Remittances and Banking Sector Development in Kyrgyzstan

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Abstract

Labor migration is an important aspect of economic reality and market relations in the world. The same can be said about the flow of remittances between the migrants receiving and emigration countries. Moreover, both these flows represent an important factor in supporting the economies of the developing countries, which helps to stabilize the political systems of these countries. This paper investigates the relationship between remittances and banking sector development at the household level in the case of the Kyrgyz Republic. The paper tests the hypothesis that remittances inflows increase the probability of a household taking a loan from formal financial institutions. The sample for household level investigation is based on the Kyrgyz Integrated Household Survey 2005-2007.A probit random effects and logit fixed effects models are used to estimate the relationship between the remittances and a household's probability of taking loan. The baseline model of the paper is probit random effects, while logit fixed effects was used to address possible endogeneity in the relationship between dependent variable, probability of taking loan, and main independent variable, remittances. The main result of this paper is that the consistent and efficient model of this study is Panel Probit Estimation with Random Effects (remittances as dummy) due to the results of postestimation test of predicted probabilities and Hausman Selection test. As a result, we consider that the probability of taking loan is higher by 27 percent for households that receive remittances, ceteris paribus. Possible policy recommendations are suggested.

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1. Introduction

Migrant remittances or migrant transfers are transactions of money from workers who work in host country and their families in home country. According to the sixth edition of the IMF Balance of Payments and International Investment Position Manual (BPM6) personal remittances are defined as a combination of following three components: i) compensation of employees, ii) personal transfers, and iii) capital transfers between households. It should be stated that data on third component "capital transfers between household" is difficult to collect, consequently only first two components are used in calculating remittances in most countries. World Bank and IMF define "compensation of employees" as "remuneration in return for the labor input to the production process contributed by an individual in an employer-employee relationship with the enterprise", while "personal transfers" are defined as "all current transfers in cash or in kind made or received by resident households to or from nonresident households."[1]

According to the World Bank at the end of 2013, the total amount of migrants in a world amounted to 247.2 million or 3.4percent of total population. The largest part of migrants were citizens of following ten countries: Afghanistan, Bangladesh, China, India, Russian Federation, Mexico, Pakistan, Philippines, Ukraine and the United Kingdom. The highest share of migrants choose high-income OECD countries (16.1percent of total migrants at YE13), high-income non-OECD countries (8percent), developing countries (72.8percent) and others.

World Bank's Migration and Remittances Factbook 2016 states that in 2014 the total amount of remittances inflows to developing countries accounted for USD 431.1 billion, while global remittances inflows including developed countries amounted to USD 592.9 billion and equaled to 0.8percent of world GNI in 2013. It should be noted that remittances in the world became one of the most important source of economic development of developing countries. In addition, remittances are considered as one of the most important sources of external financing

after the Foreign Direct Investment (FDI). The stability of remittances as a source of financing was proved after the world crisis of 2008, when the volume of remittances decreased only by 6.2%, while FDI decreased by 40%.(Ratha et al, 2010)

It is also known that remittances play an important role as an alternative state network of social protection in many developing countries. The growing volume of remittances is gradually creating new opportunities for their use, including the acquisition of real estate, investment in human capital and the development of local infrastructure. In addition, migrant remittances have a significant secondary impact on telecommunications, tourism and the banking sector in migrant-sending countries. The economic role of remittances is particularly clear in those countries that have lost through emigration a significant part of population. (Nikas and King, 2005; Kireyev, 2006; Vargas-Silva and Huang, 2006).

The growth of the scale of world migration leads to an increase in the importance of money transfer systems. They directly affect the standard of living of more than 10 percent of the world's population. The importance of remittances to overcome poverty is obvious, but in addition, remittances also have a significant effect on the development of the economies of countries.

The largest recipients of remittances for migrants in 2015 were Asia ($ 244 billion), Latin America and the Caribbean ($ 68 billion), Africa ($ 97.4 billion), the Middle East ($ 29 billion). The economies of some CIS countries depend on them especially strongly. Thus, the volume of remittances in Tajikistan is 41.7 percent of GDP, Kyrgyzstan – 30.3 percent of GDP, Moldova – 26.2 percent. For Russia, which is the largest recipient of transfers in absolute terms ($7.9 billion), this share is insignificant - only 1 percent at year-end 2015.

The aim of this paper is to analyze the relationship of remittances and banking sector development on a household level in Kyrgyzstan using the Kyrgyz Integrated Household Survey (KIHS) for period of 2005-2007. There are several reasons of investigating the effect

of remittances especially on banking sector. First, banking sector plays a leading role in the supply of external finance in developing countries. Second, because remittances recipients are usually low-income households, the direct effect of remittances on capital (shares and bonds) market is less probable (Aggarwal et al., 2011). Third, banking sector plays a key role in the economic development of a country and its development leads to the economic growth and poverty reduction. (Beck, Thorsten, Demirguc-Kunt & Levine, 2007). The paper focuses on the probability of household taking a loan in the Kyrgyz Republic.

The rest of the paper structured as follows. Section II describes the theoretical background on relationship between remittances and banking sector development. Review of related literature is provided in section III. Section IV consists of the country background. In section V the methodology, modelling and econometric analysis of the relationship between remittances and banking sector development are presented. Section VI concludes the paper and suggests possible areas for further investigation.

2. Overview of Kyrgyzstan

The Kyrgyz Republic is an agrarian-industrial country. Agriculture is the leading branch of the economy, in which about 40percent of the gross added value is created and more than half of the able-bodied population is employed. The share of agricultural land is 53.9percent of the total territory of the republic. The main branch of agriculture is crop production (growing grain, cotton, tobacco, oilseeds, horticultural and melon crops). Meat and dairy cattle breeding is developing. A promising industry is sheep breeding.

The main industries are hydropower, non-ferrous metallurgy, mining, machine building, instrument making, light and food industries. Engineering has developed mainly in the north of the republic. There is also a concentration of the largest enterprises of light industry (knitted, sewing, leather-shoe factories, Worsted-Cloth Factory). Most of the non-ferrous metallurgy enterprises are located in the south (Osh oblast). The city of Osh is also a major center of the silk and cotton industries. A large cement production has been set up in the republic. The branches of the food industry (meat, butter-cheese, sugar, butter, tobacco, etc.) almost completely work on local agricultural raw materials.

2.1. Banking System of Kyrgyzstan

The banking sector of the republic is rising year to year with total assets accounted for USD 2.69 billion, which equaled to 40percent of the GDP as of June 30, 2016. 95percent of the total banking assets belonged to the five largest banks, while overall there are 25 banks out of which seven banks were domestically owned and 18 were banks with foreign participation in capital.

