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Remittances and Children's Capabilities: New Evidence from Kyrgyzstan, 2005-2008

Antje Kroeger
Kathryn Anderson

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Forschungsinstitut
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of Labor

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Antje Kroeger
DIW Berlin

Kathryn Anderson
Vanderbilt University,
UCA and IZA

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IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

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ABSTRACT

Remittances and Children's Capabilities: New Evidence from Kyrgyzstan, 2005-2008*

The Kyrgyz Republic is one of the largest recipients of international remittances in the world; from a Balance of Payments measure of remittances, it ranked tenth in the world in 2008 in the ratio of remittances to GDP, a rapid increase from 30th place in 2004. Remittances can be used to maintain the household's standard of living by providing income to families with unemployed and underemployed adult members. Remittances can also be used to promote investment not only in businesses and communities but also in people. In this paper, we examine the role that remittances have played in the Kyrgyz Republic in promoting investments in children. Based on the capabilities approach to well-being initiated by Sen (2010), we look at the impact of remittances and domestic transfer payments primarily from internal migration on children's education and health. Our outcomes include enrollment in school and preschool, expenditures, stunting and wasting of preschool children, and health habits of older children. We use unique panel data from the Kyrgyz Republic for 2005-2008 and thus control for some of the biases inherent in cross-sectional studies of remittances and family outcomes. We find that overall remittances and domestic transfers have not promoted investments in the human capital of children. Specifically, preschool enrollments were higher in the urban north but secondary school enrollments were lower in other regions in remittance receiving households; expenditures were also negatively affected in the south and the mountain areas. These negative enrollment results were larger for girls than for boys. We also found evidence of stunting and wasting among young children and worse health habits among boys in remittance or transfer receiving households. In the long run, Kyrgyzstan needs human capital development for growth; our results suggest that remittances are not providing the boost needed in human capital to promote development in the future.

JEL Classification: C23, F22, I21, 053, R23

Keywords: children's education and health, remittances, Central Asia

Corresponding author:

Antje Kroeger
DIW Berlin
Mohrenstr. 58
10117 Berlin
Germany,
E-mail: akroeger@diw.de

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1 Introduction

For centuries, Central Asia was a region of significant and frequent household mobility. The Kyrgyz and Kazakh ethnic groups in particular moved voluntarily and with regularity to trade along the Silk Road or to find new and better pasture lands for their livestock. However, during the period of Soviet occupation of the region, voluntary migration was disrupted; ethnic groups were moved involuntarily often with large property incentives, and pastoral mobility was disrupted. Russians, Ukrainians, Koreans, and Volga Germans were settled in the region of the Kyrgyz Republic. Although the titular ethnicity of each new country retained the majority, the policies of the Soviet Union promoted mixing of groups and mobility was allowed with permission of the Central government (Anderson and Mirkasimov 2010) [1].

Following the dissolution of the Soviet Union and independence for the five republics of Central Asia, migration was no longer controlled by the central government in Moscow. Korobkov (2007) defined five migration periods between 1991 and 2005. During the first period, many non-native ethnic groups moved back to their homelands. Kyrgyzstan, for example, lost almost all of their German and Korean residents and most of their Russian citizens. The percentage of Russians in the country fell from 24 percent in 1993 to 19 percent in 1998 (World Bank, Living Standards Measurement data from 1993-1998). By 2005, the percentage of non-Kyrgyz ethnic groups in the country was so low that the Kyrgyzstan Integrated Household Survey (KIHS) no longer reported ethnicity in their publicly available survey data to avoid confidential problems. After 2005, economic performance in the countries of Central Asia, with the exception of oil-rich Kazakhstan, was in decline, and in the labor market wages were

[1] Much of the information on historical mobility was obtained from "The History of Krygzystan" class at the American University of Central Asia, Bishkek, Kyrgyz Republic, in 2009. The instructor of the course was Professor Cholpon Turdalieva, Department of Anthropology.

relatively low and unemployment was high in comparison to the labor markets in Russia and Kazakhstan (National Statistical Committee of the Kyrgyz Republic 2011). The high demand for resources in these countries encouraged a boom in construction and services that could not be filled only with the labor of native Russian workers. So migration in Central Asia entered a new phase which was almost entirely motivated by economics (Davis, Carletto and Winters 2010). Many households came to depend on remittances from migrants in Russia, Kazakhstan, the Middle East and other countries. The increase in remittance flows motivated studies in 2007, sponsored by the Asian Development Bank, of how remittances were used in Tajikistan and the Kyrgyz Republic (Brown, Olimova and Boboev 2008; Ibragimova et al. 2008). In both studies, poverty was significantly reduced by international transfers; in Tajikistan there was also evidence of effects on education and capital investment.

Following the global economic downturn in 2008, changes in migration occurred. Many migrants returned to Kyrgyzstan and other Central Asian countries (El Pakir 2009), but beginning in 2008 there is descriptive evidence that emigration increased or stabilized, but the size of international transfers significantly fell (Marat 2009). These changes have affected how households allocate their money towards maintenance of their standard of living, investment, and community support.

In this paper, we use data unique to Central Asia to evaluate how these changes in recent migration have affected human capital investment in children. Education and health of children are two important indicators of future capabilities and are now included regularly in multidimensional poverty measurements (Alkire and Santos 2010). The data were provided by the National Statistical Committee of the Kyrgyz Republic and form a panel survey from 2005-2008. While we are unable to identify migrants from this survey because all data on

labor market activities were excluded, we can identify households that report receiving international remittances or domestic transfers largely from internal migration or temporary work in Kyrgyzstan during the last year. In most cases, households receiving these transfers have at least one migrant member. Using panel data analysis, we examine the impact of these international and domestic transfers on the education and health of children at home. Education measures include enrollment in school, preschool, and secondary school and specific expenditures on education. Health measures include height (stunting) and weight (wasting) of young children and health habits of older children. We estimate our models for the nation as a whole and separately for three distinct regions of the country. We also estimate separate models for boys and girls. We include fixed effects for year of the data to measure whether changes in the global economy affected transfers by 2008.

Many different theories suggest that migration, remittances, and transfers can affect investments. In some models (Lu and Treiman 2007), migration and remittances promote human capital development; this occurs largely through an income effect. In other models (Booth and Tamura 2009), migration and remittances can discourage human capital investment. This usually results from the loss of household labor to migration and the need for children to pick up the slack at home and in family businesses and farming. In addition, differences in expectations for girls and boys may encourage remittance and transfer receiving households to focus their attention on one gender over the other. Overall, the predictions from the theoretical models are ambiguous. From our empirical results, we find more negative effects of transfers on human capital investment than positive effects, and girls are more likely to be affected, on average, than boys. Specifically, remittances have a negative effect on enrollment in secondary school, especially among girls. Preschool enrollment is encouraged, however,

but only in the wealthier urban northern region. On health outcomes, transfers affect both height and weight of young children; we find on average that children in transfer-receiving households are smaller and more likely to be thin or severely thin. This is true especially for girls and in the southern and mountain regions. Finally, we find that boys in transfer receiving households smoke more than other children, but these effects are very small.

In the Kyrgyz Republic, remittances and domestic transfers have not been used to promote human capital development while there is some evidence from the same surveys (Ukueva and Becker 2010) that investment in durables is more likely with remittances. While physical capital investment and durable consumption are important to well-being, human capital investment is critical for long run development. Our results suggest that the large outmigration from the Kyrgyz Republic is not promoting this important component of development.

The remainder of this paper is organized as follows. Sections 2 and 3 provide background information on migration and remittances and education and health in Kyrgyzstan. Section 4 summarizes the existing literature on the impact of migration and remittances on children's capability measures. Section 5 describes the data and section 6 our empirical strategy. In section 7, we discuss the empirical findings and section 8 concludes.

