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**Remittances and Expenditure Patterns of
Households in the Kyrgyz Republic**

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Remittances and Expenditure Patterns of Households in the Kyrgyz Republic

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Views expressed in this paper are solely those of the authors and do not necessarily reflect the views of the National Bank of the Kyrgyz Republic.

Abstract

Remittances make a significant part of households' income in Kyrgyz Republic and play a big role in the economy. This work analyses the impact of international migrants' remittances on the expenditure structure of households in the Kyrgyz Republic between 2010-2012 using Life in Kyrgyzstan survey data².

JEL: D12, F22, O15, P36

Key words: remittances, household expenditures, Engel curve

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² Life in Kyrgyzstan survey data were provided by the German Institute for Economic Research (DIW Berlin)

Contents

Introduction	4
1. Review of the literature	5
2. Model and Methodology	8
2.1. Model Description	8
2.2. Data description	11
3. Estimation and results.....	13
3.1 Estimation of Engel curves, inverse Mills ratios, and SUR.....	13
3.2. PSM	15
Findings and recommendations	16
Conclusion	18
References	20
Appendix	22

Introduction

In 2014, the total amount of remittances to developing countries reached 436 billion US dollars and is expected to accelerate in next years, according to the World Bank Migration and Development Brief 2015. The Kyrgyz Republic is included into the list of most remittance dependent countries in the world, because remittances made 31.5 percent of GDP in 2014 (World Bank). It is in fact on the second place, being behind Tajikistan where remittances made 49 percent of GDP.

In 2014, net inflow of remittances to the country via money transfer operators (MTO) made 1.8 bln. US dollars and decreased by 5.1 percent comparing with the previous year (National Bank of the Kyrgyz Republic). Low oil prices, tighter immigration policy, depreciation of the ruble and deterioration of the economic situation in Russia have affected the volume of remittances in Kyrgyzstan. The fall in remittances is related to the fact that over 97 percent of all remittances came from Russia, and mainly in ruble (80 percent of remittances). It is illustrated by sharp decline in remittances in the first three quarters of 2015, when they fell by 37.3 percent compared to the same period of the previous year and made 199.2 mln. US dollars (NBKR).

The Russian Central Bank reports that Russia sent 33 percent less remittances during the fourth quarter of 2014 (compared to same period of the previous year) and relates it to the depreciation of the ruble, which reduced the real incomes of migrants in Russia and also reduced the value of remittances in US dollar terms. The World Bank experts forecast fall of remittances from Russia to Central Asia by 11.4 percent in 2015, but expect it to jump back in 2016. The fall in remittance inflows might have a significant effect on income of a number of households in Kyrgyzstan and their well-being. Knowing the level of impact of remittances on household expenditure structure and knowing the elasticity of different categories of expenditures we can make more precise and detailed predictions about the effect of fall in remittances on population.

The official statistics on remittances do not account for money that comes through informal channels (e.g. transferred via relatives and friends or brought by the migrant himself). But according to National Bank experts most of remittances to Kyrgyzstan are official and come through different money transfer operators (MTO) due to their accessibility, safety, and decreasing costs. The average cost for sending money from abroad to the Kyrgyz Republic is much lower than the world average of 8 percent (The World Bank, 2015). For example, sending money from Russia (main remitter) is less than 2 percent of remittance size (World Bank Remittance Price Database). Moreover, the MTO have their offices not only in cities, but also in district centers and transfer money within several hours.

The aim of the paper is to analyze how remittances coming to the Kyrgyz Republic from labor migrants are spent by domestic households, using the Life in Kyrgyzstan survey for 2010-

2012. The research question is: Do remittances affect the expenditure patterns of households in Kyrgyzstan? Hypothesis tested is that remittance receiving households spend larger shares of their incomes for construction and repair, investments into human capital, and spend less on food than non-receiving households.

The next section of this work presents the overview and analysis of empirical papers written on remittances and their effect on households' expenditure patterns. The section 3 includes the description of the econometric model and data. The final section of the work shows the estimations and results.

1. Review of the literature

Remittances and their impacts have been a topic of interest for many developing countries that send migrants abroad. It became even more urgent and drew a lot of attention of researchers in last twenty years. Analyses of remittances' effect were done on both micro and macro levels, showing that they can affect: poverty and income inequality (Portes, 2009), human capital (Bansak and Chezum, 2009; Kroeger and Anderson, 2011), household consumption behavior (Clement, 2011; Adams, 2010; and others), as well as inflation and exchange rates (Ball et al., 2013; Bayangos and Jansen, 2009; Saadi-Sedik and Petri, 2006), investments (Adams, 1998), consumption (Chami et al., 2008; Pushpangadan, 2003), and overall economic growth (Nishat and Bilgrami, 1991; Kireyev, 2006; Stratan et al., 2013; and others). A number of research works is devoted to analysis of impact of remittances on the Kyrgyz Republic economy. According to them, remittances affect macroeconomic situation and financial sector (Mogilevski and Atamanov, 2009), consumption behavior of households (Ukueva and Becker, 2010) and depend on the economic situation in a host country (Lukashova and Makenbaeva, 2009) and socio-economic characteristics of migrant sending households (Atamanov and M.van den Berg, 2010). This section is devoted to the analysis of research studies done on the issue of remittances and households' expenditure patterns.

