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MASTER THESIS

Determinants of Education Indicators in Kyrgyzstan

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Hereby, I declare that the thesis is my own work and all used sources are referenced.

Akylai Tazabekova,
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Zásady pro vypracování

Education plays an important role in building up one of the main economic drivers of any country – human capital. "Achieving universal primary education" was one of the Millennium Development Goals, and later it translated into a more sophisticated Sustainable Development Goal # 3 "Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all". Regardless of a substantial progress in the last decades, there is still a vast space available for improving both quantitative and qualitative indicators of education in developing countries. This study aims to look at education indicators in Kyrgyzstan which is a developing country in Central Asia. Survey results from reliable sources will be used to analyze the impact of microeconomic, ie individual, household, and community characteristics, on education indicators in the given country. Thereby, the study can assist policymakers in revealing potential ways of correcting or improving the education system to provide better education to more citizens.

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Abstract

The study aims to define various characteristics that affect the educational attainment of people living in Kyrgyzstan and to identify whether positive returns to education exist at a microeconomic level. The sample of interest includes residents aged 25 and above. The health condition, migrant status, proxies for household wealth, generation, ethnic belonging, and first language tend to impact the schooling years or acquisition of higher education. Both parent's education level has a statistically significant positive impact on the educational attainment of their children. The magnitude of the impact increases with the education level of parents. The number of siblings is insignificant in terms of schooling years but has a statistically significant negative effect on getting higher education. Women have less schooling years but are more likely to get higher education in comparison to men. Among women, getting married at an early age is linked with fewer years of schooling. On the whole, there is a discrepancy in 'rural versus urban' and 'capital versus regions' pairings in terms of educational attainment of the Kyrgyz residents. It is empirically supported that positive returns to education exist in terms of employment and earnings. Taking into account benefits of education both for individuals and the country, public policies ought to focus on removing existing barriers and expand opportunities in getting education to all parts of the population throughout regions of the country.

Keywords: educational attainment, returns to education, microeconomic analysis, developing countries, Kyrgyzstan

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1. INTRODUCTION

Education plays an important role in building up one of the main economic drivers of any country - human capital. "Achieving universal primary education" was one of the Millennium Development Goals, and later it translated into a more sophisticated Sustainable Development Goal #3 "Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all" (United Nations, 2000/2015). Karymshakov & Sulaimanova (2018) state that "a high rate of educational involvement among a population may be encouraging in terms of human capital development, which in turn should have a positive contribution to long-term economic development". In the framework of the burgeoning "knowledge economy", countries which have a high human capital are more competitive due to their "ability to create and develop high technologies, to provide fundamentally new technological level of production" (Lavrinovicha et al., 2015). Moreover, equal access to education might also serve as a way to bridge inequalities within countries. For instance, Knight & Shi (1993) analyzing education and income inequality in China concluded that educational inequality might be one of the main sources of income inequality in China. UNICEF (2020) also recognizes that "education is a driver of equity, poverty reduction, empowerment, peaceful and inclusive societies and economic growth of Kyrgyzstan". It should be mentioned that in 2019, Kyrgyzstan's headcount poverty ratio equaled to 20.1% of the total population with the use of the national poverty line (World Bank, 2020).

Regardless of a substantial progress in the last decades, there is still a vast space available for improving both quantitative and qualitative indicators of education in developing countries, including Kyrgyzstan. Located in Central Asia, Kyrgyzstan, or formally the Kyrgyz Republic, gained its independence in 1991 after the collapse of the Soviet Union and started reforms in many of its sectors, including education. The "Law on Education" was adopted in 1992, later amended in 2003, and it remains as a main legal foundation for education policy and principles in the Kyrgyz Republic. Articles 2 and 3 stipulate that all citizens have equal rights to education regardless of race, sex, nationality, language, religion, social or political backgrounds. Likewise, mandatory and free primary and basic education for every citizen and free access to general secondary education should be provided, and education shall place priority on universal values in combination with a national heritage. (The Law of the Kyrgyz Republic "On Education", 2003). The Ministry of Education and Science, in charge of education, strives to develop an education system that matches knowledge and skills of

student with the demands of the market economy (UNESCO & IBE, 2011). Article 46 of the Constitution states in the same manner that every citizen has the right to education, and general basic education shall be mandatory and provided free of charge (The Constitution of the Kyrgyz Republic, 2021).

1.1 Education System Overview

Compulsory education in Kyrgyzstan lasts for nine years with four years spent at primary school and five years at lower secondary school. Afterwards, students can either complete their secondary education in two years or apply to professional lyceums and vocational technical colleges (UNESCO & IBE, 2011). Higher education is organized through (re)training of individuals in bachelor's, specialty and master's programs to deepen and expand education on the basis of general, secondary and higher professional education (Education, Audiovisual and Culture Executive Agency & Kyrgyzstan Erasmus+ National Office, 2017).

Table 1   Education Levels and Estimated Years for Completion in Kyrgyzstan

Education Level	Years
Primary education	4
Basic secondary education	5
Complete secondary education	2
Primary vocational/technical education	1-3
Secondary vocational/technical education	4
Basic higher education (Bachelor's degree)	4
Complete higher education (Master's degree)	2
Complete higher education (Specialty)	5
Postgraduate education	3

Source: author's construction based on the UNESCO & IBE's World Data on Education, 2011.

The table above describes different levels of education in the country and years taken to complete each level. In some cases, years are approximate depending on the structure of the program. Children usually start attending primary school at 6-7 and complete it at 17-18. As those who decide to pursue higher education usually do so without taking a break, by 22-23 they will have completed their basic higher education, i.e. Bachelor's degree.

1.2 Statistics on Education

The literacy rate is very high, averaging at around 99% throughout years. In 2018, the following figures were reported.

Table 2   Literacy Rate in Kyrgyzstan in 2018

	TOTAL	MALE	FEMALE	
Literacy rate (%)				
15-24 years	99.8	99.7	99.8	(2018)
15 years and older	99.6	99.7	99.5	(2018)
65 years and older	97.1	98.7	96.2	(2018)

Source: UNESCO Institute for Statistics, Data for SDGs, 2020.

The net enrollment ratio for primary education was at around 89% for the last decade, whereas for the secondary education it averaged 82% for the 2014-2019 period. The gross enrollment ratio for the tertiary education is provided below.

Figure 1   The Gross Enrollment Ratio for Tertiary Education

TERTIARY EDUCATION	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Gross enrolment ratio (%)										
Total	42.2	41.3	44	47.5	45.9	46.7	45.1	42.8	41.3	42.3
Female	47.8	45.8	49.1	53.6	52	53	50.7	47.5	46.7	47.4
Male	36.6	36.8	38.9	41.5	39.9	40.6	39.7	38.3	36	37.4
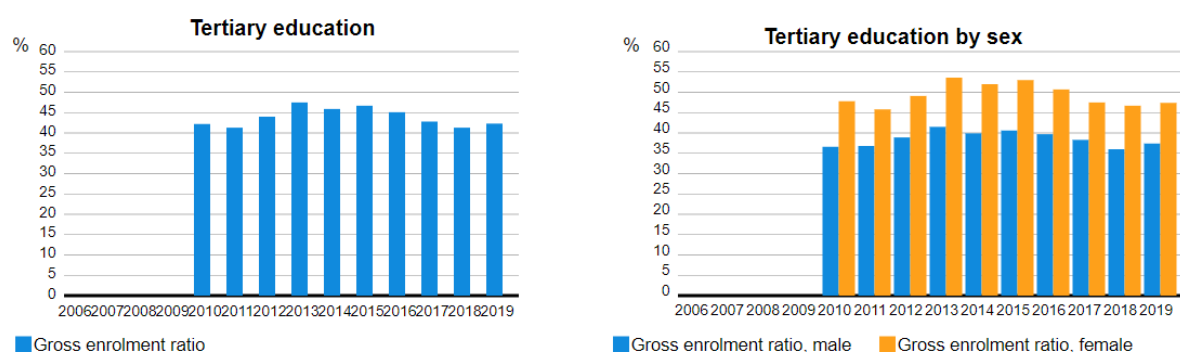
Source: UNESCO Institute for Statistics, Data for SDGs, 2020.

For the given period, the gross enrollment ratio was around 43.91% on average. The average for females is equal to 49.36 which is 2.65% more than males (46.71%). Thus, a larger proportion of women enroll into the tertiary education rather than men. It might occur due to a cultural factor that men have to take a responsibility to provide for their families and choose or have to work instead of pursuing higher education. In the 2017-18 academic year, number of students admitted to higher educational institutions decreased by 14% in comparison to the figure in the 2013-14 academic year (National Statistical Committee, 2018).

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Table 3 Educational Attainment of the Kyrgyz Population aged 15 and over by economic activity in 2017

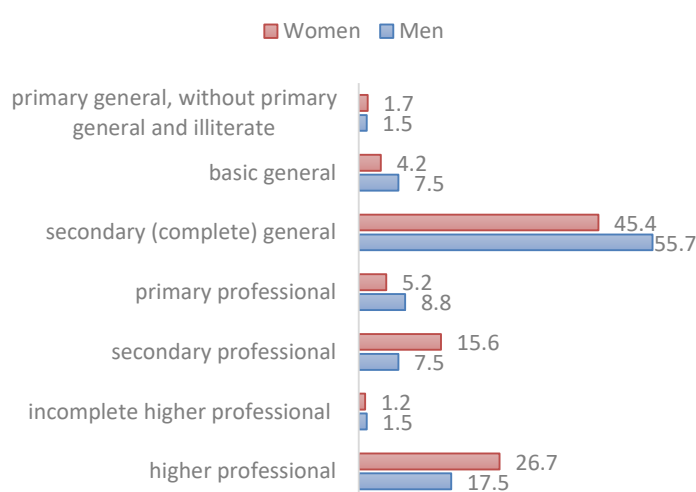|	Total	economic activity status			
		economically active population	out of which		economically inactive population
			employed	unemployed	
		Total population			
Total	**100**	**100**	**100**	**100**	**100**
out of which those who have education:					
higher professional education	16.4	20.9	21.0	19.2	9.6
incomplete higher professional education	1.9	1.5	1.4	2.4	2.6
secondary professional education	9.9	10.7	10.6	12.5	8.8
primary professional education	6.1	7.4	7.4	6.8	4.1
secondary education	50.0	51.6	51.8	49.1	47.5
basic education	10.7	6.3	6.3	7.5	17.3
primary basic/no primary basic education	5.0	1.6	1.6	2.4	10.1

Source: National Statistical Committee of the Kyrgyz Republic, Education and Science in the Kyrgyz Republic, 2018.

