The Impact of Remittances on Household Welfare: Evidence from Kyrgyzstan

Master's Thesis

By

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Abstract

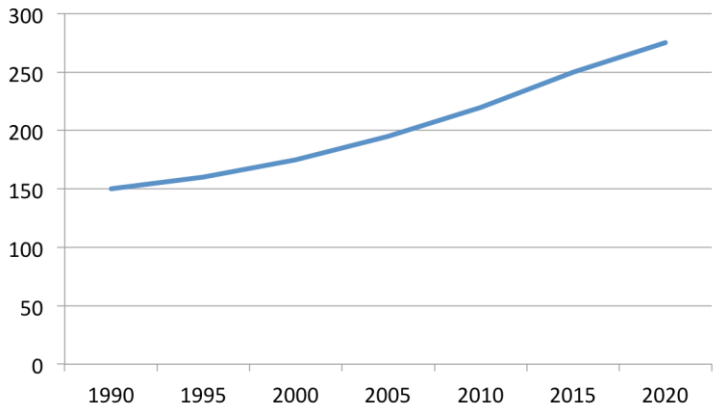
In this paper I study the impact of remittances on household welfare in Kyrgyzstan. I deploy asset indices calculated using Principal Component Analysis and asset accumulation over four years (2010-2013) to measure the average effect of remittances on household well-being. The Propensity Score matching method is applied to address the self-selection to receive remittances and the 2010 data on asset holdings is used to add the pre-treatment information on assets. The study finds that remittances have a negative impact on consumer asset holdings and the accumulation of productive assets over four year-period.

Keywords: remittances; Propensity Score Matching; Principal Component Analysis.

Introduction

Recently, globalization, open border policies, widened access to information technologies, and reduction in transportation costs have significantly contributed to the larger movement of factors of production. Not least, this trend affected the number of people moving across borders seeking out better opportunities for work and life. In 2017 the number of migrants worldwide reached 258 million, up from 173 million in 2000. Some 64 percent or 165 million of these people settled in high-income countries, while the rest 36 percent or 92 million people settled in middle- and low-income countries (United Nations, 2017).

Figure 1. Number of migrants worldwide



Source: United Nations, 2017

However, becoming an integral part of the world development process, migration can lead to both positive and negative outcomes in the short and long term. On the one hand, migration promotes standards of living and improves social services. From the other hand, favorable prospects of living in economically and socially better places attract educated people to depart from developing countries, encouraging the «brain drain» and human capital loss problems.

One of the primary attributes of migration such as remittances has the power to fill these losses and contribute to the economic growth of developing states. In 2016, $413 billion out of a total of $573 billion of remittances went to developing countries (World Bank, 2017). This source of household income could have a significant impact on the improvement of the living conditions of people if it was used to promote economically sustainable sectors. There is a bunch of studies that investigate various uses of these transfers. Adams (1991 and 1998) and Adams and Cuecuecha (2010) found that households in Egypt tend to devote their income from remittances to purchase housing, lend or invest money to agriculture, while people in Pakistan

and Indonesia devote this money to the current expenditures. Hines and Simpson (2009) and Prabel and Ratha (2012) indicated that because of remittances households allot more funding on human capital stock such as education.

This paper specifically focuses on productive (livestock and agricultural machinery), consumer assets (physical commodities), and their accumulation over four year-period 2010 – 2013 to understand how remittances affect household welfare. An asset is defined as a tangible item that has a monetary value and can be sold or converted to cash. This type of stock represents a good measure of a household's well-being since the greater the amount of assets people own, the less unprotected and uncertain they are at the times of risks and instability (Moser, 1998). Assets are also easier to assess than other welfare indicators, and they provide an opportunity to study a large number of respondents. In this paper, assets are aggregated to two asset indices using the Principal Component Analysis approach: consumer and productive assets (Filmer and Pritchett, 2001). These two categories are proposed to addres the question how money transfers contribute to asset holdings and accumulation in remittance-sending migrant families.

Kyrgyzstan is the world's second most remittance-dependent country in 2014 after Tajikistan, with remittances accounted for 30.3 percent of national GDP (World Bank, 2014). Research papers have been already conducted to explore migration and remittances in Kyrgyzstan have mainly focused on their impact on the overall economy rather than on the welfare of a particular household (Makhlouf, 2018; Goerlich and Luecke, 2011; Jongwanich and Kohpaiboon. 2018). The literature on the growth of the asset stock is not numerous too.

I use the data from the Life in Kyrgyzstan longitudinal survey (LiK), to examine the impact of remittances on the household well-being in Kyrgyzstan in 2013, particularly whether remittances affect the growth of durable assets and livestock. Studies that estimate the impact of remittances on household welfare often face the problem of self-selection when some household members themselves select to go abroad for work and send remittances and hence the difficulty to create the situation when a household would not have received remittances. To address that I use the Propensity Score Matching method – PSM that allows me to compare the outcomes of remittance-receiving households with the outcomes of alike households that do not receive remittances. I also use the data on asset holdings in 2010 from the survey of that year to add the pre-treatment information on assets.

The results show that having a migrant household member who sends money transfers negatively contributes to the rise of both consumer and the productive asset index rates and the accumulation of assets. Thereby, the results are not aligned with expectations that the remittances have positive effect on consumer assets but rather are aligned with expectations that remittances negatively affect productive assets. However, despite that the Propensity Score Matching is widely applied to study the effects of remittances, there still can be some unobserved heterogeneity – factors that affect how households use remittances and in turn that might affect the results of the study.

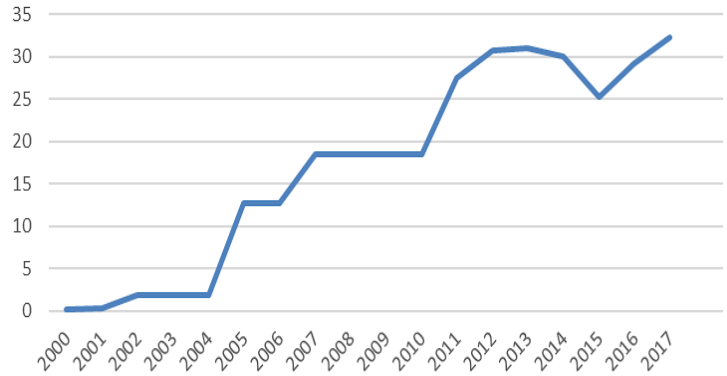
The remainder of the paper is organized as follows. Section 2 presents the background information on migration and remittances in Kyrgyzstan. Section 3 discusses the studies on the effect of remittances on household welfare in other countries and Kyrgyzstan and their uses, specifically related to purchase or investment in assets. Section 4 describes data. Section 5 introduces the methodology and asset index construction process. Section 6 reports the results. Section 7 provides conclusions.

