



# Transaction costs and recorded remittances in the post-Soviet economies: Evidence from a new dataset on bilateral flows<sup>☆</sup>



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## ABSTRACT

Labour migrants' remittances are a rapidly growing phenomenon in the countries of the former Soviet Union. The size and growth of remittances in the countries of the recipients brought the issue under the scrutiny of researchers and policymakers. In this paper we investigate the main factors behind the growing volume of remittances in the post-Soviet space. By applying panel data techniques we found that a reduction in transaction costs and a depreciation of the currency in the host country were the main factors that influenced the growth of recorded remittances. The size of transaction costs remains a significant predictor of the volume of formal remittances, even after correcting for endogeneity using an instrumental variable estimator. The inverse relationship between transaction costs and recorded remittances suggests that migrants switch from informal channels to formal channels to send remittances when costs are low. Thus lower transaction costs may help curb the proportion of informal flows and lead to increased use of remittances in the formal economy.

## 1. Introduction

The phenomenal increase in the flow of remittances to transition economies and developing countries has raised questions about the role of remittances in various types of economic activity. For many households, the main purpose of remittances has been to smooth consumption and alleviate budget constraints. However, the financial system and entrepreneurship also appear to be immediate beneficiaries of this windfall (Aggarwal et al., 2011; Chowdhury, 2011).

The large-scale remittances in the post-Communist economies are a relatively recent phenomenon and are linked to dramatically increased labour mobility since the collapse of the Berlin Wall. As a result, the research on remittances in transition economies remains scarce, albeit growing rapidly. The main objective of this research is to investigate the determinants of remittances using newly available data covering the countries of the former Soviet Union. Focusing on this region allows the use of data which was not available for previous studies of remittances. Data on annual bilateral transfers from Russia to the countries of remittance recipients, data on the annual flows of migrants

from particular countries to Russia, annual data on the number of branches of money transfer operators (MTOs) in Russia, and statistics on remittance transfer fees<sup>1</sup> charged by MTOs are all novel variables used in this panel study. Despite a somewhat small sample size, the results appear to be robust and provide solid empirical evidence as to the determinants of remittances. Remittances flow to less-developed countries via formal and informal channels. In the case of the former Soviet Union, the formal channels predominantly consist of bank and MTO transfers. Informal channels include cash carried by migrants and third parties<sup>2</sup> (friends, relatives, and other couriers), as well as transfers similar to 'hawala'.<sup>3</sup> It is assumed that the higher the proportion of remittances through formal channels, the greater the expected benefits of remittances to the economy as a whole. The financial system stands to gain from remittance transfer fees. Moreover, if it is sufficiently effective, it may attract new deposits from the beneficiaries of these transfers. Furthermore, channelling remittances through official channels, typically catalysed by lower remittance transfer fees, renders them subject to monitoring to deter money laundering and the financing of terrorist activities.

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<sup>1</sup> Remittance transfer fees are the service fees charged by MTOs and are considered as transaction costs for remitting money.

<sup>2</sup> All travellers departing Russia are required to report any currency and/or traveller's cheques of US\$10,000 or more, or a foreign currency equivalent that they are carrying. Although this seems to be a factor discouraging the use of informal channels for large transfers, the majority of recorded transfers from Russia are for small amounts.

<sup>3</sup> Hawala is an alternative informal transfer method used in parallel to official channels and implies the use of brokers (hawaladars), family and regional ties and connections.

Many factors may impact upon the flow of remittances. The regulatory framework for transferring remittances, taxation considerations, and the foreign exchange regimes in the host and home countries of migrants, are among the factors that may affect the recorded remittances. However, one of the main findings of this study is that lower transaction costs facilitated an increase in the volume of remittances passing through official channels.

The paper is organized as follows. Section 2 briefly reviews the literature on the determinants of remittances. Section 3 presents an overview of migration flows and remittances in the post-Soviet transition economies. Section 4 provides a description of the data and the methodology used. Section 5 presents the estimation results, and discusses the major findings and their implications. Finally, Section 6 draws conclusions and makes some policy recommendations.

## 2. Determinants of remittances: theoretical debate and international evidence

The theoretical foundations of micro-level research on the deter-

minants of remittances were laid down by Lucas and Stark (1985), who identified a number of determinants at the household level: ‘pure altruism’, ‘pure self-interest’, and ‘tempered altruism or enlightened self-interest’. However, in many cases the different motives could account for the same type of migration and remittance behaviours. While a body of research has attempted to identify these distinct motives, the process is difficult given that survey data is not always appropriately detailed.

Classical and neo-classical economic models view migrants as self-interested agents who leave their places of origin in search of new economic opportunities in their destination countries. As such, migrant remittances represent the largest observable impact of migration on migrant sending areas. The New Economics of Labour Migration (NELM), developed by Stark (1991) and others, links remittance behaviour to migration decisions. According to the NELM, migration decisions are a ‘calculated strategy’ of households aimed at improving the well-being of the whole family, and not an ‘act of desperation or boundless optimism’ (Stark, 1996, p. 26). According to the NELM, by sending a member of a household to migrate, the household aims to

**Table 1**  
A summary of empirical literature on the determinants of remittances.

Author(s)	Method	Data	Findings
Ahamada and Coulibaly (2011)	Panel data techniques	87 emerging and developing countries	A high level of financial development in remittance recipient countries allows remittances to have a stabilizing effect on GDP growth.
Al Mamun et al. (2015)	Panel data techniques	61 top remittance recipient countries	A positive relationship between remittances and labour productivity in both higher remittance (size) and remittance share of GDP.
Alkhatlan (2013)	Autoregressive distributed lag	Saudi Arabia	Significant negative correlation between workers' remittances and economic growth in the short term.
Aydas et al. (2005)	Ordinary least squares (OLS)	Turkey	Black market premium, interest rate differential, inflation rate, growth, home and host country income levels, and periods of military administration in Turkey have significantly affected remittances.
Bang et al. (2016)	An instrumental variable quantile regression	Kenya	While remittances increase expenditure at all levels of the distribution, the impact is greatest for poorer households.
Bouhga–Hagbe (2006)	Vector error correction model	Egypt, Jordan, Morocco, Pakistan and Tunisia	Altruism could be an important factor in the flow of remittances. Hardship increases remittances.
Coulibaly (2015)	Panel Granger causality tests based on Seemingly Unrelated Regressions	Sub-Saharan African countries.	There is no strong evidence supporting the view that remittances promote financial development in SSA countries.
Durand et al. (1996)	OLS, Bivariate probit	Mexico	Migrants are more likely to send remittances to entrepreneurially vibrant communities.
Freund and Spatafora (2008)	Cross-country panel regressions	104 countries	Flow of migrants was the primary determinant of official remittances; transaction costs are also important.
Hagen–Zanker (2010)	Tobit models	Moldova	Self-insurance and loan repayment motives drive the volume of remittances.
Hathroubi and Chaker (2016)	Wavelet methods to time series analysis	Saudi Arabia	Remittance outflows are strongly associated with the host country aggregates and their relationships change across time scale/frequency bands.
International Monetary Fund (2005)	Panel data techniques	101 countries	The high cost of remittances and a non-conducive business environment in the home country may have detrimental consequences and result in lost opportunities for home countries.
Lueth and Ruiz-Arraz (2008)	Cross-country panel regressions	11 countries from Asia, Europe and the Middle East	Evidence of links between remittances and business cycles.
Piracha and Saraogi (2012)	Two-part Heckman selection model	Moldova	A combination of household and migrant characteristics and some community-level variables are the key elements in explaining remittance behaviour. Altruistic and investment motives drive remittances.
Schiopu and Siegfried (2006)	Cross-country panel regressions	7 EU neighbouring countries	Transaction costs, proxied by remittance infrastructure, do not have a significant impact on remittances in the whole sample and are significant only for remittance flows between countries without common borders.
Schrooten (2005)	Generalized method of moments (GMM)	Eastern Europe and the Commonwealth of Independent States	In Eastern Europe, remittances increase with unemployment and the size of the interest rate differential, and are inversely related to domestic credit.
Schrooten (2006)	GMM	Former Soviet Union	The performance of the domestic banking sector and the access of the private sector to credit are important determinants of remittances. Better international integration and quality of institutions lead to an increase in remittances.
Straubhaar (1986)	OLS	Turkey	Turkish emigrants are not sensitive to economic benefits of remitting more. Positive link between political stability in home countries and remittances.
Vargas-Silva and Huang (2006)	Vector error correction model	Brazil, Colombia, Dominican Republic, El Salvador, Mexico and USA	Host country (USA) conditions are more important than home country.