By analyzing the breakdown of the population by its employment status and education level provided in the table above, we see that about half of the population aged 15 and more have at least secondary education, about 15% have professional education, either primary or secondary. A similar proportion (16%) have higher professional education, i.e. tertiary education. As for the employed part of the population, almost every fifth person has higher or incomplete higher education. The part of urban population which is employed has higher educational level their working counterparts in rural areas. The breakdown by sex below illustrates that proportionally more women have acquired secondary and higher professional education than men. In addition to the cultural factor mentioned above, girls would be willing to continue their education due to the fact that "employment opportunities for women without special training are limited", whereas the majority of men can find jobs in sectors where general secondary education with some professional training would be sufficient (National Statistical Committee, 2018).

Figure 2 Employed population aged 15 years and over by educational level and sex in 2017

Source: National Statistical Committee of the Kyrgyz Republic, Education and Science in the Kyrgyz Republic, 2018.

As the role of education for the society and the state has been mentioned above, it tremendously affects lives of people on an individual level as well. Usually, more educated people know more about; hence, exercise their human, civil, and labor rights. Likewise, the prospects of getting a job and earning more money are expected results of investing into education. Lavrinovicha et al. (2015) stress that education helps "to adapt to the rapidly changing information environment, to be competitive in the labor market and, as a result, to have higher incomes." According to Picot & Hou (2011), "educational attainment is frequently viewed as the most important means of social mobility and labor market success." Therefore, education considerably contributes to social mobility of citizens between income groups. Moreover, education affects all other aspects of life, such as physical and mental health, political stance and civic activity, interpersonal relationships and overall well-being. However, when deciding to whether to invest more time and resources into education, individuals are driven more by tangible results, such as improved job and income prospects. With the expansion of the service sector in Kyrgyzstan, the public attitude to the higher education has been affected. As one can earn higher wages in the service sector without the higher education degree, citizens often pose a question of continuing their studies after graduating from school.

Taking the abovementioned issues into account, this study aims to look at microeconomic, i.e. individual, household, and community characteristics, which affect the level of educational attainment by Kyrgyz residents. This will allow us to see if there is any systemic misbalance in terms of gender, health status, income, social and cultural background, urban/rural or regional belonging and other factors in receiving education. Special attention will be paid to see if there is an intergenerational transfer of education, i.e. if the education level of parents affects the education level that their children attain, and if the size of the family impacts the distribution of education. Furthermore, the study will analyze returns to education, namely how employment and wages are affected by educational attainment. This will help to answer a question whether it pays back to obtain more education which can serve as a basis for individual decision-making as well as government policies.

In line with the study aim, the following null hypotheses are drawn:

$H_0 1$: There is an intergenerational transfer of education, i.e. the higher educational level parents have, the more education their children attain.

$H_0$2: There is a "child quantity versus quality" trade-off, i.e. the more siblings people have, the less education they attain.

$H_0$3: There are tangible returns to education, namely better employment chances and higher wages. Thus, it can be further decomposed into 2 simpler hypotheses:

$H_0$3.1: Educated people are more likely to find employment.

$H_0$3.2: Educated people are more likely to earn more money.

To test these hypotheses, I will start with thoroughly examining available literature on the given themes. Afterwards, the chapter on data will describe and analyze the source of data to be used and its chief features. The next part will focus on the methodology and results. Econometric estimation techniques and model specifications for running regression analyses will be presented. Next, the regression results will be estimated and interpreted. The last chapter will outline key findings and derive policy recommendations.

2. LITERATURE REVIEW

In the literature review, I will first go through theoretical background on educational attainment, and later have a look at empirical studies conducted at a microeconomic level which highlight the factors affecting educational attainment and returns to education.

2.1 Theoretical Framework

One of the classical theoretical studies broadly applied to an array of topics in economics is known as "human capital theory" put forward in 1960s by Gary Becker. The theory attempted to explain differences in education among people. Accordingly, it stated that education should be viewed as an "investment in human capital motivated by the higher expected earnings" (Becker, 1964). Human capital is one of key inputs in the production process and can be expressed as the stock of knowledge and skills that a worker owns and that have a direct impact on his or her productivity. Consequently, increases in human capital will improve worker's productivity which will induce firms to pay higher wages for more educated and trained workers. Another study by Becker (1965) "A Theory of the Allocation of Time" highlights that like a huge assortment of consumption goods, there are many different ways of spending one's time. As mix of several goods together provide consumers with some utility level, the combination of different activities yields common utility. Thus,

educational attainment is pursued by making a cost-benefit analysis with respect to alternative activities that individuals can engage in, like work or leisure. Other scholars viewed educational attainment as an output of a functions of given inputs, such as household and school characteristics: changing inputs leads to changes in the educational attainment. Thus, it is not determined by individual choices but rather by given characteristics of the individual and his background (Hanushek, 1986; Greenwald et al., 1994).

The human capital theory and its proponents might be missing the important factors which affect the educational outcome, such as family income or school features, by assuming that an individual chooses whichever level of education they want to acquire. On the other hand, the production function approach dismisses the decision-making role of an individual in regards to educational attainment by relating it to given characteristics only (Wilson, 2001).

2.2 Empirical Studies

The empirical approach estimates reduced-form equations of educational attainment regressing it on individual, household, and community characteristics without an explicit goal of explaining the mechanism underlying the relationship between independent variables but rather describing it.

2.2.1 Household Wealth

Wilson (2001) uses a ratio of the family income to needs and finds that it has a positive impact on educational attainment. However, this effect becomes statistically insignificant when other family characteristics are controlled. Wolfe & Behrman (1984) also state that family background plays an important role in educational attainment, and suggest that intergenerational mobility is limited. Analyzing empirical papers available on the determinants of human capital investment, Behrman & Schneider (1992) state that "family income regularly has a significant though not a large effect on human capital investments". Exploiting macroeconomic data, Filmer & Pritchtett (1998) conclude that the median years of school completion differ substantially between the poor and the well-off parts of population in several countries.

2.2.2 Gender

Stromquist (1989) emphasized that cultural expectations and labor division detriments the educational attainment of girls who are defined "primarily as future mothers." Even though women in higher socioeconomic classes have more access to university, they still are confined

in their choice of fields of study due to traditional expectations. Similarly, during interviews with parents, teachers and university students in neighboring Tajikistan in 2006–2007, respondents attributed large decrease in girls' education attainment to cultural norms which place restrictions on their future occupations and as future housewives there is not much need to get further education (Whitsel, 2009). Likewise, it was found that men attain higher qualification than women in the study on the distribution of qualification levels in Germany (Ammermueller & Weber, 2005).

2.2.3 Parental Education

Wilson (2001) finds that a higher-educated or a working mother increases the likelihood of graduation of a child. In a two-country study of educational attainment of the children of immigrants in the US and Canada, Picot & Hou (2011) conclude that parental education, in addition to residential location, can explain the positive gap in educational attainment between the children of immigrants and those born to native parents. However, it goes against findings of another research according to which intergenerational transmission of educational attainment is rather weak between immigrants and their children born in the country of immigration (Aydemir & et al., 2013). In the study of the 1970 Brazilian household data, children from poorer families and less-educated parents enjoyed greater positive effect from public inputs on their schooling (Birdsall, 1985). It suggests that public programs might help to close the educational gap of the children arising due to family income and parental education. On the contrary, for the birth cohorts 1929 through 1978 in Germany, the role of parents' education persisted in spite of education reforms and policy changes (Heineck & Riphahn, 2009). As for Behrman & Schneider (1992), there is a strong intergenerational association between parental schooling and child schooling, especially for mothers' human capital. Using individual data, Altonji and Dunn (2008) find mixed evidence in respect of the effect of parental education. Nevertheless, in most of the specifications "having a more educated parent is associated with a higher rate of return to education". Other researches highlight the strong effect, both statistically and economically, of parental education on children's educational success (Hill & Duncan 1987; Haveman et al., 1991, Lehrer, 1999).

2.2.4 Number of Siblings & Other Factors

In addition to parental education, B.R. Chiswick (1988) found that having fewer siblings led to more educational attainment, explaining that thus they would compete less for parental time and other family resources. Likewise, Lehrer (1999) using OLS estimations determine

that number of siblings affect schooling negatively. It fits with the study by Booth & Kee (2008) that all other things equal, children coming from larger families attain less education. Rumbaut (2005) point out incarceration for men and early childbearing for women as turning points which considerably disrupt educational and occupational attainment. Findings by Abada et al. (2008) suggest that race and ethnicity are inherent factors in educational stratification. Wolfe & Behrman (1984) in their paper on schooling determinants in Nicaragua conclude that "rural boys receive less schooling than rural girls, possibly because of higher opportunity costs for boys in agricultural work".

2.3 Returns to Education

As for the returns to education, several empirical studies have been carried out. The majority of them find a positive link between education attainment and employment chances and higher wages. Lavrinovicha et al. (2015) empirically confirmed that the influence of education on labor status and incomes is significant; therefore, the role of education is in the spotlight in the modern world. Riddel & Song (2011) arrived at the conclusion that education significantly increases re-employment rate, especially 12 to 16 years of schooling have a large impact. On the other hand, they find that evidence on the impact of formal schooling on unemployment incidence is mixed. Another study looked at school-leavers and discovered that those who leave school but earn some qualification are at a lower unemployment risk than those with general education only. Furthermore, the unemployment risk gap gradually widens between low-educated and medium- and highly educated people for both sexes (Klein, 2015). Baah-Boateng (2013) confirms that education and gender can explain unemployment in addition to age and urban location. Looking into durations of unemployment spells, Tansel & Tasci (2004) demonstrate that education has a positive effect on the hazard rate. Analyzing unemployment duration in Russia during the beginning of transition with the use of longitudinal surveys, Foley (1997) finds that educated or high-skilled individuals have very low unemployment rate in comparison to low-skilled individuals or those without education. The study exploiting two national household surveys for the mid-1990s of South Africa and the probit estimation technique revealed that main determinant of unemployment is education in addition to age, sex, race, location, and home ownership (Kingdon & Knight, 2001). Similarly, Wilson (2001) finds that high-school graduates earn more than their counterparts who didn't graduate. Behrman & Schneider (1992) also find that the schooling impact is significant on wages and productivity. However, the returns are relatively higher to lower schooling. Another study analyzed unemployment of two distinct age groups: adults and

youth of 15-25 years old in Italy and Russia. For adults, secondary and tertiary education were found to be statistically significant with higher decreasing the likelihood of the being unemployed. As for youth, tertiary education was insignificant and secondary education increased the probability of the unemployment status. Based on the findings, it was also outlined that services should be provided to young people for their smooth "school-to-work" transition (Marelli & Vakulenko, 2016).