According to the National Bank of the Kyrgyz Republic, the Kyrgyz banking sector is mostly domestically oriented (more than 95percent of the total loan exposure as of June 30, 2016. In addition, it should be noted that the dollarization of loan portfolios of banks is high,

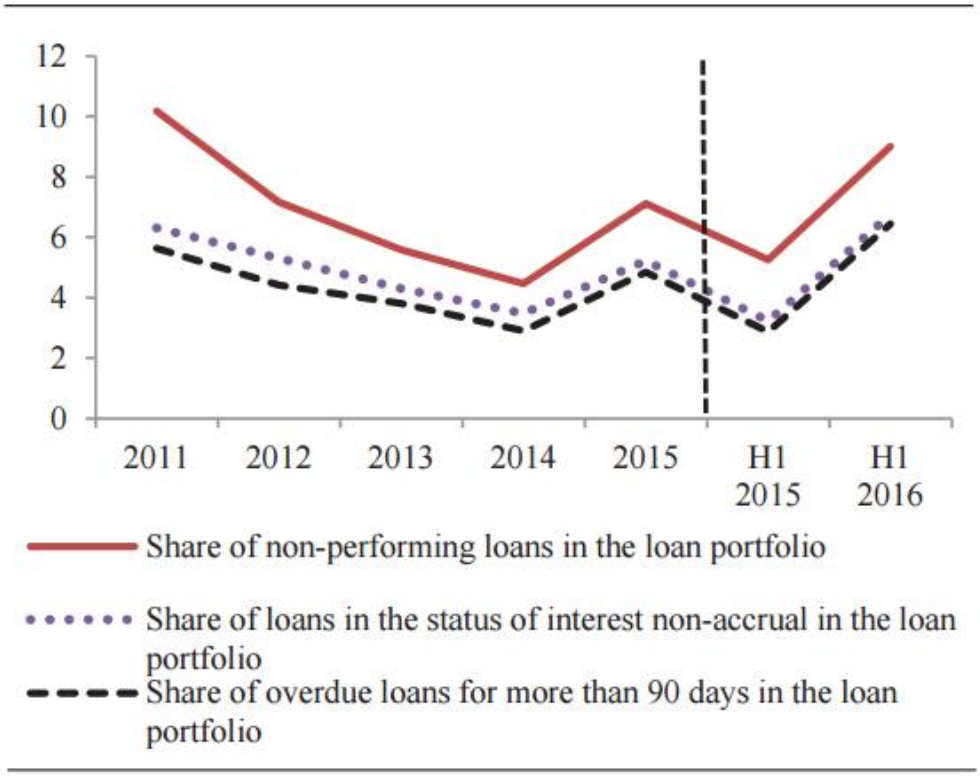
approximately 44.2percent of total loans in the banking sector are denominated in foreign currency.

The Kyrgyz banks have historically been oriented on retail and commercial banking sectors. More than 70percent of the total loan exposure belonged to the private sector as of June 30, 2016. The largest share of the private sector related to the trade and commerce loans (40percent of the total private sector loans), the second largest part of the loan portfolio is consumer loans with share of 10 percent of the total loan book. As regards to the non-financial loan book, the most significant exposure in the Kyrgyz banking sector are to agriculture (23 percent of the loan book), loans to industrial sectors (less than 10 percent) and construction and mortgage loans with share of 10 percent.

2.1.1. Asset Quality

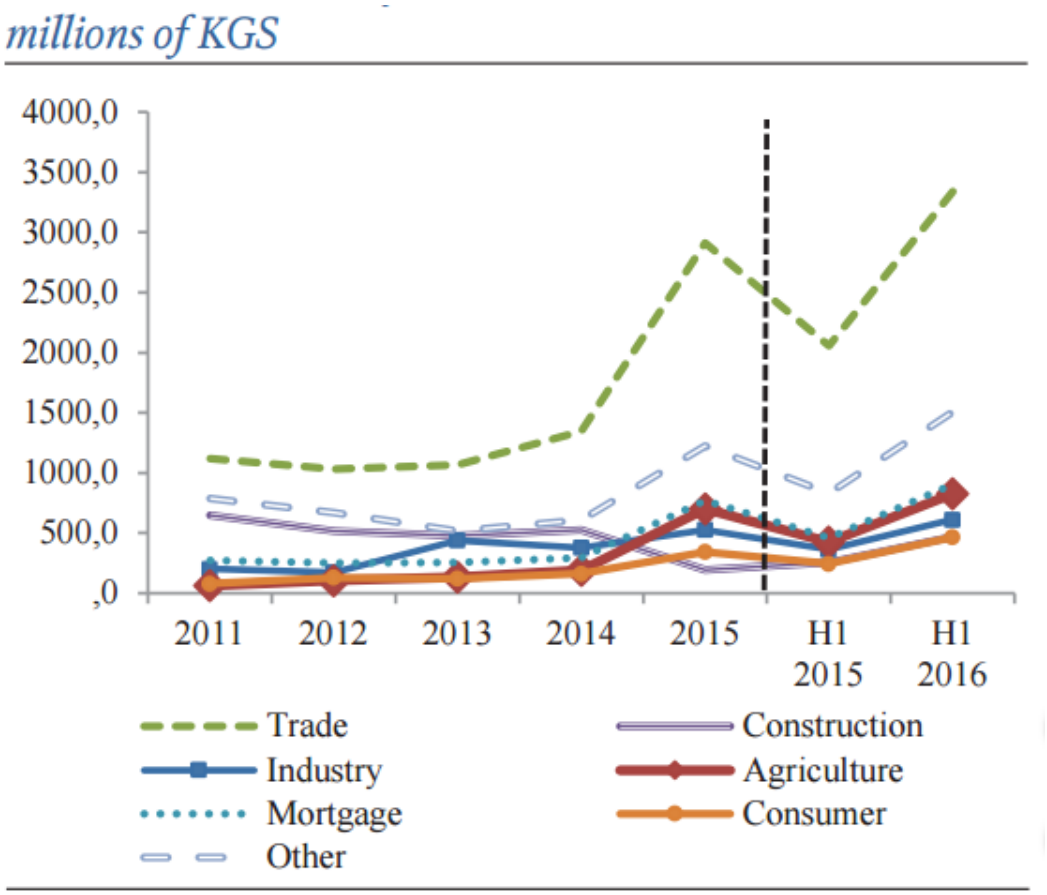
Kyrgyz banks have historically had moderate asset quality and credit defaults have been not high. However, it should be noted that in recent year the share of non-performing loans (NPLs) has increased, in 2016 the NPL ratio of a whole banking sector accounted for 9 percent, while in 2015 it was equal to 5.2 percent. The largest share of the NPLs belonged to the trade and commercial loans, the main reason of such an increase in the NPLs in trade industry might be the fact that after the Kyrgyz Republic became a member of the Eurasian Economic Union the volume of the imported goods from China decreased because of the increased taxes.