2. Migration and remittances in Kyrgyzstan

Kyrgyzstan is a landlocked country in Central Asia with a population of 6.315 million and GDP per capita in current USD prices $1281 (World Bank, 2018).

After the breakdown of the Soviet Union at the beginning of the 1990s, Kyrgyzstan went through the difficult period of the transition to a market economy that caused the emergence of several economic crises in the country. As a result of negative economic impacts and improved opportunities abroad, the domestic unemployment level increased dramatically from 4.1 percent of the total labor force in 1994 to 12.6 percent in 2002 (IMF, 2019). The living standards of Kyrgyz families also deteriorated: the country's GNI per capita decreased from $3420 in 1990 to $1932 in 2000 (in current USD prices) (UNDP, 2019). The unfavorable situation in the country facilitated a large-scale migration of Kyrgyz workers searching for the job and better payment in the late 1990s. According to the Statistical Committee of Kyrgyz Republic (2014), the income sent by the migrant population reduced the poverty rate from 36.8 percent to 30.2 percent from 2012 to 2014. The positive dynamics of poverty reduction can be attributed to the fact that approximately 80 percent of Kyrgyz migrants send money transfers to their families (Andersson and Kroeger, 2014).

Figure 2. The share of remittances in GDP in Kyrgyzstan (%)



Source: World Bank, 2016

As indicated in Figure 2 migration and remittances considerably supported the national economy of Kyrgyzstan, contributing 30.3 percent of overall GDP (World Bank, 2016). At present, the number of Kyrgyz citizens working abroad is high, according to the State Migration Service of Kyrgyzstan in 2018 more than 800 thousand people left the country to earn income abroad, with majority 639 thousand people working in the Russian Federation and the total amount of remittances sent to the state reached $2,7 billion (World Bank, 2019).

In 2013 the number of workers departed the country was 676 thousand people (United Nations, 2013) and the total value of remittances received by the country was $2.3 billion (World Bank, 2014).

3. Literature Review

Studies on remittance flow to recipient countries focus on the impact of remittances on the economic growth, standards of living, and household welfare. Makhlouf (2018) in his note on the effect of remittances on productivity in Morocco found that money transfers from the migrant citizens make a more substantial contribution to the development of the state than any other foreign finance channels such as FDI or official development assistance. Goerlich and Luecke (2011) also argued that remittances positively affect wages of workers and the sustainability of public spending. However, Jongwanich and Kohpaiboon (2018) came to the opposite conclusion by showing that the common sources of development like trade and FDI have a more considerable effect on economic growth than remittances. They pointed out that if remittances achieve 10 percent of GDP or higher, they might induce income inequality and thereby negatively affect economic growth.

Adams's study (2006) based on the comprehensive analysis of households from the six developing countries emphasized that the places, which receive remittances experience a reduction of existent poverty. However, Wagle (2012) added that even though remittances can lessen the poverty level, they might demotivate people to work or set up business given that they receive income from someone outside.

Regarding the utilization of income from remittances, households usually are divided into different groups based on their needs and plans. For instance, Adams (1991) found that in rural Egypt people do not squander much remittance money on incidental consumption and are more inclined to devote their income on durables like housing or to invest money to buy land for agriculture or construction. It was found that in Pakistan remittance-receiving households spend the income from the transfers on current needs rather than on savings. Indonesia showed a similar consumption pattern as Pakistan. Remittance-receiving families in this country are poorer than other types of households and tend to spend their remittances on the present consumption rather than invest them (Adams, 1991, 1998; Adams and Cuecuecha, 2010). In general, the literature on the use of remittances illustrates that the presence of safe investment or savings vehicles in the country where remittances significantly contribute to a state budget mainly determines how this money is applied by recipient families.

Some authors stressed the importance of foreign transfers for human capital development, especially for education. Hines and Simpson (2009) and Prabel and Ratha (2012) pointed out a positive relationship between remittances and the number of expenditures devoted to human capital needs such as child and adult education.

The utilization of remittances can be also divided by the type of migration: temporary and permanent. Galor and Stark (1990) and Poirine (1997) found that temporary migrants send more remittances, mainly because they have own families that reside in the homeland. Authors also point out that families that receive remittances from temporary migrants usually save them. On the other hand, Merkle and Zimmermann (1997) found that while temporary migrants send more money to their families and accordingly benefit from their earnings, permanent migrants are not much interested to send money back home and use them to anchor in the country where they work. Bauer and Sinning (2005) indicate that households that have migrant members who stay permanently abroad receive a low amount of remittances from them and do not benefit much from these money.

The implication of remittances on the welfare of households was studied by Koc and Onan (2001), who found that remittances positively affect the welfare of families in Turkey. The authors noted that 80 percent of remittances were utilized by 12 percent of households to enhance the standards of living, although this improvement is dependent on the stability of the flow of remittances. Since the end of the last century, many researchers have increasingly begun to turn their attention to different types of assets (physical and financial) to assess household welfare progress. Adams (1998), Quisumbing, and McNiven (2010), Chowdhury and Radicic (2019) investigated the effects of internal and external remittances on asset accumulation. Adams (1998) identified that in rural Pakistan, international transfers have a positive and significant effect on land and physical assets, and internal remittances on the accumulation of agricultural stock. Quisumbing and McNiven (2010) stressed that internal remittances have a positive impact on housing, consumer durables, non-land assets, and negative effect on land assets in the Philippines. Chowdhury and Radicic (2019) applied the Generalized Propensity Score method and found that at a higher level of internal remittances net assets of the Bangladesh families decrease. A similar pattern of net asset dynamics is revealed for the use of foreign transfer.