On micro level, researchers analyzed a number of developing countries that receive significant amount of remittances, including China (Zhu et al., 2012), Colombia (Sosa and Medina, 2006), Albania (Castaldo and Reilly, 2007), Mexico (Rivera and Gonzalez, 2009), Tajikistan (Clement, 2011), Philippine (Tabuga, 2007), and Guatemala (Adams, 2010). All of them use household level data to evaluate the impact of remittances (internal and external) on family expenditure patterns. It is usually very broad household surveys done on the basis of Living Standards Measurement Survey (LSMS), or surveys that are similar to LSMS in terms of their structure and scope. Most of them base their analysis on cross-sectional data, and some use panel data.

There are two different points of view on how remittances are spent: the optimists claim that remittances stimulate investments, while pessimists say that remittances mainly affect the private consumption. Large group of studies supports the pessimistic view on remittances and claim that they are consumed rather than invested and thus do not contribute a lot to the development of migrant sending countries. For some of them (Chami et al., 2003; Taylor et al., 1996; Malik and Sarwar, 1993) however the results might be distorted, because these works did not consider educational and medical expenses as investment. Clement (2009) included the educational expenses into the investments list, but did not find any productive use of remittances due to the poor quality of the education system in Tajikistan and disincentives to school attendance and enrollment. As argued in Rivera and Gonzalez (2009), housing expenditures should also be considered as productive investment, because of their importance for mobility, family health and construction sector development in the regions with large share of migrants. Authors claim that Earlier works that do not consider it might have some biased results.

Recent studies tend to support more the optimistic view on remittances and argue that remittances affect significantly the education and health expenditures (Adams, 2005; Sosa and Medina, 2006; Rivera and Gonzalez, 2009), capital investment (Rivera and Gonzalez, 2009), and housing (Adams, 2005; Zhu et. al, 2009).

Majority of works use Engel curve framework, which illustrates the relationship between the consumption of different goods and income of consumers (assuming that prices and preferences are constant). The Engel curves are similar to demand curves: they reflect the relationship between the factor that affects the demand (e.g. remittances) and the consumption. It implies estimation of different Engel curve equations for certain commodities and their share from total expenditures. Moreover, the framework states that on average poorer households spend larger part of their total expenditures on food.

One of the first works done on the remittances using the Engel curve is written by Malik and Warwar (1993) on case of Pakistan. Their results contradict to most of other findings: remittance receiving households have lower marginal propensities to consume than non-migrant households. However, the results could be affected by the estimation method (OLS) that does not account for correlation between equations and the fact that only consumption and durable expenditures were considered as expenditure groups.

Zhu et al. (2012) рассчитывают построенные уравнения кривой Энгеля с помощью метода FE-IV и находят, что домохозяйства из сельской местности воспринимают денежные переводы как постоянный доход и тратят их преимущественно на продукты питания. Более того, судя по их результатам, в сельской части Китая предельная склонность

к потреблению от денежных переводов значительно выше для семей с недавними мигрантами, чем для семей с мигрантами, уехавшими давно или не в первый раз.

Zhu et al. (2009) estimate it using FE-IV method and find that rural households that are the main migrant senders and remittance receivers consider remittances as permanent income and spend disproportionately on food. Moreover, according to their results, in rural China the marginal propensity to consume out of remittances is significantly higher for new migrants than for repeat migrants. Sosa and Medina estimate a similar model with 2SLS and find the highest effect of remittances on education and almost no effect on consumption and investment. Remittance receiving households in Colombia spend about 10% more on education than non-receivers, and there is a significant effect on the probability of attending a private, rather than a public, educational institution. Similar results are in the work of Adams (2010) and Rivera and Gonzalez (2009): their estimations demonstrate higher spending on education, investments, and health and lower on food for remittance receiving households. We need to consider that the findings of Adams (2010) for Guatemala might be distorted, because in opposite to other researchers (Zhu et al., 2009; Sosa and Medina; Rivera and Gonzalez, 2009) he does not consider the correlation between different expenditure equations and uses OLS in his estimations despite potential endogeneity problem.

The Engel curve framework might have a censorship problem and the problem of correlation between equations for different categories of expenditures. Moreover, microeconomic data usually has a large number of zeros in the dependent variable. Rivera and Gonzalez (2009) argue that it happens due to i) infrequency of purchase, ii) selection bias and iii) corner solution. They claim that one can solve these methodological issues by using Tobit model (to solve censorship problem) and Seemingly Unrelated Regression (SUR) technique (to consider the correlation between equations). Their results support the Engel law about lower share of expenditures spent for food by higher-income (or remittance receiving) households. Also, they argue that remittance income is less transitory than income from other sources and is less risky compared to farming. Tabuga (2007) also uses censored Tobit at the first step of estimations, and quintile regression analysis to find the marginal effects of remittances. Unlike other researchers, she analyzes the effect of remittances not only on food, education, and housing but also tobacco and alcohol. Her cross-sectional analysis of the household consumption patterns in Philippines shows that remittance receiving households invest more on education, housing, medical care and durable goods. At the same time there is no significant effect of remittances on tobacco and alcohol.

