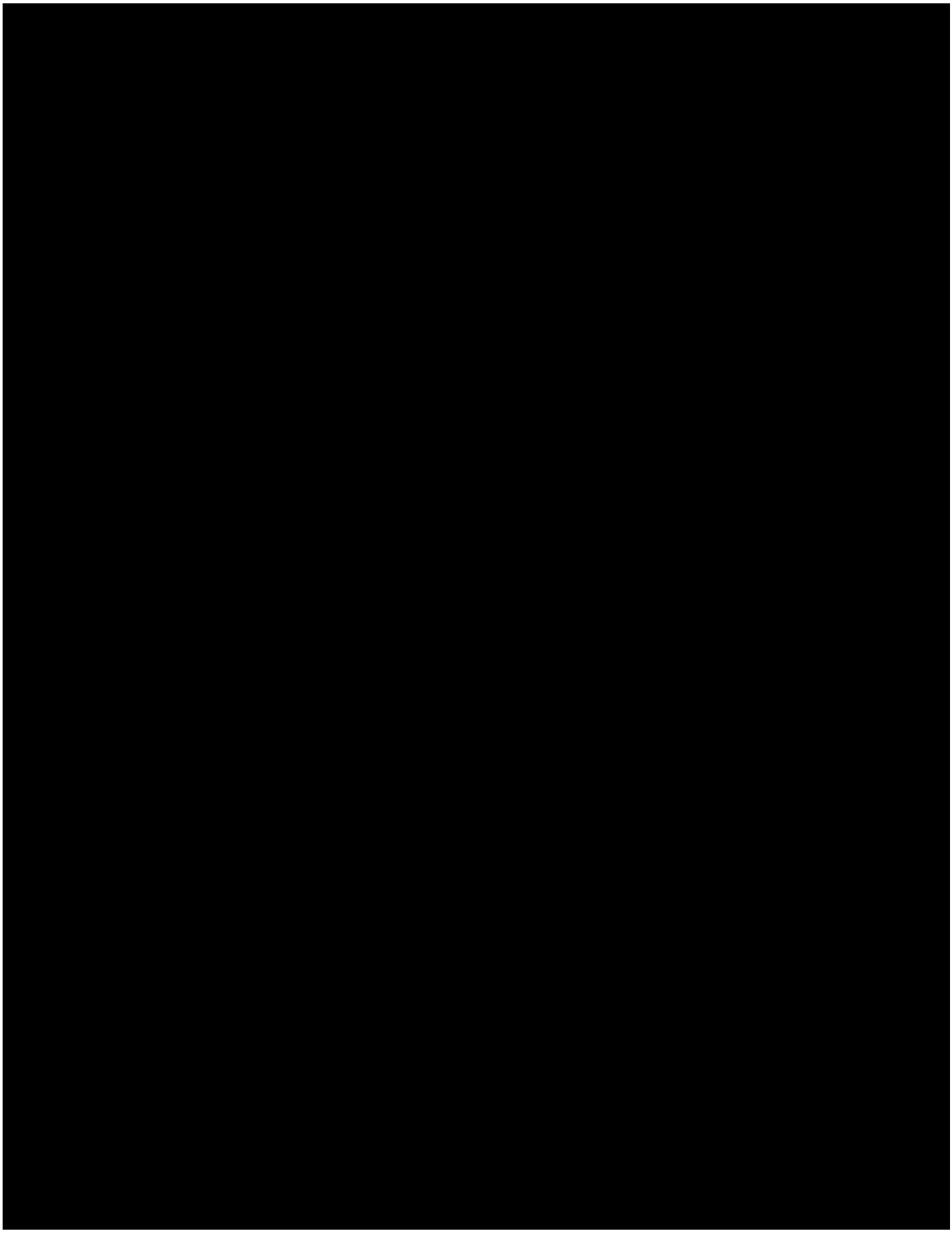


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Remittances in Russia and Caucasus and Central Asia: The Gravity Model

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Abstract

Remitances are an important source of external financing in low- and middle-income countries. This paper uses the gravity model to analyze remittance flows in Russia and Caucasus and Central Asia (CCA) countries. Standard gravity determinants, such as GDP in sending and recieiving countries, bilateral distance, existence of common borders and common official language, fit remittance flows well. Remittances also react to inflation and exchange rate movements in recipient countries to sustain their purchasing power. In line with the altruism hypothesis, remittances flow to countries with higher age dependency ratio. Remittances are countercyclical and help stabilize outputs in recipient countries. However, global shocks resulting in sharp output losses of sending countries would lead to large volatility and decline of remittance inflows in recipient countries. The results of the analysis can be used to assess the impact of the COVID-19 shock on projected remittance flows into CCA.