That remittances lead to a rise in the accumulation of productive assets was claimed by Adams (1991), Dustmann and Kirchkamp (2002), Nicholson (2001), Taylor (1992), and Woodruff and Zenteno (2004). They reported that remittances were used by households to acquire machinery for small family ventures, livestock, and agricultural devices for farming, land, and other necessary equipment for setting up businesses. Ahmed (2000) also highlighted that in Somaliland people were willing to invest the income from transfers in production even in highly unfavorable economic and political conditions. However, Ahmed et al. (2018) stated that, even though migrant families illustrate the growing interest in purchasing productive assets such as land and livestock in Pakistan, the greater number of households are still more inclined to accumulate consumer durables, probably since buying or investing in productive stock does not pay off well. Lefebvre (1999) and Watkins (2003) also indicated that a major amount of remittances is spent on households' current expenditures rather on productive asset accumulation. Azama and Gubert (2006) and Garip (2014) proposed that the reasons behind productive assets decline with migration are the reduction in the labor force available to carry on economic activities and the lack of improvement in performing agricultural activities. Adams and Cuecuecha (2010a) and Andersson (2014) also noted that usually migrant households, which initially invested money to send a migrant abroad, are just enjoying the

returns of this input by buying consumer goods.

There are a few studies that investigated remittances' impact on household welfare for Kyrgyzstan, and most of them concluded that money transfers mainly contribute to the durable consumption growth (Kumar et al., 2017). The authors in their study on the effect of remittances on economic growth both in Kyrgyzstan and Macedonia acknowledged that in the long-run, both countries benefit in terms of economic progress due to transfers from migrants. However, Karymshakov et al. (2015) and Petreski et al. (2016) underlined that improvement of financial institutions such as banks and pension funds in Kyrgyzstan and Macedonia is a prerequisite to keep remittances positively influence both economies. Karymshakov et al. (2016) also stated that there is no significant proof of remittance-dependent behavior among migrant households as well as no evidence that remittances affect wage employment. The results of their analysis also verified that income from money transfers was mainly used for current expenditures and was not the source of funding entrepreneurial ventures. Anderson and Kroeger (2011) neither found that remittances foster investment in children's education and health. In contrast, Schoch et al. (2010) found that sending remittances by labor migrants to rural areas on a large scale and the considerable investments in land and housing in urban centers became the recent trend at the beginning of 2008s in Kyrgyzstan. However, they are not confident over whether the investment to rural areas would bring positive results in the future, and whether the transfer flow would continue to grow. The main cause for the concern is that the major part of migrants is constituted by younger people, who mostly see their future in cities, and are not willing to return to their homes in rural places (Schoch et al., 2010).

4. Data and descriptive statistics

4.1. Data

The study is based on Life in Kyrgyzstan - LiK longitudinal survey. The survey has been traced to 3000 households and over 8000 individuals over four-year period from 2010 to 2013. Each separate year consists of the household and individual-level data sets, which comprises statistics on household demographics, child education and health, housing, assets, individual occupation and subjective well-being, income sources, expenditure, migration, agricultural activity, shocks and on other social matters. All individuals within a household were eligible to complete the questionnaire if they were 18 years old and above; the respondents on the household questionnaire were usually the head of a family or the most informed adult

household member presented at the time of the interview. In the survey households as an observation unit are defined as a group of people who are bounded by cognate relations or any other form of social connections and share either common housing or common family budget.

In this paper, the year 2013 has been chosen to study the most recent causal effect of sending the remittances back to the families in Kyrgystan by migrant members on the households' welfare. The raw data consisted of 2586 households, which are in total of 13132 observations. Migrants are regarded as absent family members and not tracked by the survey until their return to home as proper household constituents. They are marked on the household roster as absent for work. In the primary sample, there are 411 families, which have 1 or 2 migrants, and receive money from relatives abroad. The total number of these migrants is 559, and computing all the members of the households to which migrants belong, the final number of observations for families that receive remittances is 2691.

For the goals of the study, I add additional datasets on asset holdings in 2010 of the families are presented in the survey in 2013. Accordingly, I get the dataset that contains backdated information related to household assets four years before the survey in 2013 was conducted. Moreover, the method of analysis in this paper demands the final dataset to take a uniform format to create a group of non-participants or in my case the non-remittance-receiving households that resemble the families that do have them in all appropriate pre-treatment characteristics. Therefore, I exclude all families that indicated as household members: children of the spouse, father- and mother-in-law, sisters and brothers, uncles, aunts, nephews, nieces, and other relatives. I get families with a husband as a head of a family, his spouse and their children, and families with the oldest generation designated as household heads, their sons or daughters with their families sharing one dwelling, and households, where a mother or a father alone is a head of a family living with his or her children. The sample is also limited to those remittance-receiving families that began receiving remittances in recent four years so that the variation in welfare before and after the household began receiving remittances can be evaluated. The number of observations is reduced to 5575 and the number of observations for families that receive remittances to 887. Finally, to avoid the problem of unbalancing I remove all household members except heads of their families from the reduced sample. After all procedures, the final sample consists of 1086 observations – heads of houses from which 118 are heads of migrant families, which receive remittances.

4.2. Descriptive statistics

General characteristics of migrant household members in the sample presented in Table 1 in Appendix indicate that the majority of them are males, 71 percent, whose age between 15-30 years, 75.29 percent. In the composition of family sons or daughters is the largest group, 76.54 percent that migrates abroad. The next most migrating categories are sons and daughters-in-law, 8.64 percent, and heads of households. Grandchildren, 5.35 percent, and spouse, 2.06 percent, are two least migrating categories. Out of total number of migrants, single individuals are among the most migrating categories, 59.26 percent, followed by married, 34.57 percent, divorced, 5.76 percent, and widowed, 0.41 percent individuals respectively. The largest share of migrants has sent remittances for 1 year, 28.57 percent. The next group of migrants has sent remittances for 2 years, 26.07 percent, and the left two groups have sent remittances for less than a year, 25,06 percent, and 3 years, 20.29 percent, respectively.