2 Migration and Remittances in Kyrgyzstan

The population in Kyrgyzstan is poor, young, and growing in number; 30 percent of Kyrgyz are 14 years old or younger (CIA 2010), and 60 percent of the population is under age 30 (National Statistical Committee of the Kyrgyz Republic 2009). Officially, the unemployment rate was 8.3 percent in 2006 (World Bank 2007), but experts estimate a much higher rate of unreported unemployment (Open Society Institute (OSI) 2002). The Kyrgyz Republic is one of the

poorest Soviet Republics, and during the early 1990s it suffered from a large decline in average income and increasing income inequality. Until recently it was one of the more rapidly reforming former Soviet Republics; it was among the first to issue a national currency in 1993, and in 1998 became the first to join the World Trade Organization (Pomfret 2006). However, political upheaval in 2010 resulted in the overthrow of a very corrupt government, and subsequent ethnic clashes particularly in the southern region of the country have had a significant negative impact on growth and prospects for economic development in the near future (International Crisis Group 2010). The global economic downturn has increased the uncertainty in the Kyrgyz economy.

In the transitional economy of the Kyrgyz Republic, labor migration helps absorb and ease social discontent, especially from the south of the country, from where 80 percent of labor migrants originate. To some extent migration makes up for failed government reforms and provides alternative means for migrant families to achieve economic stability [2].

The Asian Development Bank supported the collection of survey data in 2007 to assess the impact of migration and remittances on poverty in the Kyrgyz Republic. Their report found that about 70 percent of all migrants are male, and the majority (80 percent) migrates to Russia. The second most common destination is Kazakhstan. Two main sectors of employment for Kyrgyz migrants are construction (45 percent) and trade (30 percent) (Ibragimova et al. 2008). The short term nature of emigration is a distinct feature among post-Soviet sending countries (Ivakhniouk 2004).

The ADB report (Ibragimova et al. 2008) estimated that about 80 percent of Kyrgyz migrants send remittances back to Kyrgyzstan (Ibragimova et al. 2008).

[2] Accurate aggregate migration statistics are not available from the National Statistical Committee, but their data, reported in the TransMONEE 2011 dataset, do show the recent upward trends in emigration from the Kyrgyz Republic and in emigration to Russia and Kazakhstan (Figure 1).

According to the World Bank (2011), Kyrgyz migrants remitted nearly US$ 313 million to Kyrgyzstan in 2005. Two years later the amount of remittances totaled about US$ 705 million [3]. These numbers indicate that labor migration and remittances are of highest importance for many households in Kyrgyzstan [4].

3 Education and health

The Kyrygz education system is in a catastrophic situation (Rahmetov, 2009). While education played a very important role in Soviet times, the prestige of education declined during transition and was replaced by an income-generating imperative that attached less value to education in the former planned economies of Central Asia (Mertaugh 2004). Corruption pervades schools and higher education institutions (Heyneman 2007) while the main problems in the Kyrgyz education system are the shortage of qualified teachers and very low teachers' salaries (Anderson, Pomfret and Usseinova 2004; Mertaugh 2004; Rahmetov 2009) [5]. High inflation and reduced real government expenditure led to increased educational costs to families. Overall, government expenditure on education as a percentage of GDP declined from 7.5 percent in 1990 to 3.9 percent in 2003 and 4.9 percent in 2007 (UNICEF 2011). The consequence of increased schooling costs, the decline in early childhood education, and teacher shortages are lower enrollment rates among school-age children (Anderson, Pomfret and Usseinova 2004). In comparison to other former Soviet Union states, the Central

[3] For data see: http://data.worldbank.org/indicator/BX.TRF.PWKR.CD

[4] See Figure 1 for the trend in remittances in Central Asia.

[5] The 2006 PISA study explicitly mentions the shortage of qualified teachers in Kyrgyzstan and attributes the low test results achieved in science to the lack of qualified science teachers: In Kyrgyzstan, 62 percent of all schools report vacancies in science, and almost all of these schools cope with this shortage by filling their vacancies with teachers from different fields or by assigning unqualified teachers to classes (Steiner-Khami 2009). In the 2006 and 2009 Pisa ranking, Kyrgyzstan placed last in all three categories out of 57 participating countries (OECD 2010).

Asian republics have some of the lowest student enrollment rates in secondary school (OSI 2002).

Less is known about health outcomes of children in the Kyrgyz Republic. The World Food Programme (2008) concluded in 2008 that one-fifth of Kyrgyzstan's households were at high nutritional and health risk due to poor food consumption. UNICEF (2010) reported chronic micro nutrient deficiency in Kyrgyzstan in 2006 when experts found that 13 percent of children under five were growing more slowly than normal. A study by Buckley (2003) showed that 11 percent of children under age three were far below the recommended weight for their age. Further, IRIN (2010) warned that in Kyrgyzstan, malnutrition is easy to overlook since children do not have protruding ribs and distended bellies. However, healthy food does not only mean sufficient food but also the right amount of vitamins and minerals. Overall, government expenditure on health as a percentage of GDP declined from four percent in 1995 to 2.6 percent in 2007 (UNICEF 2011).

4 Hypotheses and Existing Literature

Because of the development potential of financial inflows, a growing literature has examined the impact of remittances on poor countries. Research has focused on the impact of remittances on household consumption, business development and entrepreneurship, and the quality of housing. There is a large literature on the impact of remittances and migration on employment, health, and education in receiving and sending countries. First, we review recent studies that have linked migration and education by estimating the impact of remittances or migration on children's schooling. We then review the studies that link migration

or remittances to children's health. [6]

We restrict our review of the empirical literature on education to studies on Central Asian countries and evidence from panel data analysis from other countries. To our knowledge, only two studies analyzed the impact of migration and remittances on children's education in Central Asia: Brown, Olimova and Boboev (2008) and Anderson and Mirkasimov (2010), both using data from Tajikistan.

Brown, Olimova and Boboev (2008) evaluated data from the Asian Development Bank's Remittance Survey of 2007 and concluded that most Tajik households did not invest in education if they did not know whether education would yield a positive return to the household. The experience of labor migration from Tajikistan showed that there is little demand for highly skilled migrants in recipient countries. The authors showed that school absenteeism increased when remittances were received.

Anderson and Mirkasimov (2010) evaluated data from the 2007 Tajikistan Living Standards Measurement Survey and compared educational investments of children in migrant and non-migrant households. Their study showed that older children were more likely to complete secondary school and to enroll in higher education if migrants were in the household. However, younger children were less likely to enroll in secondary school and more likely to be absent from school.

To our knowledge, there is only one empirical study on the impact of remittances in Kyrgyzstan. Ukueva and Becker (2010) studied the effect of remittances on the purchase of durable goods using the Kyrgyzstan Integrated Household Survey (KIHS) data. They found a positive impact of remittances on purchases of durable goods.

[6] See Edwards and Ureta (2003), Lopez-Cordoba (2005), Yang (2008), Rapoport and Docquier (2006) for surveys of the remittances literature.

Most studies of the impact of remittances in poor countries used cross-sectional data. (See literature reviews referenced in footnote 4.) There are only a few exceptions such as Booth and Tamura (2009), Miranda (2007), Lu and Treiman (2007) and Chen (2006). Booth and Tamura (2009) examined the impact of parents' absenteeism on school attendance using first-differenced regressions with a two-year-panel of Vietnamese households. They found that more boys dropped out of school to contribute to the household's income if one parent was absent for longer than a month. Miranda (2007) found that family and community migration experience influenced the probability of completing high school in Mexico by using a dynamic probit model (1982-2005). His findings indicated that an extra migrant in the family decreased the likelihood of high school graduation significantly. Lu and Treiman (2007) showed for blacks in South Africa that remittances substantially increased the likelihood that children were in school. However, Chen (2008) found that girls were more likely to engage in chores if the father was absent in China.

The literature on the impact of migration and remittances on health outcomes in the CIS region is also thin. The ADB remittance studies in Tajikistan (Brown, Olimova and Boboev 2008) and Kyrgyzstan (Ibragimova et al. 2008) did not link remittances to health status but found important positive effects of remittances on poverty, which can contribute to health outcomes. Walewski et al. (2009) found positive correlations between remittances and expenditures on health in migrant households in Moldova. Mansuri (2006) examined height and weight of children in migrant households in Pakistan and found that both increase for girls relative to non-migrant households. Several studies from Africa and Latin America reach contradictory conclusions. Two studies on Kenya conclude that children are sicker and mortality is higher when parents are absent (Konseiga, 2008; Konseiga, Zulu and Ye, 2006). However, Acosta, Fajnzyl-

ber and Lopez (2007) found a positive impact of remittances on weight and vaccinations in Guatemala and Nicaragua and an increase in hospital births. Hildebrandt and McKenzie (2005) also found an increase in hospital births and associated increases in birth weight, survival, and breastfeeding when the Mexican household had at least one migrant residing abroad. In contrast, Kanaiaupuni and Donato (1999) found lower survival with frequent trips abroad from Mexico but higher survival with frequent trips to the United States. Little is known about the impact of migration on health in Central Asia from quantitative analysis.