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Keywords: international remittances, migration, gravity model

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I. INTRODUCTION

Remittances are an important source of external financing in Caucasus and Central Asia (CCA), reaching more than 30 percent of GDP in some countries. This echoes the growing importance of remittances globally, where remittance inflows exceeded 5 percent of GDP in 57 countries in 2019. According to World Bank (2020), remittance inflows to low- and middle-income countries have reached a record USD 554 bln in 2019 and surpassed other types of inflows (aid, foreign direct investment, portfolio flows).

CCA remittances largely originate from Russia and are in part motivated by altruism. Common history, cultural links, and language knowledge make Russia a popular destination for CCA migrants. Unlike other external financing sources, remittances involve transactions between individuals that are altruistically linked and are not subject to repayment (Chami and others, 2005; Docquier and Rapoport, 2006; Yang, 2011).

The dependence of CCA countries on remittances has grown over time. Remittances have been a remarkably stable source of income for CCA countries, unlike other types of external financing. This has important implications for macroeconomic stability (Frankel, 2011; Chami and others, 2012). Remittances can stabilize output fluctuations, since they tend to rise in periods of economic downturn in home countries. In this sense, remittances are thought of as a stabilizing lifeline.

However, remittances can also play a destabilizing role in periods of economic shocks in sending countries and globally (Barajas and others, 2012). The COVID-19 shock has adversely affected global economic activity and led to a downward correction in oil prices, weakening the economic activity in Russia. Therefore, outward remittances from Russia are likely to decrease and become more volatile, increasing output volatility in remittance-dependent CCA countries and having detrimental impact on their growth (Sayeh and Chami, 2020; World Bank, 2020).

This note analyzes the determinants of bilateral remittances in Russia and CCA using the gravity model for the 2010-17 period. We regress bilateral remittances across these countries on standard gravity determinants (GDP in sending and receiving countries, physical distance, existence of a common border and official language) and other controls. The paper also analyzes whether remittances help smooth cyclical fluctuations of output in receiving countries and are directly influenced by oil prices. The gravity model fits the data well. The elasticity of remittances to sending country GDP is ranging between 0.4 – 1.4 depending on model specification. The elasticity estimates derived from the model can be used to predict the expected decline in CCA remittances following the COVID-19 shock (Barajas and others, 2012; IMF, 2012).[2]

[2] According to the World Bank's Migration and Development Brief 32 (April, 2020), remittance flows to low and middle-income countries will fall by 20 percent in 2020 reflecting the impact of the COVID-19.

The remainder of the paper is structured as follows. Section II provides a survey of related literature. Section III presents the data and stylized facts. Section IV describes the gravity model and presents the estimation results. The last section concludes.

II. LITERATURE REVIEW

Several studies have applied the gravity model to analyze determinants of bilateral remittances, but to our best knowledge none of them focuses on Russia and CCA countries. Some studies estimate the gravity model using the OLS estimator (with country, country-pair, and time fixed effects). More recent studies use alternative estimation methods (tobit, poisson) that are better suited for dependent variables involving many zeros (Yotov and others, 2016).

Most studies find that the standard *gravity determinants* used in the trade literature explain the dynamics of bilateral remittances well. The gravity model has a good fit, explaining more than 60 percent of variation in bilateral remittances. Consistent with the assumptions of the gravity model,[3] larger countries tend to remit more remittances, larger countries tend to receive more remittances, and country pairs with larger *geographical distance* exchange less remittances (Leuth and Ruiz-Arranz, 2008; Abdih and others, 2012; Docquier and others, 2012; Le Golf and Salomone, 2015). The elasticity of remittances to sending country GDP varies widely across studies, ranging between 0.25 – 3.9 in most studies, and reaching the 5 – 10 range in Le Golf and Salomone (2015).

In addition to gravity determinants, some studies analyze the association between remittances and *institutional characteristics* of countries. *Common official language* between pairs of countries facilitates migration and plays important role as predictor of bilateral remittance flows (Leuth and Ruiz-Arranz, 2008; Abdih and others, 2012; Docquier and others, 2012; Le Golf and Salomone, 2015). Another important institutional determinant of bilateral remittances is the existence of *common colonial links* (Frankel, 2011; Abdih and others, 2012; Le Golf and Salomone, 2015).