Household characteristics for migrant and non-migrant families in Table 1 in Appendix show that migrant households have larger household size, 5-7 people sharing one dwelling, 70.68 percent, compared to that of non-migrant, 58.44 percent. Migrant households have more households with 5-7 members of working age, 26.31 percent as compared to non-migrant families, 7.87 percent, and fewer children, at most 2 in one family, of the young, 32.33 percent, and older age, 60.15 percent, as compared to non-migrant households that have more children of young, 38.3 percent, and more children, 3 to 5 in one family, of older age, 30.53 percent. Non-migrant families have larger number of old-aged members, 16.79 percent, than migrant families, 12.03 percent. Non-migrant households are wealthier and receive more public transfer funding, 15501.1 som, than migrant households, 13328.7 som. The percentage of families with members who achieved basic education level prevails in non-migrant households, 11.05 percent, as compared to migrant households, 3.61 percent, whereas, the percentage of families with members with secondary education certificate is higher for migrant households, 84.34 percent, as compared to non-migrant households, 69.4 percent. In comparison, the percentage of families with members with a university degree is higher for families that do not have migrant members, 11.67 percent, than for migrant families, 4.82 percent. In migrant households, more people speak and write fluently in Russian, 49.57 percent, than in migrant families, 47.21 percent Heads of migrant households are mainly engaged in agricultural activities, 29.32 percent, in the household work, 14.29 percent, or are retired, 29.32 percent. On the other hand, heads of non-migrant families have paid work, 20.57 percent, or own business,

10.6 percent. Households that have migrant members also mainly live in rural places, 90.98 percent, whereas the percentage of families that live in cities is higher for families without migrant members, 24.03 percent. In the sample, there are a fewer migrant households that live in Bishkek. 2.26 percent, as compared to non-migrant households, 10.6 percent. Finally, Table 1 illustrates that Kyrgyz families prevail among migrant households, 84.21 percent, in comparison with non-migrant families, 71.67 percent, whereas Uzbek families are presented in both groups almost equally.

5. Methodology

5.1. Propensity Score Matching

The evaluation of the impact of migrants' remittances on the welfare of their families is coupled with several methodological problems broadly recognized in the literature. The first matter is that remittances cannot be considered as an external source of the beneficiary income, because it disregards what would have happened if an individual did not migrate and earn income abroad, and how this would have affected the welfare of those remaining at home, e.g. opportunity costs. Hence, many studies at tempt to estimate this counterfactual situation and accordingly assess the impact of remittances on household well-being (De and Ratha, 2012). The second matter is that remittance-receiving households are not randomly selected and might not have common characteristics with non-recipient families. For this reason, the estimation of the counterfactual well-being of remittance-receiving households using the data on the welfare of non-recipient households requires relevant measurement to cope with self-selection; otherwise, such analysis may produce biased estimates.

These issues sparked development of methodologies used to estimate the effects of remittances, including a counterfactual selection method (Adams, 1989), Heckman self-selection correction models that solve the problem of endogeneity in the sample through using a variable that affects selection but not the outcome (Barham and Boucher, 1998), instrumental variables models that try to do the same but through using relevant instruments (McKenzie and Sasin, 2007; Adams, 2011), and propensity score matching (Esquivel and Huerta-Pineda, 2007). In my study, I apply the propensity score matching method. This approach is preffered to other methods for three reasons: firstly, this estimation works only considering the common support condition and accordingly produces more robust estimations. Secondly, using of the

propensity score matching does not assume application of specific assumptions on the form of the regression function. Regression approaches usually impose linear relationships between the output variable and covariates, which could be inaccurate in some cases and propensity score matching could avoid this threat (Dehejia and Wahba, 1998; Smith and Todd, 2000). Thirdly, this method can balance participant and non-participant groups without a large lose of observation number.

Propensity score matching is a program evaluation tool, used to identify members of the sample within a non-participant group that are similar to the ones in all pre-treatment characteristics. This approach enables to describe the differences in outcomes of the accurately selected control group and participants to the program. This method was first suggested as a way to address the self-selection problem in the evaluation of treatment effects with observational data by Rosenbaum and Rubin (1983).

The first step of the approach is to estimate a probit regression model with a dependent variable that indicates whether a household receives remittances or not. Then, the specification of the evaluated probit model is deployed to assess the propensity score, that is, the probability to receive remittances for each family, based on the observed characteristics contained in the model. The third step is to match each remittance-receiving household with a non-recipient family in a way that both groups are compared with each other based on the similarity of their estimated propensity scores.

Accordingly, the equation form of the model executed in this paper is the following:

$$Y_i = \alpha_0 + \rho_{ATEi} d_i + \beta_i X_i + \varepsilon_i \tag{1}$$

where *d* is a dummy variable that shows whether the household receives remittances or not. It is equal to one of the household receives remittances and is zero otherwise. *Y* is the outcome variable that indicates consumer and productive asset indices depending on observable household (i) characteristics *X*. All characterisitcs used in the model are listed in Table 2 in Appedix. The average treatment effect ρ_{ATE} for household *i* represents the difference between outcomes of families that receive remittances and outcomes of families that do not receive remittances. It is given by:

$$\rho_{ATE} = E[Y|X, d = 1] - E[Y|X, d = 0] \tag{2}$$

However, this comparison has one fundamental problem: it can assess the outcome of a household that either receives remittances or not, but it cannot evaluate the outcome of the household if it would have been in the counterfactual situation, simply because household surveys do not provide the data on someone in two different states. Accordingly, this obstacle impedes the analysis to capture the exact effect of remittances on household well-being since there can be other factors that are associated with receiving money affecting the welfare of the family, including omitted variables in the error term ε_i.

In such circumstances, a more appropriate decision is to use the Average Treatment Effect on the Treated – ATT instead of ATE, specified as:

$$ATT = E[Y_1|d = 1] - E[Y_0|d = 1] \tag{3}$$

where Y_1 and Y_0 are outcomes with and without treatment and accordingly $E[Y_1|\ d = 1]$ is an observed outcome of households that receive remittances, while $E[Y_0|\ d = 1]$ is the unobserved outcome of the same households had they not received the money.

To fill in the absent data on the counterfactual, I use the propensity score matching. Following this method, households that receive remittances are matched with households that do not receive them with as many alike characteristics as possible to minimize self-selection bias. The matching is executed based on the propensity score - an index, which sums up all the relevant pre-treatment characteristics of each family. The mathematical form of the propensity score is the following:

$$P(X) = P[d = 1|X] \tag{4}$$

Where P(X) is the probability of receiving remittances depending on the selection of characteristics X.