Figure 1 Indicators of the Loan Portfolio Quality



Source: National Bank. Financial Sector Stability Report of the Kyrgyz Republic, December 2016

Figure 2 Volume of Non-performing Loans by Sector of Economy

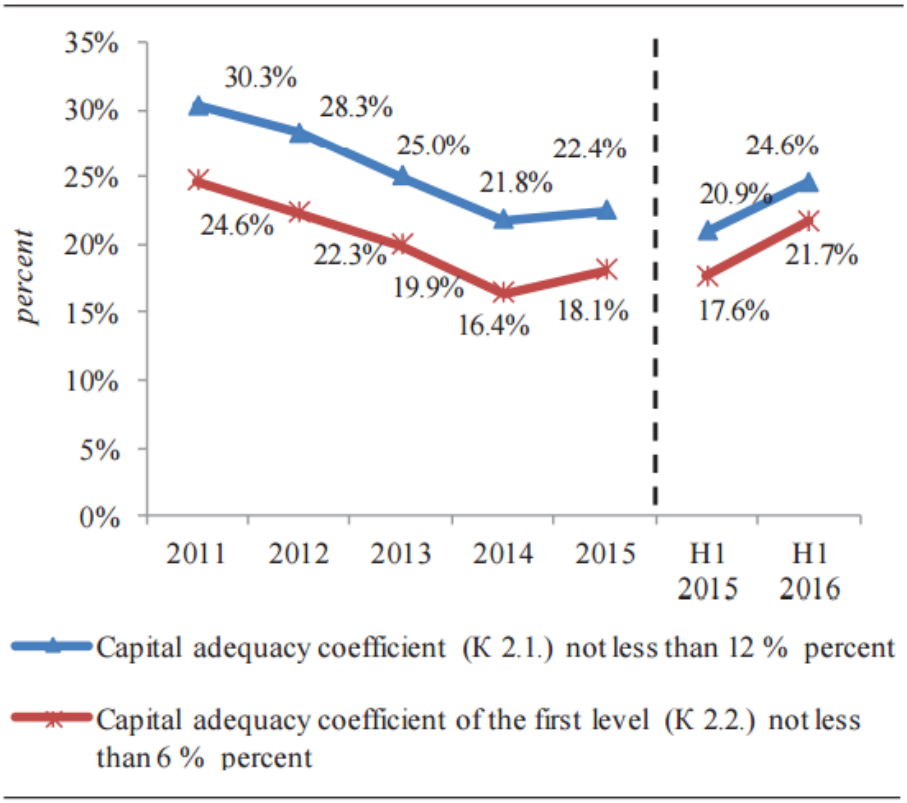


Source: National Bank. Financial Sector Stability Report of the Kyrgyz Republic, December 2016

2.1.2. Capitalization

The capitalization of the Kyrgyz banking sector is adequate as evidenced by the high Core Tier 1 ratio of 21.7 percent and the total capital ratio of 24.6, while the minimum requirements for these ratios are 6percent and 12percent respectively. It should be noted that the capital ratios have been on a rising trend since 2014 driven by the growth of total net capital despite the increase in the risk weighted assets and off-balance liabilities. As a result of the increasing capital ratios, the leverage ratio of the banking sector also has increased in recent years and at the end of 2015 equaled to 4percent, which is pretty good result and is higher than the Basel III minimum leverage requirement of 3percent.

Figure 3 Dynamics of Capital Adequacy



Source: National Bank. Financial Sector Stability Report of the Kyrgyz Republic, December 2016

2.1.3. Profitability

The Kyrgyz banking sector has a business model focused on commercial banking with net interest income as a principal source of earnings (more than 90 percent of total income of the sector is net interest income). The share of the net interest income s high in comparison with Kazakhstan and Russian Federation, mainly because the investment banking is not well developed in Kyrgyzstan.

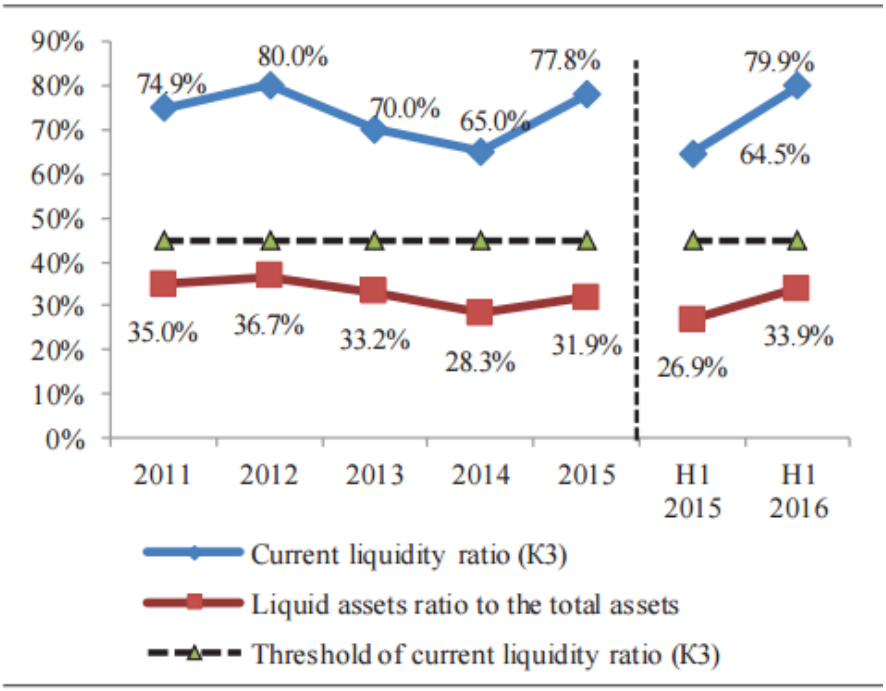
Profitability of the Kyrgyz banks have been in pressure over the recent years due to several factors: (i) reduced interest margins despite the high interest environment in the country (interest margin decreased by 18percent since 2015 and equaled to 35.6percent at first half of 2016), (ii) high risk provisioning because if rsing NPLs, which were pushed up by economic slowdown, (iii) fall in trading income. However the profitability of the Kyrgyz banks is still

moderate as evidence by the return on assets ration of 1.6percent and return on equity ratio of 11.5percent at year end of 2015.

2.1.4. Liquidity

Kyrgyz banking sector is characterized by a good with a liquidity ratio of 33.9 percent of total assets, whereas liquid assets covered 79.9 percent of short-term liabilities at first half of 2016 (64.5percent and 26.9percent respectively at first half of 2015). The increase in liquidity ratio was driven by the excess of growth rate of liquid assets over growth rate of total assets.

