddelen beschikbaar zullen zijn en ook werkelijk alle kinderen negen jaar basisonderwijs zullen afronden.

De overheid van Rwanda moet echter op veel ontwikkelingsterreinen tegelijk actief zijn en de bereikte resultaten op meerdere van deze gebieden zijn, gezien de verlopen tijdsduur, zeer hoopgevend. Deze studie heeft aangetoond dat niet alleen het onderwijsbeleid belangrijk is om de kinderen naar school te krijgen, maar dat ook beleid gericht op het verminderen van de kwetsbaarheid van huishoudens. Ook de groei van formele werkgelegenheid op districtsniveau verhoogt de kans dat kinderen naar schoolgaan en ouders in hun opleiding investeren. Als aan die voorwaarden is voldaan zullen ouders durven te kiezen voor minder maar beter opgeleide kinderen.

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## Curriculum Vitae

Joseph Nkurunziza was born on May, 12, 1974 in Bubanza, Burundi. He attended primary, secondary and the first year of higher education in the same country. In 2001, he completed a Bachelor in Economics at the National University of Rwanda (NUR). From February 2002 to November 2002, he was employed as Bank Manager in Popular Bank of Rwanda, Kacyiru Branch.

He joined the National University of Rwanda in December 2002 and worked as Assistant Lecturer in Department of Economics till September 2005 when through the partnership of NUFFIC and the NUR under the grant NPT-RWA-053, he benefited from a scholarship for a Master's degree in Applied Statistics. He graduated in July 2007 at the '*Institut de Statistique de l'Université Catholique de Louvain-la-Neuve (UCL)*' in Belgium. When he returned to the National University of Rwanda in July 2007, he was transferred to the Department of Applied Statistics as Assistant Lecturer.

In his academic career, besides teaching duties at the National University of Rwanda/University of Rwanda, he has participated in different researches as a consultant/or researcher. Furthermore, he strengthened his research methods through various trainings on quantitative methods for policy analysis and advanced econometrics.

In July 2009, under the financial support of the William and Flora Hewlett Foundation, and The Netherlands Organization for Scientific Research (NWO/WOTRO grant number W07 40 202 00), he enrolled in a PhD program at Utrecht University in The Netherlands on a sandwich mode. His doctoral research - "Human capital development in Rwanda: effects of education, social protection and rural development policies" - is aimed at understanding how education, social protection and rural development strategies contribute to the Rwandan path on human capital development. While doing his PhD, he participated in various national and international conferences in which he presented papers, a number of which have been published in peer-reviewed journals or still under review.

During his academic career, he has been active in a variety of administrative positions at University level: coordinator of programmes and projects (a.o NPT-RWA-053), Vice Dean of the School of Economics and academic secretary of the Faculty. Apart from his academic career, he has been a president of mediators in Cyarwa Cell (2008-2009) and he is currently a board member of Imanzi Investment Group Ltd, the National University of Rwanda staff Company.