**Table 2**

Top recipients of personal remittances in the world in 2014.  
 Source: Calculations of the author based on data for bilateral remittances (World Bank, 2014) and GDP data from World Development Indicators.

Country	Remittances (US\$ million)	GDP (US\$ million)	Remittances to GDP ratio (%)
<b>Tajikistan</b>	3,835	9,241	41.4
<b>Kyrgyz Republic</b>	2,246	7,404	30.3
Nepal	5,875	19,636	29.9
Tonga	114	434	26.3
<b>Moldova</b>	1,981	7,944	24.9
Lesotho	456	2,088	21.8
<b>Armenia</b>	2,159	10,882	19.8
Lebanon	8,899	45,731	19.5
Honduras	3,329	19,385	17.7

maximize joint income and status, and minimize risks. Thus the NELM offers another important insight into migration decisions by linking labour migration with public policy and capital market failures in the labour-source countries. In making the decision on migration, households design their own strategy to cope with the absence of appropriate credit, insurance instruments and public protection. Remittances from a family member abroad provide an additional source of funding, insurance in case the main source of family income falters, and financial protection in case of a rainy day. As such, migration can be viewed as a result of risk aversion on the part of a household that has insufficient income. In general, the NELM has proved to be an innovative, realistic, useful and widely applied framework in recent migration studies.

Some critics of the NELM, such as Hagen–Zanker (2010), highlight its strong assumptions of rationality, and others, such as Aslan (2011), criticize NELM for its neglect of the role of informal institutions as non-rational and non-economic determinants of human motivation and behaviour. In the context of the former Soviet Union, and especially in Central Asia, these informal institutions and social networks seem to play a significant role in migration decisions (Aslan, 2011; Juraev, 2012).

Another theoretical model emphasizes the exchange motive in remittance behaviour (Cox and Jakubson, 1995; Rapoport and Docquier, 2006): remittances can be used to pay for services provided by relatives in the home countries of migrants. Modern empirical

**Table 3**

Proportion of remittances from Russia and relative to GDP for the Former Soviet Republics in 2014<sup>a</sup>.  
 Source: Calculations of the author based on data for total remittances and bilateral remittances from Russia (World Bank, 2014).

Country	Indicator	Total remittances (US\$ million)	Remittances from Russia (US\$ million)	Proportion of remittances from Russia (%)	Remittances to GDP ratio (%)
Armenia	2,159	1,380	64	19.8	
Azerbaijan	1,898	1,107	58	2.5	
Belarus	1,258	576	46	1.7	
Estonia	476	137	29	1.8	
Georgia	2,065	1,233	60	12.5	
Kazakhstan	209	133	64	0.1	
Kyrgyzstan	2,246	1,735	77	30.3	
Latvia	790	193	24	2.5	
Lithuania	2,399	269	11	5.0	
Moldova	1,981	656	33	24.9	
Tajikistan	3,835	2,952	77	41.4	
Turkmenistan	30	30	100	0.1	
Ukraine	7,587	3,936	52	5.8	
Uzbekistan	5,588	5,588	100	9.0	

<sup>a</sup> It should be noted that the data on bilateral remittances from the World Bank used in constructing Tables 1 and 2 is not without ambiguities. For instance, according to World Bank estimations, Uzbekistan receives remittances only from Russia, whereas anecdotal evidence (as well as a number of surveys) indicates that the migrant stock of both legal and illegal Uzbek labourers in South Korea, Turkey, the USA, and especially Kazakhstan is sizeable too. For example, Makhmutova et al. (2008), using a survey financed by the Asian Development Bank, estimated that 2004 remittances from Kazakhstan to Uzbekistan were ~US\$500 million.

studies exploring determinants of remittances may be divided conceptually into two categories. On the one hand, micro-level research uses household-level surveys to investigate the remittance decisions of individuals. On the other, macro-level inquiries resort to macroeconomic indicators to understand determinants of remittances in the economy as a whole.

The main focus of this paper is on macroeconomic determinants. Macro-level research has identified a number of factors which have influenced the amount of remittances a country receives. Among these are differences between the host and home countries in the group of macroeconomic variables, such as relative income/wage levels, economic growth, interest rates, macroeconomic stability, and variations in business cycles. There are also a number of other macroeconomic factors which could be considered on a stand-alone basis or in relation to their dynamics in both host and home countries, such as exchange rate-related variables (e.g. fluctuations, dual exchange rate systems, restrictions, existence of a foreign exchange black market), political risk and institutional development, unemployment, demographics, the infrastructure for fund transfers, the business environment and financial sector development.

There is also a strand in the literature on determinants of remittances which includes demographic/social factors (e.g. age dependency, illiteracy, percentage of population under 14 years old, income inequality) and combines micro and macro factors into a model (Adams, 2009; Buch and Kuckulenz, 2010). These demographic/social factors include the number of children in a family; the dependency ratio, and the ratio of females in the population of the host country, as well as among the migrants themselves (Table 1).

A summary of empirical literature on the determinants of remittances is presented in.

In summary, the literature on the determinants of remittances in various regions is not conclusive. This is due to the fact that the remittance decision is complex, depending on status, education, intentions, gender, family ties, age, and many other characteristics. It could also be due to an endogeneity problem and/or the uniqueness of each region/country. However, this uniqueness should not preclude cross-country examination of the determinants of remittances. In fact, one of the remarkable shortcomings of literature on the determinants of remittances is the limited availability of panel studies on groupings of countries with similar characteristics. The present research addresses this gap in the literature by investigating the determinants of

remittances in a set of countries with similar economic histories, commonly used language, and significant cultural ties.