Overall, the literature on the impact of remittances and migration on children's human capital - education and health - is inconclusive, and there is little information on the relationship between remittances and these important outcomes in Central Asia.

5 Data and Descriptive Statistics

In this paper, we use four waves of the Kyrgyzstan Integrated Household Surveys (KIHS) and create a panel dataset of children. This survey covered around 6,000 children each year since its inception in 2003. The survey includes detailed information on demographic characteristics, consumption and income of the households and education and health of individual household members. The KIHS survey data for 2003-2008 were provided to us by the National Statistical Committee (NSC) [7]. Labor force data are excluded from these surveys and placed in separate Labor Force Surveys; the NSC would not release the labor

[7] The KIHS survey was conducted by the National Statistical Committee (NSC) in Bishkek as a rotating panel survey (with about a 20 percent replacement rate each year), but no panel identification code for individuals within each household was created. We merged the children in our working sample based on the following criteria: household code, gender, day, month and year of birth. We were unable to identify which household members (adults and children) were migrants. The sampling procedure for the KIHS is multistage random sampling, and the survey is representative at the national, rural/urban as well as the regional (oblast) levels.

force data to us. Therefore, we have no information on which persons are working abroad or in other areas of the Kyrgyz Republic, and the only way to identify if the household is a migrant household is through remittances' data [8]. Information on the receipt of remittances by the household is only available from 2005-2008. Hence, we focus our analysis on the years 2005 through 2008 [9]. After adjusting for missing values, we are left with 4,995 (6,285) households (children aged 6-18) for 2008, 4,803 (6,306) for 2007, 4,863 (6,564) for 2006 and 4,771 (6,449) for 2005. We use all of the household data for each year, and our working data set is an unbalanced panel.

The income section of the KIHS contains information on the remittances received by households. The specific question is: What aid did your family receive from your relatives and/or acquaintances? (The value of in-kind aid is also evaluated and added to money transfers.) For 2005-2008 the survey breaks down transfers into transfers received from outside and inside the territory of Kyrgyzstan. We classify these data as international remittances (external) and domestic transfers (internal) and look at their joint and differential impacts on households. We use the term transfers to refer to either remittances or domestic transfers.

Unfortunately, the survey does not provide any other information on the sources or the purposes of the transfers. We do not have information on migrant characteristics in the dataset and can only use the information on whether the household received any remittances and domestic transfers and the amount received for our analysis [10]. However, we assume that the majority of families

[8] In the household roster, there is a question about whether a household member has been absent permanently or temporarily. However, the percentage of households reporting to have an absent household member is negligible.

[9] We delete those observations for which there is missing information in the household roster. Over all four years, we lose 3,372 individual observations and are left with 86,034 over all four years of observations.

[10] We know from other surveys as explained in section three that the majority of Kyrgyz migrants is male and goes to Russia in search of better employment.

receives transfers from a household member and not from friends or distant acquaintances. The ADB Remittances Study (Ibragimova et al. 2008) finds that approximately 83 percent of international remittances is received from a migrant family member. A more recent study of return migrants to Kyrgyzstan in 2008 shows that 87 percent of migrants sent remittances back home (El Pakir 2009). The "Life in Kyrgyzstan Survey" 2010 [11] shows that almost 90 percent of remittances is received from a migrant family member. We, therefore, assume that transfer receiving families have at least one migrant household member abroad or elsewhere in Kyrgyzstan who is sending support back home.

Tables 1-3 define the variables included in our study and report summary statistics on the amount of remittances and domestic transfers over the years 2005-2008 by region. The total number and share of remittances receiving households increased over time. In 2005 only 2.41 percent of households reported the receipt of remittances, but the share of receiving households increased more than threefold by 2008 to 7.93 percent. The share of households receiving domestic transfers was much higher at approximately 40 percent. While more families received remittances in 2008, the average amount of remittances decreased compared to 2007. This is consistent with the recent literature on remittances and migration in Central Asia (Marat 2009; Ivakhnyuk 2009). Marat (2009) concluded that the primary reason for the increase in migration but the decrease in average remittances in 2008 was the global financial crisis which significantly decreased employment in Central Asia relative to Russia, encouraged emigration, but reduced wages paid and the probability of employment in construction and services abroad [12]. A similar pattern is true for domestic transfers over time.

Household characteristics vary by the region of residence. We create three regional variables: south Kyrgyzstan (Osh, Djalalabad, and Batken oblasts),

[11] The German Institute for Economic Research (DIW) is collecting panel data for Kyrgyzstan beginning in 2010 funded by the Volkswagen Foundation.

[12] 2006 (EBRD), 2007 (ADB), 2010 (DIW: Life in Kyrgyzstan Survey).

north Kyrgyzstan (capital Bishkek and Chui oblast) and mountainous regions (Naryn, Talas and Issyk-kul oblasts). The map in Figure 2 illustrates the location of these regions. Most remittance receiving families reside in southern Kyrgyzstan where the unemployment and wage situation is worse than in the north or mountain regions of the country (Figure 3). Higher unemployment and lower wages encourage households in the south to send family members abroad while households in mountainous regions are more likely to send family members to the north of the country for work. From summary statistics for households in Table 4, we find that households in southern and mountainous areas have lower income and housing assets compared to northern families. Further, they have more dependents - children and elderly- residing in the household. In the lower part of Table 4, we show that educational attainment is lower among southern residents; education may play a lesser role in transfer decisions in the south than in the urban north.

Differences across regions are also high among children (Table 5). They are less likely to be enrolled in secondary or preschool when living in the south or the mountainous part of the country. Children also do less exercise and are more likely to be malnourished in these areas [13]. Because of the discernible differences among the three regions in these summary statistics, we estimate our models separately for the regions and for the nation as a whole.

5.1 Differences between transfer receiving and non- receiving households and children

We first describe the differences between transfer receiving households (either international or domestic) and other households. Then, we describe differences

[13] Good Nutrition is a problem in Central Asia. This is not only identified by thinness or lack of food but also by consumption of a high fat /carbohydrate based diet (Zanca, 2002). While we cannot measure individual consumption of nutrients in our data, it is a problem that needs to be examined in the future.

between children in receiving and non-receiving households.

Table 6 shows that households receiving transfers are significantly different from non-receiving households on many socioeconomic characteristics. The share of females in the household is higher in transfer receiving families. Migration is largely male-dominated, and frequently wives or other female relatives of absent male household members live together after migration occurs (Anderson and Mirkasimov 2010). More elderly people also reside in transfer receiving families which can indicate that families combine with older relatives when some household members migrate. Transfers are more likely to flow to vulnerable households with lower assets and household income. These findings are in line with the recent work by Ukueva and Becker (2010) on the Kyrgyz Republic using the KIHS data.

Total educational expenditures (Table 6) are significantly lower in transfer receiving households than in other households. Specifically, transfer receiving families spend more money on other unspecified expenditures and school repairs and renovations and they spend less on tuition fees than other households.

In Table 7, we examine differences in our children's outcome variables. The health outcomes are not significantly different between children in non-receiving and receiving families. For the set of education outcomes, we find that the overall enrollment rate of children aged 6 to 18 is not significantly different in the transfer receiving and not receiving groups. Because basic schooling is compulsory in Kyrgyzstan, it is not surprising that the enrollment rates for all children do not differ between receiving and non-receiving families on average.

After basic school, children and their families decide if it is preferable to continue in school or to focus on market or household work. As our descriptive statistics show, the enrollment rate for secondary school age children is significantly lower in transfer receiving families. Further, preschool enrollment

remains a problem; fewer children from transfer receiving families are enrolled in preschool compared to children in other households. Because preschools today are more likely to be found in urban than rural areas, these results are particularly pronounced in cities [14].