One of a few empirical and reliable works done on this topic in the region is the article of Matthieu Clement (2011) on remittances and household expenditure in Tajikistan. He uses 2003 TLSMS (Tajikistan Living Standards Measurement Survey) and a propensity score matching analysis to show that remittances affect daily consumption only and have no impact on investments. He explains his findings with poverty among migrant sending households that then use remittances to cover basic needs. Moreover, he assumes that low quality of schools and poor qualification of teachers restrains families from investing into education, while lack of business opportunities moderates investment into capital. Unlike other studies, Clement does not use an Engle curve framework and evaluates the average effect of remittances by matching remittance-receiving and not receiving households. He claims that it is a more relevant method because “it helps reduce the selection bias linked to the existence of observed differences in socioeconomic characteristics between recipient and non-recipient households”. (Clement, 2011, p. 62) We need to mention that Clement did not take construction and repair as a separate category of expenditures, even though in Tajikistan it is one of the main ways to spend remittances.

Ukueva and Becker (2010) discuss not only external remittances, but also internal transfers between households. Using Kyrgyz Integrated Household Survey for 2005-2007 they show that remittances mainly to more vulnerable households and are spent mainly on durable goods.

Overall, the review of previous literature written on this topic revealed that the main approach to this question implies using Engel curve. However, while using it we should consider two important methodological questions: potential selection bias and correlation between different equations. We should also think about potential endogeneity problem and relevant number of expenditure categories.

2. Model and Methodology

2.1. Model Description

Most researchers base their work on Engel framework that shows the relationship between consumption of different goods and income of buyer. Engel curves demonstrate how factor that affects demand (e.g. remittances) through increased income changes the consumed quantity of a certain good.

Engel curves show how the factor that affects demand through increased income (for example, remittances) changes the consumption of a certain good. The most common specification of Engel curve is the model developed by Working and Leser (Working, 1943, Leser, 1963):

$$C_{ij} = \alpha_j + \beta_j \ln (exp_i) + \mathcal{E}_{ij}, \quad (1)$$

where C_{ij} is the share of expenditure on category j from total expenditures in household i . exp_j is the total expenditures of the household, \mathcal{E}_{ij} error term. This form assumes that the marginal propensity to consume is constant.

The specification of Engel curve that we use in our work was developed by Rivera and Gonzalez (2009) and looks as the following:

$$C_{ij} = \alpha_j + \beta_j \ln (exp_i) + \gamma_j \mathbf{X}_i + \theta_j \ln (remit_i) + \mathcal{E}_{ij}, \quad (2)$$

where C_{ij} is the category j 's share of expenditures, exp_j is total expenditures, \mathbf{X}_i includes a vector of socio-economic characteristics of households and their geographical characteristics (urban/rural, north/south), $remit_i$ is the external remittances received by the household, and \mathcal{E}_{ij} error term.

The expenditure (consumption) categories based on available data are divided into six groups:

- food;
- durable goods;
- public utilities and communication;
- education and medical expenditures (human capital investments);
- construction, repair and furniture expenditures;
- celebrations and entertainment expenditures.

Grouping of expenditures into different categories is justified by the specification of the model and is a common approach in all empirical works done on this topic on micro level. However, our works also separates celebrations into a separate category due to the region specific role of celebrations in households' lives, their importance for social networking, broad scope and significant expenditures on them. For each category a separate equation is estimated, and their coefficients are used to find individual elasticity.

This is the final model used for analyzing the effect of remittances on household expenditure patterns:

$$C_{ijt} = \alpha_j + \beta_j \ln (exp_{it}) + \gamma_{j1} \#adults_{it} + \gamma_{j2} \#children_{it} + \gamma_{j3} female_{it} + \gamma_{j4} age_{it} + \gamma_{j5} age^2_{it} + \gamma_{j6} prof_educ_{it} + \gamma_{j7} univers_educ_{it} + \gamma_{j8} married_{it} + \gamma_{j9} city_{it} + \gamma_{j10} south_{it} + \gamma_{j11} shock_{it} + \gamma_{j12} kyrgyz_{it} + \gamma_{j13} uzbek_{it} + \gamma_{j14} russian_{it} + \gamma_{j15} 2010_{it} + \gamma_{j16} 2011_{it} + \gamma_{j17} + \theta_j remit_{it} / income_{it} + \mathcal{E}_{ijt}, \quad (3)$$

where C_j is the share of expenditure category j from total expenditures;

exp_j – total household expenditures;

$\#adults$ – number of adults (older than 18 years) in the household;

$\#children$ – number of children (younger than 18 years) in the household;

$female$ – dummy variable, equals 1 if the head of the household is female;

age – age of the head of the household;

prof_educ – dummy variable, equals 1 if the head of the household has vocational technical education;

univers_educ – dummy variable, equals 1 if the head of the household has university education

married – dummy variable, equals 1 if the head of the household is married

city – dummy variable, equals 1 if the household is located in a city;

south – dummy variable, equals 1 if the household is located in southern part of the country (Osh, Jalal-Abad, and Batken oblasts);

shock – dummy variable, equals 1 if the household faced some serious shock (loss of a job, death or illness of the household head or other family member);

kyrgyz, uzbek, russian – dummy variables that consider ethnicity of the head of the household, equal 1 if the household head is Kyrgyz, Uzbek or Russian, accordingly;

remit/income – доля внешних денежных переводов от общего дохода домохозяйства;

remit/income – share of remittances from total income of the household;

2010 – dummy variable, equals 1 for households in 2010 and accounts for countrywide shocks that happened in 2010 and might have affected the household expenditure patterns;

2011 – dummy variable, equals 1 for households in 2011 and accounts for countrywide shocks that happened in 2011 and might have affected the household expenditure patterns;

\mathcal{E} – error term.