### 3. Overview of remittances within the former Soviet union

The analysis in this paper focuses on the determinants of remittances flowing from the Russian Federation to the rest of the former Soviet republics. Some of these former Soviet countries are among the world's leaders in terms of remittances to GDP ratios. In fact, four (indicated in bold type) of the world's top remittance recipients, measured in these terms and shown in Table 2, are located in this region.

As is evident from Table 3 below, the proportion of remittances from Russia among the total remittances received by countries included in the estimations of this study varies significantly between countries, from 11% to 100%. This is the case despite large differences in the post-Soviet transition path of these economies.

Given that the Baltic states (Estonia, Latvia and Lithuania) have some structural differences with the rest of our sample, their inclusion requires some justification. These countries joined the European Union in 2004, which may have altered the migration trajectories to and from the region. For this reason, the determinants and patterns of remittances in the Baltics could be hypothesized to differ from the rest of the former Soviet countries. However, a review of World Bank (2014) statistics on bilateral remittances indicates that the Russian Federation still remains the major source of remittances for these countries. Russia is the main source of remittances for both Estonia (US\$137 million) and Latvia (US\$193 million), significantly outstripping the second most important sources: Finland in the case of Estonia (US\$87 million), and the UK in the case of Latvia (US\$165 million). Lithuania is the only country in the Baltics where Russia, with US\$269 million in remittances, is ranked only second as a source of remittances behind the principal country, the UK (US\$547 million).

Despite more than twenty years of independent development, interdependencies between the Russian and former Soviet economies are still strong. Fig. 1 below illustrates that remittances are sensitive to changes in economic conditions in Russia. Whereas the global financial crisis hit the world economy in general, the slowdown in Russian economic growth had a particularly severe impact on the economies of the former Soviet Union countries. As a result, remittances and economic growth declined significantly, albeit temporarily, in the former Soviet Union countries, but bounced back after the Russian economy started to grow again.

### 4. Data description and methodology

#### 4.1. Data sources

To determine the drivers of remittances in the former Soviet Union, the paper applies panel data analysis techniques and regresses remittances on a range of macroeconomic and demographic variables. The panel is unbalanced and covers a set of 11–12<sup>4</sup> countries of the former Soviet Union over an 11–15 year period from 2000 to 2014.

Arguably, cross-country studies that estimate average coefficients may potentially produce erroneous results because this methodology may obscure diverse remittance flow patterns received by individual countries in a sample (Sayan, 2006). Since the sample for this research includes countries with a common past, culture, mentality and, in some cases, a similar trajectory of development, this heterogeneity problem is largely mitigated. By taking first differences between variables, it also becomes possible to eliminate many of the biases that arise from endogeneity and omitted variables, simultaneously addressing con-

cerns about stationarity (Adams, 2009).

Our data set differs from those of many existing cross-country studies in three important dimensions. First, previous research has relied on International Monetary Fund (IMF) data on remittances that has some errors and inconsistencies (Kakhkharov and Akimov, 2015). The remittances series used in this paper use data from the Central Bank of Russia, collected from MTOs in Russia, on bilateral remittances for each of the countries of the Commonwealth of Independent States (CIS) and believed to be more reliable. The Central Bank of Russia publishes two sets of data on remittances: the total remittances of individuals from Russia to each of the CIS countries, and remittances implemented through MTOs. The difference between these two series is insubstantial. However, since labour migration from the CIS countries to Russia is predominantly seasonal and illegal, most migrants use MTOs because of their lower documentation requirements and relative accessibility. In addition, the data on total remittances from individuals is more likely to capture transactions which should not be classified as remittances. These may include gifts, money transfers made by tourists, and/or trade-related transactions. Therefore, in this study we use the statistics for remittances via MTOs<sup>5</sup>.

The second distinctive feature of the dataset is that the data contains good-quality observations for the major explanatory variable, which is the cost of remitting US\$200 from the Russian Federation for the period 2003–2013, collected by the Central Bank of Russia as a result of regular surveys of MTOs operating in Russia. A quick overview of the relationship between these transfer fees and remittances from Russia reveals an interesting pattern: thus Fig. 2 illustrates the inverse relationship between remittances from Russia to the former Soviet Union countries and remittance transfer fees.

Thirdly, another explanatory variable – the number of migrants from each country of the former Soviet Union – is also collected from a single source: the Federal Migration Service (FMS) of Russia. These data were gathered from arrival cards processed by the territorial bodies of the FMS of Russia when migrants register at an address and explicitly indicate that they have arrived in Russia to work. Because migration to Russia has been highly seasonal, until 2011 this system covered only migrants moving to Russia for nine months or less. As of 2011, the system takes into account those who register for a period of longer than nine months. It should be noted that the data series for this variable is not faultless due to the difficulties in measuring illegal migration and due to frequent changes in the regulations governing labour migration in Russia. Overall, however, the series represents a reasonably good proxy for capturing fluctuations in the migrant flow and is expected to show a positive relationship with the volume of remittances. Finally, the study also uses data on the number of MTO service points implementing cross-border transfers from Russia in its instrumental variable (IV) estimations. This data was harvested from two reports of the Central Bank of Russia (2009, 2012).

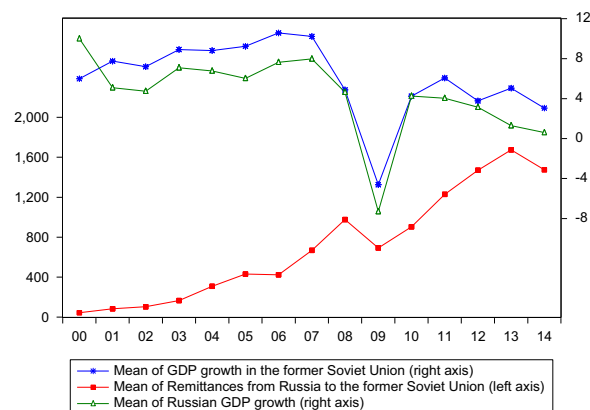


Fig. 1. Remittances from Russia, GDP growth in Russia, and GDP growth in the former Soviet Union 2000–2014 (GDP growth in percentages and remittances in US\$ million).

<sup>4</sup> In all estimations, except for one of the IV regressions, the sample consists of 11 countries.

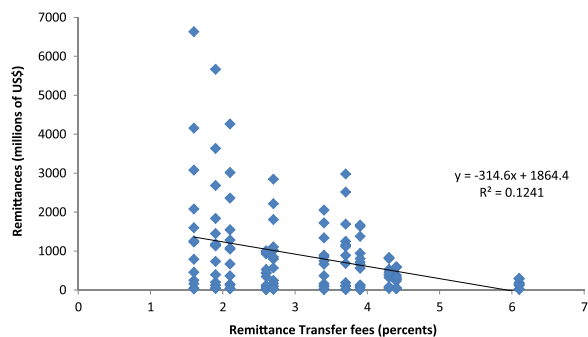


Fig. 2. Remittances from Russia to the Former Soviet Union and remittance transfer fees.