In addition to physical distance, other geographical characteristics can also explain remittance flows. For instance, Frankel (2011) finds that *landlocked* countries receive less remittances, while *island* countries receive more remittances. Sharing a *common border* between pairs of countries is another important geographical characteristic explaining remittance flows, but the evidence is mixed: Abdih and others (2012), Le Golf and Salomone (2015) find that sharing common border is associated with more remittance flows, while

[3] According to Newton's Law of Universal Gravitation, any two particles attract each other thanks to a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them (Yotov and others, 2016). Applied to bilateral remittances, Newton's Law of Gravity implies that countries exchange remittances in proportion to their respective economic size (e.g. gross domestic products) and proximity.

Leuth and Ruiz-Arranz (2008) report a negative association suggesting that sharing a border may facilitate non-official remittance flows that are not fully captured in the data.

The *number of migrants* is another important determinant of remittance flows, since having more compatriots leaving abroad implies more financial resources and willingness to remit back home. Leuth and Ruiz-Arranz (2008), Frankel (2011), Docquier and others (2012), Le Golf and Salomone (2015), and Bettin and others (2017) report a positive association between the number of migrants and remittance flows.

Finally, several studies have explored the association between various macroeconomic variables and bilateral remittance flows. For instance, Leuth and Ruiz-Arranz (2008) find that the *inflation differential* between sending and receiving countries has a positive association with bilateral remittance flows. Leuth and Ruiz-Arranz (2008) and Le Golf and Salomone (2015) include the *nominal exchange rate* vis-à-vis the US dollar among determinants to test whether the motivation to maintain purchasing power of remittances matters but find insignificant coefficients.

Some papers have studied the implication of remittances for *cyclical output fluctuations* of the economy in receiving countries. For instance, Bettin and others (2017) find that remittance outflows from Italian provinces are negatively correlated with the business cycle in recipient countries. Such countercyclical behavior of remittances helps smooth economic fluctuations and contributes to macroeconomic stability of recipient countries. Frankel (2011) finds a positive correlation between remittances and differences between economic cycles of sending and recipient countries, confirming the stabilization role. Similarly, Chami and others (2012) find that remittances have a negative effect on output growth volatility.

On the other hand, Barajas and others (2012) and IMF (2012) find that remittance-dependence makes recipient countries vulnerable to shocks hitting sending countries. The larger are remittance flows between countries, the larger is the business cycle synchronization among them and the potential for transmission of negative spillovers from external shocks to recipient countries.

III. DATA AND STYLIZED FACTS

Our sample covers Russia and eight CCA countries.[4] Table 1 presents all variables used in the analysis and their sources. Data on bilateral remittance flows for the period 2010-2017 comes from the World Bank. It is complemented by data from CEPII on bilateral geographical distances between capitals of countries and dummy variable taking the value of 1 if countries share a common official language. Macroeconomic variables are extracted from the World Bank (nominal GDP in USD), Penn World Table (nominal exchange rate

[4] The sample includes Armenia, Azerbaijan, Georgia, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The time period is limited to 2010-17 due to availability of data on bilateral remittances.

vis-à-vis the US dollar), and WEO (inflation). We also use information on the number of migrants in 2013 and 2017 and the share of female migrants in total migrants for 2000 from the World Bank. Data on oil prices are extracted from the Datastream.

The remittance-to-GDP ratio varies widely across Russia and CCA countries (Figure 1). The remittance ratio is the highest in Tajikistan and Kyrgyzstan (ranging from 20 to 42 percent in different years), and the lowest in Turkmenistan and Russia (less than 1 percent). The ratio has shown some variation over the sample period, especially for Tajikistan.

The volume of bilateral remittances varies widely across sending and receiving country-pairs. The heatmap of bilateral remittances in 2017 (Figure 2) shows that the main remittance sending country is Russia, from which transfers are remitted to all CCA countries. The largest recipients of remittances from Russia are Kyrgyzstan, Tajikistan, and Uzbekistan. For some country-pairs, the volume of remittances is very small or zero. For instance, Kazakhstan, Turkmenistan and Uzbekistan receive very few remittances from countries other than Russia. Similarly, Tajikistan transfers very few remittances to countries other than Kyrgyzstan and Russia.