To estimate the Engel equations we use the methodology similar to Rivera and Gonzalez (2009): first estimate inverse Mills ratios through the probit model that help to solve the potential selection bias problem, and then solve Engel curves through seemingly unrelated regression (SUR). SUR would give more relevant results than OLS, because it considers the issue of correlation between equations for different expenditure categories. This correlation appears when a household takes into account its spending on one type of good while deciding about spending on another good. For example, while deciding about construction expenditures, a household takes into account its expenditures on other activities, like celebrations. Moreover, SUR helps to estimate the marginal effect of remittances and other explanatory variables for each expenditure category. Unfortunately, this method does not solve the potential endogeneity problem, which means that we have to confirm the results with the alternative method described below.

Propensity score matching analysis (PSM) was chosen as alternative estimation method, because it accounts for the potential endogeneity problem and also solves the selection bias that is common for many micro-level research works. It appears because we want to compare the

consumption behavior of the household when it receives and when it does not receive remittances, but these two scenarios cannot be observed simultaneously. Dividing households into two groups, receiving and not receiving remittances, and comparing their average expenditures is not recommended, because these groups might differ in their initial characteristics and therefore behavior. PSM is a widely used way to solve this problem and estimates the effect of remittances of households' behavior the next way: remittance receiving households are matched with non receiving ones that have similar social, demographic and geographical characteristics. This way the difference in consumption behavior between households that receive and don't receive remittances can be explained by remittances.

The vector of socio-economic characteristics of household and their geographical characteristics is based on the empirical literature. The variables included into the model also are used Clement (2011), Rivera and Gonzalez (2009) and Castaldo (2007), and include the following:

- household's structure: number of adults, number of children;
- household head's social and demographic characteristics: gender, age (and age squared), education level, marital status, ethnicity;
- place of residence of the household: city/village, oblast.

We assume that the consumption patterns of the households depend on the incoming remittances, total expenditures, and vector of household characteristics discussed above.

2.2. Data description

Data on income, expenditures of households and their characteristics is taken from the Life in Kyrgyzstan (LIK) survey that was implemented by DIW Berlin, in collaboration with Humboldt University of Berlin, CASE Kyrgyzstan and AUCA³. The survey is representative at the national level and covers around 3,000 households from all seven provinces (*oblasts*) and the Bishkek city. We used three waves (2010 - 2012), which were merged into one balanced panel.

The LIK survey provides us with all necessary data on income, consumption patterns, remittances, and socio-demographic characteristics of households living in different areas of the country.

While forming a panel, mainly the household questionnaire results are used: sub-module 1a (household composition), module 4 (consumption and expenditure), module 5 (income sources), module 6 (migration). From the individual questionnaire results we use module 2 (education and health) and module 3 (labor market) to get variables "household head's education level" and "household head's occupation". The information about the location of the household

³ To get more detailed information about the survey, follow the link http://www.diw.de/de/diw_01.c.100313.en/forschung_beratung/projekte/projekte.html?id=diw_01.c.345525.en

is derived from the control card. Separate modules are merged within a wave based on “hhid” and “pid” unique identifiers. Merging across waves is done according to recommendations of the LIK Codebook⁴.

The final panel consists of 2 822 households, and 40.5 percent of them live in cities, while 59.5 percent live in rural areas. 12.0 percent of urban households in the panel and 18.3 percent of rural households in the panel have remittances as one of the sources for income.

Most of the households in the panel are from Bishkek and Chui oblast, Osh oblast and Jalal-Abad oblast (Table 1). The average amount of remittances for households that are remittance-receivers depends on the region where the household is located: the largest remittances come to households from Chui and Osh oblasts, and the lowest come to households in Naryn.

Table 1.

Geographic structure of the panel and the average remittance size, LIK

	Province/oblast	Number of households	Share from sample, in %	Average remittance per month, som
1	Issyk-Kul	263	9.3	4792.9
2	Jalal-Abad	467	16.5	7617.7
3	Naryn	124	4.4	4722.2
4	Batken	220	7.8	7365.8
5	Osh	473	16.8	9570.6
6	Talas	119	4.2	5904.2
7	Chui	465	16.5	12039.9
8	Bishkek city	571	20.2	6420.3
9	Osh city	120	4.3	6710.9
10	<i>Total</i>	2822	<i>Average</i>	7238.3

The next table shows that our grouping of expenditures into six categories is justified, households spend received remittances mainly on durable and current expenditures, weddings, education, and healthcare (Table 2).

Table 2.