2.4 Studies Done in Kyrgyzstan

One of the recently published papers on the topic is concerned with education and job mismatch and how it effects employment of youth in Kyrgyzstan. Using OLS and propensity score matching, Karymshakov & Sulaimanova (2018) find that over-education leads to lower earnings of young people. Moreover, young people with technical education are more likely to be employed in relevant jobs rather those with higher education. The assessment of higher education in Kyrgyzstan done by the Asian Development Bank (2015) concluded that "the secondary technical and vocational education sector represents an opportunity for many higher education institutions to align their education programs with the immediate needs of the labor market". Kroeger & Anderson (2014) with a focus on the period of 2005-2009 analyze the impact of remittances on education and health of children. The male students between 14 and 18 years old were less likely to be enrolled in school in households which received remittances with distinct regional differences. The study of young people's transition from school to work in 2011-2012 conducted by the European Training Foundation (2013) revealed that those with basic education are usually engaged in unpaid household work, whereas those with primary vocational education or general secondary education only tend to work in informal sectors of the economy. On the contrary, those with secondary vocational education or higher education have better chances of getting formal employment. It confirms that there is a link between education attained and labor market positions of the youth in Kyrgyzstan. A comparative study of four Central Asian countries, namely Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan was conducted focusing on the policy change of the latter three in terms of compulsory education until grade 9 instead of 11 as during the Soviet Union's single education system. In Kazakhstan, where compulsory education remained until the 11th grade, demonstrated higher school attainment and larger probability of earning higher education among its students in comparison to students of its neighboring countries (Whitsel, 2014). Another study analyzed intergenerational educational mobility with a focus on the post-socialist transition. Running OLS regressions, the authors revealed that high educational

mobility was maintained despite the decline in living standards (Brück & Esenaliev, 2017). As this is the closest study in terms of topic, some primary differences with the given research should be outlined. The key independent variable used by Brück & Esenaliev (2017) was average years of schooling of both parents. In contrast, I will be using education levels of each parent separately to track the impact of mothers' and fathers' education on their children's educational attainment. Moreover, my model specifications are quite extended involving numerous variables, whereas the last paper only included some variables of interest. On the whole, I believe that this research can complement the findings of previous researchers done in Kyrgyzstan by shedding light on new aspects in the issues of educational attainment and returns to education.

3. DATA DESCRIPTION

3.1 Data Source

The data used in the study is the results of the "Life in Kyrgyzstan" study (LiK). It is a research-based, multidimensional longitudinal survey of households and individuals in Kyrgyzstan. It is publicly available for non-for-profit research, policy analysis and teaching purposes. The first time it was conducted in 2010 and repeated in 2011, 2012, 2013, 2016 and 2020. Throughout these years, it tracks the same 3,000 households and 8,000 individuals in 7 oblasts (largest administrative units) and 2 largest cities: capital Bishkek and Osh city. Hence, the data are representative both at the national and regional levels. The survey includes sections on household demographics, including education, health, subjective well-being, employment, migration, etc., of household members. Likewise, household characteristics, such as housing, assets, expenditure items, agricultural production, shocks, social networks, and so on. Majority of the topics are addressed in every wave whereas some topics are available only for specific waves. As all household members are tracked since 2010 while new ones who have joined the household are added as well, this survey serves as one of very few options for building panel data sets in Kyrgyzstan.

Since its establishment by Professor Tilman Brück, the study has been financed by the German Volkswagen Foundation and DFID, and each wave has been conducted by a consortium of different institutions comprising of the German Institute for Economic Research, International Food Policy Research Institute, Food and Agriculture Organization of the United Nations, the University of Central Asia and other research institutions from Asia,

Europe and North America. Since 2015, an annual academic conference of researches using the LiK data takes place around October in Bishkek, Kyrgyzstan. The conference brings various stakeholders to discuss recent socio-economic occurrences and to promote evidence-based policy making in Kyrgyzstan and Central Asia.

One of the drawbacks of the dataset in the framework of the given study is that educational levels of parents is not available for all of the respondents but only a fraction of them. Likewise, some variables were not recorded in the straightforward form, such as the birth order which will be discussed later in detail.

In this study, I have used 2010, 2011, 2012, 2013, and 2016 waves. The first wave of 2010 is exploited only for extracting information on parents' education of respondents inasmuch as the question on schooling years of respondents themselves wasn't included in this wave, only their education levels. The last wave of 2020 was dropped due to the fact that the survey results are not available yet. A pooled cross-sectional dataset was compiled using the given years. Its choice over other types of datasets is advocated due to the fact that it enlarges a sample size considerably and as the literature review showed OLS estimation technique was frequently used for which pooled cross-sections are sufficient. Besides, another reason is the relatively static quality of educational attainment after some age. I started with the 2011 sample and updated it with newer information available in subsequent years for the existing individuals. Also, I added the new household members who joined in the following waves. Booth & Kee (2008) in their study of the birth order's impact on educational attainment in the Great Britain dropped individuals younger than 28 years old in order to ensure that respondents have completed their education. In case of Kyrgyzstan, 25 years of age seems to be a better fit as majority of citizens complete their education by around this age. After dropping those who are younger than 25, I arrive at the first sample containing 7,360 unique individuals with their latest reported data.

On the whole, as both datasets are comprised of very large and representative samples, the results obtained shall be deemed reliable. "Household Composition", "Education and Health" "Housing", "Labor Markets", "Movements" and other sections of the survey are utilized. The samples are representative at the national, rural/urban, and south/north levels.

3.2 Variable Description

In the analysis of determinants of educational attainment, I use two types of dependent variables. The first one is total number of years spent at educational institutions which is derived as a sum of answers to two questions in the survey:

1. *"How many years, in total, did you study in secondary school?"*
2. *"In total, how many years did you study in post-secondary education such as technikum or university?".*

This is very convenient as typically surveys only report the highest education attained and the years have to be computed manually. However, as some education levels may take a range of years, these calculations are not always accurate. The second one is a dummy equal to 1 if the person has higher education or 0 otherwise. This will help to discern the factors which affect acquisition of higher education.

In the analysis of returns to education, there are 2 explained variables as well. The first one is a dummy on the employment status of the respondent, and the second is an income per month earned from labor contracts and profits if the respondent owns some business enterprise. It is reported in 2011 constant Kyrgyz soms (KGS).

The set of independent variables slightly change for each model specification presented in the next part of the paper. Here is the list of independent variables and their definitions.

Table 4   Independent Variables and Descriptions

Variable Name	Description
female	= 1 if female, 0 otherwise
age	age (in full years)
age_squared	age squared
generation	generation: = 1 if Baby Boomers (born in 1946-1964) = 2 if Generation X (born in 1965-1980) if Silent Generation (born in 1912-1945) = 3 = 4 if Generation Y (born in 1981-1996)
chronic	a sum of chronic illnesses a respondent has
ethnicity	ethnicity: =1 if Kyrgyz = 2 if Uzbek

	= 3 if Russian = 4 if Dungan = 5 if Uighur = 6 if Tajik = 7 if Kazakh = 8 if Other
minority	=1 if the respondent's ethnicity is different from Kyrgyz, 0 otherwise
language	first language = 1 if Kyrgyz = 2 if Uzbek = 3 if Russian = 4 if Other
migrant	= 1 if the respondent wasn't born in the current place of residence, 0 otherwise
house_inherited	= 1 if the household has inherited housing, 0 otherwise
land_inherited	= 1 if the household has inherited land, 0 otherwise
educ_father	father's education level: = 1 if illiterate = 2 if primary = 3 if basic = 4 if secondary general = 5 if technical/special (primary/secondary) = 6 if university (bachelor, diploma, master) = 7 if PhD or equivalent
educ_mother	mother's education level: = 1 if illiterate = 2 if primary = 3 if basic = 4 if secondary general = 5 if technical/special (primary/secondary) = 6 if university (bachelor, diploma, master) = 7 if PhD or equivalent
siblings	a number of brothers and sisters a respondent has
birth_order	birth order based on age = 1 if the eldest = 2 if the second order by age, but not the youngest = 3 if the second order by age and the youngest = 4 if the third or more order by age, but not the youngest =5 third or more order by age and the youngest

marriage_age	first marriage age (for women only)
employment	= 1 if the respondent is employed, 0 otherwise
income_constant	individual income per month in constant 2011 Kyrgyz soms
married	= 1 if the respondent is married or lives together with a partner, 0 otherwise
rural	= 1 if the household is located in a rural location, 0 otherwise
oblast	= 1 if the household is located in the city of Bishkek = 2 if Issyk-Kul oblast = 3 if Jalal-Abad oblast = 4 if Naryn oblast = 5 if Batken oblast = 6 if Osh oblast = 7 if Talas oblast = 8 if Chui oblast = 9 if Osh city
south	=1 if the household is located in the southern part of the country (Jalal-Abad, Osh, Batken oblasts and Osh city), 0 otherwise

Source: author's construction based on LiK survey

In the "generation" variable, the borders of the Silent Generation are wider than conventionally used owing to the fact that there only very few respondents born in the generation before. Education levels of parents was slightly modified in the way it is depicted; more precisely, the original list contained of 8 categories but categories 5 and 6 were combined as in different waves the places of secondary technical and primary technical was not the same. Ideally, the data on the income or wealth status during the previous period when the respondents were making decisions about their education would be utilized. As such information is not available, instead I used dummies for inherited house and inherited land as proxies for the wealth status of the household.

3.3 Summary Statistics

The summary statistics of the explanatory variables are provided below.

Table 5   Summary Statistics of Variables

Variable	Mean	Std. Dev.	Min.	Max.
female	0.522	0.499	0	1
age	46.664	15.532	25	99
age_squared	2,418.798	1,597.652	625	9,801
generation	2.135	0.954	1	4
chronic	0.397	0.677	0	7
ethnicity	1.784	1.537	1	8
minority	0.330	0.470	0	1
language	1.512	0.880	1	4
migrant	0.044	0.205	0	1
siblings	4.242	2.537	0	15
birth_order	2.318	1.265	1	5
marriage_age	21.020	3.228	13	45
educ_father	3.373	1.443	1	7
educ_mother	3.223	1.417	1	7
house_inherited	0.026	0.160	0	1
land_inherited	0.193	0.395	0	1
rural	0.629	0.483	0	1
oblast	4.691	2.590	1	9
south	0.496	0.500	0	1
employment	0.514	0.499	0	1
income_constant	3,957.374	6,503.454	0	134,960.5
married	0.754	0.430	0	1

Source: author's construction based on LiK survey results

Out of 7,360 respondents 3,518 are females (47.80%) and 3,842 are male (52.20%). The mean age of the respondents is equal to 46.6. Half of the respondents are employed, and the average monthly income is around 4,600 Kyrgyz soms (KGS).