The volume of remittances is positively correlated with the number of migrants (Figure 3). The elasticity is about 0.5, suggesting that an increase in the number of migrants by 1 percent is associated with an increase in remittances by 0.5 percent. This is intuitive, since having more compatriots living abroad increases the potential volume of financial resources that could be remitted back home.

IV. THE GRAVITY MODEL

We use the standard gravity model to analyze determinants of bilateral remittance flows. The gravity model takes the following form:

$$REM_{ijt} = \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(DIST_{ij}) + \beta_4' X_{ijt} + \mu_i + u_j + \eta_t + \varepsilon_{ijt}$$

where REM_{ijt} is the flow of remittances (in USD) from sending country i to receiving country j in year t; GDP_{it} and GDP_{jt} are nominal GDPs (in USD) of sending and receiving countries in year t, respectively; $DIST_{ij}$ is the physical distance (in kilometers) between the capitals of sending and receiving countries; X_{ijt} is a vector of other variables influencing remittance flows; μ, u, and η are country and time fixed effects; and ε is the residual.

We also test whether remittances help smooth output cycles in recipient countries using the following specification (Frankel, 2011):

$$REM_{ijt} = \beta_0 + \beta_1 (GAP_{it} - GAP_{jt}) + \beta_2 \ln(DIST_{ij}) + \beta_3' X_{ijt} + \mu_i + u_j + \eta_t + \varepsilon_{ijt}$$

where (GAP_{it}-GAP_{jt}) is the difference in output gaps between sending and recipient countries. A positive coefficient β_1 would support the hypothesis of countercyclicality of remittances.

The estimations are performed using the Pseudo Poisson Maximum Likelihood (PPML) estimator. The PPML performs better than the OLS in the presence of many zeroes in the dependent variable (Santos Silva and Tenreyro, 2010). The interpretation of the coefficients is as follows: a unit change in the independent variable leads to a $100*(e^{\beta}-1)$ percent change in bilateral remittances.

V. ESTIMATION RESULTS

In this section, we provide empirical evidence on the determinants of bilateral remittance flows in Russia and CCA over 2010–2017. We start by presenting results from the baseline gravity model and then expand it to include additional controls. Next, we test whether remittances help smooth cyclical output fluctuations in recipient countries and report some robustness checks.

A. The Baseline Gravity Model

The baseline gravity model of bilateral remittances fits the data well (Table 2). We run several specifications: (i) pooled specification without fixed effects (column 1), (ii) specification with fixed effects for sending and receiving countries (column 2), (iii) specification with fixed effects for sending and receiving countries and time effects (column 3), (iv) specification with sending and receiving country-pair fixed effects (column 4), (v) specification with sending and receiving country-pair fixed effects and time effects (column 5). The inclusion of country, country-pair, and time fixed effects allows controlling for unobservable factors at the country, country-pair, and time level. The control variables explain a large share of the variation in the dependent variable (the pseudo R-squared is ranging between 0.65 and 0.93).

The standard gravity determinants included in the baseline specification have the expected signs when significant. The *sending country GDP* has a positive association with remittance outflows (elasticity = 0.4 – 1.4), consistent with the gravity model prediction that larger countries send more remittances. The *receiving country GDP* has a positive association with incoming bilateral remittances (elasticity = 2.5), which is also consistent with the gravity model prediction that larger countries receive more remittances.

Geographical and institutional variables also matter. The *physical distance* between sending and receiving country capitals has a negative association with bilateral remittances (elasticity = -0.7). This is consistent with the gravity model prediction that greater physical distance between countries decreases the volume of remittances due to higher transaction costs related to migration and transfer of remittances. The sending and receiving countries *sharing a border* have less bilateral remittances (elasticity = -0.6), as sharing a border makes it easier for remittances to be transmitted informally by cash, which is not fully captured in the official statistics. Finally, sending and receiving countries *sharing a common official language* have more bilateral remittances (elasticity = 5.8), which is not surprising given that these countries are more likely to exchange migrants.

B. The Baseline Gravity Model with Additional Controls

We expand the baseline gravity model by including additional control variables commonly used in the literature (Table 3). The inclusion of these controls does not have a qualitative effect on the determinants on the baseline gravity model. The elasticity of the sending country GDP is somewhat lower, ranging between 0.6 – 0.8. The coefficients of control variables have the expected signs when significant.