Question “What did you spend the money on?” (multiple answers allowed), 2011, LIK

	Expenditure category	«Yes», in %	«No», in %
1	Education	22.60	77.40
2	Medical expenses	17.10	82.90
3	Wedding	31.00	69.00
4	Funeral	9.90	90.10
5	Investment in enterprise	0.29	99.71
6	Purchase of durable goods	26.38	73.62
7	Current expenditures	72.46	27.54
8	Helped other households	6.09	93.91
9	Public savings	41.74	58.26
10	Other	11.59	88.41

⁴ Compiled by Susan Steiner with the help of Philipp Jager

According to answers, households spend remittances more on weddings than on education or health care. Moreover, almost no remittances are invested in private entrepreneurship.

The next two tables present the descriptive statistics of independent variables that are included into empirical model. The first table (Table 3) summarizes the qualitative variables, while the second one includes dummy variables.

The average volume of remittances is small due to the large number of households in the sample that do not receive them. The maximum size of the transfer in the sample is 50 000 soms. The average age of the household's head is around 51 years, and the average size of the household is almost five people.

Table 3.

Summary statistics of independent variables

	Variable	Average	Std.dev.	Min.	Max.
1	Remittance	1 002.7	3 359.6	0	50 000
2	Age	51.5	14.0	16	105
3	Number of children	1.6	1.5	0	9
4	Number of adults	3.1	1.5	0	10

Most of household heads are men and married, more than half of them have secondary school education, and less have professional or university education (Table 4).

Table 4.

Summary statistics of dummy variables

	Variable	Частота	Доля, проценты
1	Sex of the household's head:		
2	Male	2 036	72,2
3	Female	786	27,8
4	Marital status of the household's head:		
5	Married	2 019	71,5
6	Not married	803	28,5
7	Household's location:		
8	City	1 143	40,5
9	Village	1 679	59,5
10	North	1 543	54,7
11	South	1 279	45,3
12	Education of the household's head:		
13	Professional-technical education	587	21,2
14	University education	510	18,1

3. Estimation and results

3.1 Estimation of Engel curves, inverse Mills ratios, and SUR

The Engel equation (3) estimation results for all six expenditure categories are presented in Appendix (Table 5). Estimations take into account inverse Mills ratios, which are necessary

for solving the potential selection bias problem. According to the results, remittances positively affect the consumption of durable goods, human capital investment, construction, and celebration expenses. At the same time, remittances decrease the share of expenditures on food and public utilities. The impact of remittances on construction is statistically significant at 1 percent, on celebrations and entertainment on 5 percent, and on durable goods on 10 percent significance level. Overall, when share of remittance from total income increases by 1 percent, construction expenditures increase by 0.3 percent.

The derived coefficients also can be used to calculate the elasticities by income from remittances for each expenditures category. Elasticity is calculated by getting the ratio of marginal budget share of a category to average budget share of the same category from total budget (MBS/ABS). When share of remittances from total household income increases by a certain amount, consumption of goods with lower elasticity increases less than consumption of goods with greater elasticity. Categories with elasticity less than one are the following: expenditures on food, public utilities, and human capital (0.97; 0.29 and 0.70 accordingly). Categories with elasticity higher than one are: expenditures on durable goods (1.12), construction and renovation (1.17), and celebrations (*tois*) and entertainment (1.016). This means that if remittances' share from total income increases by one percent, share of expenditures on durable goods, construction, and celebrations increase by more than one percent.

For example, there is a household with average monthly income from economic activity of 40 000 soms and 10 000 in form of remittances. It does not have any savings and spends on construction and renovation 6 750 soms per month⁵. If due to some external shocks (e.g. tightening of migration policy in Russia) remittances fall to 5 000 soms per month, their share from total income decrease from 20 to 11 percent. Therefore, share of expenditures on construction also decreases, from 13.5 to 10.9 percent from total expenditures, making 4 905 soms.

Total expenditures of the household affect all categories of expenditures: the effect is negative on food and public utilities categories, and it is positive on others. This effect is statistically significant at any significance levels.

Household size determines what share of the budget it spends on food, durable goods, public utilities, and celebrations. Number of children (unlike the number of adults) also affects the construction expenditures of the household. Share of celebrations spending are positively affected by the number of adults, and negatively by the number of children in the household.

⁵ 6 750 soms were calculated based on survey data and average share of construction expenditures from total household budget.

Household head's gender has almost no impact on the expenditures structure; coefficients for all expenditure categories are statistically insignificant. Household head's age affects the spending on food, durable goods, and celebrations. It does not affect the spending on public utilities, human capital, and construction. With an increase in head's age share of celebration expenses increases and share of expenses on food and durables decreases.

Education level of the household's head affects almost all expenditure categories, except food and construction. Families with married head spend more in relative terms on food and durable goods, construction, and celebrations (on construction the effect is statistically significant only at 10 percent significance level).

Households located in a city spend greater share of their budget on food and human capital, and lower share on construction/renovation and celebrations. Households located in North also spend relatively more on food. External shocks that families face have an impact on all expenditure categories: share of spending on food and public utilities increase, and expenditures on durables and construction fall down.

Households where the head is Kyrgyz spend lower part of their budget on food and public utilities, but share of spending on durable goods, construction, and celebrations are higher. Households with Uzbek head spend more on durable goods and human capital in relative terms, and households with Russian head spend less on celebrations (*tois*).