6 Empirical Strategy

Two econometric issues arise when estimating the impact of remittances and domestic transfers on children's educational outcomes. First, receiving and non-receiving households are likely to differ on observable (described above) and unobservable characteristics. The sample of transfer receiving households is not randomly drawn from the population of the Kyrgyz Republic. Second, the explanatory remittance and domestic transfer variables may be correlated with the error term in the schooling and health equations i.e. certain household characteristics (motivation, culture, access) might drive both the receipt of transfers and the schooling and health decisions. We face the twin problems of self-selection into migration and endogeneity of remittances and domestic transfers.

To mitigate these problems we use panel data analysis. In our case, we exploit four waves of the KIHS from 2005 through 2008. With repeated observations for the same individuals over several years, it is possible to control for individual, unobserved fixed-effects that are constant over time and may be correlated with both the receipt of transfers and the human capital outcomes of interest. Panel data analysis reduces omitted variable bias created by time-invariant unobservables. In addition, if selection is at least partially determined by the fixed component of the error term over time, then panel data analysis

[14] Preprimary enrollment fell from 34 percent in 1991 to 17 percent in 2008 (UNESCO 2011). From the 1998 Living Standards Measurement Survey, we find that among all children less than age 18, 77 percent in urban areas and 33 percent in rural areas had access to preschool in their community.

moderates the influence of sample selection bias on our results.

We include separate measures for remittances and domestic transfers in our models. This dichotomy tests whether households create mental accounts and use transfers from different sources for different purposes. In the mountain region migration to other countries is rare; we expect domestic transfers to exert more influence on behavior in this region. In the north, almost all of the migration is to other countries so we expect remittances to dominate domestic transfers on education and health choices in the north. In the south, there is a mixture of mobility patterns. Often migrants first move to the north of the country then, after saving enough to finance their travel, they move abroad. We expect both remittances and domestic transfers to matter in this region, and the effects of these two forms of transfers may be different.

6.1 Panel Data Analysis

We use individual fixed effects estimation to exploit the fact that panel data allow us to control for time-invariant individual heterogeneity which may bias cross sectional results. We run regressions of the form:

$$y_{it} = \beta_0 + X_{it}\beta + \eta_i + u_{it}$$

where y_{it} is the outcome variable of individual i at time t, X_{it} is a vector of individual and household characteristics, η_i captures unobserved, time-invariant individual-level heterogeneity and u_{it} is an idiosyncratic error term. Standard errors are robust to heteroskedasticity (Wooldridge 2002).

We examine several educational and health outcomes of children. The dependent education variables are indicator variables for school enrollment at different levels (overall for ages 6-18, secondary school for ages 14-18 and preschool for

ages 3-6), total educational expenditures per child and type of expenditure [15]. The health outcomes differ by age of the child. For children aged 5 and younger, we look at height for age (stunting), weight for age, and indicators that the child is thin or severely thin based on weight for age (wasting). For the older children (ages 7-18), we look at their health habits: whether they exercise or smoke [16]. For each variable, we look at the effect of remittances and domestic transfers on all children, then separately on boys and girls to test for gender preferences in these decisions.

Our three independent remittance variables are dummy variables for receipt of international remittances, domestic transfers, and either or both remittances and domestic transfers [17]. We run two different specifications of our model for each outcome of interest; one model includes the dummy variable for any type of transfer, and the other model includes two dummy variables for receipt of remittances and receipt of domestic transfers.

The model specification is consistent with the panel data models of migration estimated by Booth and Tamura (2009), Lu and Treiman (2007) and Chen (2006). We control for time-varying individual and household characteristics including age and age squared of the child, household wealth [18], the demographic

[15] We also estimated models of whether the child is enrolled in school but not in the age-relevant grade, but we found no impact of remittances or transfers on this variable in any of our models so we do not report the regression results in this paper.

[16] We also examined a subjective assessment of their health by their parents (very good, good, average, poor, very poor) and consumption of alcohol and found no effect of any of our remittance and transfer variables on these outcomes so we do not report these results.

[17] We experimented with variables representing the amounts of remittances and domestic transfers received relative to family income but do not report these results. The measurement error is likely to be high in the transfers reported and the level of family income which is why in most evaluations of poverty in Central Asia, expenditures are used in place of income. The preferred transfer measure is the amount of net transfers, but we have information on inflows only, not payments by the household to others. In addition, income is affected by the receipt of internal and external transfers and therefore its use introduces another econometric problem into our model. The use of dummy variables is consistent with much of the literature on remittances and migration (Amuedo-Dorantes, Georges, Pozo 2008; Booth and Tamura 2009; Lu and Treiman 2007; Mansuri 2006).

[18] We create a simple index which is the number of the following wealth conditions present in the household: availability of hot water, availability of heating for at least four months in the winter, condition of the walls and roof of the house, and ownership of the dwelling.

composition of the household (number of children, elderly, and share of females in the household), the age and sex of the household head, and the highest level of completed education among adults in the household. We also include distance to the nearest bus stop to measure the isolation of the household and dummy variables for years. As already mentioned above, we estimate separate models for each outcome for the nation as a whole and by region: south (Osh oblast and city, Djalalabad and Batken oblasts), north (Chui oblast and Bishkek, the capital city), and mountain (Naryn, Talas, and Issyk-kul in the center of the country).

7 Discussion of Results

Our education results are presented in Tables 8-11; Table 8 contains enrollment results for all children, Table 9 for girls and Table 10 for boys. Table 11 contains the household education expenditure results; we cannot differentiate between expenditures on boys and girls because expenditures are only provided at the household level. Our health outcome results for children aged 0-5 are presented in Tables 12 and 13 for all children and separately for girls. Table 14 contains the results on health habits for older children aged 7-18 [19].

7.1 Education Results

First, we describe the effects of receipt of remittances and domestic transfers on education enrollment. For enrollment of children aged 6-18 in any school, we find a small but negative effect of any internal or external transfer on the national level, but the result is primarily from the receipt of domestic transfers and is significant only in the mountain region. Gender matters to these small

[19] The full results for the regression models presented in the text are available on request from the authors.

effects; the enrollment of girls is not affected by either type of transfer in any region or nationally but the enrollment of boys is affected nationally and in the mountain and northern regions. Here an interesting pattern is observed; boys are less likely to be enrolled in school in the mountain region when the household receives domestic transfers, but boys in the north are more likely to enroll in school when they receive international remittances. The north is the wealthiest region of the country; we find that remittances encourage schooling for boys here, and the effect is much larger in absolute value than in the mountain region. The probability that boys enroll in school is .1 higher in remittance receiving households than in other households. In the significantly poorer mountain area where boys are more likely to be used in the production of agricultural goods or livestock products, enrollment falls with domestic transfers, but the probability decline is relatively small at .02.

We examine the impact of remittances and domestic transfers on enrollment at different levels. For basic education which is mandatory in Kyrgyzstan, there is no impact of either form of transfer, and we do not report these results. For older children aged 14-18, transfers do affect enrollment in secondary school but now the impact is only on girls in all regions, and the effect sizes are small except in the north. In the south and mountain regions only internal transfers matter and lower the probability of secondary school enrollment by .05. In the north, domestic transfers do not affect enrollment, but receipt of remittances lowers the probability of enrollment of girls by .2.

Among the youngest children, preschool enrollment is affected by domestic transfers but only in the north when we pool boys and girls. The probability of enrollment in preschool increases by .3. The separate models for boys and girls are weaker; while preschool effects are positive for boys and girls in the north, the estimates are not precise. In the south, remittances and domestic

transfers have large and opposite effects on preschool enrollment of girls, but when added together, these effects cancel each other out. One problem with the preschool model is that many households did not have access to preschool especially outside of the north and the capital Bishkek in particular. Therefore, many households did not answer the questions related to preschool enrollment.