Some requirements have to be satisfied to execute the propensity matching analysis. The first one is the conditional independence assumption, which states that the outcomes of the participant and non-participant groups are independent of treatment conditional on observable characteristics (Rosenbaum and Rubin, 1983). The next one is conditional mean independence that requires mean outcome for participant group had they not participated to be alike with the mean outcome for non-participant group. And finally, keeping in the analysis the common support condition ensures that participant and non-participant groups have to share similar observed characteristics (Bryson, Dorsett, and Purdon, 2002).

5.2. Matching estimators

The process of matching households using propensity scores demands a specific approach, since the propensity score – P(X) is a continuous variable and the chance that each match finds a pair with the same score is very low. There are different types of matching methods described in the econometric literature. Three of them are used in this paper.

The first estimator is the nearest neighbor (NN) matching (Esquivel and Huerta-Pineda, 2007). In NN method, the matching pairs are formed based on the closeness of their propensity scores. The NN matching has two ways to be done: with and without replacement. The variant with replacement is more preferable since a comparison unit from the control group can be deployed as a pair more than once, and thereby the average quality of matching is better and the bias is smaller. The problem of NN matching is that even the closest matches can still have very different propensity scores.

The second estimator is the radius caliper estimator that lays a tolerance level - a caliper on the maximum distances between propensity scores (Bryson, Dorsett, and Purdon, 2002). The objective of this method is to use all of the comparison units within an allowed tolerance level. The third method is the Kernel matching according to which weighted averages of comparison units in the control group are used to match them with units from the treatment group (Esquivel and Huerta-Pineda, 2007). The extent of weights assigned to comparison units depends on the closeness of propensity scores between the two groups. The reason why the Kernel matching is preferable to other estimators is that it uses more information from the data and accordingly induces lower variance. However, this approach also involves a risk of bad matches, since it uses all comparison units from the control group. The solution to this problem is to apply common support restriction when using this estimation.

In this paper, given that number of observations in the control group is scarce, I implement the Kernel matching estimator. I apply the nearest neighbor and radius matching methods to execute additional evaluations for the robustness check. The common support condition is strictly followed in all assessments.

This study also discusses one of the key competing uses of remittances in Kyrgyzstan: expenditures on ceremonies (toi) and bride-price (kalym). If men go abroad in order to earn part but not all bride-price (kalym) and wedding expenses, then there may be a natural negative correlation with remittances and household assets. This can also hold for funerals and other ceremonies. Accordingly, it can affect both likelihood of receiving remittances and the uses to

which they are put. Thus, in order to control these factors that can affect results, I include ceremonies and bride-price expenditures' controls in the model.

In this study I will test at least two hypotheses. First, whether the estimates of the consumer index and accumulation of consumer assets are significant and have positive signs, given that remittances as an additional source of income enable households to buy more physical items. Second, whether the estimates of productive asset index and accumulation of productive assets are significantand display negative signs, given that additional income from migration discourages households to produce items using productive assets.

5.3. Asset index – Principal Component Analysis

In this paper, household welfare is measured through the use of an asset index strategy. The two asset indices are calculated for the consumer and productive goods used as outcome variables for analysis are run to assess the impact of receiving remittances on the household economic status.

Assets as a measure of the welfare and the standard of living have become increasingly prevalent in the same line with income and consumption. The reasons are that the estimation analyses using the assets produce less bias, and in general, assets are more manageable rather than consumption or income data, which depend on the series of external factors, such as fluctuations in prices, interest rates, etc. Moreover, this measure has not been yet used to study the growth or the decline of the welfare of people due to migration and remittances in Kyrgyzstan that is why implementation of empirical analysis using assets as a measure of wealth can contribute to the literature on the related topic with new evidence. I also separate assets into two groups: productive and consumer assets to investigate other routes through which remittances affect household well-being.

However, the main problem with using assets is that they represent a large number of categories such as durable and non-durable commodities, housing characteristics, facilities, livestock, and land, which are given in surveys in the form of separate variables. Conducting analysis using each of these variables could be a laborious and lengthy process, and Filmer and Pritchett (2001) introduced in 2001 Principal Component Analysis (PCA) – a statistical method of computation an asset index, or wealth index, which aggregate all assets to get a univariate measure of household wealth. The first principal component of a set of variables is the linear combination of all the variables that captures the largest amount of information that is common to all of the variables. The procedure of this method is the following: Firstly, we identify those

variables that include common information:

$$a_{1j} = (a^*_{1j} - a^*_1)/(s^{*1})$$

So, each value of the variable is normalized. Secondly, the selected variables are identified as linear combinations of a set of components for each household j:

$$\begin{aligned} &a_{1j} = v_{11} \times A_{1j} + v_{12} \times A_{2j} + ... + v_{1N} \times A_{Nj} \\ &... \qquad\qquad j = 1, ...J \\ &a_{Nj} = v_{N1} \times A_{1j} + v_{N2} \times A_{2j} + ... + v_{NN} \times A_{Nj} \end{aligned} \tag{5}$$

The scoring factors Ai can be found by inverting the system implied by Eq. (1), and yield a set of estimates for each of the N principal components:

$$\begin{aligned} &A_{1j} = f_{11} \times a_{1j} + f_{12} \times a_{2j} + ... + f_{1N} \times a_{Nj} \\ &... \qquad\qquad j = 1, ...J \\ &A_{Nj} = f_{N1} \times a_{1j} + f_{N2} \times a_{2j} + ... + f_{NN} \times a_{Nj} \end{aligned} \tag{6}$$

The first principal component, which is a needed index for each household, is expressed in terms of the unnormalized variables:

$$A_{1j} = f_{11} \times (a^*_{1j} - a^*_1)/(s^*_1) + ... + f_{1N} \times (a^*_{Nj} - a^*_N)/(s^*_N) \tag{7}$$

The implementation of the procedures to construct an asset index for this paper required the following steps: first, I selected commodities and livestock from the asset dataset for two years 2010 and 2013, which represent the household well-being of a family in Kyrgyzstan and the possession of those items variates across households in the sample. Accordingly, a consumer's assets list comprises main dwellings, garages, cars, refrigerators, electric stoves, microwaves, air conditioners, washing machines, TV, video cameras, personal computers, mobile telephones, and Internet access. The productive assets include poultries or chickens, goats or sheep, donkeys, cows and bulls, horses, tractor, truck, and other agricultural machines as one category of the asset. Second, the variables were standardized to have a unique form of binary variables indicating whether a household has - «1» or has not - «0» a named asset. Then, the principal components were generated for the two separate listings of consumer and productive assets for two different years separately. The first principal component, which represents a factor score for each asset variable, is chosen to construct a final index. Table 3 in

Appendix illustrates the first component scores calculated for durable and productive assets in 2010 and 2013 through the principal component analysis method. According to the values of components, it is evident that the bigger scores are given to assets that vary the most across households, which means that it is owned only by a few of households, and close to zero scores otherwise are given to assets that are owned by many or all households. The final asset index values are calculated and assigned to each household in the survey based on his/her household asset ownership.