1Figure 4 Liquidity Indicators in the Banking Sector



Source: National Bank. Financial Sector Stability Report of the Kyrgyz Republic, December 2016

2.2. Migration from Kyrgyzstan

Labor migration from Kyrgyzstan over the past ten years has not only gained strength, but also demonstrated the sustainability of the process even against the global economic crisis. The study "The Impact of the World Economic Crisis on Labor Migration from Kyrgyzstan to Russia", conducted by the OSCE in 2009, revealed that, despite the problems associated with job cuts, the toughening of legalization procedures in receiving countries and consequently the deterioration of the situation of migrants, there is no real alternative to labor migration in Kyrgyzstan. Even at the peak of the crisis, the return of migrants was no more than 10percent. Nowadays it is obvious that at the micro level the return of migrants will worsen the financial situation and the quality of life of their families, and on the macro level, it will lead to an increase of unemployment in Kyrgyzstan, increase pressure on the social protection system, etc.

In the beginning of the 21st century, problems of labor migration and migrant remittances became very important for Kyrgyzstan. According to the World Bank, Kyrgyzstan, along with neighboring Tajikistan, is among the top five states in terms of the ratio of the remittances of labor migrants to the value of the country's gross domestic product. In Kyrgyzstan, the indicators of socio-economic development and the situation in the sphere of poverty reduction are closely interrelated with the trends of external labor migration and the volumes of migrant remittances. The financial flows of labor migration are important in the structure of the inflow of foreign currency into the republic, highly influence on the rates of economic development and the poverty level of the population.

At present time, the government of the republic is concerned about the slowdown in economic growth in the Russian Federation and Kazakhstan and is considering various scenarios for changing the social and economic situation in the republic. In fact the dependence of the Kyrgyz Republic on migrants and consequently on Russia and Kazakhstan is strong.

Among the possible negative consequences of deteriorating economic conditions in the Russian Federation and the Republic of Kazakhstan is a large-scale return of labor migrants and a sharp decrease in the inflow of migrant remittances.

In recent years, there has been an increase in the impact of the volume of remittance of labor migrants on the social and economic situation in the republic. Transfers of migrants allow to reduce the influence of international financial institutions. Additional foreign currency earnings from migrants allow Kyrgyzstan to apply models of developing national economy insurance through transfers from labor migrants. Migrant remittances compensate the demand for foreign currency in conditions of growing openness of markets and internal liberalization of the economy. In addition, transfers reduce inflation evidenced by the fact that the remittances of migrants are a stable source of foreign currency entering the republic and consequently they mitigate the impact of world economic crises. In the 1990s, the 2000s, foreign investment and other flows of foreign capital to Kyrgyzstan were not stable driven by the world economic situation, but the remittances of migrants were steady and even increased, despite economic crises.

Very often, inflation in the republic leads to an increase in migration transfers, since migrants tend to support relatives in more difficult conditions. Foreign investors invest their capital in a favorable economic situation when money transfers sent by migrants to relatives living in Kyrgyzstan depend on obligations between migrants and their families, and therefore remittances are a more stable than other flows of capital to the republic. This was evidence by the growth of remittances in 2001 despite the economic downturn, while other sources of financing like FDI declined (Neagu, Ileana & Schiff, 2009). Families that receive remittances tend to save more than other families, and consequently, transfers can greatly contribute to economic development by increasing the savings of the population. The impact of transfers on the economy depends on the propensity of the population to save. The development of a banking

network that stimulates the savings of the population allows to save the migrant remittances and to direct them to the development of the economy of Kyrgyzstan and, consequently, contributes to poverty reduction.

Migration is used as a means of diversifying risk. The desire to ensure future income to the family budget pushes family members for the migration. Diversification of risk is an important incentive for migration. A migrant plays the role of an insurer of family income, transferring money when necessary. Transfers are an independent insurance mechanism for Kyrgyzstan, taking place due to migrants who live and work in Russia and Kazakhstan. Migrant transfers are becoming a source of financing small businesses, investing in microenterprises. Often in agriculture, small businesses do not have the sources to switch from family production to larger production, and migration and migration transfers can solve this problem.

Studies have shown that migrant money is an important part of small business investment. The remittances of migrants stimulate the growth of production if there is a rational balanced policy of the government, which stimulates the investment of migrants' money in the economy of the country.

The increase in consumer demand for goods by families of migrants indirectly promotes production growth. Additional consumption increases the payments of indirect taxes. Migrant remittances, due to the multiplier effects, have the potential to use them as a generator of economic development. These transfers, apparently, are capable of triggering a mechanism for the development of the economy of Kyrgyzstan.

3. Theoretical background: Remittances and Banking Sector

As it is mentioned above remittances can positively influence on the whole economy of the country that receives remittances inflows. It should be mentioned that according to many previous research papers remittances could affect not only on poverty reduction, but also have some indirect influence on some economic growth determinants such as healthcare expenditure, expenditure on children's education, on standards of living parameter and on banking sector development. The direct impact of remittances on banking sector development can be considered from the supply side and demand side (Brown et al., 2013). Therefore, the main aim of this paper is to identify the direct impact of remittances on the banking sector development.

Banks of the country recipient can increase their funds through remittances, and therefore it can help to increase availability of loanable funds, which in its turn will increase the ability of banks to extend loans to the population (Brown et al., 2013). The important point is that remittances can help benefit not only remittance-receiving families but also others through the increasing of loanable funds of banks. Remittances of migrants as a source of funding for commercial banks might be the much cheaper than the wholesale funding and in addition it might be less risky for the banks to fund themselves through remittances as deposits (Aggarwal et. al, 2011). In addition remittance can be considered as an informal collateral because of its stable and large cash flow (Brown et al., 2013)..

On the demand side, remittances can influence on the remittance-receiving households by increasing their financial literacy. Firstly, households that receive remittances are more likely to open bank accounts in order to better manage their money. In addition, as it is mentioned above, families of migrants are tend to be savers, and therefore they usually use banking services. Secondly, household that already have bank accounts might be willing to use other banking services and therefore increase their demand in terms of loans and mortgages (Orozco and Fedewa, 2007).

Theoretically, remittances have positive impact on banking sector development. However, it is necessary to test the hypothesis of the positive impact of remittances on development of banking sector using the real data, because theoretical assumptions might not held in real life

4. Literature review

It should be mentioned that with the increase of the remittances inflows in a whole world the number of studies and research paper on the influence of remittances on different economic indicators. The largest part of the studies related to remittances have studied the relationship between remittances and economic growth, inflation, poverty reduction, quality of children education.