In Table 11 we look at per child household expenditures on education by category. The results are in soms per school aged child [20]. Our results are consistent with the literature (Anderson and Mirkasimov 2010; Brown, Olimova and Boboev 2008; Walewski et al. 2009). At the national level, total expenditures are 607 soms less per child in remittance receiving households, but there is no discernible difference across regions. Individual expenditures that are affected by remittances or domestic transfers are school fees, transportation costs, library fees, school repairs, tutoring, and unspecified other expenses, but there is considerable variation in the impact on these expenses across regions. In the north, tutoring and transportation costs are increased by domestic transfers; tutoring expenses are 40 soms higher and transport expenditures are 80.6 soms higher in the north in transfer households. In the south, school fees decline by 493 soms on average with either form of transfer, library expenditures fall by a small amount with remittances, school repair expenditures are slightly higher with domestic transfers, and transportation expenditures are 112 soms lower with remittances. Households also spend less on unspecified expenses when they receive remittances in the south. In the mountain region, only domestic transfers matter and seem to lower both tutoring expenses by a small amount and other expenditures by 125 soms on average. Overall, the wealthier north does use transfers to positively impact student knowledge and access to school, but the impact of transfers is more likely to be negative in the other regions.

[20] The exchange rates with the dollar are 37.32 in 2005, 39.85 in 2006, 34.54 in 2007, and 36.11 in 2008.

7.2 Health Results

In this section, we describe the effects of remittances and domestic transfers on younger children's physical outcomes such as weight and height and analyze two indicators of malnutrition: being thin and being severely thin [21]. For older children aged 7-18, we examine the impact of transfers on their health habits, i.e. exercise and smoking.

Table 12 shows that there is a negative impact of international remittances on height (stunting) and weight (wasting) of younger children in southern areas. Children living in the south and receiving international remittances weigh on average 700 Grams less and are on average 1.85 cm smaller than children in non-remittance receiving households. As with the educational outcomes, the effect is only significant for young girls (Table 13) supporting our hypothesis that girls suffer more from the absence of a household member. We find a positive effect of transfer receipt at the national level on thinness and severe thinness. The result is only significant in the south (severe thinness) and mountainous areas (thinness) and results from the effect of domestic transfers. The weight-for-age and height-for-age of girls is affected by remittance receipt for the nation as a whole, but this effect is found only in the south. Transfer receipt increases girls' likelihood to be thin by .05 and their likelihood to be severely thin by .03. However, the weight and height of boys are not affected by any form of transfers in any region.

Table 14 reports the results for health habits such as smoking and exercise for older children. The smoking change is very small: significant but negligible. Children in transfer receiving households are more likely to smoke than children in non-receiving families. This is only true for boys. If residing in a receiving

[21] Thin is defined as weight for age two or more standard deviations below the British average. Severe thinness is three or more standard deviations below the mean. We used the zanthro.ado program in Stata based on the analysis of wasting and stunting in the UK by Cole, Freeman, and Preece (1998).

household, the probability that a boy smokes is .0021 higher than in other households. Interestingly, there are opposite effects of international remittances and domestic transfers on exercise. Domestic transfers have a negative effect but international remittances have a positive effect on exercise in the south. For boys, the overall effect of any transfer receipt is zero in all regions. In general, transfer receipt is associated with worse health habits among older children, but the effects are very small.

Finally, we looked at the impact of the financial crisis in 2008 on education and health directly and on the impact of transfers. We were surprised to find no impact of the financial crisis on our outcomes. That could be due to the fact that the data were collected in October 2008, but the financial crisis in Russia began only in the fall of that year. We anticipate that later waves of that survey will show some impact of the downturn of the economy and the subsequent revolution in 2010.

8 Conclusion

Do remittances have an impact on children's education and health outcomes in Central Asia? We examine the role of domestic transfers and international remittances on household decisions to invest in children's human capital in one country of Central Asia - the Kyrgyz Republic. This country is one of the poorest former Soviet Republics and currently one of the top remittance receiving countries in the world. Remittances from abroad and at home are widely believed to improve the well-being of recipient households and household members. Using four waves of the KIHS, we estimate the effect of transfers on children's education and health outcomes and practices. To our knowledge, this is the first empirical work examining the impact of remittances on children's human capital outcomes over time in Central Asia. Our analysis shows that remit-

tances receipt does not relieve the liquidity constraint in receiving households with respect to human capital investment in children. Migration disrupts the family structure in such a way that particularly girls suffer on educational and nutritional outcomes. Children living in the south or mountainous region of Kyrgyzstan are more affected than children in the north, partly because schools at all levels and health care are less accessible in these regions. Transfer receipt negatively affects nutritional outcomes of younger girls; they are more likely to be malnourished if they live in a transfer receiving household. Older boys have worse health habits in transfer households.

Our results can be explained by the fact that the absence of a migrant household member especially a parent can exert pressure on remaining household members, mostly children and women, to contribute more of their time to household and market work. Children may also be less supervised when a parent is absent. We cannot test with our data either of these possible explanations. Because migration in Kyrgyzstan is male-dominated, households depend more on girls for household tasks and hence, their human capital investment is often regarded as secondary to investment in sons (Akiner 1997). In a society, in which the first born son is expected to take care of elderly parents, investment in sons is even more important to families. Our results suggest that some of this investment is in the form of education.

From a policy perspective, our results suggest that children in migrant households may not be better off on average than other children; they also suggest a regional disparity in the impact of transfers. The disparity in favor of the north from emigration may in the long run exacerbate and not mitigate economic inequality. Policies that support families with migrants can help development, growth and equality. Assistance in schools and health care centers particularly in the poor regions of the country would be appropriate to lessen the longer-

term, negative effects of emigration on the education and health of children left behind.

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Table 1: Definition of Variables

Name of Variable	
Dependent Variables	
Enrollment (d)	enrollment of all school-age children (6-18)
Secondary School Enrollment (d)	enrollment of school-age children (14-18)
Preschool Enrollment (d)	enrollment at preschool (3-6)
Educational Expenditures	total amount of educational expenditures per school-age child
Weight	weight of children in kg (0-5)
Height	height of children in cm (0-5)
Thin (d)	Thinness of children (0-5) as calculated from z-scores one if thin, zero otherwise
Severe (d)	Severe thinness of children (0-5) as calculated from z-scores one if severely thin, zero otherwise
Exercise (d)	one if exercise at least once a week (7-18)
Smoke (d)	one if smoking (7-18)
Independent Variables	
International Remit	Dummy remittances receipt
Domestic Transfers	Dummy transfers receipt
Receiving Transfers	Receipt of remittances, regardless of external or internal
age	age of the child
age2	age squared of the child
Elderly	number of elderly over 65
School children	number of children (6-18)
Adults	number of adults over 18
Share females	share of females in family
Gender head (d)	one if male, zero if female
Highest Educ	highest education in household
Asset Index	count of available assets own house, good roof, good wall, heating in winter, hotwater
Next bus (d)	distance in km to next bus station

Table 2: Average amount of international remittances received by region

	South	Mountainous	North	Obs.	% of HH's
2005	5,103	12,749	8,537	114	2.41%
2006	16,513	5,040	5,057	208	4.28%
2007	15,300	21,314	11,956	292	6.08%
2008	8,457	19,391	7,737	396	7.93%
Obs.	679	95	236	1,010	
% of HH's	9.44%	1.41%	4.27%	5.20%	

Note: Calculations by household, in Kyrgyz Som annually.
Source: KIHS 2005-2008. Authors calculations.

Table 3: Average amount of domestic transfers received by region

	South	Mountainous	North	Obs.	% of HH's
2005	4,242	3,530	3,150	2,030	42.5%
2006	2,951	2,271	1,705	2,010	41.3%
2007	7,777	9,478	9,429	1,897	39.5%
2008	4,463	4,411	4,242	1,895	37.9%
Obs.	2,613	3,307	1,912	7,831	
% of HH's	36.3%	49.2%	34.6%	40.3%	

Note: Calculations by household, in Kyrgyz Som annually.
Source: KIHS 2005-2008. Authors calculations.