The following figure shows the educational attainment segregated by sex. No outstanding differences can be pointed out between men and women. The handsome majority of both sexes fall in the category of the Secondary education.

Figure 3 Educational Attainment of Women and Men in the Sample
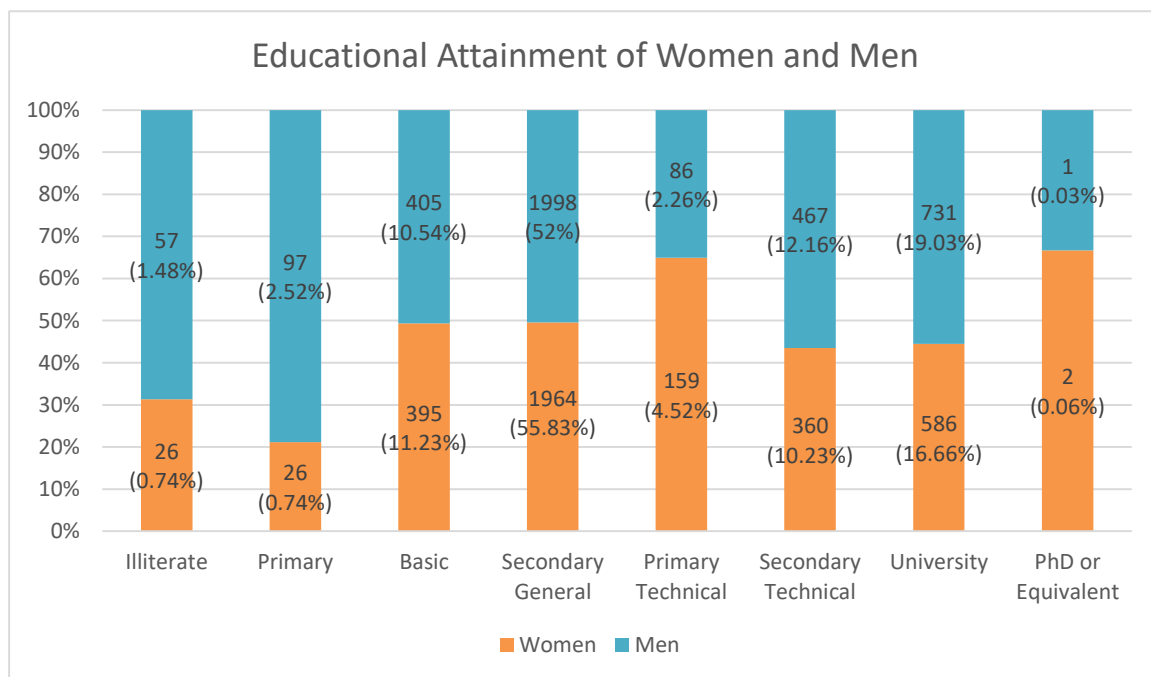
Source: author's construction based on LiK survey results

The number of women with Primary Technical education prevail that of men by almost twice. However, more men have attained Secondary Technical education or some university degree than women both in absolute and relative terms. It is obvious from the graph that half of both women and men have the Secondary General education, meaning that they didn't continue their education after graduating from school. An interesting question on subjective perception of the value of school education was included in the survey. It asked *"To what extent was the education you obtained at school useful for your professional life?"*. Out of 6,961 respondents, only 7% replied that it was not useful at all. 33% and 61% of them agreed that the school education was "very useful" and "useful" respectively.

In the figure below, the educational attainment of residents in rural and urban locations are depicted. It is obvious that there are more people with secondary technical education,

university degree or higher in urban locations in contrast to rural ones both in terms of absolute and relative numbers.

Figure 4 Educational Attainment in Rural and Urban Locations
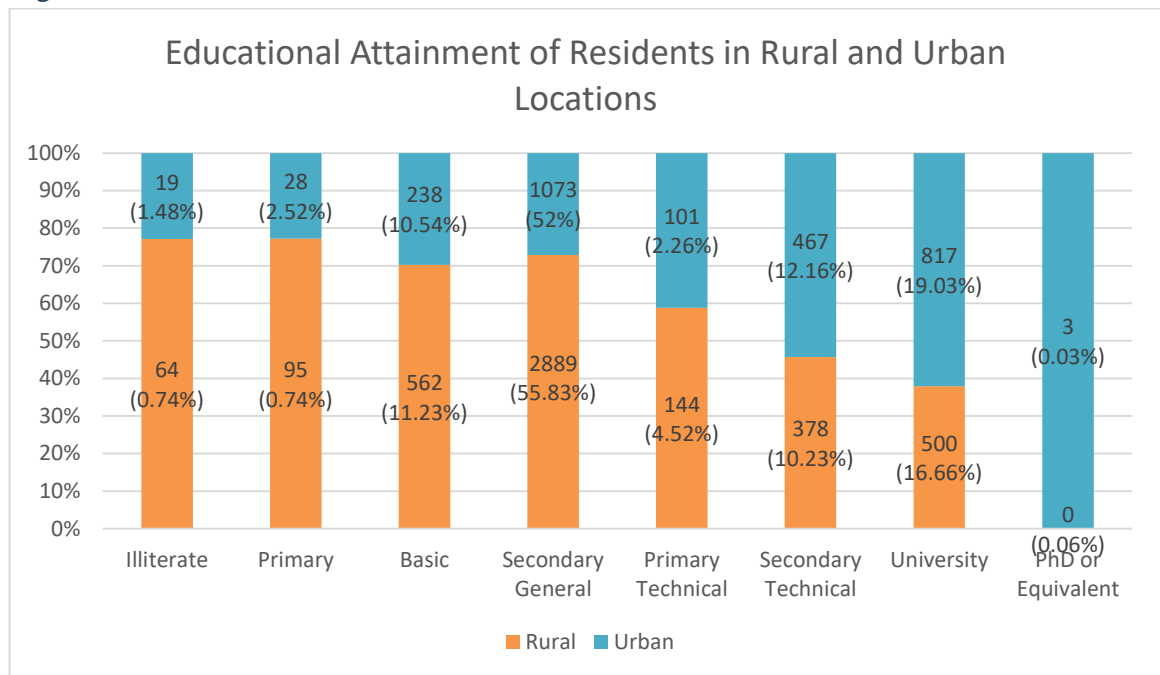
Source: author's construction based on LiK survey results

The next figure compares the educational attainment in terms of southern and northern parts of the country. There are almost twice more residents with higher education in the Northern part in absolute numbers but in relative terms, it is about 3% less. A higher number of illiterate or those with primary education live in the Southern regions.

Figure 5 Educational Attainment in the Southern and Northern Regions
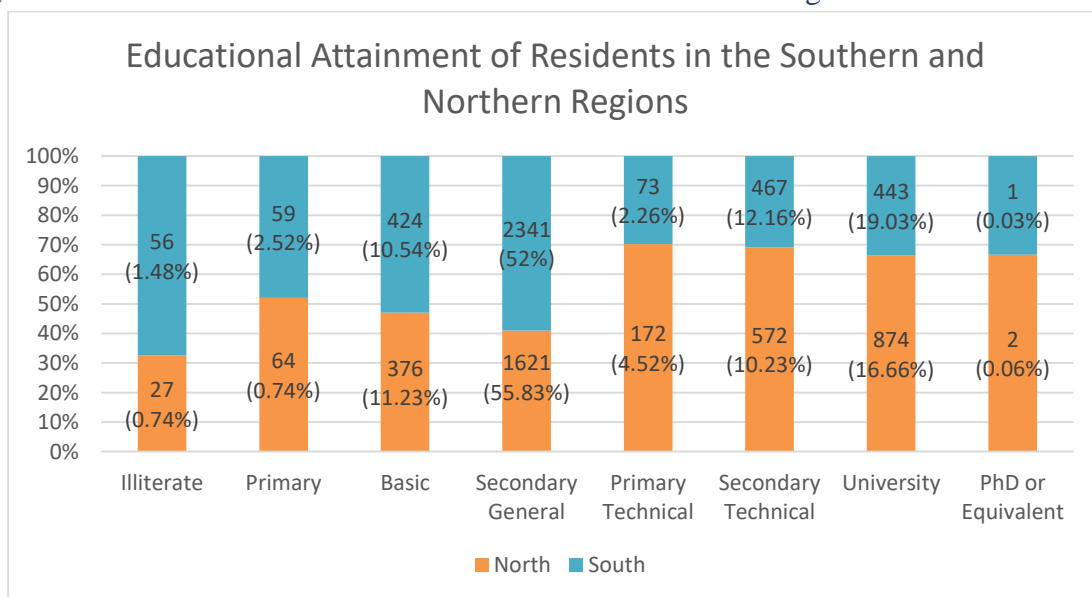
Source: author's construction based on LiK survey results

Even though no considerable difference was identified between educational attainment of women and men, in the pie-charts below it is clear that it is not the same case in terms of employment. The percentage of employed men prevails that of employed women by 22%, whereas 63% of the unemployed people are composed by women.