Overall, the Engel equations results that were derived by inverse Mills ratios and SUR show that due to the incoming remittances households direct greater share of their budget on construction and renovation, celebrations and entertainment, and durable goods (at 10 percent significance level). The other expenditure categories are affected more not by remittances, but other socio-economic and geographic characteristics of the households. Also, the estimated results do not account for the potential endogenous nature of remittances, and need to be supported by an alternative PSM estimation method.

3.2. PSM

While implying PSM method, we used not standard nearest neighbor approach, but Kernel matching. It lets to pair households not with one, but with the weighted sum of all households that are similar to it by the vector f different social and demographic characteristics.

To evaluate the quality of matching we run tests that determine how efficient the propensity scores are after balancing characteristics of the households that receive and don't receive remittances. If case of good matching the chosen covariates should have similar averages in both household groups after PSM process. Balancing tests are given in Appendix (Table 6) and show that bias is less than 5 percent for all variables and less than 1 percent for most of them. So, Kernel matching gives us households with and without remittances that are comparable, and bias for

which is minimized. After matching the difference in averages of independent variables is statistically insignificant.

PSM позволяет рассчитать средний эффект от получения денежных переводов с учетом наблюдаемых характеристик домохозяйств. PSM results (table 7) support the results of Engel equations, which were derived through inverse Mills ratios and SUR. Results demonstrate that households with remittances on average spend less share of their expenditures on food, public utilities and commutation services than non-migrant households. At the same time, remittance-receiving households spend more on durable goods, human capital investment, construction, and celebrations in relative terms.

PSM does not show the impact of each independent variable on separate expenditure categories, but demonstrates the average effect of remittances on consumption structure. The impact of remittances is the highest for food consumption: share of spending on food for remittance receiving families is 2.7 percent less than for non-receiving families.

Receiving remittances increases the shares of expenditures on education and healthcare by 0.7 percent and on construction almost by 1 percent. Share of expenditures on durable goods increases by 2 percent, on celebrations by 0.6 percent. Share of expenditures on public utilities and communication services decrease by 0.7 percent if household receives remittances.

These results support the results of Ukueva and Becker (2010) about stimulation by remittances the households' spending on durable goods. If spending on education, healthcare, and construction and renovation are considered as investment then we can conclude that in Kyrgyzstan investment potential of remittances is partially realized, but less than in other countries (Guatemala, Columbia, Mexico, and China).

Findings and recommendations

Categories with elasticity by income from remittances less than one are the following: expenditures on food, public utilities, and human capital (0.97; 0.29 and 0.70 accordingly). Categories with elasticity higher than one are: expenditures on durable goods (1.12), construction and renovation (1.17), and celebrations (*tois*) and entertainment (1.016). This means that when remittances' share from total income is decreasing, expenditures decrease first and foremost on durable goods, celebrations, and especially construction. Categories with small elasticity by income from remittances will not suffer a lot due to the fall in remittance inflows, but they also will not benefit significantly in case of their drastic growth.

Significant changes in remittance flows affect mostly the construction industry, which is illustrated by 2010-2012 data. In 2010 actual spending on private housing construction in the Kyrgyz Republic was 7 691,0 mln soms, in 2011 – 8 394,5 mln soms, and in 2012 – 10 511 mln

soms. The fitted numbers produced with our obtained parameters are pretty similar to actual ones: 6 095,3 mln soms in 2010, 8 464,1 mln soms in 2011, and 10 470,2 mln soms in 2012. Comparison of actual and fitted values for other industries are given in Tables 8 and 9.

Table 8.

Comparison of actual and fitted gross value added estimates

	Industry	Gross value added, mln som					
		Actual			Fitted		
		2010	2011	2012	2010	2011	2012
1	Healthcare	5588.3	8308.2	10542.9	6129.9	7588.8	8226.2
2	Education	9654.1	15280.8	18589.7	10554.4	13066.4	14164.0
3	Restaurants	2152.1	3284.1	3219.0	2498.9	3362.1	3772.0

Source: Authors' own calculations based on NSC KR data

Table 9.

Comparison of actual and fitted by share in GDP

	Industry	Share in GDP, percent					
		Actual			Fitted		
		2010	2011	2012	2010	2011	2012
1	Private construction by households and contractor entities	1.8	1.5	2.4	2.6	2.8	2.9
2	Healthcare	2.5	2.9	3.4	2.8	2.7	2.6
3	Education	4.4	5.3	6.0	4.8	4.6	4.6
4	Restaurants	1.0	1.1	1.1	1.1	1.2	1.2

Source: Authors' own calculations based on NSC KR data

As it is seen from the tables, actual and fitted values for different industries for 2010-2012 are mostly similar. Some difference might be observed due to the following reasons:

- fitted values take into account only effect from remittances, in absence of shocks and changes in economic conditions, exchange rates, import tariffs, and others; they do not take into account factors that affect the development or decline in the industry;

- multiplicative effect of remittances is not considered: for example, increased spending on construction will lead to changes in salaries and employment in the industry, and broadening the opportunities for development of business (construction, renovation, sale of construction materials);

- households could underreport the amounts of received remittances during the survey and therefore the obtained parameters might slightly differ from the actual values;

- presence of shadow economy.