Table 4: Summary Statistics for Households by Region

	South		Mountain		North	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Financial Characteristics						
Total Income Income per	54,872	47,167	40,213	38,363	55,055	51,633
capita International	14,981	15,348	11,834	13,063	21,143	19,026
Remittances (d) Domestic	.094	.292	.014	.118	.042	.202
Remittances (d)	.363	.480	.492	.499	.346	.475
General Characteristics						
Dependency Ratio	76.70	76.83	77.23	73.63	66.5	67.20
Household Size	4.30	1.90	4.11	1.72	3.10	1.70
Number of Children	1.90	1.42	1.75	1.37	1.00	1.163
Number of Small Children	.424	.687	.461	.70	.268	.548
Number of School Children	1.47	1.26	1.29	1.17	.735	.964
Number of Elderly	1.60	1.55	1.34	1.427	.967	1.124
Number Adults	3.74	1.94	3.42	1.68	.2.69	1.52
Gender of head	.656	.475	.706	.455	.521	.499
Age of head	49.78	13.95	50.86	14.09	52.19	15.59
Share of females	.666	.3648	.642	.352	.668	.355
Married (d)	.363	.265	.392	.276	.321	.337
Dwelling Characteristics						
Heating winter (in months)	4.10	.850	5.07	.821	4.93	.595
Bus station (distance in km)	1.85	.78	1.91	.74	1.66	.63
Good house wall (d)	.382	.486	.318	.466	.645	.478
Hotwater (d)	.030	.171	.015	.123	.426	.494
Ind Heating (d)	.758	.4280	.884	.320	.524	.499
Owner dwelling	.059	.235	.064	.244	.081	.273
Asset Index	2.22	.736	2.35	.60	3.06	.975
Education						
No educ	.090	.143	.082	.137	.053	.129
Illiterate	.022	.080	.020	.070	.013	.067
Higher Educ	.094	.197	.108	.215	.176	.298
Incomplete Secon	.089	.159	.081	.161	.101	.219
Total Educ Exp	1,363	4,438	1,047	4,339	1,935	5,839
(per school-age child)						

Note: Source: KIHS 2005-2008. Authors calculations.

Table 5: Summary Statistics for Children by Region

	South		Mountain		North	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
General Characteristics						
Gender	1.49	.500	1.49	.49	1.52	.49
Age	12.35	3.65	12.36	3.65	12.47	3.71
Educational Outcomes						
Overall Enrolment (6-18)	.89	.306	.89	.31	.90	.290
Second Enrolment (14-18)	.90	.287	.915	.278	.956	.203
Preschool Enrolment (3-6)	.57	.495	.59	.493	.71	.453
Health Outcomes						
Weight (0-5)	13.32	6.30	13.27	5.71	12.79	5.14
Height (0-5)	87.17	15.05	87.11	15.43	85.92	14.32
Thin (0-5)	.238	.426	.258	.437	.271	.444
Severe (0-5)	.082	.273	.083	.276	.081	.280
Exercise (7-18)	.665	.472	.714	.451	.787	.408
Smoke (7-18)	.001	.033	.004	.068	.001	.034

Note: Source: KIHS 2005-2008. Authors calculations.

Table 6: Summary Statistics for Household Variables

	Non-Receiving	Receiving	diff	diff se
Explanatory Var				
Small child	0.387	0.402	-0.0145	(0.00969)
School child	1.247	1.127	0.120***	(0.0175)
Elderly	1.327	1.336	-0.00854	(0.0208)
Adults	3.456	3.166	0.290***	(0.0263)
Gender Head (d)	0.674	0.579	0.0945***	(0.00702)
Age Head (d)	51.10	50.53	0.568***	(0.213)
Share females	0.633	0.695	-0.0625***	(0.00522)
Highest edu	6.421	6.355	0.0662**	(0.0287)
Asset index	2.528	2.500	0.0275**	(0.0123)
Next busstation (km)	1.818	1.827	-0.00862	(0.0108)
Total Income	59,760.4	42,986.8	16,773.6***	(1157.6)
Expenditures				
Fees	664.7	512.8	151.8***	(41.34)
Textbooks	27.46	28.97	-1.505	(3.516)
Library	3.432	2.808	0.624	(0.496)
Tutoring	9.080	7.733	1.346	(1.821)
Transport	57.59	43.63	13.97***	(4.051)
Repair	35.16	36.11	-0.954	(1.526)
Presents	81.86	80.49	1.370	(5.027)
Others	107.8	92.97	14.87**	(7.295)
Total	2463.9	2154.6	309.3**	(137.9)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Tests of difference between receiving and non-receiving households.

Table 7: Summary Statistics for Children's Variables

	Non-receiving	Receiving	diff	diff se
Age	12.46	12.29	0.167***	(0.047)
Age2	168.6	164.7	3.885***	(1.155)
Sex	1.499	1.511	-0.012*	(0.006)
Education				
Enrolment	0.898	0.899	-0.001	(0.004)
Preschool (3-6)	0.635	0.617	0.018*	(0.036)
Secondary (14-18)	0.786	0.769	0.017**	(0.008)
Health				
Weight (0-5)	13.11	13.12	-0.019	(0.144)
Height (0-5)	86.64	86.76	-0.118	(0.370)
Thin (0-5)	0.256	0.253	0.003	(0.010)
Severe (0-5)	0.083	0.084	-0.001	(0.006)
Exercise	0.746	0.747	-0.001	(0.006)
Smoke	0.002	0.002	-0.000	(0.001)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Tests of difference between receiving and non-receiving households.

Table 8: Estimates of the Impact of Remittances and Transfers Receipt on Childrens' Education Outcomes

	Overall (6-18)	Secondary (14-18)	Preschool (3-6)
National			
Model 1			
Receiving Transfers	-.01**	-.0251**	.0698
	(-2.04)	(-2.33)	(1.53)
Model 2			
International Remit	-.000329	-.00586	-.0164
	(-0.03)	(-0.24)	(-0.42)
Domestic Transfers	-.00951*	-.0242**	.0712
	(-1.87)	(-2.19)	(1.54)
South			
Model 1			
Receiving Transfers	.0000138	-.0306*	.0556
	(0.00)	(-1.85)	(0.69)
Model 2			
International Remit	-.00313	.00174	.0618
	(-0.25)	(0.07)	(0.77)
Domestic Transfers	.00186	-.0306*	.0862
	(0.23)	(-1.78)	(1.10)
Mountainous			
Model 1			
Receiving Transfers	.00001	-.0306*	-.0684
	(0.00)	(-1.85)	(-1.09)
Model 2			
International Remit	.00544	.00174	-
	(0.12)	(0.07)	-
Domestic Transfers	-.0164**	-.0306*	-.0684
	(-2.17)	(-1.78)	(-1.09)
North			
Model 1			
Receiving Transfers	-.00643	-.0137	.286**
	(-0.44)	(-0.56)	(2.33)
Model 2			
International Remit	.0259	-.0613	-.0754
	(0.86)	(-0.85)	(-0.98)
Domestic Transfers	-.00869	-.00909	.289**
	(-0.57)	(-0.35)	(2.32)

Note: We use individual fixed effects estimation for the dependent variables enrollment for all school-age children aged 6-18, secondary enrollment (14-18) and preschool enrollment (3-6). All control variables are included. t-values are reported in brackets.
Source: KIHS 2005-2008.

Table 9: Estimates of the Impact of Remittances and Transfers Receipt on Girls' Educational Outcomes

	Overall (6-18)	Secondary (14-18)	Preschool (3-6)
National			
Model 1			
Receiving Transfers	-.00893	-.0495***	.206
	(-1.30)	(-3.15)	(1.43)
Model 2			
International Remit	-.00787	-.00875	.151
	(-0.53)	(-0.24)	(1.14)
Domestic Transfers	-.00687	-.0464***	.0467
	(-0.96)	(-2.87)	(1.11)
South			
Model 1			
Receiving Transfers	-.000576	-.052**	.276
	(-0.06)	(-2.17)	(1.22)
Model 2			
International Remit	-.00504	.0108	-1.47***
	(-0.31)	(0.30)	(5.59)
Domestic Transfers	.00314	-.0495**	1.19***
	(0.28)	(-1.97)	(4.55)
Mountainous			
Model 1			
Receiving Transfers	-.0117	-.0413*	-
	(-1.08)	(-1.71)	-
Model 2			
International Remit	.105	-.0853	-
	(1.23)	(-0.56)	-
Domestic Transfers	-.0133	-.041*	-
	(-1.25)	(-1.70)	-
North			
Model 1			
Receiving Transfers	-.00926	-.035	.39**
	(-0.41)	(-0.99)	(2.05)
Model 2			
International Remit	-.0586	-.222*	-
	(-1.26)	(-1.69)	-
Domestic Transfers	-.00333	-.0109	.39**
	(-0.14)	(-0.27)	(2.05)

Note: We use individual fixed effects estimation for the dependent variables enrollment for all school-age children aged 6-18, secondary enrollment (14-18) and preschool enrollment (3-6). All control variables are included. t-values are reported in brackets.
Source: KIHS 2005-2008.