Figure 6 Employment Status of the Women and Men
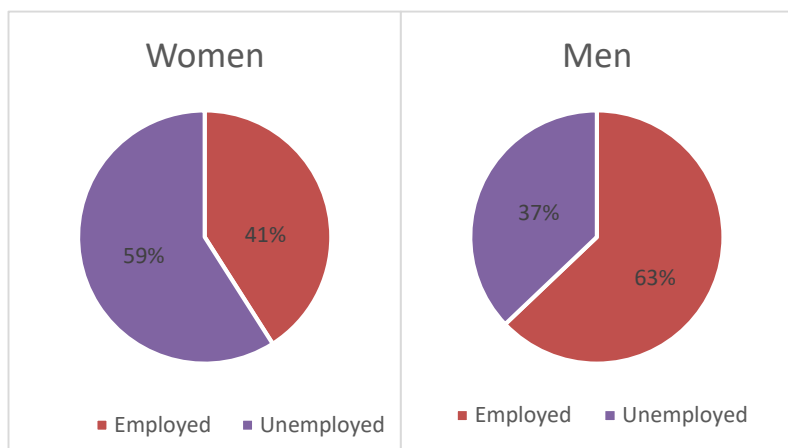
	Employed	Unemployed	Total
Women	1,574	2,268	3,842
Men	2,213	1,305	3,518
Total	3,787	3,573	7,360

Source: author's construction based on LiK survey results

4. METHODOLOGY & RESULTS

4.1 Theoretical Foundation

According to Guimbert et al. (2008), analysis of educational attainment and other activities connected to schooling like enrollment or attendance generally begins with a comparison of benefits and costs which can be expressed as the following function: $E = f(S, C, H, R)$;

where E is education variable,

S is a vector of educational institution characteristics

C is a vector of individual characteristics

H is a vector of household characteristics

R is a vector of community or regional characteristics

Including all vectors into the regression would be an optimal choice; however, as the analysis is focused on general educational attainment, it involves a diverse array of educational institutions whose characteristics cannot be easily summed by specific variables. If the primary emphasis was on the school education, the variable on the type of the school, public or private, which is available in the survey could have been used. Nevertheless, the variability is very small as only a very limited number of respondents attended private schools. As for other educational institutions attended by the respondents, no such data is available. Thereby, only individual, household, community, and regional features will be included. Likewise, according to theoretical studies, an individual may allocate their time to leisure and work, besides education. In particular, as in Ravallion and Wodon (2000), it is assumed that families have the following utility function:

$$U = U \ (C; \ S; \ H; \ Z);$$

where C is consumption, S stands for schooling, H is leisure, and Z is a vector of household characteristics. In addition, the individual's total time available is:

T = S + H + L; where S – time devoted schooling, H – to leisure, and L – to labor.

So, a decision whether a person attains more education depends not only on individual, family or community characteristics, but also on the opportunity cost of receiving education with respect to other activities that a person can be involved in.

4.2 Regression Results

For the first part of the analysis on the determinants of educational attainment, I will use 4 model specifications. The first one is the model where the dependent variable is a number of years of education. The second one is the same model but with educational attainment of a respondent's father and mother included as explanatory variables. As the data on parents' education is available only for smaller number of respondents, I have to run this model separately. The third model is the one with the dependent variable specified as a dummy of having a higher education level or not. Likewise, the last specification is the third model with added variables of parents' education levels. I use Ordinary Least Squares (OLS) and Probit estimation techniques for the first 2 and the last 2 models respectively. The marginal effects at means for Probit models can be found in the Appendix, Table 9.

As a robustness check, I also run an ordered probit of highest educational degree and OLS of the natural logarithm of years of education, as Booth & Key (2008) did in their regression analyses which will be reported in the Appendix. Likewise, additional model specifications

using variables which are not available for the whole sample but only part of it will be reported below.

Table 6 Regression Results on the Determinants of Educational Attainment

Model	Model I	Model II	Model III	Model IV
Method	OLS	OLS	Probit	Probit
Dep. Var.	Educ. Years	Educ. Years	Higher Educ.	Higher Educ.
Indep. Var.	All	Parents' Educ.	All	Parents' Educ.
Individual				
female	-0.018 (0.05)	-0.154 (0.06)**	0.161 (0.06)***	0.125 (0.09)
chronic	-0.254 (0.04)***	-0.197 (0.05)***	-0.008 (0.05)	-0.025 (0.07)
migrant	-0.475 (0.14)***	-0.586 (0.16)***	1.029 (0.09)***	1.171 (0.12)***
Household				
house_inherited	0.177 (0.17)	0.084 (0.23)	0.729 (0.13)***	0.680 (0.22)***
land_inherited	-0.265 (0.07)***	-0.172 (0.08)*	-0.332 (0.09)***	-0.420 (0.15)***
educ_father				
-Primary		0.530 (0.17)***		0.631 (0.39)
-Basic		0.587 (0.20)***		0.745 (0.42)*
-Sec. General		0.471 (0.22)***		0.851 (0.44)*
-Tech./Special		1.058 (0.23)***		0.984 (0.43)**
-University		1.670 (0.24)***		1.139 (0.44)***
-PhD or eq.		1.850 (1.62)		
educ_mother				
-Primary		0.473 (0.16)***		-0.153 (0.30)
-Basic		0.498 (0.19)**		-0.163 (0.33)
-Sec. General		0.744 (0.22)***		-0.178 (0.35)
-Tech./Special		1.088 (0.23)***		-0.009 (0.34)
-University		1.602 (0.26)***		0.024 (0.36)
-PhD or eq.		4.161 (1.61)***		
siblings	-0.006 (0.012)	0.007 (0.01)	-0.028 (0.01)**	-0.050 (0.02)**
Community				
generation				
Generation X	0.109 (0.072)	-0.259 (0.08)***	0.311 (0.09)***	0.191 (0.12)
Generation Y	0.792 (0.07)***	0.550 (0.12)***	0.659 (0.09)***	0.554 (0.13)***
Silent Gen.	-2.856 (0.11)***	-2.157 (0.13)***	-0.161 (0.15)	-0.023 (0.22)

ethnicity

Uzbek	0.709 (0.11)***	-0.550 (0.13)***	-0.705 (0.19)***	-0.545 (0.26)**
Russian	-0.206 (0.18)	-0.159 (0.22)	-0.486 (0.17)***	-0.663 (0.24)***
Dungan	-1.100 (0.23)***	-0.806 (0.27)***		
Uighur	-0.618 (0.25)**	-0.720 (0.37)*	-0.308 (0.25)	0.052 (0.36)
Tajik	-0.587 (0.32)*	-0.540 (0.38)	-0.026 (0.33)	0.476 (0.47)
Kazakh	0.037 (0.45)	0.644 (0.51)	-0.213 (0.45)	0.058 (0.53)
Other	-0.762 (0.20)***	-0.663 (0.25)***	-0.488 (0.22)**	-0.549 (0.32)*

language

Uzbek	-0.480 (0.13)***	-0.325 (0.16)**	0.027 (0.21)	-0.077 (0.29)
Russian	0.364 (0.16)**	0.302 (0.19)	0.532 (0.15)***	0.587 (0.20)***
Other	-0.398 (0.22)*	-0.455 (0.27)*	0.072 (0.27)	-0.012 (0.39)

Regional

rural	-0.483 (0.08)***	-0.360 (0.09)***	-0.295 (0.09)***	-0.452 (0.13)***

oblast

Issyk-Kul	-1.281 (0.13)***	-1.050 (0.15)***	-0.192 (0.14)	-0.129 (0.18)
Jalal-Abad	-1.873 (0.12)***	-1.784 (0.14)***	-0.086 (0.12)	-0.011 (0.17)
Naryn	-1.819 (0.16)***	-1.622 (0.20)***	-0.329 (0.22)	-0.113 (0.30)
Batken	-2.136 (0.14)***	-1.934 (0.16)***	-0.293 (0.16)*	-0.463 (0.28)*
Osh	-1.706 (0.13)***	-1.407 (0.16)***	0.148 (0.13)	0.387 (0.19)**
Talas	-1.532 (0.17)***	-1.265 (0.20)***	-0.505 (0.22)**	-0.227 (0.28)
Chui	-1.623 (0.12)***	-1.349 (0.14)***	-0.268 (0.12)**	-0.077 (0.17)
Osh city	-0.842 (0.15)***	-0.495 (0.18)***	0.534 (0.12)***	0.622 (0.16)***
constant	13.24 (0.11)***	11.81 (0.18)***	-1.91 (0.12)***	-2.523 (0.35)***
Observations	7,360	4,689	7,127	4,537
R^2	0.2574	0.3287	n/a	n/a
Pseudo R^2	n/a	n/a	0.1843	0.2644

* significant at 10%
** significant at 5%
*** significant at 1%

The female variable is significant only in the second and the third model with a negative and positive signs respectively. When controlling for parents' education levels, women attain 0.154 years less of education than men at 5% significance level. On the

contrary, women are more likely to have higher education than men in Kyrgyzstan but it loses its statistical significance when parents' education is controlled. The first finding is in compliance with studies in other developing countries where usually women have less chance of receiving education but the second finding contradicts it. Also, it confirms the statement National Statistical Committee (2018) that women face limited employment opportunities without special training. This prospect might be motivating women to receive higher education more often than men.

The chronic variable accounting for the number of chronic diseases a person has is statistically different from 0 in the first two models at 1% significance level. People with health issues might face more challenges in attaining education due to continuous physical and mental strain needed for attaining education. However, they often might be missing classes at school due to the health condition or spending financial resources on treatment which could have been directed for educational purposes.

The migration dummy variable is statistically significant in all models. In case of total years of schooling, people who were not born in their current place of living had fewer years of schooling. Whereas, in attaining higher education they were more likely to have it. In the first case, it can be explained how moving places can pose some barriers in educational attainment, especially in schools as usually places are fully occupied and registration documents are needed for registering as a school student. In the second case, moving might contribute to improving access to higher educational institutions, especially in case of rural to urban migration.

In respect to household characteristics, inheriting a house has a statistically significant positive effect at 1% significance level in the Probit models only. As this variable was used as a proxy for household's wealth, the result supports the statement that inheriting a house increases the likelihood of getting higher education in Kyrgyzstan.

On the other hand, inheriting land is statistically significant in all models with a negative sign. Inheriting some land leads to fewer schooling years according OLS models and fewer odds of entering university. Agriculture plays an important role in the economy of the country, and citizens who live in rural areas use it as one of their major income sources. Thus, inheriting land might make engaging in agricultural activities more attractive for people rather than continuing their education. It goes in hand with the theoretical framework of the opportunity costs discussed above. The same is true for getting higher education when parent's

educational level is included in the model. Therefore, the land as an asset and a possible indicator of wealth doesn't increase one's chances to pursue more education in this analysis.

Education level of parents is statistically significant in both second and fourth models. Except for father's PhD or equivalent level, all other levels of both father's and mother's education have positive impact on their children's schooling years. The magnitudes of father's and mother's education levels are more or less similar, except for the fact that fathers' primary or basic education levels have larger coefficients than those of mothers. In the opposite way, Secondary General education of mothers has larger impact than the same educational level of fathers. Having technical/special, university or higher degree has the largest magnitudes. For instance, having a mother with university degree or PhD or equivalent increases one's schooling years by 1.63 and 4.18 years respectively. Thus, these findings confirm that there is an intergenerational transfer of education from parents to children. People with low levels of education might not assign due weight to the education of their children, in contrast, those who received more education themselves would strongly support better schooling of their children. Moreover, those parents with more education might have better social capital and more financial resources which would also allow their children to study more. In terms of higher education, interestingly only father's education plays a statistically significant positive role whereas mother's education is insignificant. This difference can be accounted for in part by a cultural phenomenon due to which fathers, usually as heads of households, have more voice in some important household decisions, including sending children to university.