In case of relationship between remittances and banking sector development most of the studies investigated remittances influence on the macro level. Aggarwal et al. (2010), Gani et al. (2013), identified the positive relationship between the migrants remittances and banking sector development. Most of the studies used the same time periods and mostly same variables in their investigation, therefore studies that had strong positive relationship between remittances and banking sector development usually had similar numerical results. Aggarwal et al. (2010) have found positive relationship between remittances as a share of GDP, aggregate deposits level as share of GDP and domestic credit to private sector as share of GDP. According to their study, one percentage point increase in the remittances will lead to the increase of 0.17 percentage points in aggregate deposits level and increases credit to private sector by 0.13 percentage point. Noman M. et al. (2011) analyzed the relationship between remittances and financial sector development in four South Asian countries and have found both negative and positive results.

It should be noted that most of the studies also used similar techniques in investigating the relationship. Aggrawal et al. (2010), and Babatudne et al. (2011) have used the GMM estimation and both of them as mentioned above have found strong positive relationship. Brown et. al, 2013 examined the relationship by panel 2SLS-instrumental variable estimation using variables lagged for five year as the instruments for themselves. Their results suggest that the relationship between remittances and banking sector development depends on the sample of

countries, for the developing countries they found out the negative and insignificant result, while in developed countries the relationship is tend to be positive and strongly significant.

The important difference between most of the studies is the choice of a sample. Investigations with different countries in samples can give different results mainly due to the country specific characteristics such as political origin, level of economic development, etc. For example there is a big difference between the Islamic and other legal origins, which results in a different rights of people and institutions. Usually authors divide countries into developed and developing and results depend on the sample used. For example Brown et al. (2013) used 138 countries and divided them by the level of economic development. Remittances had negative and statistically insignificant results in developing countries, while in developed countries the relationship between remittance and financial sector development was positive. Aggarwal et al. (2010) analyzed the relationship between remittances and financial sector development in developing countries and had positive and statistically significant results.

Overall, there are many studies on remittances and banking sector development relationship at macro level. Most of the papers use the same data sources and periods between 1970 and 2010, as a result studies have investigated the influence of financial crisis on the remittances inflow and banking sector. In addition, set of variables used were similar, most of the paper used aggregate levels of deposits and loans in order to indicate the depth of the banking sector. The control variables also were similar: GDP, GDP per capita, inflation, poverty gap, trade openness, remittances, etc.

In case of micro level studies, only few researches used household level data in order to find the relationship between remittances and banking sector development. One of the studies that examined the impact of remittances at micro level data is Demeriguc-Kunt et al. (2010), which used municipality-level data for Mexico for one year of 2000. The study has found the positive and strongly significant link between remittances and number of banks' branches and

deposit accounts per capita. Other study that investigated the relationship at micro level is Brown et al. (2013). In their study, authors analyzed the relationship between remittances and financial literacy in two countries: Azerbaijan and Kyrgyzstan. As an indicator of the financial literacy, the study used a binary variable whether household has bank account or not. As control variables, authors included location of a household, demographic characteristics, income and wealth. As a technique of investigation, the probit model was used where the dependent variable was a dummy variable. So Brown et al. (2013) has found results for Azerbaijan where remittances had negative impact on financial literacy, but were insignificant. In case of Kyrgyzstan results were as expected, remittances had positive and significant impact on the probability of household to have bank account.

Therefore, we can conclude that the relationship between remittances and banking sector development has been studying for a long time and by different authors. Most of the studies used almost the same variable, similar time periods and therefore had similar results. In addition, it should be noted that the majority of studies were conducted at the macro level, and therefore it is relevant to investigate the relationship at the micro level.

5. Empirical Framework

5.1. Data Description

Data is derived from the Kyrgyz Integrated Household Survey (KIHS). The survey has been conducted to measure the standards of living in Kyrgyz Republic to obtain a better estimation of poverty rates. It is designed to represent the standards of living of each segment of population, and the poor in particular. The KIHS was introduced in 2003 by National Statistical Committee (NSC) with financial and technical support from the UK Department for International Development (DFID). Oxford Policy Management provided technical assistance to the NSC in the survey design and the first year data collection. The KIHS has been conducted quarterly since its inception in 2003. It covers close to 5,000 households and therefore it is the household survey with the largest sample size in the Kyrgyz Republic (Falkingham, Akkazieva & Baschier, 2009).

KIHS contains information about households' social, economic, demographic, and geographical characteristics, it includes information about dwelling conditions, households' expenditures and occupational activities. Information from each survey is recorded in special forms (Basic, Education, Health, Food Expenditure, Expenditure on Clothing and Shoes, Expenditure on Utilities, Dwelling Conditions, Savings, and others.) Results obtained from the survey can be generalized to the entire population.

In order to collect the data, KIHS performs direct interviews to each household during two weeks. The staff is organized into interviewers, supervisors, and state project managers. Two instruments are used to collect the data: a questionnaire and a journal. The questionnaire is designed to collect the data concerning the house infrastructure, the members and their household identification, and members' socio-demographic characteristics. In addition, for household members older than 14 years old, the questionnaire will capture occupational

activities and related characteristics as well as income and expenditures. On the other hand, the journal is designed to collect at-home and away-from-home expenditures on food, drinks, cigarettes and public transportation. During the first day of interview, expenditures on food, drinks, cigarettes and public transportation are recorded in the journal by the interviewer in order to train the interviewee. The journal remains with, and is filled by, the interviewee for the next thirteen days of the week. However, the interviewer will visit the household each day until the end of the period of interview in order to continue training of the interviewee and make sure that expenditures on food, drinks, cigarettes and public transportation are correctly being recorded by the interviewee in the journal (Falkingham, Akkazieva & Baschier, 2009).

In order to conduct the investigation of relationship between remittances and banking sector development we used Kyrgyz Integrated Household Survey for 2005-2007. Consequently, in our panel we have 14,401 observations after deducted all missing values.

5.2. Variable specification and measurement

5.2.1. Outcome variable

In this paper, the likelihood of that household takes loan is used as outcome variable. The dependent variable was derived from the above-mentioned Kyrgyz Integrated Household Survey. The values of the dependent variable was taken from the question 9 in form 6 of KIHS, the question states: "From whom did you borrow money?" In order to collect the relevant data on the outcome variable we used only answers: "Commercial bank", "Commercial organization", International microfinance organization". Consequently, if household borrowed money from these three types of organizations then the value of the dependent variable equals to one, in other case to zero. Out of 14,401 observations 1,703 observations have dependent variable equaling to one. The number of taken loans differ depending on the geographical

location of the household. Most of loans were taken in Naryn oblast, while households from Bishkek took only 24 loans in 2005-2007 (see Table 1).