Bilateral remittances are positively correlated with the *number of migrants* in the sending country (significant only in the first column). However, the *share of female migrants* in total migrants of the sending country has a negative association with bilateral remittances.[5] This could be due to a gender bias and lower income received by female migrants relative to male migrants.

We also find a positive association between the *inflation rate* in the receiving country and bilateral remittances. This implies that higher inflation in receiving countries encourages more remittances to compensate for the loss of purchasing power at home. By contrast, *exchange rate depreciation* vis-à-vis the US dollar in receiving countries is associated with lower USD remittances, since less dollars can buy the same goods basket as before the depreciation. Finally, the coefficient on the *age dependency ratio* variable is positive when significant. This lends support to the altruism hypothesis (Chami and others, 2005; Docquier and Rapoport, 2006; Yang, 2011), suggesting that remittances flow back to support children and elderly.

C. Do Remittances Help Smooth Cyclical Fluctuations of Output?

Remittances stabilize output fluctuations in the recipient countries (Frankel, 2011; Chami and others, 2012; Bettin and others, 2017). Transfer of remittances is a decentralized decision made by individuals based on familiarity with the needs of their compatriots at home. Therefore, it is expected that inward remittances will increase in periods of cyclical downturns in receiving countries. On the other hand, outward remittances are likely to decline in periods of cyclical downturns in sending countries (Barajas and others, 2012; IMF, 2012).

To test the countercyclicality hypothesis, we include the difference between output gaps in sending and receiving countries as an independent variable (Table 4). The coefficient on the difference between output gaps in sending and receiving countries is positive and significant. This supports the countercyclicality hypothesis: remittances sent back home are high when output is above potential in the sending country or when output is below potential in the receiving country. The average elasticity of the difference in output gaps variable is 0.1, suggesting that a one percentage point decline in output below potential in the recipient

[5] This result differs from that of Le Golf and Salomone (2015), who find a positive coefficient on the share of female migrants variable in a sample of 89 sending and 46 receiving countries over the period 1985-2005.

countries is associated with a 0.1 percent increase in remittance inflows. However, the positive coefficient also implies that a global shock resulting in output losses of sending countries would lead to higher volatility and a downward shift in outward remittances, with detrimental impact on output growth of recipient countries.[6]

The other control variables remain qualitatively unchanged: coefficients on distance, contiguity dummy, share of female migrants, and exchange rate depreciation variables are negative, and coefficients on the common official language dummy, number of migrants, and age dependency variables are positive.

D. Robustness Checks

We run some robustness checks for the gravity model. First, we check whether oil prices have a direct association with remittances in Russia and CCA countries. Given the dependence of the Russian economy on developments in oil prices, we have added the log of oil prices as an additional control to test whether oil prices have a direct impact on bilateral remittance flows (Table 5). Since oil prices are defined in the global market and are common to all countries, we have excluded time fixed effects from regressions. The estimation results do not support this hypothesis: the coefficient on the oil price variable is insignificant.[7] However, this does not rule out the indirect impact of oil prices on remittances through the output of oil exporting countries.[8]

Second, we recognize the possible endogeneity of remittances with respect to GDP of receiving countries. As mentioned above, remittances have reached more than a third of GDP in some countries during the period under consideration, which can prompt reverse causality and bias the coefficient of the GDP variable. To alleviate this issue, we have used lagged GDP in both sending and recipient countries (Table 6). This specification produces comparable coefficients for the GDP variable in sending and receiving countries, suggesting that the endogeneity issue is not particularly strong. The other results remain qualitatively unchanged.

Finally, we check whether the results hold when the sample is expanded to other former USSR countries that receive large remittance flows from Russia, namely Belarus, Moldova, and Ukraine. Estimation results presented in Table 7 remain qualitatively unchanged. In particular, the *sending country GDP* has a positive association with remittance outflows with

[6] This is consistent with Barajas and others (2012) and IMF (2012). These studies also find that business cycle synchronization between home and host countries increases with the volume of remittance flows.

[7] Replacing the level of oil prices with their changes leads to qualitatively similar results.

[8] Indeed, when Russia is excluded from the sample, the coefficient of oil prices becomes positive and significant in all specifications (results available upon request). This suggests that oil prices have indirect association with remittance flows through their impact on the Russian economy.

elasticity ranging between 0.5 – 0.8, which is comparable to elasticities from Table 3. This suggests that the gravity model of remittances is robust to the expansion of country coverage.