A number of siblings a person has is statistically insignificant in terms of education years which allures to the notion that there is not a very strong "child quantity versus quality" trade-off. On the other hand, in terms of getting higher education such a trade-off exists as people with more siblings are less likely to get it. This can be explained by the fact that higher education usually requires more commitment in terms of financial resources from the family, and hence, decreases one's chances of attending university when there more children are present in the family and compete for the same resources. This finding is also in line with the literature discussed.

The generational differences are also present according to the results of the regressions. In the first model, the Generation Y has more years of schooling whereas the Silent Generation has around three years less than the Baby Boomers Generation. Likewise, the Generations X and Y have a higher probability of having higher education than Baby

Boomers but when parental education is taken into account, it concerns only the latter one. Surprisingly, the Generation X has 0.25 fewer schooling years in the second model and it is difficult to provide some satisfactory explanation for this. On the whole, the results demonstrate that educational attainment is becoming more accessible and affordable than before. It would be interesting to conduct a similar study in the future incorporating educational attainment of newer generations as they age to see if this trend is sustainable.

In the first model, five out of seven ethnic minority groups have statistically significant and negative impact on total years of schooling in comparison to the major ethnic group of the Kyrgyz people. The result stays negative for four of them when parental education is controlled. It confirms the findings by Brück & Esenaliev (2017) who also highlighted a prominent role of the ethnicity in educational attainment but only with two ethnicities of interest. In addition to cultural differences, a language barrier might be one of the major justifications as education is mainly delivered in Kyrgyz and Russian languages at state educational institutions. A small number of secondary schools have Uzbek and Tajik as languages of instruction, primarily in the southern part of the country (National Statistical Committee, 2018). In fact, the next variable which tracks down the impact of the first language of the respondent complies with this proposition. In terms of higher education, three categories of ethnic minority groups also assert a statistically significant negative effect.

Going further, it can be easily noticed that having Russian as the first language has a positive impact both on the years of education and attainment of higher education whereas having Uzbek and other languages reduces the years of education. As mentioned above, a good justification might be owing to the fact that Kyrgyz and Russian are major languages of instruction in the Kyrgyz Republic. Particularly, more learning materials and resources are available in Russian due its widespread use in other countries. Moreover, according to the Government Resolution #514 (2013), the nationwide testing for entering higher educational institutions in the Kyrgyz Republic shall be conducted only in Kyrgyz and Russian. Previously, versions in Uzbek and other languages (if there were enough applicants) were available for the school graduates and those wishing to take the test. The decision was taken on the grounds that higher education is mostly offered in Russian and Kyrgyz in the country and it is not very reasonable to conduct the test in other languages. Moreover, removing additional language options would cut down high operational costs of translating the tests. Therefore, since then it poses an additional obstacle for those whose mother tongue is different from Kyrgyz or Russian to receive higher scores on the test, and hence, pursue

higher education. One of the school principals from a predominantly ethnic Uzbek school also pointed out that "Multilingual education is necessary in order to give them a fair chance to access higher education" (UNICEF, 2018).

The last batch of variables are regional variables: dummy for rural location and regions of Kyrgyzstan as categorical variables. The dummy for rural location is statistically significant in all four models with a negative sign. Likewise, all of the regional categories are statistically different from 0 in the first and second models and some are so in the third and fourth models. The magnitudes of the variables are considerably higher in comparison to other variables: living in other oblasts except for Osh city implies one or more years of less education than living in Bishkek. These results show that there is a noticeable discrepancy between educational attainment of people living in the in the regions in comparison to their counterparts from the capital city of Bishkek, and those who reside in rural locations also have less educational attainment than those in urban settlements. Abazov (1999) contemplates that after the dissolution of the Soviet Union, people with better education started to disproportionately migrate both abroad and from villages to urban settlements. Thus, the discrepancy in educational attainment shows that regions in general and rural settlements in particular should stay in the focus of the both economic and social development agenda to prevent "brain-drain" and offer opportunities for educated residents to stay at home and invest their human capital into the development of their native places.

Robustness checks with ordered probit and natural log of education years do not contradict with the results above. Similar variables are statistically significant with the same sign of the coefficients. Likewise, an additional model including only those who are 28 and above was analyzed. It returns similar results to the models with the age of 25 and above (see Appendix, Table 10).

In addition to the above model specifications, separate regressions were run with additional explanatory variables whose values are not available for all observations. The variable birth order in the family which could offer evidence for the advantage or disadvantage in receiving education based on birth order turned out to be statistically insignificant. The explanation behind this could be that it was initially recorded not as a first, second, etc. child in the family but in a very specific list of five choices, such as the eldest; second order by age, but not the youngest; second order by age and the youngest, etc. Even using it as a categorical variable doesn't produce significant results. Thus, based on this

sample and available variable, there is no effect of the birth order on educational attainment. Another variable of additional interest was marriage age. It was available only for 3,473 female respondents. The results yielded positive coefficients which are statistically significant in terms of years of schooling. One additional year of getting married later adds 0.145 years or 1.74 months of more schooling for women. Moreover, all education levels of mothers are statistically significant for the educational attainment of their daughters unlike fathers' education levels out of which only three are statistically significant. Likewise, the magnitudes are higher for mothers' educational levels. For instance, having a father and a mother with a university degree increases schooling years of the daughter by 1.33 and 2.19 years respectively at 1% significance level. These results demonstrate that mothers' education plays a more substantial role in the educational attainment of girls which emphasizes the importance of female education due to its high intergenerational transferability.

Table 7 Regression Results on Models with a Specific Variable Focus

Model	Model I	Model II
Method	OLS	OLS
Dep. Var.	Educ. Years	Educ. Years
Indep. Var.	Birth Order	Marriage age
Individual		
female	-0.071 (0.08)	
chronic	-0.134 (0.06)**	-0.227 (0.06)***
migrant		-0.368 (0.21)*
Household		
house_inherited	0.592 (0.58)	0.137 (0.30)
land_inherited	-0.153 (0.10)	-0.106 (0.11)
educ_father		
-Primary	0.236 (0.21)	0.382 (0.24)
-Basic	0.249 (0.24)	0.513 (0.27)*
-Sec. General	0.076 (0.26)	0.388 (0.30)
-Tech./Special	0.694 (0.27)***	0.985 (0.31)***
-University	1.137 (0.29)***	1.332 (0.32)***
-PhD or eq.	1.501 (1.56)	
educ_mother		
-Primary	0.349 (0.20)*	0.995 (0.23)***
-Basic	0.322 (0.23)	0.977 (0.27)***

-Sec. General	0.674 (0.25)***	1.312 (0.29)***
-Tech./Special	1.000 (0.26)***	1.488 (0.30)***
-University	1.562 (0.29)***	2.191 (0.34)***
-PhD or eq.	3.932 (1.55)**	
siblings	0.021 (0.01)	0.019 (0.01)
Community		
generation		
Generation X	-0.245 (0.09)**	-0.145 (0.11)
Generation Y	0.535 (0.14)***	0.699 (0.14)***
Silent Gen.	-2.099 (0.17)***	-2.410 (0.17)***
ethnicity		
Uzbek	-0.583 (0.14)***	-0.309 (0.18)*
Russian	0.164 (0.26)	0.215 (0.29)
Dungan	-0.700 (0.32)**	-0.858 (0.36)**
Uighur	-0.218 (0.60)	-0.661 (0.46)
Tajik	-0.483 (0.42)	-1.039 (0.49)**
Kazakh	2.669 (0.91)***	0.380 (0.76)
Other	-0.762 (0.30)**	-0.561 (0.32)*
language		
Uzbek	-0.454 (0.18)**	-0.659 (0.21)***
Russian	0.098 (0.22)	0.213 (0.25)
Other	-0.657 (0.31)**	-0.483 (0.35)
Regional		
rural	-0.183 (0.11)	-0.419 (0.12)***
oblast		
Issyk-Kul	-1.288 (0.18)***	-0.878 (0.20)***
Jalal-Abad	-1.952 (0.17)***	-1.775 (0.19)***
Naryn	-1.949 (0.22)***	-1.255 (0.26)***
Batken	-2.051 (0.19)***	-1.697 (0.22)***
Osh	-1.587 (0.18)***	-1.304 (0.21)***
Talas	-1.422 (0.22)***	-0.917 (0.27)***
Chui	-1.574 (0.17)***	-1.178 (0.19)***
Osh city	-0.833 (0.22)***	-0.360 (0.24)

birth_order	0.009 (0.03)	
marriage_age		0.145 (0.01)***
constant	12.15 (0.23)***	8.025 (0.40)***
Observations	3,203	2,716
R^2	0.2968	.3945
Pseudo R^2	n/a	n/a

* significant at 10%
** significant at 5%
*** significant at 1%

Source: LiK study (2010, 2011, 2012, 2013, 2016 waves)

In respect of returns to education, four regressions are run with the use of the same pooled cross-sections. The first one is a model where an explained variable is employment status which is a dummy equal to 1 if person is employed or involved in some income-generating activity. The Probit estimation technique is used to see if education years influence the probability of being employed. The second model is the same as the first, except for the fact that education levels are used as explanatory categorical variables instead of continuous schooling years' variable in the first one. This might help to better reflect returns to specific education levels in Kyrgyzstan. The third and fourth ones are models with monthly income in constant 2011 Kyrgyz soms as the dependent variable with education years and education levels as major independent variables respectively. It includes wages and profits for employees and employers respectively.

Explanatory variables are similar to those from the model specifications above but with some modifications. For instance, instead of the categorical generation variable, age and age squared are used to see the trend over time. The number of siblings is dropped but marital status, a dummy of being married/living together with a partner is added. Ethnic minorities are presented as a dummy instead of a categorical variable before. Likewise, instead of oblasts a dummy variable of the southern region is used to see if there are differences between oblasts and cities in the northern part and those in the southern part of the country.