Table 1 The Number of Loans Taken by Oblasts

Oblast	Number of loans taken	Oblast	Number of loans taken
Issyk-Kul	176	Osh	104
Djalal-Abad	228	Talas	120
Naryn	423	Chui	403
Batken	225	Bishkek	24

Source: KIHS 2005-2007

5.2.2. Explanatory variables

The main explanatory variable in our model is remittances. Out of 14,401 observations there are 5,194 observations where households receive remittances. The average amount of remittances accounted for KGS 8,999, while the minimum value of received remittances equaled to KGS 25 and maximum value was KGS 650,000. As it was mentioned above, there are seven oblasts in Kyrgyzstan and the largest average value of remittances received belonged to households from Osh oblast equaling to KGS 11,644, while the lowest mean value of remittances to households from Djalal Abad oblast, equaling to KGS 7,060 (See Table 2).

Table 2 Remittance Inflows in Kyrgyzstan by Oblasts

Oblast	Number of observations	Mean value	Standard deviation
Issyk-Kul	881	7723	11181
Djalal-Abad	543	7060	8724
Naryn	756	8703	14721
Batken	621	11134	34276
Osh	696	11644	21225
Talas	923	8707	8046
Chui	775	8008	13790
Bishkek	719	9370	12333

Source: KIHS 2005-2007

Based on the KIHS data we also used data on household head's gender, age, education level, household's geographic region, rural-urban status and total income as control variables.

Sex variable is defined as dummy variable, it equals to 1, if head of household is man, and 0, if head is woman. Kyrgyzstan contains 7 regions: Chui, Issyk-Kul, Talas, Naryn, Djalal-Abad, Osh, Batket, and two metropolitan areas: Bishkek and Osh. All of these variables are also dummy variables. Education level of the head of household is separated in 3 variables. First variable contains from higher education and higher incomplete, second one is a group of secondary general, secondary vocational, and secondary special, and third variable contains from incomplete education.

5.3. Model Specification

In this study, we decided to use the model of Brown et al. (2013). In this section, we will check the hypothesis of the positive relationship between the remittances and the probability of that household takes loan. According to the Brown et al. (2013) the techniques for this model are panel probit regression with random effects and panel logistic regression with fixed effects. As it was mentioned in previous section the dependent variable is dummy variable indicating whether the household takes the loan or not. The model (1) was taken from the Brown et al., 2013.

$$Prob\ (Loan_{i,t}) = f\ [remittances_{i,t} + total\ income_{i,t} + Household's\ Head\ Characteristics_{i,t} + Location\ of\ the\ Household_{i,t} + Household\ size_{i,t} + u_{i,t}] \quad (2)$$

$$u_{i,t} = \mu_i + \nu_{t,i};\ i = 1,...N;\ t = 1,...\ T.$$

- *Remittances* $_{i,t}$ is variable, which indicates the value of cash that each household *i* receives as remittances from abroad in the current year *t*.
- *Total Income* $_{i,t}$ indicates the total income of the household *i* at current year *t.* This variable includes all kinds of income that indicated at KIHS except the income from

receiving of remittances. The deduction of the remittances from total income was made in order not to have double counting.

- *Household's Head Characteristics* $_{i,\,t}$ is a set of control variables which stands for characteristics of the head of household. We included characteristics of the head of household in order to analyze how head of the household and his behavior may influence on the probability of taking loan. The set includes following indicators: (i) gender of the head of household *i,* this variable was used in order to control for the difference in household behavior. Families with female head are tend to manage the family budget better than families with male head (Brown et al., 2013). (ii) Age of the head of household *i,* we used age of the head in order to analyze the linear relationship between age of the head and probability of taking loans. (iii) Squared age of the household age, this variable stands for the non-linear relationship between age of head and probability of taking loans. The younger the head of household the riskier he might be and he might be more likely to borrow money from banks. (iv) Education variables are dummy variables, which indicate the level of education of the head of household head. The first education variable (high_educ) stands for whether head has higher education or not, the second variable (second_educ) stands for whether head has secondary education or not.
- *Location of the Household* $_{i,\,t}$ is a set of variables consisting of 7 dummy variables, which indicate the oblast of the household and rural/urban status. These variable are used in order to analyze the behavior of households from different regions of the country and households from urban and rural areas.
- *Household size* $_{i,\,t}$ indicates the number of family members in the household. The larger the household the higher the probability of taking loans.
- $u_{i,\,t}$ is a standard error, which includes some immeasurable characteristics of households like the level of trust to banks, motivation of getting the loan, etc.

Brown et al. (2013) states that there might be endogeneity bias that can arise because of some measurement errors, omitted variables or autocorrelation of the error term. As it was mentioned above, the error term consists of some immeasurable characteristics as location-specific variations in the availability of the banking service, which can influence on the probability of taking loan and on value of remittances as well. In order to avoid any kind of measurement bias we decided to use two techniques of estimation. The difference between the techniques is a measuring of remittances, in first technique we measure remittances in absolute values and in the second one we use binary variable indicating whether household receives remittances or not. Further, Brown et al. (2013) suggests that the probit estimation with random effects ignores possible endogeneity in the relationship between remittances and probability of taking loan and in order to control for immeasurable characteristics that are included in the error term it is reasonable to estimate "panel logistic estimation with fixed effects", which can help to get consistent results.

5.4. Interpretation of Results

Taking into consideration possible measurement errors and immeasurable characteristics, we used two estimation techniques and two specifications of the model in order to investigate the relationship between the probability of taking loan and remittances. In the Table 3 there are results of the Panel Probit Estimation with Random Effects and Panel Logistic Estimation with Fixed Effects, both estimations were conducted with absolute value of remittances.

Table 3 Probit Random-Effects, Logit Fixed-Effects Estimation Results (Remittances in Absolute Value)

Explanatory variable	**Probit random-effects**	**Logit fixed-effects**
Remittances	$2.2*10^{-6}$	$8.3*10^{-6}$
	($1.7*10^{-6}$)	($4.2*10^{-6}$)
Total income (without remittances)	$4.4*10^{-7}$	$3.5*10^{-7}$
	($5.8*10^{-7}$)	($4.2*10^{-7}$)
Household size	0.095***	0.141**
	(0.014)	(0.063)
Household age	0.022*	-0.085
	(0.011)	(0.054)
Household age squared	-0.0003***	0.0008
	(0.0001)	(0.0005)
Male	-0.050	0.079
	(0.054)	(0.254)
Urban	0.099*	-
	(0.053)	
High education	-0.100	-0.024
	(0.071)	(0.509)
Secondary education	0.037	0.659
	(0.066)	(0.537)
Issyk-Kul	0.354***	-
	(0.042)	
Djalal-Abad	0.476***	-
	(0.141)	
Naryn	0.346***	-
	(0.107)	
Batken	0.703***	-
	(0.146)	
Osh	0.235***	-
	(0.046)	
Talas	0.203**	-
	(0.148)	
Chui	0.116	-
	(0.144)	
Number of observations	14401	2477
R-squared		

Notes:

Remittance and total income are measured in thousands KGS.