Table 10: Estimates of the Impact of Remittances and Transfers Receipt on Boys' Educational Outcomes

	Overall (6-18)	Secondary (14-18)	Preschool (3-6)
National			
Model 1			
Receiving Transfers	-.0115*	-.00481	.0401
	(-1.66)	(-0.33)	(1.04)
Model 2			
International Remit	.00766	.00033	.0105
	(0.50)	(0.01)	(0.62)
Domestic Transfers	-.0126*	-.00605	.0398
	(-1.75)	(-0.40)	(1.04)
South			
Model 1			
Receiving Transfers	.000673	-.0103	-
	(0.06)	(-0.46)	-
Model 2			
International Remit	.000224	-.0102	-
	(0.01)	(-0.26)	-
Domestic Transfers	.000455	-.011	-
	(0.04)	(-0.48)	-
Mountainous			
Model 1			
Receiving Transfers	-.0217**	-.0271	-
	(-2.05)	(-1.07)	-
Model 2			
International Remit	-.0627	.0677	-
	(-1.62)	(0.59)	-
Domestic Transfers	-.0204*	-.0284	-
	(-1.90)	(-1.11)	-

Note: We use individual fixed effects estimation for the dependent variables enrollment for all school-age children aged 6-18, secondary enrollment (14-18) and preschool enrollment (3-6). All control variables are included. t-values are reported in brackets.
Source: KIHS 2005-2008.

North			
Model 1			
Receiving Transfers	-.00609	-.000379	.194
	(-0.32)	(-0.01)	(0.99)
Model 2			
International Remit	.101***	.0384	.121
	(2.70)	(0.53)	(1.03)
Domestic Transfers	-.0134	-.00237	.211
	(-0.68)	(-0.07)	(1.02)

Note: We use individual fixed effects estimation for the dependent variables enrollment for all school-age children aged 6-18, secondary enrollment (14-18) and preschool enrollment (3-6). All control variables are included. t-values are reported in brackets.
Source: KIHS 2005-2008.

Table 11: Household Expenditures on Education

	Fee	Book	Library	Tutoring	Transport	Repair	Presents	Other	Total
National									
Model 1									
Receiving Remittances	-184	-2.72	-2.38	1.55	15.2	10.2**	-22	27.6	-141
	(-0.75)	(-0.52)	(-1.55)	(0.42)	(0.87)	(1.97)	(-1.19)	(0.89)	(-0.57)
Model 2									
International Remit	-208	-8.07	-8.05	-1.97	-69.1*	-19.7**	26.4	-36.7	-607*
	(-0.67)	(-0.63)	(-1.27)	(-0.28)	(-1.71)	(-2.14)	(0.65)	(-0.73)	(-1.65)
Domestic Transfers	-133	22.6	-.703	1.55	33.3*	11.9**	-3.37	47.9	50.7
	(-0.50)	(0.81)	(-0.48)	(0.39)	(1.87)	(2.25)	(-0.16)	(1.34)	(0.21)
South									
Model 1									
Receiving Remittances	-493**	61.1	-4.43	-1.04	-11.8	20***	11.8	-4	-95.7
	(-2.15)	(0.86)	(-1.29)	(-0.25)	(-0.33)	(3.33)	(0.39)	(-0.09)	(-0.33)
Model 2									
International Remit	-329	-26.4	-16.2**	-5.04	-112**	-10.8	58.1	-96.7*	-539
	(-0.94)	(-0.92)	(-2.28)	(-0.66)	(-2.36)	(-1.13)	(1.21)	(-1.96)	(-1.40)
Domestic Transfers	-402	67.2	.3	.0802	20.5	22.2***	1.56	16.7	52.2
	(-1.54)	(0.87)	(0.08)	(0.02)	(0.57)	(3.42)	(0.05)	(0.35)	(0.16)
Mountainous									
Model 1									
Receiving Remittances	-512	3.75	.0995	-11.5*	5.04	6.04	12.4	-125**	-378
	(-0.83)	(0.25)	(0.12)	(-1.92)	(0.22)	(0.44)	(0.25)	(-2.14)	(-0.61)
Model 2									
International Remit	1518	2.95	11.2	-2.75	162	7.6	43.5	6.58	614
	(0.85)	(0.05)	(1.33)	(-0.10)	(1.56)	(0.36)	(0.24)	(0.07)	(0.29)
Domestic Transfers	-550	3.67	-.18	-11.4*	.986	5.85	11.4	-125**	-343
	(-0.88)	(0.26)	(-0.21)	(-1.86)	(0.04)	(0.42)	(0.22)	(-2.13)	(-0.54)
North									
Model 1									
Receiving Remittances	1387	-14.1	4.82	40.3**	80.5*	-14.9	7.36	106	1677
	(1.11)	(-1.03)	(1.31)	(2.14)	(1.81)	(-0.87)	(0.12)	(0.66)	(1.44)
Model 2									
International Remit	-871	-26.4	27.6	-28	-12	-40.3	-37.9	12.4	-702
	(-0.77)	(-0.93)	(0.87)	(-0.82)	(-0.11)	(-1.12)	(-0.47)	(0.05)	(-0.63)
Domestic Transfers	1476	-11.4	2.02	43.1**	81.8*	-10.8	11.2	104	1753
	(1.11)	(-0.77)	(0.69)	(2.05)	(1.66)	(-0.63)	(0.17)	(0.60)	(1.45)

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Estimates of the Impact of Remittances and Transfers Receipt on Childrens' Health Outcomes

	Weight	Height	Thin	Severe
National				
Model 1				
Receiving Transfers	.0786	.234	.0333**	.0217**
	(0.48)	(0.63)	(2.24)	(2.05)
Model 2				
International Remit	-1.06***	-1.97**	.00568	.0369*
	(-2.37)	(-2.46)	(0.18)	(1.88)
Domestic Transfers	.228	.525	.0356**	.0178
	(1.23)	(1.26)	(2.29)	(1.60)
South				
Model 1				
Receiving Transfers	.0207	.14	.0236	.0418**
	(0.08)	(0.24)	(0.99)	(2.53)
Model 2				
International Remit	-.72*	-1.85**	.0213	.0226
	(-1.79)	(-2.48)	(0.58)	(1.00)
Domestic Transfers	.187	.605	.0244	.0376**
	(0.61)	(0.96)	(0.93)	(2.08)
Mountainous				
Model 1				
Receiving Transfers	.39	.34	.0139	.0274
	(0.61)	(0.22)	(.31)	(0.79)
Model 2				
International Remit	-2.04	-2.81	.108	.0891
	(-1.15)	(-0.73)	(0.80)	(1.13)
Domestic Transfers	.0564	.261	.0563**	.0143
	(0.20)	(2.21)	(2.30)	(0.78)
North				
Model 1				
Receiving Transfers	.396	.343	.014	.0275
	(0.61)	(0.22)	(0.31)	(0.79)
Model 2				
International Remit	-2.9	-4.73	-.0727	.0336
	(-1.64)	(-1.42)	(-1.23)	(1.08)
Domestic Transfers	.685	.863	.0243	.0247
	(1.07)	(0.55)	(0.52)	(0.67)

Note: We use individual fixed effects estimation for the dependent variables weight, height, thin and severe (thin).
All control variables are included. t-values are reported in brackets.
Source: KIHS 2005-2008.