Table 8 Regression Results on the Returns to Education

Model	Model I	Model II	Model III	Model IV
Method	Probit	Probit	OLS	OLS
Dep. var.	Employment	Employment	Income_constant	Income_constant
Indep. var.	Education Years	Education Levels	Education Years	Education Levels
Individual				
educ_years	0.05 (0.00)***		180.2 (28.4)***	
educ_level				
-Primary		0.49 (0.32)		444.0 (852.3)
-Basic		0.20 (0.24)		-1,539.1 (700.1)**
-Sec. General		0.43 (0.23)*		-1,310.9 (683.9)*
-Primary Technical		0.63 (0.25)**		-377.6 (781.7)
-Sec. Technical		0.68 (0.24)***		-253.3 (709.6)
-University		0.77 (0.24)***		602.1 (700.9)
-PhD or eq.		3.65 (1.90)*		5,693.5 (3,513.9)
female	-0.67 (0.03)***	-0.67 (0.03)***	-3,019.6 (142.5)***	-3,081.1 (142.5)***
age	0.17 (0.0)***	0.17 (0.00)***	208.6 (27.9)***	240.7 (29.1)***
age_squared	-0.00 (0.00)***	-0.00 (0.00)***	-2.6 (0.2)***	-3.0 (0.2)***
chronic	-0.16 (0.02)***	-0.16 (0.02)***	-495.5 (116.8)***	-513.4 (116.4)***
migrant	-0.02 (0.08)	-0.03 (0.08)	379.6 (348.9)	299.9 (347.5)
Household				
house_inh	0.36 (0.10)***	0.35 (0.10)***	-281.3 (443.2)	-289.2 (441.4)
land_inh	0.01 (0.04)	0.02 (0.04)	190.1 (183.2)	211.4 (182.5)
Community				
minority	-0.28 (0.03)***	-0.27 (0.03)***	-100.6 (152.5)	-42.0 (152.8)
Regional				
rural	-0.13 (0.03)***	-0.11 (0.03)***	-2,027.6 (157.6)***	-1,864.3 (158.0)***
south	-0.52 (0.03)***	-0.51 (0.03)***	-803.2 (150.3)***	-692.8 (150.9)***
married	-0.13 (0.04)***	-0.13 (0.04)***	-213.7 (175.3)	-169.7 (174.7)
constant	-2.92 (0.22)***	-2.60 (0.30)***	2,250.1 (740.4)***	4,421.3 (910.8)***
Observations	7,360	7,360	7,360	7,360
R^2	n/a	n/a	0.1500	0.1589
Pseudo R^2	0.2255	0.2290	n/a	n/a

* significant at 10%
** significant at 5%
*** significant at 1%

Source: LiK study (2010, 2011, 2012, 2013, 2016 waves)

In the first and third models, where education years are used, the outcomes are statistically significant at 1%. In the first case, education years play a positive contribution in being employed; whereas, one additional year of education adds about 180 Kyrgyz soms to one's income after adjusting for inflation. In the second model, having any educational level higher than the Basic education raises the probability of having a job with different levels of statistical significance. In the last model, surprisingly, two levels of education with statistically significant results are Basic and Secondary General education levels. However, they both have negative magnitudes which might be due to the fact that the earning potential of the people depend on specific knowledge and skills which are acquired through other ways, such as technical or higher education rather than these two levels. These findings also comply with the results of the study by the European Training Foundation (2013) which outlined that young people with secondary vocational or higher education earn lower wages in Kyrgyzstan even if employed in the formal sectors in contrast to their counterparts with lesser education level employed in the informal sector. Heyneman et al. (2008) also highlighted that increasing corruption incidences significantly reduce payoffs to higher education in Central Asian countries.

Other statistically significant outcomes include gender, age, age squared, having chronic illnesses, living in the rural location and southern regions of the Kyrgyz Republic in all four models. In that way, women are less likely to be employed and they earn about 3,000 Kyrgyz soms less per month than their male counterparts. The same is true for having chronic illnesses, but each chronic illness suppresses the monthly income by about 500 Kyrgyz soms. Residents in rural areas and southern regions having less likelihood to be employed and earn 2,027 KGS and 803 KGS less per month respectively. This suggests that there are fewer employment and earning opportunities in rural locations in comparison with urban ones and in southern oblasts in comparison with northern ones. Age has an inverted U-shaped relation with both employment and income. As people become older, they are more likely to find some job and earn more most probably due to increasing experience; however, after certain age these benefits start going down which can be attributed to declining motivation or productivity.

In the first and second models, inheriting a house, belong to an ethnic minority, and being married or living together with your partner were also found to be statistically significant. Inheriting a house increases the probability of being employed which confirms the notion that coming from a wealthier background increases one's chances of finding a job. On the other

hand, being a representative of an ethnic minority decreases one's chances of being employed. Likewise, being married or living together with your partner is negatively correlated with employment. The reason behind this finding might be that when individuals are married or live together, they can rely upon their partner in terms of financial issues, especially in case of women who often have to forgo their jobs while attending to their children and household chores.

As robustness checks, I compiled a panel dataset (28,291 observations for 4 years) with the same yearly data used for pooled cross-sections. Due to some missing independent variables, such as natural ability, talent, competitiveness, etc. which might affect both educational attainment and dependent variables of employment and income, an issue of endogeneity might arise. To counteract it, I ran the same models but with Logit Fixed Effects regressions for the first two models and Fixed Effects for the last two by clustering standard errors within oblasts (Appendix, Table 11). This allows to control for the missing time-invariant characteristics of individuals, such as capability and motivation, which might cause endogeneity in such analyses if not controlled for. The statistical significance and sign of the variables do not considerably vary. The effect of schooling years on the probability of being employed remains positive at 1%. However, using Fixed Effects increases the impact of one additional year of schooling to 295.01 KGS from 180.26 KGS obtained by using OLS. The level of statistical significance changes from 5% to 10%. No education level is statistically significant in the second model now. In the fourth model, having secondary technical or university education leads to additional 4,500 KGS at 5% and 5,000 KGS at 10% significance level respectively. These findings are more in compliance with previous research findings than those by OLS. The variable "rural" is statistically significant only in the third model, but the migrant status become so in the first two models. The independent variable of inheriting a house is no longer statistically significant with Fixed Effects estimations. Likewise, having chronic illnesses, age, and age squared remain statistically significant with the same sign but slightly altered magnitudes. Covariates of female, minority, and south are dropped as they are time-invariant.

Some caveats have to be taken into account while reading the above results. Behrman & Schneider (1992) warn that associating schooling with various outcomes, including wage rates, does not necessarily represent causality because there are such factors as ability, family background, and schooling quality which are correlated with it. Even though the family background was approximated by using the variables of inheriting a house or land and Fixed

Effects estimation technique was exploited to deal with omitted variables which might lead to endogeneity, it was impossible to school or education facility factors due to unavailability of data. Another highlight is that adults with more income may decide to invest more in their health; thus, raising an issue of causality in the relation between health and income. However, the number of chronic illnesses was used as a variable for the health, or rather bad health status, in the models above; and, the emergence of chronic illnesses is not strictly related to monetary investments but rather they are more permanent issues arising due to heritage, environmental or other factors.

Based on the results of the study, I fail to reject the hypothesis *H₀1: There is an intergenerational transfer of education from parents to children*. Both mothers' and fathers' education levels have a statistically significant positive impact on their children's educational attainment. The magnitude of the impact increases with the educational level of parents. Notwithstanding, in respect to getting higher education only father's education is statistically significant while mother's education is not. Furthermore, I partially fail to reject the second hypothesis, *H₀2: There is a "child quantity versus quality" trade-off, i.e. the more siblings people have, the less education they attain*. The number of siblings is insignificant in terms of schooling years but has a statistically significant negative effect on getting higher education. The last hypothesis, *H₀3: There are tangible returns to education, namely better employment chances and higher wages*, cannot be rejected either. Those with more schooling years are more likely to be employed and earn more than those with less education.

5. CONCLUSION & POLICY RECOMMENDATIONS

Education plays an imperative role both for individuals and for communities, and at a broader sense, countries they live in. In order to be able to reap various benefits associated with schooling at an individual and state level, the governments of developing countries, including Kyrgyzstan, have to always bear in mind the importance of the sphere of education. This study has delved into tracking down which factors determine why Kyrgyz residents decide to attain education using micro-level data from a trustworthy and representative data source, namely the Life in Kyrgyzstan survey results. The following conclusions were drawn.

One of the key variables of interest was parent's education. Using the sample of respondents above 25, both mother's and father's education produced positive significant results. The size of the impact increases with the level of the education that parents have. This is in line with

the statement that there is an intergenerational benefit of education. Thus, not only does investment into education of the current generation bring about shorter-term results, such as better qualified labor force for the country and better earning potential for individuals, etc. but also has a long-term positive effect on the educational attainment of future generations.

The second key variable of interest was a number of siblings. It produced ambiguous results as in terms of schooling years, there is no negative impact of having more siblings. On the other hand, it decreases one's chances of getting higher education. This finding might be used for family planning purposes in the way that future parents can be informed that as the number of their children increases, the prospect of sending them to the university decreases.

Furthermore, women attain a little less of education in terms of total years of education but are more likely to have higher education than men in Kyrgyzstan. The first finding is in compliance with studies in other developing countries where usually women have less chance of receiving education but the second finding contradicts it. Furthermore, among women getting married at an early age is linked with fewer years of schooling in general.

The educational attainment has been steadily increasing among younger generations of the Kyrgyz citizens. As favorable legal framework and availability of educational institutions are crucial in this regard, the Kyrgyz government has to continue investing into the education sector and offering more and better opportunities for its citizens to attain the education they aspire for.

Having chronic illnesses was found to be negatively correlated with educational attainment. It would also have been valuable to include a disabilities variable. Due to data limitations, it was not feasible. It would be very insightful to add such a variable to analysis in the future as the issue of inclusive education is gradually gaining attention both in the policy-making and the general public. Notwithstanding, even use of the current variable draws an attention that health is an important factor which determines one's educational attainment.

Another variable of interest revealed that representatives of ethnic minorities attain less education "all other things equal". As the discrepancy between the first language of citizens and the state or official languages might be one of the critical factors, the government ought to provide opportunities for ethnic minorities to better learn the latter two to be able to pursue their education beside the point of the Secondary General education where some of them can still have classes in their own mother tongues. It was also pointed out by the UNICEF (2018)

that "improving minorities' knowledge of the state language is key to enabling deeper integration in society". Policy options might include offering more or better-fit state language courses to students from minority backgrounds both at school and outside-school facilities, such as youth or educational centers.

Likewise, a conspicuous discrepancy exists between 'rural versus urban' and 'capital versus regions' pairings in terms of educational attainment. The government has to ensure that equal educational opportunities are available everywhere throughout the country, especially in villages and remote regions. More attention in terms of budgeting, curriculum development, and teaching quality should be directed towards schools, colleges, and other educational institutions. Likewise, international donors have to consider them first and allocate more funding to them instead of those located in big cities or the capital city. In addition to this, some informational campaigns concerning the importance of education, especially of the technical or higher education, should be held in the regions to raise more awareness on the issue and promote continuing education among citizens. Furthermore, better economic and social opportunities should become available for residents to stay in their native places instead of migration leading to the "brain-drain".