As can be seen from the above, fall of remittance inflows by 27 percent in 2015 will have a negative impact on households' expenditures and therefore the economy. Not accounting for the multiplicative effect from decreased expenditures on the industry, fall of remittances should lead to the 0.23 percent contraction of GDP⁶.

⁶ According to NSC, total input of private housing construction, education, healthcare, and restaurants to GDP is not significant and less than 1 percent.

Conclusion

The issue of internal and external migration in Kyrgyzstan has been a subject of active discussions and analysis for population, researchers, and policy makers for a while. Large outflows of labor force are determined mainly by economic reasons – higher earnings and living standards in neighboring countries. Labor migration is an important issue for Kyrgyzstan not only because of its impact on country's labor market, its demographic and social situation, but also as a source of income for many households.

Remittances to the Kyrgyz Republic are around the third of GDP; their volumes are larger than volumes of incoming foreign direct investments and foreign aid. In first half-year of 2015 inflow of remittances decreased significantly in their dollar equivalent, which is related to the economic situation in Russia and toughening of Russian migration policy.

Review of the literature revealed that usually the analysis of impact of remittances on households' consumption and expenditures is done using Engel's curve model on a case of developing countries with large labor outflows. There are two different opinions about the effect of remittances: the group of pessimists think that the remittances induce households spend larger share of their budget on consumption (food and durable goods), but not on investment. Optimists claim that households with remittances invest more than households without them.

We used two alternative methods of evaluation the impact of remittances on households' expenditures: 1) solving Engel's curve equations with seemingly unrelated regressions (SUR), taking into account inverse Mills ratios, and 2) using propensity score matching (PSM) approach. Each of these methods has its strong sides and weaknesses: the first approach considers the correlation between different equations for expenditure categories and lets to estimate the marginal effect of remittances and other explanatory variables for each category. Unfortunately, unlike the PSM approach it does not solve the problem of endogenous nature of remittances. Moreover, PSM solves the problem of selection bias that is present in most of microeconomic works. It estimates the effect of remittances by matching and comparing households with and without remittances that are close in their social, demographic, and geographic characteristics. This way the difference in consumption between households with and without remittances is explained not by the basic differences between these groups, but entirely by remittances. However PSM does not show the impact of separate explanatory variables on the expenditure structure as SUR.

The first and second approach results support each other: according to SUR results, remittances increase the share of expenditures on durable goods, human capital investment (healthcare and education expenses), construction, and celebrations (tois). At the same time remittances decrease shares of expenditures on food and public utilities. The effect of

remittances is statistically significant on construction, celebrations, and durable goods (the effect on the last category is significant at 10 percent significance level). The increase of share of remittances from household's total income leads to 0.3 percent increase in the share of construction expenditures. According to PSM results, households with remittances direct smaller share of expenditures on food and public utilities, but spend more on construction, durable goods, and celebrations.

Fall in remittance inflows and decrease of their share in households' incomes will first and foremost decrease the aggregate expenditures on durable goods, celebrations, and especially construction. Categories with low elasticity of income from remittances will not suffer a lot due to the fall in remittances, but also they will not benefit from their growth. Changes in construction and restaurant industries that are projected with our estimated parameters are similar to the actual changes. Overall, fall of remittances by 27 percent in 2015 will have moderate negative effect on households' expenditures and economy if multiplicative effect of expenditure decrease is not considered (GDP will decrease by 0.23 percent).

If expenditures on education and healthcare, construction and renovation are considered as investment, then we can conclude that in the Kyrgyz Republic the optimistic point of view on effect of remittances is supported⁷. However, the size of impact of remittances on investment is not significant and is much lower than the impact of households' social, demographic, and geographic characteristics. There is a need in development of instruments that will redirect part of remittances received by households from celebrations and durable goods categories to the categories of investment to business, education, and healthcare.

⁷ There is no unambiguous opinion about the expenditure on celebrations (tois): some consider it as social capital investment, others take it as conspicuous consumption

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Appendix

Table 5.