VI. CONCLUSIONS

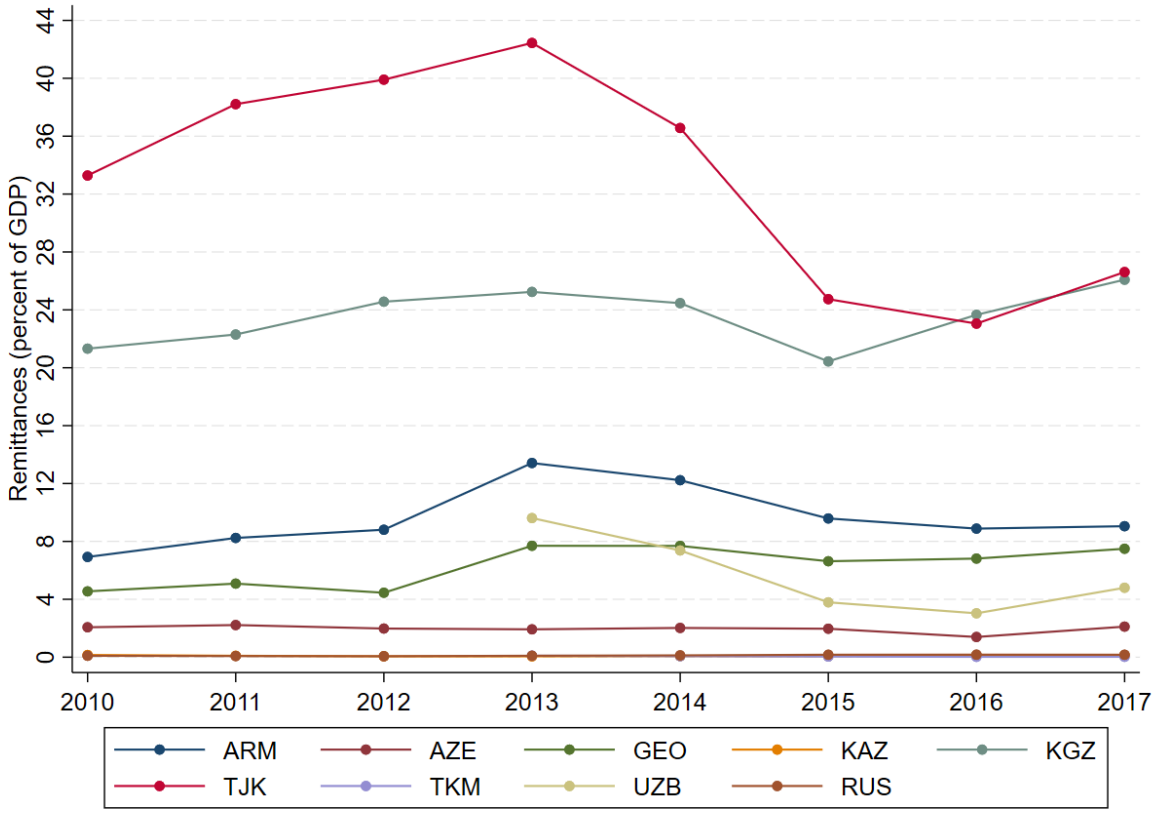
Remittances are an important source of external financing in CCA countries and should be monitored carefully. The reliance on remittances has grown over time, especially in Kyrgyzstan and Tajikistan. Russia is the main source of remittances, due to the size of its economy and historical links. The increased dependence on remittances has implications for macroeconomic stability: remittances can stabilize output fluctuations in recipient countries in normal times and destabilize output fluctuations in periods of global shocks hitting sending countries.

The baseline gravity model explains bilateral remittance flows in Russia and CCA well and can be used for making remittance projections. Consistent with the gravity model predictions, larger countries tend to send more remittances, larger countries tend to receive more remittances, and greater physical distance across pairs of countries is associated with lower volumes of remittances. Countries sharing a border tend to exchange less remittances through formal channels, since some remittances flows are redirected through informal cash channels. Finally, countries sharing official language tend to exchange more remittances.