The second part of the regression analysis focused on the returns to education, especially in terms of employment and earnings. Exploiting different models and estimation techniques, it was discovered that the returns to more schooling can be statistically verified. People with more schooling years have better chances of finding a job and earn more than their counterparts with lesser educational attainment. As mentioned before, about 20% of the population lives under the national poverty line. Thus, education can be viewed as an additional tool to reduce poverty at an individual and household levels. Likewise, educated citizens serve as qualified labor supply propelling the country's economic growth further forward. Thereby, the Kyrgyz government and other stakeholders ought to keep education as one of the central spheres in the development agenda of the country. Furthermore, citizens themselves have to prioritize education as a plausible means of improving their living standards.

There are some limitations of this study to be taken into account for further research. First, the data on birth order was not available for all respondents and was categorized in a very specific way. If it becomes available in future for more respondents and in a conventional order, running regression analyses with a larger sample size might provide some

insightful results whether the birth order matters in educational attainment of children. A hypothesis whether older children have better advantage in getting education than younger ones might be tested as less resources are available with more children. As the second hypothesis on the number of siblings was only partially rejected, including a variable on birth order might change the results. Next, in the Fixed Effects analysis of returns to education, only 4 years were used in the panel dataset. Future studies can focus on the returns to education throughout more years. Third, as this study largely focused on the quantitative measures of education, using variables which reflect quality of the education might shed light on other factors and issues which influence educational attainment and returns to education in Kyrgyzstan.

In conclusion, education should remain in the spotlight of both the state, citizens, and other stakeholders as it can serve as an effective means of not only elevating people out of poverty by enhancing their employment and earning prospects but also improving the country's economic potential through supply of a qualified labor force.

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Appendix

Table 9 Marginal Effects at Means for Probit Regression on Higher Education

Model	Model I	Model II
Method	Probit	Probit
Dep. Var.	Higher education	Higher education
Indep. Var.	All	Parental Education
Individual		
female	0.008 (0.003)***	0.003 (0.002)
chronic		
migrant	0.052 (0.005)***	0.036 (0.005)***
Household		
house_inh	0.036 (0.007)***	0.020 (0.007)***
land_inh	-0.016 (0.005)***	-0.012 (0.004)***
educ_fath		
-Primary		0.007 (0.004)*
-Basic		0.010 (0.005)*
-Sec. General		0.014 (0.005)**
-Tech./Special		0.020 (0.007)***
-University		0.029 (0.010)***
educ_moth		
-Primary		-0.005 (0.011)
-Basic		-0.005 (0.012)
-Sec. General		-0.005 (0.012)
-Tech./Special		-0.005 (0.013)
sibl	-0.001 (0.000)**	-0.001 (0.000)**
Community		
generation		
Generation X	0.012 (0.003)***	0.005 (0.003)
Generation Y	0.039 (0.005)***	0.023 (0.007)***
Silent Gen.	-0.003 (0.003)	-0.000 (0.004)
ethnicity		
Uzbek	-0.026 (0.004)***	-0.013 (0.004)***
Russian	-0.022 (0.005)***	-0.014 (0.003)***
Dungan		

Uighur	-0.016 (0.010)	-0.002 (0.017)
Tajik	-0.001 (0.022)	0.034 (0.049)
Kazakh	-0.012 (0.021)	0.002 (0.026)
Other	-0.022 (0.006)***	-0.013 (0.005)***
language		
Uzbek	0.001 (0.009)	-0.001 (0.006)
Russian	0.039 (0.015)**	0.030 (0.015)*
Other	0.003 (0.013)	0.000 (0.010)
Regional		
rural	-0.014 (0.004)***	-0.013 (0.004)***
oblast		
Issyk-Kul	-0.009 (0.006)	-0.003 (0.004)
Jalal-Abad	-0.004 (0.006)	-0.000 (0.005)
Naryn	-0.013 (0.007)*	-0.002 (0.007)
Batken	-0.012 (0.006)*	-0.008 (0.004)*
Osh	0.010 (0.009)	0.017 (0.009)*
Talas	-0.018 (0.006)***	-0.005 (0.005)
Chui	-0.012 (0.005)**	-0.002 (0.004)
Osh city	0.051 (0.016)***	-0.037 (0.015)**

Source: LiK study (2010, 2011, 2012, 2013, 2016 waves)

Table 10 Regression Results of Models on Educational Attainment for Robustness Checks

Model	Model I	Model II	Model III
Method	Ordered_Probit	OLS	OLS
Dep. Var.	Educ. Levels	Natural Log of Educ. Years	Educ. Years
Indep. Var.	All		Age>28
Individual			
female	-0.005 (0.02)	-0.006 (0.005)	-0.071 (0.05)
chronic	-0.081 (0.02)***	-0.015 (0.00)***	-0.252 (0.04)***
migrant	-0.215 (0.06)***	-0.042 (0.01)**	-0.508 (0.15)***
Household			
house_inh	0.072 (0.08)	0.002 (0.01)	0.011 (0.19)
land_inh	-0.146 (0.03)***	-0.020 (0.00)***	-0.251 (0.07)***
sibl	-0.004 (0.005)		-0.004 (0.01)
Community			

generation			
Generation X	-0.007 (0.03)	-0.009 (0.006)	0.112 (0.07)
Generation Y	0.067 (0.03)*	0.071 (0.00)***	0.897 (0.09)***
Silent Gen.	-1.047 (0.05)***	-0.309 (0.01)***	-2.849 (0.11)***
ethnicity			
Uzbek	-0.389 (0.05)***	-0.057 (0.01)***	-0.677 (0.12)***
Russian	-0.122 (0.08)	-0.007 (0.01)	-0.206 (0.19)
Dungan	-0.459 (0.10)***	-0.075 (0.02)***	-1.111 (0.24)***
Uighur	-0.193 (0.11)*	-0.039 (0.02)*	-0.616 (0.27)**
Tajik	-0.343 (0.15)**	-0.040 (0.02)	-0.454 (0.35)
Kazakh	0.081 (0.20)	0.032 (0.04)	0.328 (0.48)
Other	-0.291 (0.09)***	-0.058 (0.01)***	-0.765 (0.21)***
language			
Uzbek	-0.263 (0.06)***	-0.041 (0.01)***	-0.437 (0.14)***
Russian	0.218 (0.07)***	0.028 (0.01)*	0.400 (0.17)**
Other	-0.253 (0.10)**	-0.034 (0.02)*	-0.408 (0.23)*
Regional			
rural	-0.218 (0.03)***	-0.042 (0.00)**	-0.464 (0.08)***
oblast			
Issyk-Kul	-0.554 (0.06)***	-0.097 (0.01)***	-1.271 (0.14)***
Jalal-Abad	-0.871 (0.05)***	-0.134 (0.01)***	-1.909 (0.13)***
Naryn	-0.876 (0.07)***	-0.143 (0.01)***	-1.906 (0.17)***
Batken	-0.902 (0.06)***	-0.172 (0.01)***	-2.310 (0.15)***
Osh	-0.802 (0.06)***	-0.139 (0.01)***	-1.782 (0.14)***
Talas	-0.724 (0.08)***	-0.125 (0.01)***	-1.573 (0.18)***
Chui	-0.811 (0.05)***	-0.137 (0.01)***	-1.638 (0.12)***
Osh city	-0.384 (0.07)***	-0.065 (0.01)***	-0.847 (0.17)***
constant	n/a	2.565 (0.01)***	13.27 (0.12)***
Observations	7,360	7,275	6,605
R^2	n/a	0.2565	0.2627
Pseudo R^2	0.0885	n/a	n/a

* significant at 10%
** significant at 5%
*** significant at 1%

Source: LiK study (2010, 2011, 2012, 2013, 2016 waves)

Table 11 Regression Results of Models on the Returns to Education for Robustness Checks

Model	Model I	Model II	Model III	Model IV
Method	Logit FE	Logit FE	Fixed Effects	Fixed Effects
Dep. var.	Employment	Employment	Income_constant	Income_constant
Indep. var.	Education Years	Education Levels	Education Years	Education Levels
Individual				
educ_years	0.19 (0.03)***		295.0 (141.5)*	
educ_level				
-Primary		14.51 (1,170.52)		3,854.7 (3,043.9)
-Basic		13.89 (1,170.52)		2,361.9 (2,462.0)
-Sec. General		14.12 (1,170.52)		3.382.2 (2,492.6)
-Primary Technical		14.61 (1,170.52)		3,955.0 (2,251.2)
-Sec. Technical		14.83 (1,170.52)		4,534.4(1,893.1)**
-University		15.26 (1,170.52)		5,042.6(2,360.4)*
age	0.29 (0.10)***	0.29 (0.10)***	682.3 (215.8)**	671.5 (212.1)**
age_squared	-0.00 (0.00)***	-0.00 (0.00)***	-6.1 (0.7)***	-6.0 (0.7)**
chronic	-0.25 (0.04)***	-0.25 (0.04)***	-213.3 (70.1)**	-215.9 (70.3)**
migrant	-0.46 (0.10)***	-0.46 (0.10)***	-143.5 (291.2)	-137.7 (292.7)
Household				
house_inh	0.14 (0.10)	0.14 (0.10)	362.5 (289.2)	362.3 (289.6)
land_inh	-0.00 (0.06)		309.5 (244.2)	313.0 (244.3)
Regional				
rural	12.52 (789.21)	13.42 (1,221.53	-2,646.3 (2,165.6)***	-2,640.1 (2,165.6)
married	-0.31 (0.12)***	-0.33 (0.12)***	-28.3 (173.1)	-34.1 (176.5)
year		0.48 (0.12)***		
2012	0.48 (0.12)***	-0.61 (0.22)***	206.3 (229.2)	220.8 (230.6)
2013	-0.61 (0.22)***	0.45 (0.51)	-666.5 (248.7)**	-652.3 (245.6)**
2016	0.45 (0.51)		-649.7 (823.3)	-647.6 (809.6)
constant	n/a	n/a	-13,728.3 (9,300.6)	-13,863.5 (8,415.5)
Observations	12,172	12,172	28,291	28,321
R^2	n/a	n/a	0.0427	0.0409

* significant at 10%
** significant at 5%
*** significant at 1%

Source: LiK study (2010, 2011, 2012, 2013, 2016 waves)