Finally, households represented in the sample are divided into five wealth quintiles based on the asset indices scores in two years. Table 4 in Appendix shows all five categories from 1 to 5, meaning different welfare status of the Kyrgyz households in 2010 and 2013.

Distribution of households by the consumer index in 2010 is the following: nearly forty percent of the families in the sample fall into wealthy and wealthiest categories, which indicate that almost half of the population in the sample have good standards of living. Remaining part of the households has the following distribution: 19.71 percent are the medium, 19.24 percent are poor, and the last 21.09 percent are the poorest. The situation did not change significantly after four years, the values show that the percent of the poorest dropped only by nearly one percent, and the percent of the group of wealthy and wealthiest families decreased by 0.45 percent. The picture for the productive asset indices values for rural households in 2010 and 2013 is different, Table 4 in Appendix expresses that almost thirty-three percent of the households are hit into the poorest category by the distribution procedure, and even greater in 2013, 34.44 percent. Similar to consumer indices' values, less than 40 percent are considered among the wealthier and wealthiest according to the productive indices' distribution for two years.

In Table 5 in Appendix it is also found that the consumer index and consumer asset accumulation is lower for remittance-receiving households in comparison with non-remittance receiving households. A similar situation is characterized by a productive index and accumulation values.

It should be also noted that index scores for every family could vary from the negative to positive numbers. Factor scores derived by PCA on each commodity take positive and negative values.

6. Results

6.1. The probability of receiving remittances

The first part of the main analysis is to execute a probit estimation to determine the probability of receiving remittances across households conditional on household-level characteristics.

Table 6 in Appendix reports the results for the probit regressions, where the first column illustrates estimations for the regression that includes all households in the sample and compares remittance-receiving households to all non-remittance-recipient households. The second column represents values for the second regression that excludes non-remittance-recipient households with migrant members to compare remittance-receiving households to households that have never had any member who migrated abroad or sent remittances.

The defining factors of receiving remittances are a number of household members in working age, a head of a household occupation in family work, residence, and whether the household's ethnicity is Kyrgyz or Uzbek. The greater the number of people who can legally work and contribute towards a household income, the greater a probability that someone from this family will go to work abroad and send remittances The probability of receiving remittances is also positively correlated with the occupation of a head of household, which shows that households that have members that are not engaged in any official employment or business are more likely to send migrants and receive remittances. Moreover, households that have members who are engaged in household work and those family sizes are usually big mainly reside in rural regions, accordingly the residence is also the important determinant of receiving remittances. Finally, Kyrgyz and Uzbek households have the highest probability of receiving remittances that can be also explained by their high presence in rural areas, where working opportunities are limited. All of these five factors are statistically significant and they remain to be significant in the second column.

The characteristics that significantly decrease the probability of receiving remittances are the occupation of the household head in paid work and business since these factors might reduce the need for an additional source of income if the financial statement of the household is satisfactory. Moreover, having a higher number of young children, female to male ratio and family members with basic education also negatively affects the probability of the household to receive money from abroad, probably because it would be harder to leave the family without any male support if its composition is prevailed mostly by women, young children, and also

because for migration, a worker should have at least a secondary education level. These effects are statistically significant in both columns.

6.2. Results from propensity score matching: asset indices

The second part of the analysis involves application of propensity score matching method with outcome variables – consumer and productive asset indices. Separate estimation is also executed for the rural households.

As Table 7 in Appendix illustrates, households that receive remittances on average own fewer consumer assets and also accumulated them less over the past four years compared to other households that do not receive remittances. The negative effect of receiving remittances on the consumer asset index in 2013 is statistically significant at a 10 percent level for the total sample and the reduced sample. These results for the consumer index can be interpreted in the way that families that let one of the members to go and earn money abroad may experience the decrease of the income in the first few years after the departure of this member, especially if the migrant is one of the main breadwinners, and therefore may not be afford to purchase consumer assets at large. Accordingly, although the accumulation of consumer assets is founded to be negative for both samples, its value is not very large and its effect is not statistically significant.

Estimation of productive asset index and the accumulation of productive assets over four years for rural households also shows negative results, but it has statistically significant effect on the accumulation of productive items. The results indicate that rural households that receive remittances bear considerable losses of productive assets in comparison with households that do not receive money. This can be linked to the presence of migration costs, such as transportation, accommodation costs and costs of living until the migrant finds a job. For rural households, the means to finance these expenses are mainly livestock or other productive assets. Subsequently, if a migrant abroad does not send sufficient amount of money to compensate for the migration costs it will lead to a decrease of productive asset holdings.

6.3. Robustness check

To test the robustness of the results, I apply other two matching estimators, nearest neighbor (NN) and radius caliper as an alternative to the Kernel method. In general, the results

tend to be similar to the ones obtained with the kernel matching and even stronger in terms of statistical significance, e.g. all variables included are statistically significant at 1 percent significance level. However, the balancing test for both the nearest neighbor and radius does not pass the allowed level of bias. Hence, the results for the nearest neighbor and the radius matching estimators are not presented in the paper.

7. Discussion and conclusion

This paper aims to study the relationship between remittances that are sent by migrants working abroad and household welfare in Kyrgyzstan. I selected the measure of the family well-being to be the asset goods and generated two asset indices: consumer and productive indices that combine in these variables all physical commodities and livestock, representing the welfare of the Kyrgyz family. Both indices were calculated for two years 2010 and 2013 to estimate the asset accumulation over four years period. Two indices and the asset accumulation over four years are the outcome variables in the analysis of the effect of remittances on the asset holdings and their aggregation.