Observed Information Matrix (OIM) standard errors are presented in parentheses.

*** denotes significance at 1percent, ** at 5percent, *at 10percent levels.

When we measure remittances, in absolute values, the results of the regression are positive and indicating the positive relationship between the probability of taking loan and remittances, however they are not significant in both of the techniques that we used. We consider that insignificant results were found due to the abovementioned measurement bias and that is why we do not discuss results of regressions with absolute value of remittances.

In Table 4 there are results for both types of estimations where we used remittances as dummy variable, equaling to one if household receives remittances and to zero if not. The estimated coefficient on dummy remittances variable is positive and significant at 1 percent level in both estimation methods. Panel Probit Estimation with Random Effects results mean that if a household receives remittances in current year then the likelihood of the taking loan is more likely. Panel Logistic Estimation with Fixed Effects results state that if a household receives remittances in a current year then the probability of taking a loan is more likely at 1percent significance level, having other things constant.

Table 4 Probit Random-Effects, Logit Fixed-Effects Estimation Results (Remittances as dummy)

Explanatory variable	**Probit random-effect**	**Logit fixed-effect**
Remittances	0.342***	0.416***
	(0.043)	(0.108)
Total income (without remittances)	$7.9*10^{-7}$	$1.05*10^{-6}$
	$(4.8*10^{-7})$	$(1.4*10^{-6})$
Household size	0.103***	0.143**
	0.014	(0.064)
Household head's age	0.026**	-0.091**
	0.010	(0.054)
Household head's age squared	-0.0003***	0.0008*
	(0.0001)	(0.0005)
Male	-0.033	0.051
	(0.054)	(0.255)
Urban	0.079	-
	(0.053)	
High education	-0.085	-0.040
	(0.070)	(0.518)
Secondary education	0.048	0.696
	(0.066)	(0.538)
Issyk-Kul	0.303***	-
	(0.042)	
Djalal-Abad	0.487***	-
	(0.043)	
Naryn	1.277***	-
	(0.146)	
Batken	0.667***	-
	(0.145)	
Osh	0.413***	-
	(0.046)	
Talas	0.186***	-
	(0.049)	
Chui	0.839	-
	(0.144)	
Number of observations	14401	2477

Notes:

Total income are measured in thousands KGS.

Observed Information Matrix (OIM) standard errors are presented in parentheses.

*** denotes significance at 1percent, ** at 5percent, *at 10percent levels.

It is important to know that in cases of probit and logit models we interpret only the sign of the coefficient but not the magnitude. The reason why we cannot interpret the magnitude of the coefficient in the probit/logit model is that different models have different scales of

coefficients. Consequently we cannot compare magnitude of the coefficients of probit and logit model, coefficients differ among models because of the functional form of the F function.

$$\beta_{logit} \approx 4\beta_{OLS}$$

$$\beta_{probit} \approx 2.5\beta_{OLS}$$

$$\beta_{logit} \approx 1.6\beta_{probit}$$

It is very useful to report the marginal effects of the results after reporting the coefficients when we conduct probit/logit models, because by using the marginal effects we can interpret the magnitude of the coefficients not only the signs. The marginal effects reflect the change in the probability of the dependent variable *Y (taking a loan)* equaling one given a one-unit change in an independent variable *X*. In order to calculate the marginal effects of probit/logit models we needed to define the derivatives of the function with respect to every independent variable.

$$Y_{i,t} = F(\beta X_{i,t})$$

$$\partial Y/\partial \beta_j = F'(x'\beta)\beta_j$$

Where index *j* refers to the j^{th} independent variable. As it is written above the marginal effects depend on X (dependent variables) so it is needed to estimate the marginal effects at specific value of X (typically at averages). The Table 5 demonstrates the results of the Panel Probit estimation (RE) method marginal effects with remittances as dummy variable.

Table 5 Probit Random-Effects, Logit Fixed-Effects Estimation Results (Marginal Effects)

Explanatory variable	**Probit random-effect**
Remittances	0.270***
	(0.030)
Total income (without remittances)	$1.01*10^{-6}$
	$(3.31*10^{-6})$
Household size	0.071***
	(0.008)
Household head's age	0.024***
	(0.007)
Household head's age squared	-0.0003***
	(0.0001)
Male	-0.028
	(0.034)
Urban	0.046
	(0.032)
High education	-0.059
	(0.043)
Secondary education	0.018
	(0.040)
Issyk-Kul	0.256***
	(0.036)
Djalal-Abad	0.391***
	(0.039)
Naryn	1.082***
	(0.115)
Batken	0.553***
	(0.138)
Osh	0.399***
	(0.029)
Talas	0.165***
	(0.036)
Chui	0.757
	(0.125)
Number of observations	14401

Notes:

The table provides marginal effects of explanatory variables.

Total income are measured in thousands KGS.

Observed Information Matrix (OIM) standard errors are presented in parentheses.

*** denotes significance at 1percent, ** at 5percent, * at 10percent levels.

After calculating marginal effects for the probit and logit results, we can interpret the magnitude of the coefficients. Panel Probit estimation (RE) results show that households, which

receive remittances are more likely to take a loan in comparison with those that do not receive by 27 percent. Relationship between the total income of the household and probability of taking loan is positive, however the magnitude is too small. One of the interesting results of the estimation is that households that live not in the capital of the country are tend to have higher probability of taking loans than household from the capital. Coefficients of six geographic location coefficients shows positive results at 1percent significance level. Second interesting result is that relationship between age of the household head and probability of taking loan is not linear. Coefficient of the squared age of household head is negative at 5percent significance level. Household size has positive relationship with probability of taking loan, households that are larger by one person is tend to have higher probability of taking loan at 1percent significance level, ceteris paribus.

We also looked at alternative approach based on the odds ratio or relative risk in order to transform the binary dependent variable to the real line. If some event occurs with probability *p*, then the odds of it happening are

$$O(p) = p/(1-p)$$

It should be noted that we estimated the odds ratio only for logistic model, while for the probit model we use marginal effects. Many studies that are estimating probit and logit models more often use marginal effects instead of odds ratios, however, we want to find the odds ratio of our logistic model. The Table 6 shows the results of estimating odds ratios of the logistic model.

Table 6 The Odds Ratio of the Logistic Model

Explanatory variable	**Logistic Model**
Remittances	1.583***
	(0.087)
Total income (without remittances)	1.000
	($5.83*10^{-7}$)
Household size	1.956***
	(0.981)
Household head's age	1.055***
	(0.014)
Household head's age squared	0.999***
	(0.0001)
Male	1.103
	(0.066)
Urban	0.096
	(0.054)
High education	0.87
	(0.071)
Secondary education	1.010
	(0.075)
Number of observations	14401
Prob > chi2	0.000
Pseudo R2	0.1084

Notes:

The table provides odds effects of logistic model.