The literature on the determinants of remittances discussed earlier also finds that business cycles, income levels, interest rates and the business environment are important factors in remittance flows. What matters for remittance decisions are the differences in these factors between the host and home countries. Therefore, in all estimations of remittance flows, the differences in GDP growth, GDP per capita and real interest rates between Russia and the other countries of the former Soviet Union are used as proxies for differences in business cycle, income level and business environment. All of these data series have been sourced from the World Bank's World Development Indicators.

A number of studies cited in the literature review indicate that the foreign exchange rates of the host and home countries, the development level of their financial sectors, and the macroeconomic instability of the home country are relevant to remittances. The recent economic recession in Russia, accompanied by the dramatic depreciation of the Russian rouble, decimated migrants' real earnings. For this reason, nominal US dollar exchange rates for the Russian rouble and the former Soviet republics' currencies are included in the estimations as explanatory variables. Financial sector development is expressed in terms of the ratio of credit to GDP and comes from the IMF's International Financial Statistics (IFS). Since inflation is perceived as a sign of macroeconomic instability, a GDP deflator from the World Development Indicators is also included in estimations as a proxy for the rate of inflation.

A range of standard demographic and qualitative variables are used as control variables. This includes age dependency (used by Adams (2009) and Buch and Kuckulenz (2010)), multiple exchange rate regimes (used by Aydas et al. (2005) and El-Sakka and McNabb (1999)), economic crises, and the ease of crossing borders (used by Lueth and Ruiz-Arranz (2008)). An economic crisis in the host country, Russia, may stop labour migrants from coming to the host country and decrease the amount of remittances. While the model contains a few variables capturing changes in economic performance, an additional dummy in the model identifying the Russian economic crisis is warranted to account for the fact that economic crisis is a force majeure circumstance affecting migration and remittances much more profoundly and deeply compared to relatively minor fluctuations in economic performance. Therefore, this variable represents a dummy equal to 1 for the periods when Russia's economic growth was either negative or close to zero. Finally, the existence of common borders may facilitate informal remittances and depress formal remittances (Lueth and Ruiz-Arranz, 2008). This is because having common borders and a visa trade regime makes it easy to travel to Russia and back, carrying the income earned in Russia in the pockets of migrants. However,

<sup>5</sup> The Central Bank of Russia data on annual remittances from Russia via MTOs covers the period from 2006 to 2014. For the period from 2000 to 2005, the study uses the bilateral remittance data estimated by Shelburne and Palacin (2007). This data series is not available for Estonia, for which the pro rata share of remittances from Russia is calculated according to IMF data on remittances to Estonia, and the World Bank estimate of the share of remittances from Russia.

having a common border may not necessarily make crossing the border with Russia easy because not all of the former Soviet Union enjoys a visa free regime with Russia. Estonian, Latvian, and Lithuanian citizens need a preapproved visa to visit Russia. Russia introduced a tougher a visa regime with Georgia in 2008, after the South Ossetia conflict. For other CIS countries, procedures for obtaining a work permit in Russia are much simpler compared to the non-CIS countries. Since Estonia, Latvia, and Lithuania have never been members of the CIS and Georgia exited the CIS in 2009, the citizens of these countries are subject to different treatment in Russia when applying for a work permit. Thus, despite having physical borders with Russia, some countries of the former Soviet Union that have a visa regime in place with Russia – Estonia, Latvia, Lithuania and Georgia (since 2008) – are assigned a category of not sharing a border, together with Armenia, Moldova, Uzbekistan, Kyrgyzstan and Tajikistan: the countries which do not share a physical border with Russia. Finally, since remittances have experienced strong growth in the former Soviet Union and there could be some other factors not captured by our model that might have accounted for this, a time trend variable is incorporated into all estimations.

The full description of the variables used in this study is provided in the Appendix.

#### 4.2. Empirical framework

The analysis in this section involves the application of three different econometric techniques. Initially, the determinants of remittances were estimated using ordinary least squares (OLS) to set the general direction of the investigation. Then a panel data fixed effects model is used to account for unobserved time-invariant heterogeneity.<sup>6</sup> Moreover, to address potential problems with autocorrelation, all estimations are in differences. Finally, to tackle the issue of endogeneity in a systematic way, instrumental variables were applied. In all the estimations, standard errors are robust with regard to autocorrelation and heteroscedasticity. The basic relationship is

$$\Delta Rem_{it} = \beta_0 + \beta_1 \Delta Cost_{it-1} + \beta_2 \Delta M_{it-1} + \beta_3 \Delta y_{it-1} + \lambda_4 \Delta X_{it-1} + \varepsilon_{it} \tag{1}$$

where *Rem* is the annual amount (in US dollars) of remittances from Russia, measured for different estimations in volume, or remittances per capita, or the ratio of remittances to GDP received by country *i* in period *t*. *Cost* denotes the remittance transfer fees associated with sending remittances from Russia to country *i* in period *t*; *M* is the flow of migrants to Russia from country *i* in period *t*; *y* is the GDP growth differential between Russia and country *i* in period *t*; *X* is a vector of other explanatory variables, which cover demographic, economic and financial/political factors, for country *i* at time *t*; and  $\varepsilon$  is an error term.

For fixed effects estimations, the following basic model is used:

$$\Delta Rem_{it} = \alpha_i + \beta_1 \Delta Cost_{it-1} + \beta_2 \Delta M_{it-1} + \beta_3 \Delta y_{it-1} + \lambda_4 \Delta X_{it-1} + \varepsilon_{it} \tag{2}$$

where  $\alpha_i$  denotes the country-specific fixed effects and the other symbols have the same meanings as in Eq. (1).

To overcome a problem of endogeneity, as a second step, instrumental variable estimations are applied. Five instrumental variables are carefully selected to avoid the potential problem of reverse causality. The overidentification test developed by Hansen (1982) is used in IV estimations to check the validity of instruments. The Hansen test is aimed at testing the null hypothesis that the instrument is uncorrelated with the error term and is correctly excluded from the regression equation.

<sup>6</sup> A Hausman test confirmed the preference for fixed-effects models in these estimations.

5. Results and discussion

5.1. Determinants of remittances: pooled OLS and fixed effects model

The results of estimation of the determinants of remittances are presented in Table 4. These include output for both pooled OLS and fixed effects models for three remittance variables: (a) remittances to GDP ratio; (b) volume of remittances and (c) remittances per capita. Three types of remittance-related variables are used as dependent variables in order to confirm that the impact of the independent variables holds for various modifications of a dependent variable.