The results illustrate that remittances negatively affect consumer asset holdings, but their negative impact on the accumulation of consumer assets is not significant. On the contrary, the values of estimations on productive assets and their accumulation for rural sample show that remittance-receiving households experience a significant loss of productive asset holdings over four years period in comparison with households that do not receive them as expected. The results for productive assets are also in line with the fact that there is a considerable difference between the drop of productive asset accumulation of households that do not receive remittances and households that receive transfers from abroad.

The study finds that the deterioration of household well-being in terms of asset holdings is a common tendency among all households in the sample not only among remittance-receiving families between 2010 – 2013. That can be due to the political and economic crisis that worsened in Kyrgyzstan in 2010 and lasted for several years and the 2008 global financial crisis that also affected Kyrgyzstan. Accordingly, the economic crises inevitably affected the welfare of all Kyrgyz families, though to a large extent the remittance-receiving households,

which are more vulnerable to consequences of crises since for many households, migration serves as the only channel to find a job.

The results of this paper confirm findings of other studies that stipulate negative effect of remittances using the PSM approach. Clement (2011) found that neither internal nor external remittances have a positive effect on household investment and education expenditures in Tajikistan. López-Videla et al. (2014) in their paper on the effects of remittances on poverty in Bolivia also found that there is no considerable effect of remittances on poverty in very poor households located in rural areas and put into a question their poor-friendliness.

However, on the contrary to the papers that derived a negative effect of remittances from the analysis, Siddiqui (2013) in the paper studying the impact of remittances for Pakistan through the application of the PSM approach found that remittances stimulate higher human and physical capital ownership, while De and Ratha (2012) pointed that remittances in Sri Lanka help in children's human capital accumulation and promote durable assets buying. Therefore, it is evident there can not be one definitive conclusion on the impact of remittances.

To sum up, it has to be mentioned that the year 2013 and the specific period between 2010 and 2013 taken for the analysis might not be representative of the overall impact of migration and remittances for the Kyrgyz family, and the investigation of more recent data on remittances is preferable. Moreover, the paper does not estimate the effect of temporary migration against the effect of permanent migration on the use of remittances, which might be considerable since migrants might have different motives for working abroad and sending remittances. This problem with better data collection should be addressed in future studies.

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Appendix

Table 1. Summary statistics

	(1)	(2)
	Migrant households	**Non-migrant households**
Migrants's characteristics (%) :		
Gender: Female	29	
Male	71	
Age: 15 – 30	75.3	
31 - 55	24.7	
Relation to the household head: Head	7.41	
Spouse	2.06	
Son/daughter	76.54	
Son/daughter-in-law	8.64	
Grandchild	5.35	
Civil status: Single	59.26	
Married	34.57	
Divorced	5.76	
Widowed	0.41	
For how many years has this migrant sent remittances: less than a year	25.06	
1 year	28.57	
2 years	26.07	
3 years	20.29	
Households' characteristics (%):		
Household size: 2 – 4 people	29.32	41.55
5 – 7 people	70.68	58.44
Percentage of females	50.2	53.2
Percentage of males	49.8	46.8
# Children between the age 6-18: 0	25.56	22.25
1 – 2	60.15	47.22
3 – 5	14.29	30.53
# Young children<6 years old: 0	67.67	59.6
1 – 2	32.33	38.3
3	-	2.1

# Old members >65 years: 0	87.97	83.21
1 – 2	12.03	16.79
# Household members in working age (18-63): 1 – 2	14.29	49.21
3 – 4	59.4	42.92
5 – 7	26.31	7.87
Public transfers (in soms) **(Mean number)**	13328.7	15501.1
Percentage of households with members with: basic education	3.61	11.05
secondary education	84.34	69.4
primary technical education	7.22	7.89
university degree	4.82	11.67
who fluently speak in Russian	49.57	47.21
Expenditures on ceremonies (in soms) **(Mean number)**	16456.39	14048.51
Expenditures on bride-price – kalym (in soms) **(Mean number)**	73360.9	50398.74
Head's occupation in business	4.51	10.6
Head's occupation in agriculture	29.32	25.29
Head's occupation in paid work	8.27	20.57
Head on retirement	29.32	25.39
Head's occupation in household work	14.29	6.09
Residence: rural	90.98	75.97
urban	9.02	24.03
Residence in capital city	2.26	10.6
Nationality: Kyrgyz	84.21	71.67
Nationality: Uzbek	11.28	11.33
Observations	**133**	**953**

Table 2. Control variables description

Variable	Description	Values
Household size	Number of people living in one household	Number
Female to male ratio in household	The relative number of female members to male members living in one household	Number
# Children between the age 6-18	Number of children between the 6-18 living in one household	Number
# Young children <6 years old	Number of children younger than 6 living in one household	Number
# Old members >65 years	Number of people older than 65 living in one household	Number
# Household members in working age (18-63)	Number of people in working age between 18-63 living in one household	Number
Public transfers (ln)	Money transfers a household is getting from material aid, pensions and allowances	Logarithm
# Household members with basic education	Number of people who obtain primary or basic education level living in one household	Number
# Household members with secondary education	Number of people who obtained a secondary general education certificate living in one household	Number
# Household members with primary technical education	Number of people who obtained a primary or secondary technical/special diploma living in one household	Number
# Household members with university degree	Number of people who obtained a university (BA, MA) degree living in one household	Number
# Household members who fluently speak in Russian	Number of people who fluently speak and write in Russian living in one household	Number
Expenditures on ceremonies (ln)	Household expenditures on celebrations, funerals and rituals	Logarithm
Expenditures on bride-price – kalym (ln)	Household expenditures on kalym paid for a bride	Logarithm
Head's occupation in business	A dummy variable that indicates whether a household head engages in business or not	1 or 0
Head's occupation in agriculture	A dummy variable that indicates whether a household head engages in agriculture or not	1 or 0
Head's occupation in paid work	A dummy variable that indicates whether a household engages in paid employment or not	1 or 0
Head on retirement	A dummy variable that indicates whether a household head on retirement or not	1 or 0
Head's occupation in household work	A dummy variable that indicates whether a household head engages in household work or not	1 or 0
Residence	A dummy variable that indicates whether a household resides in rural or urban area	1 – rural or 0 – urban
Residence in capital city	A dummy variable that indicates whether a household resides in Bishkek or not	1 or 0
Nationality: Kyrgyz	A dummy variable that indicates whether household members are Kyrgyz or not	1 or 0
Nationality: Uzbek	A dummy variable that indicates whether household members are Uzbek or not	1 or 0