Table 13: Estimates of the Impact of Remittances and Transfers Receipt on Girls' Health Outcomes

	Weight	Height	Thin	Severe
National				
Model 1				
Receiving Transfers	.156	.169	.0509**	.027*
	(0.75)	(0.37)	(2.31)	(1.75)
Model 2				
International Remit	-1.08***	-2.27***	.028	.0693**
	(-2.77)	(-2.58)	(0.56)	(2.27)
Domestic Transfers	.264	.4	.0521**	.021
	(1.23)	(0.84)	(2.31)	(1.31)
South				
Model 1				
Receiving Transfers	-.0854	-.216	.0581*	.0601**
	(-0.18)	(-0.22)	(1.66)	(2.55)
Model 2				
International Remit	-1.1*	-2.97**	.0286	.0499
	(-1.96)	(-2.47)	(0.48)	(1.42)
Domestic Transfers	.122	.388	.064*	.0535**
	(0.23)	(0.37)	(1.76)	(2.15)
Mountainous				
Model 1				
Receiving Transfers	.134	-.0738	.0616*	.0141
	(0.68)	(-0.14)	(1.80)	(0.62)
Model 2				
International Remit	-1	-.896	-.0704	.121
	(-1.60)	(-0.58)	(-0.58)	(1.11)
Domestic Transfers	.16	-.0502	.0633*	.0113
	(0.79)	(-0.09)	(1.82)	(0.49)
North				
Model 1				
Receiving Transfers	.02	-.26	.024	.0435
	(0.07)	(-0.35)	(0.33)	(0.76)
Model 2				
International Remit	-.701	-.583	-.0761	-.0181
	(-0.79)	(-0.26)	(-0.80)	(-0.31)
Domestic Transfers	.104	-.19	.0329	.0456
	(0.32)	(-0.23)	(0.41)	(0.73)

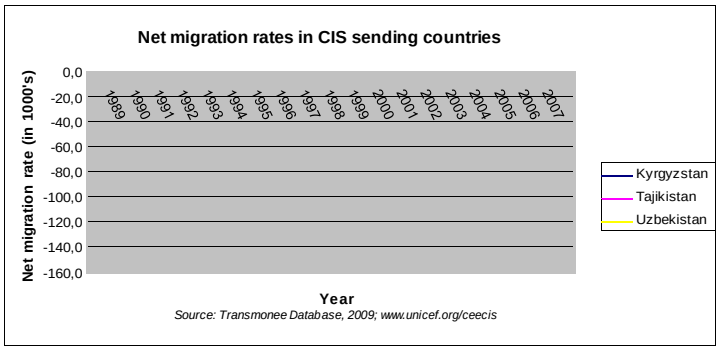
Note: We use individual fixed effects estimation for the dependent variables weight, height, thin and severe (thin).
All control variables are included. t-values are reported in brackets.
Source: KIHS 2005-2008.

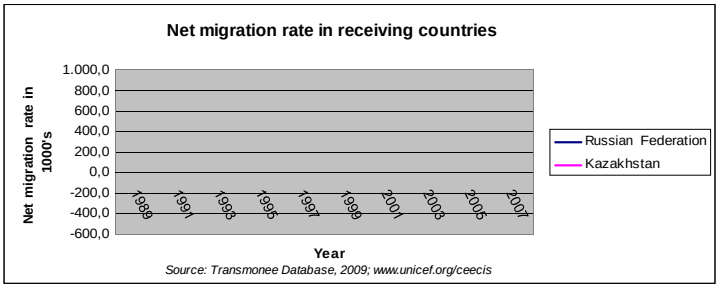
Table 14: Estimates of the Impact of Remittances and Transfers Receipt on Children's Health Habit outcomes (7-18)

	Exer	Smoke	Exer Girl	Smoke Girl	Exer Boy	Smoke Boy
National						
Model 1						
Receiving Transf	-.0117	.0015*	-.00626	.00095	-.0163	.00205*
	(-1.52)	(1.79)	(-0.54)	(0.79)	(-1.59)	(1.72)
Model 2						
Internat Remit	.0293	-.000819	.00862	-.000317	.0505*	-.00138*
	(1.55)	(-1.55)	(0.32)	(-0.41)	(1.87)	(-1.66)
Domestic Transf	-.0191**	.00161*	-.0126	.000991	-.0248**	.00223*
	(-2.39)	(1.78)	(-1.04)	(0.75)	(-2.34)	(1.74)
South						
Model 1						
Receiving Transf	-.017	.000764	-.0101	.00149	-.0224	.000112
	(-1.50)	(1.08)	(-0.63)	(1.00)	(-1.41)	(0.64)
Model 2						
Internat Remit	.068***	-.000239	.0612**	-.000949	.0751**	.000326
	(3.02)	(-0.50)	(1.98)	(-1.00)	(2.29)	(0.44)
Domestic Transf	-.0413***	.000829	-.0379**	.00175	-.0438***	.000037
	(-3.41)	(1.03)	(-2.18)	(1.00)	(-2.62)	(0.19)
Mountainous						
Model 1						
Receiving Transf	-.00273	.00122	-.00039	.000935	-.00517	.00155
	(-0.21)	(0.84)	(-0.02)	(0.37)	(-0.29)	(1.01)
Model 2						
Internat Remit	.00226	.00031	-.0609	.00126	.064	-.00002
	(0.04)	(0.42)	(-0.66)	(0.81)	(1.09)	(-0.03)
Domestic Transf	-.00278	.00121	.000572	.000922	-.00647	.00155
	(-0.21)	(0.83)	(0.03)	(0.36)	(-0.36)	(1.01)
North						
Model 1						
Receiving Transf	.00587	.00639	.0241	-	-.0101	.0111
	(0.33)	(1.58)	(0.78)	-	(-0.47)	(1.53)
Model 2						
Internat Remit	-.0304	-.0046	-.103	-	.0341	-.00395
	(-0.63)	(-1.51)	(-1.43)	-	(0.52)	(-0.80)
Domestic Transf	.00852	.00679	.0346	-	-.0126	.0114
	(0.46)	(1.60)	(1.07)	-	(-0.57)	(1.54)

Note: We use individual fixed effects estimation for the dependent variables exercising and smoking. Questions are only asked for children from age 7.
All control variables are included. t-values are reported in brackets.
Source: KIHS 2005-2008.

Figure 1: Macro data on migration and remittances in CIS region





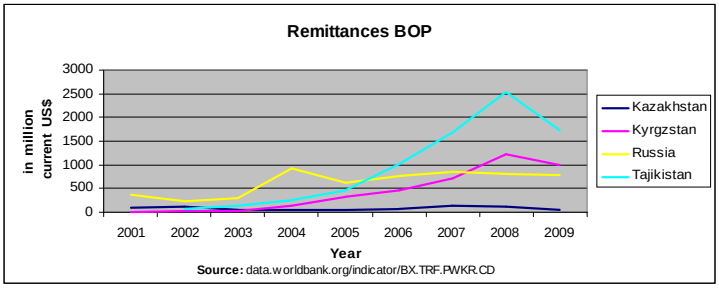


Figure 2: Map of Kyrgyzstan.
Source : www.nationsonline.org/oneworld/map/kyrgyzstan-administrative-map.htm.

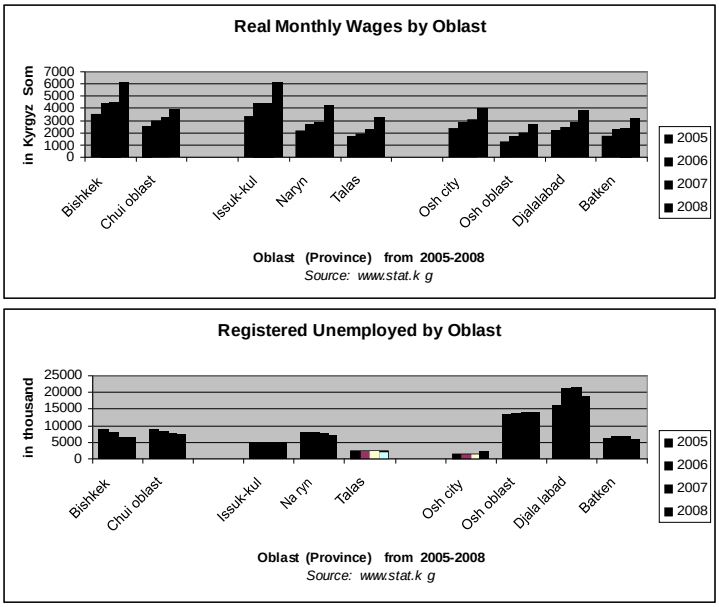



Figure 3: Macro data on economic situation in Kyrgyzstan by region