Interpretation of the coefficients, derived from both the pooled OLS and fixed effects estimations, results in a reasonably consistent story. Remittance transfer fees and foreign exchange rate in Russia have the most persistent, strongest and most statistically significant impacts on remittances, no matter which measure of remittances is used. The number of migrants was expected to have a positive relationship with the volume of remittances. However, this variable is significant only in pooled estimations. In contrast to some other studies in the area (Freund and Spatafora, 2008; Singh et al., 2010), in fixed effects models this positive relationship is not statistically significant. As discussed above, frequent changes in regulations on the classification of migrants may have been a reason behind this. Intuitively, it is clear why the foreign exchange rate in Russia proved to be an important driver of remittances: with a fall of the rouble, remittances fall too. The anecdotal evidence of this phenomenon taking place in Russia today is

plentiful and it is notable that this effect is statistically significant in five out of the six regressions. Another indicator which was expected to have a positive sign is the trend variable. As noted above, over time, remittances from Russia to the former Soviet Union increased substantially and there could be factors other than those we were able to capture in the model. Therefore, it is not surprising that the trend variable has a positive sign and its effect is statistically significant in five out of the six regressions.

5.2. Determinants of remittances: instrumental variable estimations

Despite the robust results of OLS and fixed effects estimations pointing at remittance transfer fees as the main determinant of remittances in the former Soviet Union, it is still possible that remittance transfer fees are endogenous to remittances. Although fixed effects estimations in first differences and lagging independent variables decreased the biases, reverse causality may be taking place: remittances may be affecting the remittance transfer fees while, in addition, remittance transfer fees may be affecting remittances. One potential solution to this problem is to use instrumental variable estimations. Proper external instrumental variables that are correlated with the endogenous explanatory variable, but uncorrelated with the outcome variable applied in a panel model, may eliminate many biases that arise from endogeneity concerns.

The main challenge is finding appropriate instruments to use as variables. In this study, five potentially appropriate instruments were

Table 4  
Determinants of demittances: pooled OLS and fixed effects panel regression results.

Explanatory variables	Dependent variable	Dependent variable	Dependent variable	Dependent variable	Dependent variable	Dependent variable
	Remittances to GDP	Remittances volume	Remittances per capita	Remittances to GDP	Remittances volume	Remittances per capita
	<i>Pooled OLS</i>			<i>Fixed effects</i>		
Remittance transfer fees	-0.73** (-2.78)	-39.70** (-2.48)	-5.98** (-2.08)	-0.75** (-2.61)	-35.58** (-2.18)	-5.51** (-2.52)
Migrants	0.001 (0.002)	0.03** (2.02)	0.001 (0.50)	-0.001 (-0.46)	0.01 (0.32)	-0.001 (-0.35)
GDP growth differential	0.028 (0.8)	0.03 (0.01)	-0.08 (-0.21)	0.03 (1.03)	1.33 (0.65)	0.12 (0.31)
Income differential	-0.001 (-0.44)	0.02 (0.54)	-0.001 (-0.17)	-0.001 (-0.84)	0.01 (0.18)	-0.001 (-0.37)
Interest rate differential	-0.03 (-1.63)	-1.94 (-1.24)	-0.42** (-2.01)	-0.03 (-1.47)	-0.37 (-0.47)	-0.29 (-1.15)
Foreign exchange rate in home country	0.001 (0.38)	-0.03** (-2.77)	-0.001 (-0.88)	-0.001 (-0.92)	-0.01 (-0.31)	-0.001 (-0.51)
Foreign exchange rate in host country	-0.29** (-2.07)	-41.09*** (-3.43)	-6.06*** (-4.4)	-0.24 (-1.32)	-56.56*** (-6.6)	-8.39*** (-6.42)
Unemployment in home country	0.03 (0.75)	6.55 (0.55)	4.21 (1.41)	0.04 (0.93)	12.55 (1.28)	5.48 (1.59)
Age dependency	-0.89 (-1.4)	-73.32 (-1.55)	-17.21** (-2.03)	-1.50 (-1.23)	85.19* (1.81)	4.92 (0.49)
Credit to GDP	-0.0002 (-0.008)	-2.14 (-1.51)	0.24 (0.46)	0.01 (0.47)	-3.43** (-2.54)	0.02 (0.04)
Inflation	0.005 (0.24)	0.14 (0.11)	0.21 (0.98)	0.01 (0.52)	-0.66 (-0.61)	0.15 (0.46)
Dual exchange rates	0.44 (1.03)	75.8 (1.47)	2.76 (0.53)	-0.15 (-0.22)	90.22 (1.41)	14.28 (1.61)
Economic crises	-2.74 (-1.61)	-163.9 (-1.10)	-64.16 (-1.62)	-3.66 (-1.7)*	-150.61 (-1.04)	-59.47 (-1.29)
Border	-0.99 (-2.19)	15.89 (0.68)	-19.14** (-2.56)	-0.33 (-0.41)	77 (1.15)	14.79 (0.78)
Trend	0.29** (2.15)	40.43** (2.63)	6.76*** (3.1)	0.44*** (4.68)	29.97** (3.05)	5.36** (2.90)
Constant	5.89 (1.6)	872.16*** (2.7)	134.13*** (3.82)	2.9 (0.5)	1517.4*** (6.94)	218.99*** (4.94)
Observations	91	91	91	91	91	91
Number of countries	11	11	11	11	11	11
R-squared	0.31	0.52	0.56	0.35	0.65	0.64
<b>Country fixed effects</b>						
Armenia				2.47	1603.10	259.77
Azerbaijan				1.02	1525.28	206.05
Belarus				3.57	1372.68	198.51
Georgia				2.81	1385.86	202.57
Kyrgyzstan				3.59	1618.73	239.26
Moldova				2.34	1543.60	237.11
Tajikistan				3.29	1881.58	258.69
Ukraine				3.27	1549.65	187.32
Estonia				3.50	1347.66	204.35
Latvia				3.38	1321.63	195.52
Lithuania				2.76	1431.61	205.30

Note: \*\*\*, \*\*, and \* denote significance at, respectively, the 1, 5, and 10 per cent levels. Absolute values of robust t-statistics are in parentheses.

**Table 5**  
First-stage IV estimates for remittance transfer fees of remittances from Russia to the former Soviet Union countries.

Instruments	
The number of MTO service points in Russia	-0.00*** (-4.77)
Bank branches per 100,000 adults	0.04 (0.58)
Bank concentration ratio	0.01*** (3.72)
Ratio of transferable deposits to GDP	-0.01 (-0.29)
ATMs per 100,000 adults	-0.02 (-1.33)
Exogenous variables	
GDP growth differential	0.02*** (3.26)
Income differential	-0.00 (-0.14)
Interest rate differential	-0.01 (-1.32)
Foreign exchange rate in home country	0.00 (1.18)
Foreign exchange rate in host country	-0.47*** (-6.15)
Unemployment in home country	-0.07 (-1.02)
Age dependency	-0.19 (-0.32)
Credit to GDP	0.00 (0.33)
Migrants	0.00 (1.36)
Inflation	-0.01** (-2.58)
Dual exchange rates	-0.24 (-0.76)
Economic crisis	2.36** (2.78)
Border	-0.22 (-0.73)
Trend	0.79*** (9.00)
Constant	9.25*** (7.11)
Observations	56
Number of countries	11
R-squared	0.89

Note: \*\*\*, \*\*, and \* denote significance at, respectively, the 1, 5, and 10 per cent levels. Absolute values of robust *t*-statistics are in parentheses.