Table 3. Scoring factors for first principal component – Asset indices

	Consumer index in 2010	Productive index in 2010	Consumer index in 2013	Productive index in 2013
Rural and Urban sample				
Durable assets				
Main dwelling	0.0189		- 0.3187	
Garage	0.2353		0.0671	
Car	0.1604		0.0913	
Refrigerator	0.4287		- 0.1394	
Electric stove	- 0.1284		- 0.2385	
Microwave	0.2720		0.1849	
Air conditioner	0.1685		0.3645	
Washing machine	0.2629		0.2872	
TV	- 0.5003		- 0.3008	
Video camera	0.0477		0.1044	
Computer PC	0.1346		0.4982	
Mobile	- 0.4998		0.0662	
Internet	0.1623		0.4537	
Rural sample				
Productive assets				
Poultry/chicken		0.4668		0.4417
Goats/sheep		0.5141		0.5311
Donkeys		0.3438		0.3048
Cows and bulls		0.5502		0.5356
Horses		0.3112		0.3778
Tractor, truck, other agricultural machine		- 0.0120		0.0169

Table 4. The categorization of households in the sample on wealth quintiles based on the asset index values

Quintile	Wealth status of households by the consumer asset index in 2010 in rural and urban areas (%)	Wealth status of households by the productive asset index in 2010 in rural area (%)	Wealth status of households by the consumer asset index in 2013 in rural and urban areas (%)	Wealth status of households by the productive asset index in 2013 in rural area (%)
Poorest	21.09	32.78	20.26	34.44
Poor	19.24	8.40	19.89	6.39
Medium	19.71	19.29	20.35	20.59
Wealthy	22.28	19.88	19.71	18.70
Wealthiest	17.68	19.64	19.80	19.88

Table 5. Summary statistics for assets indices (mean and standard deviation)

	(1)		(2)		(3)	
	All households		**Remittance – receiving households**		**Non - remittance-receiving households**	
Rural and Urban sample						
Consumer asset index in 2010	0.099	1.29	- 0.18	1.15	0.13	1.3
Consumer asset index in 2013	0.06	1.26	- 0.24	0.97	0.099	1.28
Accumulation consumer assets	- 0.04	1.4	- 0.05	1.3	- 0.03	1.5
Observations	**1086**		**118**		**968**	
Rural sample						
Productive asset index in 2010	- 0.16	1.37	0.22	1.6	- 0.21	1.3
Productive asset index in 2013	-0.13	1.5	-0.06	1.3	- 0.14	1.5
Accumulation productive assets	0.03	1.6	- 0.27	1.7	0.07	1.6
Observations	**845**		**108**		**737**	

Table 6. Determinants of receiving remittances – Probit analysis

	(1)	(2)
	All households	**All households except migrant households that do not receive remittances**
Household size	- 0.318	-0.317
	(0.324)	(0.325)
Female to male ratio in household	-0.174**	-0.175**
	(0.083)	(0.083)
# Children between the age 6-18	0.282	0.281
	(0.327)	(0.329)
# Young children<6 years old	-0.207**	-0.210**
	(0.098)	(0.098)
# Old members >65 years	0.329	0.325
	(0.331)	(0.333)
# Household members in working age (18-63)	0.716**	0.717**
	(0.323)	(0.324)
Public transfers (in soms) (ln)	-0.023	-0.026
	(0.024)	(0.024)
# Household members with basic education	-0.599*	-0.616*
	(0.361)	(0.361)
# Household members with secondary education	0.051	0.044
	(0.111)	(0.112)
# Household members with primary technical education	-0.081	-0.034
	(0.401)	(0.404)
# Household members with university degree	-0.376	-0.398
	(0.344)	(0.345)
# Household members who fluently speak in Russian	-0.172	-0.164
	(0.152)	(0.152)
Expenditures on ceremonies (ln)	0.001	0.002
	(0.018)	(0.019)
Expenditures on bride-price – kalym (ln)	0.002	0.001
	(0.013)	(0.013)
Head's occupation in business	-0.585*	-0.567*
	(0.308)	(0.310)
Head's occupation in agriculture	-0.273	-0.259
	(0.199)	(0.200)
Head's occupation in paid work	-0.552**	-0.542**
	(0.239)	(0.241)
Head on retirement	0.068	0.080
	(0.218)	(0.219)
Head's occupation in household work	0.553**	0.547**
	(0.238)	(0.238)
Residence	0.418**	0.419**
	(0.213)	(0.215)
Residence in capital city	-0.387	-0.383
	(0.408)	(0.410)
Nationality: Kyrgyz	0.928***	0.922***
	(0.287)	(0.292)
Nationality: Uzbek	0.681**	0.683**
	(0.327)	(0.329)
Observations	**1086**	**1071**

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1 Note: (1) probit results for all households; (2) probit results for the remittance-receiving households and households that do not have both a migrant member and do not receive remittances. The dependent variable is a dummy variable taking on value of one if the household receives remittances.

Table 7. Propensity score matching results: impact of remittances on assets indices and asset accumulation - Kernel matching estimator

	(1) **All households**		(2) **All households except migrant households that do not receive remittances**	
	ATT	**t-stat**	**ATT**	**t-stat**
Rural and urban sample				
Consumer asset index in 2013	-0.134* (0.102)	-1.324	-0.129* (0.105)	-1.226
Accumulation of consumer assets	-0.007 (0.148)	-0.047	-0.004 (0.131)	-0.028
Observations	**1086**		**1071**	
Rural sample				
Productive asset index in 2013	-0.137 (0.151)	-0.908	-0.130 (0.171)	-0.758
Accumulation of productive assets	-0.333* (0.216)	-1.541	-0.329* (0.227)	-1.45
Observations	**845**		**830**	

Note: (1) results for all households; (2) results for the remittance-receiving households and households that do not have both a migrant member and do not receive remittances. The treatment variable is a dummy taking on value of one if a household receives remittances ad is 0 otherwise