*** denotes significance at 1percent, ** at 5percent, * at 10percent levels.

The odds ratio of the remittances variable is equal to 1.58, which means that the probability of taking a loan is in one and a half times more likely for remittances receiving household.

After estimating the models, we can measure the predicted probabilities that each family takes loan of each method. In order to do so, we need to calculate the predicted probabilities for probit and logit models. For the logit and probit models, the predicted probabilities should be limited between zero and one. In the Table 7 there are predicted probabilities of taking loan of both models and actual frequency of the dependent variable. The predicted probability of the logit model is higher than the actual frequency of the dependent variable (0.436>0.118), it

means that logit model do not predict the probability of taking loan clearly. On the other hand predicted probability of the probit model is closer to the actual frequency of the probability of taking loan, consequently the probit model predict the probability of taking loan more clear than the logit model.

Table 7 Predicted Probabilities

Variable	Mean	Std. Dev.
Actual Frequency of Dependent Variable	0.1182557	0.3229218
Predicted Probability of Probit Model	0.1122921	0.1114986
Predicted Probability of Logit Model	0.4360114	0.2093524

We conducted a Hausman Specification test in order to find the best type of estimation technique and use the most efficient results (see Table 8). In the panel data the Hausman classification test is used in order to differentiate between fixed effects model and random effects model. In this case, random effects is preferred under the null hypothesis due to higher efficiency, while fixed effects is at least consistent and thus preferred under the alternative.

	H_0 is true	H_1 is true
β_1 (RE estimator)	Consistent Efficient	Inconsistent
β_0 (FE estimator)	Consistent Inefficient	Consistent

Table 8 Hausman Test for Probit Random-Effects and Logit Fixed-Effects

	Logit fixed-effects	**Probit random-eefects**
Remittances	0.416***	0.342***
Total income	$1.05*10^{-6}$	$7.9*10^{-7}$
Household size	0.143***	0.103***
Household head's age	-0.091**	0.026**
Household head's age squared	0.0008*	-0.0003***
Male	0.051	-0.033
High Education	-0.085	-0.085

Logit fixed-effects: consistent under H0 and Ha; obtained from xtlogit
Probit random-effects: inconsistent under H_a, efficient under H_0; obtained form xtprobit

Test: H_0: differences in coefficients not systematic

chi2(7) = 6.21

prob > chi2 = 0.5157

The Hausman test suggests that both of the estimations are consistent. In addition, the test states that the Panel Probit Estimation is efficient, because the p-value of the test equals to 0.52, consequently we cannot reject the null hypothesis. Depending on the results of the Hausman test, we take into the consideration results of the Panel Probit Estimation with Random Effects.

To sum up, the consistent and efficient model of this paper is Panel Probit Estimation with Random Effects (remittances as dummy) due to the results of postestimation test of predicted probabilities and Hausman Selection test. As a result, we consider that the probability of taking loan is higher by 27 percent for households that receive remittances, ceteris paribus.

6. Conclusion

Labor migration has become an important aspect of economic reality and market relations in the world. The same can be said about the flow of remittances between the migrants receiving and emigration countries. Moreover, both these flows represent an important factor in supporting the economies of the developing countries, which helps to stabilize the political systems of these countries. Even in cases when such flows lead to the removal of significant sums of money from migrant-receiving countries, the consequences are mostly positive. Remittances contribute to the economic stabilization of emigration countries.

The number of studies investigating the relationship between remittances inflows and financial development in developing countries is growing because of the rising of migrants' remittances all over the world. Remittances became one of the most important and stable sources of financing for most of the developing countries. Most of the studies, which examine the link between the remittances and financial sector developing, are conducted at the macro level.

This paper investigates the relationship between remittances and banking sector development at the household level in the case of the Kyrgyz Republic. The study was conducted on the Kyrgyz Republic, because it is one of the least developed country in CIS region, and its dependence on migrants' remittances is one of the largest among the former Soviet countries, remittances equaled to 30.3 percent of the GDP at year-end 2015 (World Bank, 2016). The paper tests the hypothesis that remittances inflows increase the probability of a household taking a loan from formal financial institutions.

A probit random effects and logit fixed effects models were used to estimate the relationship between the remittances and a household's probability of taking loan. The baseline model of the paper is probit random effects, while logit fixed effects was used to address

possible endogeneity in the relationship between dependent variable, probability of taking loan, and main independent variable, remittances. Control variables that were used in the estimation help to control for possible effect of the household characteristic on the likelihood of taking loan. However, in order to control for some unobserved characteristics that could influence on the migration and therefore on remittances and probability of taking loan, the study used logit fixed effects with seven regional fixed effects dummy variables. In addition, because of the possible underreporting problem, both models were re-estimated with a dummy dependent variable indication whether household takes loans or not.

The results of the estimated marginal effects of baseline model with dummy dependent variable has proved the hypothesis that remittances have positive effect on the households' likelihood of taking loans. Results suggest that households, which receive remittances, have higher probability of taking loan by 31 percent at 1percent significance level, ceteris paribus. Following the results of this study, we can suppose that the impact of remittances on Kyrgyzstan's future financial development might be large. That is why the further researches is relevant and needed. We suggests that it is necessary to investigate the relationship between remittances and banking sector development by using more recent data especially in countries of CIS region.

Unfortunately, despite the growing volume of remittances in the CIS countries, this region largely remains outside the research programs of the international community. There are very few studies on the impact of remittances on economic development and banking sector development in the Commonwealth countries. Additional efforts are urgently needed to uncover the potential of remittances and labor migration in order to stimulate the economic development of the CIS member countries. We would like to suggest the following:

- It is necessary to conduct a series of surveys similar to those that were conducted in Georgia[1] and Moldova[2]. Such surveys should contribute to the initial picture of the scale of migration and the structure of remittances, to identify the main host countries, the volume and the most important channels of remittances.
- Additional efforts from governments of the CIS countries are required to collect official data in the field of migration and transfers. Technical assistance in this area could contribute to the rapid build-up of required capacity.
- It is necessary to pay special attention to the development of the financial sector. Existing systems of international payments and remittances must be reformed in order to facilitate the transfer of money. To achieve these goals, both unilateral actions by interested states and concerted international actions are needed to create easily accessible, cheap and open money transfer networks.
- The purpose of the CIS member countries should not be to restrict labor migration or to prevent the flow of remittances, but to transform these flows in order to make them more transparent and enhance their positive impact on economic development and to reduce the potential negative impact associated with money laundering and terrorism financing.

These processes should be based on the results of researches aimed at understanding the economic and social impact of labor migration and remittances. Particular attention should be paid to the impact of remittances on economic development, poverty reduction, the financial sector and the macroeconomic environment.

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