identified. One of these instruments is the number of MTO service points in Russia. Recently, many banks and other financial institutions have entered the money transfer market, decreasing the remittance transfer fees being charged. The number of MTOs in Russia increased from just a few in the 1990s to more than 20 in the 2000s, facilitated by liberal policies toward MTOs on the part of Russian regulators, as well as those in the majority of the former Soviet Union countries. The

**Table 6**  
Determinants of remittances: IV estimates of the impact of transfer costs on remittances from Russia to the countries of the former Soviet Union.<sup>a</sup>

Instrumented endogenous variable	Dependent variable: Remittances to GDP			
Remittance transfer fees	-0.47** (-2.69)	-0.44** (-2.61)	-0.38** (-2.45)	-0.35** (-2.75)
Exogenous regressors				
GDP growth differential	0.07 (1.6)	0.06 (1.51)	0.05 (1.28)	0.05 (1.36)
Income differential	-0.00** (-2.84)	-0.00** (-2.64)	-0.00* (-1.88)	-0.00** (-2.71)
Interest rate differential	0.04** (-2.14)	-0.03* (-1.94)		-0.03* (-1.92)
Foreign exchange rate in home country	-0.00 (-1.14)	-0.00 (-0.81)	-0.00 (-0.43)	-0.00 (-0.77)
Foreign exchange rate in host country	0.61** (2.41)	0.61** (2.48)	0.52** (2.31)	0.42** (2.22)
Unemployment in home country	0.07* (1.72)	0.07* (1.71)	0.05 (1.12)	0.06* (1.82)
Age dependency	-2.18 (1.6)	-1.79* (-1.78)	-1.96 (-1.55)	
Credit to GDP	0.02* (1.64)	0.01 (1.51)	0.02* (1.8)	0.01 (0.73)
Migrants	-0.00** (-2.62)	-0.00** (-2.71)	-0.00** (-2.64)	-0.00** (-2.1)
Inflation	0.03* (1.78)	0.02 (1.45)	0.0008 (0.07)	0.02 (1.54)
Dual exchange rates	-0.75 (-1.05)		-0.49 (-0.8)	0.2 (0.36)
Economic crisis	-6.20** (-2.81)	-6.24*** (2.91)	-5.32** (-1.99)	-4.59** (-2.78)
Border	-0.02 (-0.02)		0.16 (0.16)	1.03 (1.44)
Trend	0.25 (1.41)	0.14 (1.14)	0.27 (1.5)	-0.07 (-0.59)
Statistics				
Observations	58	58	68	58
Number of countries	11	11	12	11
R-squared	0.42	0.41	0.38	0.41
Kleibergen–Paap (underidentification test)	19.27	17.55	19.64	18.67
Cragg–Donald Wald F statistic (weak identification test)	15.42	17.42	20.49	19.11
Kleibergen–Paap rk Wald F statistic (weak identification test)	39.87	38.38	39.72	47.18
Hansen J-statistic (overidentification test)	5.40	5.78	4.52	6.24
P-value Hansen test	0.24	0.22	0.34	0.18

Note: \*\*\*, \*\*, and \* denote significance at, respectively, the 1, 5, and 10 per cent levels. Absolute values of robust *z*-statistics are in parentheses.

<sup>a</sup> The focus in this study is on remittances to GDP ratio, rather than volume of remittances or remittances per capita, because data for population and immigration seems to be less reliable than GDP data. More detailed discussion of the problems in measuring this data can be found in Makaryan (2015).

**Table A1**  
Definitions and descriptions of variables.

Variable	Definition	Source
Remittance transfer fees	Average weighted cost for transfer of US\$200 from the Russian Federation for the period 2003–2013.	Collected by the Central Bank of Russia in regular surveys of MTOs operating in Russia
GDP growth differential	Difference in the GDP growth indicator between Russia and the respective home countries of migrants.	GDP data from World Development Indicators (WDI), World Bank
Income differential	Difference in GDP per capita between Russia and the respective home countries of migrants.	GDP per capita data from WDI
Interest rate differential	Difference in real interest rates between Russia and the respective home countries of migrants. Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator. The terms and conditions attached to lending rates differ by country, however, limiting their comparability.	Real interest rate data is from WDI
Foreign exchange rate in home country	The official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the US dollar).	WDI
Foreign exchange rate in host country	<i>Idem</i>	<i>Idem</i>
Unemployment in home country total (% of total labour force) (modelled ILO estimate)	Unemployment refers to the share of the labour force that is without work but available for and seeking employment.	<i>Idem</i>
Age dependency (% of working-age population)	The age dependency ratio is the ratio of dependents – people younger than 15 or older than 64 – to the working-age population – those aged 15–64. Data is shown as the proportion of dependents per 100 of the working-age population.	<i>Idem</i>
Credit to GDP	Deposit money banks' credit extended to the private sector expressed as a percentage of GDP.	International Financial Statistics, IMF
Migrants	The number of citizens from the former Soviet Union who came to Russia to work.	Federal Migration Service of the Russian Federation
Inflation (%)	GDP deflator (annual %)	WDI
Dual exchange rates	Dummy equals 1 indicates the presence of multiple exchange rates.	IMF Annual Report on Exchange Arrangements and Exchange Restrictions
Economic crisis	Dummy equals 1 for years when economic growth in Russia was negative (2009) or close to zero (2014).	Data on GDP growth of Russian Federation from WDI
Border	Dummy equals 1 for countries which border Russia. Estonia, Latvia, Lithuania and Georgia are assigned 0 due to existence of visa regime with Russia, despite having a physical border.	Visa policy of Russia: <a href="http://www.russianvisa.org">http://www.russianvisa.org</a>
The number of service points of MTOs in Russia	Number of service points of MTOs implementing cross-border transfers from Russia.	Central Bank of Russia
Bank branches per 100,000 adults	Commercial bank branches are retail locations of resident commercial banks and other resident banks that function as commercial banks that provide financial services to customers and are physically separated from the main office but not organized as legally separate subsidiaries.	Global Financial Development Database, World Bank
Three-bank concentration ratio	Assets of three largest commercial banks as a share of total commercial banking assets. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax assets, discontinued operations and other assets.	<i>Idem</i>
The ratio of transferable deposits to GDP	Deposit money banks' transferrable deposits expressed as a percentage of GDP. Transferable deposits comprise all deposits that are: (a) exchangeable on demand at par, without penalty or restriction; (b) freely transferable by cheque or giro-order; (c) otherwise commonly used to make payments.	International Financial Statistics, IMF
ATMs per 100,000 adults	Automated teller machines are computerized telecommunications devices that provide clients of a financial institution with access to financial transactions in a public place.	Global Financial Development Database, World Bank
Remittances	Bilateral remittances for each of the countries of the former Soviet Union implemented through MTOs for the period 2006–2014. The bilateral remittance data for period 2000–2005 is estimated by Shelburne and Palacin (2007) based on data on MTO remittances from Russia for 2006.	Central Bank of Russia and Shelburne and Palacin (2007)
Remittances per capita	Bilateral remittances for each of the countries of the former Soviet Union divided by the population of each country.	Population data from WDI
Remittances to GDP	Bilateral remittances for each of the countries of the former Soviet Union divided by the GDP of each country.	GDP data from WDI

hand, a larger number of bank branches may create a more competitive environment and lower fees. Bank concentration is an important indicator of the level of competition in the banking sector and the literature on remittances finds it to be a factor relevant to transfer costs (Freund and Spatafora, 2008). A high level of bank concentration may result in the stifling of competition and lead to higher transfer costs. The number of ATMs per 100,000 of the adult population is another factor, similar to the number of bank branches, and reflects the penetration rate of banking services, and is hence relevant to remittance transfer fees, having equivocal net effects.