Seemingly unrelated regression (SUR) results

	Variable	Food		Durable goods		Public utilities and communication		Human capital		Construction and renovation		Tois, celebrations, and entertainment	
		Coef.	Ст.отк.	Coef.	Ст.отк.	Coef.	Ст.отк.	Coef.	Std.err.	Coef.	Std.err.	Coef.	Std.err.
1	<i>Rem_inc</i>	-0.0038	0.011	0.0146*	0.008	-0.013	0.011	0.0006	0.006	0.003***	0.0002	0.0005**	0.0002
2	<i>Inexpend</i>	-0.115***	0.002	0.041***	0.002	-0.366***	0.002	0.02***	0.003	0.117***	0.004	0.042***	0.003
3	<i>#adults</i>	0.0016	0.001	-0.0017*	0.0009	0.0084***	0.0012	-0.008	0.136	-0.0147	0.017	0.0299**	0.013
4	<i>#children</i>	0.0109***	0.002	0.0022**	0.0009	-0.0049	0.001	-0.0016	0.003	0.008**	0.004	-0.0105***	0.003
5	<i>female</i>	0.0116	0.005	0.00003	0.004	-0.01	0.005	0.014	0.08	-0.0076	0.009	-0.0043	0.007
6	<i>age</i>	-0.006***	0.002	0.0008	0.0005	0.0022	0.002	-0.0003	0.003	0.0039	0.003	0.0079***	0.0025
7	<i>age²</i>	0.0001***	0.001	-0.0001**	0.000	0.00001	0.000	0.0001	0.002	-0.0001	0.0001	-0.00007***	0.00002
8	<i>prof_educ</i>	-0.0084**	0.004	-0.002	0.003	0.006	0.004	-0.0012	0.006	0.0215***	0.007	0.001	0.006
9	<i>univers_educ</i>	-0.0061	0.004	-0.008**	0.003	-0.024***	0.007	0.019*	0.011	-0.0132	0.014	-0.0318***	0.0107
10	<i>married</i>	0.0421***	0.009	0.013**	0.004	0.001	0.009	0.017	0.014	0.033*	0.018	0.035**	0.014
11	<i>city</i>	0.0425***	0.003	-0.018***	0.002	0.004	0.004	0.0145**	0.023	-0.031***	0.0078	-0.018***	0.006
12	<i>south</i>	-0.114***	0.035	0.096*	0.052	-0.0135	0.036	-0.0036	0.0024	-0.112*	0.068	-0.1328	0.052
13	<i>shock</i>	0.0137***	0.004	-0.043***	0.009	0.0229***	0.007	-0.042**	0.009	-0.046***	0.012	0.03***	0.009
14	<i>kyrgyz</i>	-0.025***	0.005	0.029***	0.004	-0.014***	0.005	0.0047	0.0035	0.0089***	0.002	0.0135***	0.004
15	<i>uzbek</i>	-0.022***	0.006	0.023***	0.005	-0.01056	0.007	0.012**	0.004	-0.00269	0.0029	0.0003	0.0056
16	<i>russian</i>	0.0056	0.006	0.0007	0.005	-0.00358	0.006	0.0062	0.0045	0.0049*	0.0028	-0.13**	0.0053
17	<i>y2010</i>	0.385***	0.003	-0.324***	0.0029	0.103***	0.003	-0.07***	0.0025	-0.02***	0.001	0.136***	0.0029
18	<i>y2011</i>	0.352***	0.003	-0.335***	0.003	0.091***	0.003	-0.04***	0.0025	-0.0069***	0.0016	0.119***	0.003
19	<i>Inv mills</i>	-0.1401	0.047	-0.1645**	0.069	0.0444	0.0488	-0.438	0.071	0.121	0.09	0.1829***	0.0699
20	<i>_cons</i>	2.1616***	0.123	1.0943***	0.184	0.4355***	0.129	-0.126	0.187	-1.61***	0.238	-0.952***	0.185

***, **, * denote statistical significance at 1, 5, and 10 percent significance levels accordingly

Table 6.

PSM balancing tests for covariates

	Переменная	Average		Percent of bias	t-test	
		Treated	Control		t	P > t
1	<i>male</i>	1.2643	1.2712	-1.5	-0.38	0.703
2	<i>age</i>	55.273	55.65	-2.9	-0.76	0.450
3	<i>kyrgyz</i>	0.72328	0.7163	1.5	0.38	0.703
4	<i>uzbek</i>	0.15576	0.15768	-0.6	-0.13	0.897
5	<i>russian</i>	0.05717	0.06115	-1.4	-0.42	0.678
6	<i>prof_educ</i>	0.19718	0.18878	2.1	0.52	0.601
7	<i>univ_educ</i>	0.1251	0.12658	-0.4	-0.11	0.913
8	<i>city</i>	0.30782	0.31012	-0.4	-0.10	0.919
9	<i>south</i>	0.7937	0.78153	2.7	0.73	0.465
10	<i>nchild</i>	1.6794	1.6947	-1.0	-0.25	0.800
11	<i>nadult</i>	4.2626	4.2175	2.8	0.62	0.534
12	<i>married</i>	0.75808	0.74671	2.6	0.65	0.518
13	<i>shock</i>	0.16321	0.16932	-1.7	-0.40	0.687

Table 7.

PSM results (Gaussian Kernel matching)

	Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
1	Food	Unmatched	0.304419	0.329267	-0.0248485	0.02484846	-3.16
		ATT	0.304418	0.331499	-0.0270813	0.01090899	-2.48
2	Durable goods	Unmatched	0.183758	0.1672015	0.01655641	0.00590777	2.80
		ATT	0.183742	0.1630376	0.02070434	0.00948704	2.18
3	Public utilities and communication	Unmatched	0.143901	0.152895	-0.008994	0.00494528	-1.82
		ATT	0.143899	0.151225	-0.0073256	0.00542567	-1.35
4	Human capital investment	Unmatched	0.082565	0.0759269	0.00663869	0.00302368	2.20
		ATT	0.082445	0.0749272	0.00751783	0.00477374	1.60
5	Construction and renovation	Unmatched	0.088394	0.078502	0.009892	0.0053747	1.84
		ATT	0.088592	0.078915	0.009677	0.00616112	1.57
6	Tois, celebrations, and entertainment	Unmatched	0.134527	0.136289	-0.001762	0.00639545	-0.28
		ATT	0.134764	0.129046	0.005718	0.00701412	0.82