Table 5 presents the first-stage results for the instrumented variable (remittance transfer fees). Two instrumental variables out of five are

significant for the prediction of transfer costs. As expected, growth in the number of MTOs decreases the remittance transfer fees, and higher bank concentrations work in the opposite direction. In accordance with the preliminary expectations, the sign for the ratio of transferrable deposits to GDP is negative, although this effect is not statistically significant. The other two variables – the number of bank branches and the number of ATMs per 100,000 adults – are also statistically insignificant, albeit having different signs. However, the ambiguity in these effects is not surprising either. Overall, these results suggest that the instruments are relevant. Therefore, these instruments are used in the second-stage estimations, and the second-stage IV results are presented in Table 6.



**Table A2**

Flow of Migrants to Russia. The number of immigrants arriving in the Russian Federation who indicated the purpose of their visit as ‘for work’ (persons).  
 Source: Data is collected by the Federal Migration Service of the Russian Federation by statistical processing of arrival cards filled out by migrants upon their arrival at a registered address. As of 2011, these statistics take into account the migrants registered at the address for a period of nine months and longer. Before 2011, these migrants were not included in the statistics.

Year														
Country of origin	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Azerbaijan	1799	729	461	186	124	196	1915	2934	2953	3211	2349	4781	5328	5876
Armenia	1347	466	408	259	245	357	956	2282	2682	3154	1973	5032	6267	7805
Belarus	775	455	440	335	322	326	311	366	365	314	286	2598	8114	6810
Georgia	1148	438	253	216	252	185	203	422	380	357	234	448	527	525
Kazakhstan	9829	4186	3093	1587	1670	2387	2249	1939	1891	2362	1517	2643	3544	4515
Kyrgyzstan	1422	844	903	486	552	826	1349	4323	4644	4298	4474	11752	11079	10484
Latvia	85	51	24	25	26	17	10	29	41	20	27	134	117	153
Lithuania	43	38	31	27	11	9	12	17	16	19	15	57	41	72
Moldova	1039	616	555	491	317	366	521	853	1030	1196	981	3282	4574	5917
Tajikistan	1726	857	630	498	291	537	938	3356	4396	6722	5138	13060	18075	25383
Uzbekistan	2308	1110	1094	805	512	743	2048	3646	2744	3997	3972	28854	46501	71738
Ukraine	6233	2754	2406	1352	803	1060	1391	2330	1954	2247	1802	8615	11435	14283
Estonia	41	21	25	19	27	22	13	27	48	44	46	279	239	281

**Table A3**

The average weighted cost of transfer of US\$200 from the Russian Federation over the period 2003–2013.

Source: Collected by the Central Bank of Russia in regular surveys of MTOs operating in Russia.

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
6.1%	4.4%	4.3%	2.6%	3.9%	3.7%	3.4%	2.7%	2.1%	1.9%	1.6%

In the IV estimations, the coefficient for remittance transfer fees has dropped in comparison with the OLS and fixed effects regressions. This leads to the conclusion that the effect of remittance transfer fees in the baseline estimation might have been overestimated. However, this impact is still persistent, negative and statistically significant. Interestingly, the economic crisis and unemployment variables are significant in the IV estimations, the former with large negative coefficient. Both are in line with expectations.

Various tests confirm the validity of the identification strategy used for the IV estimations. The Cragg and Donald (1993) and Kleibergen and Paap (2006) tests for weak instruments are used to verify the identification of the model. The value of the Cragg–Donald test ranges from 15.42 to 20.49 and the Kleibergen–Paap test statistic fluctuates between 38.38 and 47.18, depending on the specification used. Both of these indicators exceed the rule-of-thumb score of 10, indicating suitable correlations between the instruments and the remittance transfer fees. In all of our specifications, the Hansen overidentification test suggests that the instruments related to economic conditions and the financial sector used in the model are exogenous to remittance transfer fees. Therefore, their use in our model is warranted.

**6. Conclusion**

One of the attractive characteristics of remittances is the fact that these transfers are unilateral and do not require an explicit payback. However, another broadly accepted consensus – that remittances are a relatively stable source of foreign exchange flow – may not hold. The recent drastic cutback in remittances as a result of the Russian economic slowdown hurt those economies of the former Soviet Union that were dependent on the Russian remittances especially badly. This observation should warn against complacency among economic policymakers in the transition and less developed economies. As remittances might be rather volatile, policymakers should support remittances with sound macroeconomic policies and a favourable business environment in order to maximize the potential benefits of this inflow.

One way of increasing gains from remittances is to create incentives

to channel remittances through the formal sector of the economy so that foreign exchange flows reach transparent and legitimate investment projects instead of letting informal sector activities use these funds. An important finding of this paper is that formal remittances are negatively associated with remittance transfer costs. This result, and other research in the field, such as that by Freund and Spatafora (2008), hints at the possibility that a statistically significant negative correlation between remittances and remittance transfer fees may lead to channelling of funds to the formal sector at the cost of shrinking informal sector inflows. Obviously, to achieve this goal, prudent, efficient regulation of the financial system and a favourable business environment must be in place (Akimov and Dollery, 2008).

Several policy implications may be drawn from these findings. First of all, increasing the proportion of formal remittances is likely to improve the ‘bankability’ of the population. This could be the first step for beneficiaries of remittances in starting to use banking services in countries where the penetration of banking services is still low. This opportunity should be augmented by a correspondingly astute relationship management strategy aimed at retaining these beneficiaries once they are within the financial system. Second, a shift from the informal to the formal sector also allows more accurate measurement of remittances, which, in turn, permits a better estimation of funds available for investment in the economy. In addition, this makes any empirical inquiry into the effects of remittances more reliable. Third, despite the fact that lower remittance transfer fees may obviously result in a decrease in fee revenues per transfer, the overall revenues of the system may rise due to the increased volume of remittances flowing through formal channels. Last, but not least, the shift from informality to formality is a profound issue in the modern-day international security landscape. The ever-increasing threat of terrorism necessitates the close monitoring of international flows of funds, which is considerably easier to accomplish when funds flow through transparent, formal channels.

**Appendix A**

See Appendix Tables A1– A3.

**References**

Adams, R.H., 2009. The determinants of international remittances in developing countries. *World Dev.* 37 (1), 93–103.  
 Aggarwal, R., Demirgüç-Kunt, A., Peria, M.S.M., 2011. Do remittances promote financial development? *J. Dev. Econ.* 96 (2), 255–264.  
 Ahamada, I., Coulibaly, D., 2011. How does financial development influence the impact of remittances on growth volatility? *Econ. Model.* 28 (6), 2748–2760.

- Al Mamun, M., Sohag, K., Uddin, G.S., Shahbaz, M., 2015. Remittance and domestic labor productivity: evidence from remittance recipient countries. *Econ. Model.* 47, 207–218.
- Akimov, A., Dollery, B., 2008. Financial policy in transition economies: architecture, pace, and sequencing. *Probl. Econ. Transit.* 50 (9), 6–26.
- Alkhathlan, K.A., 2013. The nexus between remittance outflows and growth: a study of Saudi Arabia. *Econ. Model.* 33, 695–700.
- Aslan, H.K., 2011. International Labor Migration from Rural Central Asia: The Potential for Development in Kyrgyzstan and Uzbekistan, Doctoral Dissertation. Kent State University, US.
- Aydas, O.T., Metin-Ozcan, K., Neyapti, B., 2005. Determinants of workers' remittances: the case of Turkey. *Emerg. Mark. Finance Trade* 41 (3), 53–69.
- Bang, J.T., Mitra, A., Wunnava, P.V., 2016. Do remittances improve income inequality? An instrumental variable quantile analysis of the Kenyan case. *Econ. Model.* 58, 394–402.
- Buch, C.M., Kuckulenz, A., 2010. Worker remittances and capital flows to developing countries. *Int. Migr.* 48 (5), 89–117.
- Central Bank of Russia 2009. Informatsionna-Analyticheskiy Material "Obzor Rossiyskoga Rynka Denezhnyh Perevodov za 2009 god". ([http://www.cbr.ru/PSystem/P-sys2/obzor\\_marketcard.pdf](http://www.cbr.ru/PSystem/P-sys2/obzor_marketcard.pdf)), (accessed 22.07.15).
- Central Bank of Russia 2012. Obzor rynka platezhnyh uslug v Rossiyskoy Federatsii za 2011 god. ([http://www.cbr.ru/PSsystem/analytics/Survey\\_2011.pdf](http://www.cbr.ru/PSsystem/analytics/Survey_2011.pdf)), (accessed 22.07.15).
- Chowdhury, M.B., 2011. Remittances flow and financial development in Bangladesh. *Econ. Model.* 28 (6), 2600–2608.
- Coulibaly, D., 2015. Remittances and financial development in Sub-Saharan African countries: a system approach. *Econ. Model.* 45, 249–258.
- Cox, D., Jakubson, G., 1995. The connection between public transfers and private interfamily transfers. *J. Public Econ.* 57 (1), 129–167.
- Cragg, J.G., Donald, S.G., 1993. Testing identifiability and specification in instrumental variable models. *Econom. Theory* 9 (2), 222–240.
- Durand, J., Kandel, W., Parrado, E.A., Massey, D.S., 1996. International migration and development in Mexican communities. *Demography* 33 (2), 249–264.
- Freund, C., Spatafora, N., 2008. Remittances, transaction costs, and informality. *J. Dev. Econ.* 86 (2), 356–366.
- Hansen, L.P., 1982. Large sample properties of generalized method of moments estimators. *Econom.: J. Econom. Soc.* 50 (4), 1029–1054.
- Hathroubi, S., Chaker, A., 2016. On interactions between remittance outflows and Saudi Arabian macroeconomy: new evidence from wavelets. *Econ. Model.* 59, 32–45.
- International Monetary Fund 2005. World Economic Outlook, April 2005: Globalization and External Imbalances, in World Economic and Financial Surveys. International Monetary Fund, Washington DC.
- Juraev, A., 2012. Labor Migration from Uzbekistan: Social and Economic Impacts on Local Development Doctoral Dissertation. University of Trento, Italy.
- Kakhkharov, J., Akimov, A., 2015. Estimating remittances in the former Soviet Union: Methodological Complexities and Potential Solutions. In: Jamilov, R., Akbar, Y.H. (Eds.), *Neo-Transitional Economics*. Bingley, UK, 337–362.
- Kleibergen, F., Paap, R., 2006. Generalized reduced rank tests using the singular value decomposition. *J. Econom.* 133 (1), 97–126.
- Lucas, R.E.B., Stark, O., 1985. Motivations to remit: evidence from Botswana. *J. Political Econ.* 93 (5), 901–918.
- Lueth, E., Ruiz-Arranz, M., 2008. Determinants of bilateral remittance flows. *Top. Macroecon.* 8 (1), 1568.
- Makaryan, S., 2015. Estimation of international migration in post-Soviet republics. *Int. Migr.* 53 (5), 26–46.
- Makhmutova, M., Makatova, A., Kourmanova, A., Abdullaev, U., Dienova, M., Bakas Ulu, B., 2008. Country report on remittances of international migrants and the financial sector in Kazakhstan Study on International Migrants' Remittances in Central Asia and South Caucasus. Asian Development Bank, Manila.
- Orozco, M., 2006. International Flows of Remittances: Cost, Competition and Financial Access in Latin America and the Caribbean—Toward an Industry Scorecard. Inter-American Dialogue, Washington, DC.
- Piracha, M., Saraogi, A., 2012. The determinants of remittances: evidence from Moldova. *Oxf. Dev. Stud.* 40 (4), 467–491.
- Rapoport, H., Docquier, F., 2006. The economics of migrants' remittances, in *Handbook on the Economics of Giving, Altruism and Reciprocity*. vol 2, 1135–98
- Sayan, S. 2006. Business Cycles and Workers' Remittances: How Do Migrant Workers Respond to Cyclical Movements of GDP at Home?. IMF Working Paper No. 06/52.
- Schiopu, I.C., Siegfried, N. 2006. Determinants of Workers' Remittances: Evidence from the European Neighbouring Region. ECB Working Paper No. 688.
- Schrooten, M., 2005. Bringing home the money—what determines worker's remittances to transition countries. Institute of Economic Research, Hitotsubashi University. Discussion Paper Series A No. 466
- Schrooten, M., 2006. Workers' remittances to former Soviet states. Institute of Economic Research, Hitotsubashi University. Discussion Paper Series A No. 476
- Shelburne, R. C., Palacin, J., 2007. Remittances in the CIS: their economic implications and a new estimation procedure. Geneva: United Nations Economic Commission for Europe. Discussion Paper Series No. 2007.5.
- Singh, R.J., Haacker, M., Lee, K.W., Le Goff, M., 2010. Determinants and macroeconomic impact of remittances in Sub-Saharan Africa. *J. Afr. Econ.* 20 (2), 312–340.
- Stark, O., 1991. *The Migration of Labor*. Basil Blackwell, Cambridge, MA.
- Stark, O., 1996. *On the Microeconomics of Return Migration*. Universität Wien, Vienna.
- Straubhaar, T., 1986. The determinants of workers' remittances: the case of Turkey. *Rev. World Econ.* 122 (4), 728–740.
- World Bank, 2014. Annual Remittance Data. World Bank, DC, Washington, Remittance Data.