Inclusion of additional controls does not have a qualitative effect on gravity determinants. A larger number of compatriots living abroad is associated with more remittances back home, even though this association is lower when the share of female migrants increases (gender bias). Remittances tend to increase with higher inflation in recipient countries and decrease with higher depreciation of local currency vis-à-vis the US dollar: both results suggesting that remittance flows adjust to maintain their purchasing power. In addition, remittances inflows increase with age dependency ratio, consistent with the altruism motive (support of children and elderly). We do not find a direct association between oil prices and remittances, since this effect is probably captured indirectly by the GDPs of sending oil-exporting countries (notably, Russia).

Finally, we find that remittances are countercyclical: they tend to increase when the output is above potential in the sending country or when the output is below potential in the receiving country. On the one hand, this helps stabilize economic cycles in the recipient countries in normal times. On the other hand, in periods of global shocks hitting the sending countries hard, it can lead to a major downward shift in outgoing remittances. The latter is highly relevant for current COIVID-19 and oil price shock, as a result of which the Russian economy is projected to shrink, which will suppress outward remittances from Russia (Sayeh and Chami, 2020; World Bank, 2020). The elasticity estimates from the gravity model presented in this analysis could be used to project the impact of the shock to Russia on remittance flows into CCA countries. They could also be used to assess the transmission of remittance shocks to tax revenues based on the approach of Abdih and others (2012).

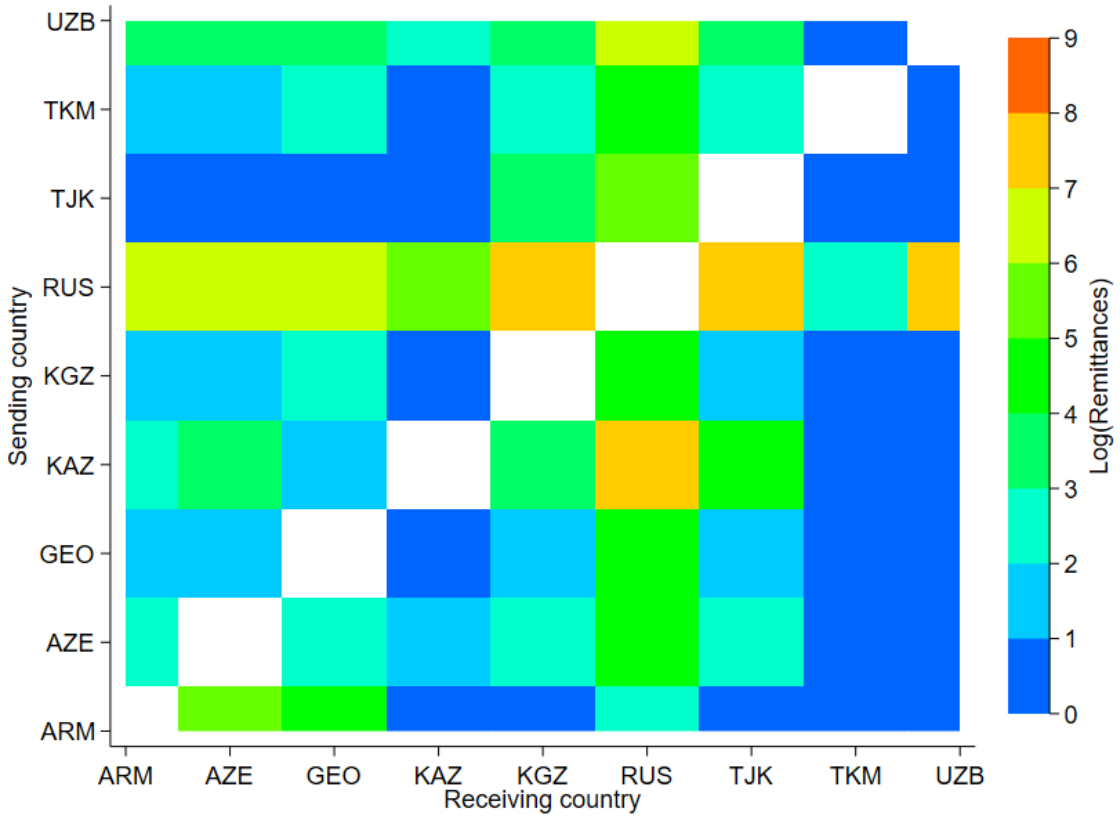
Figure 1. Remittance-to-GDP Ratio in Russia and CCA (2010-2017)



Source: World Bank and IMF Staff calculations.

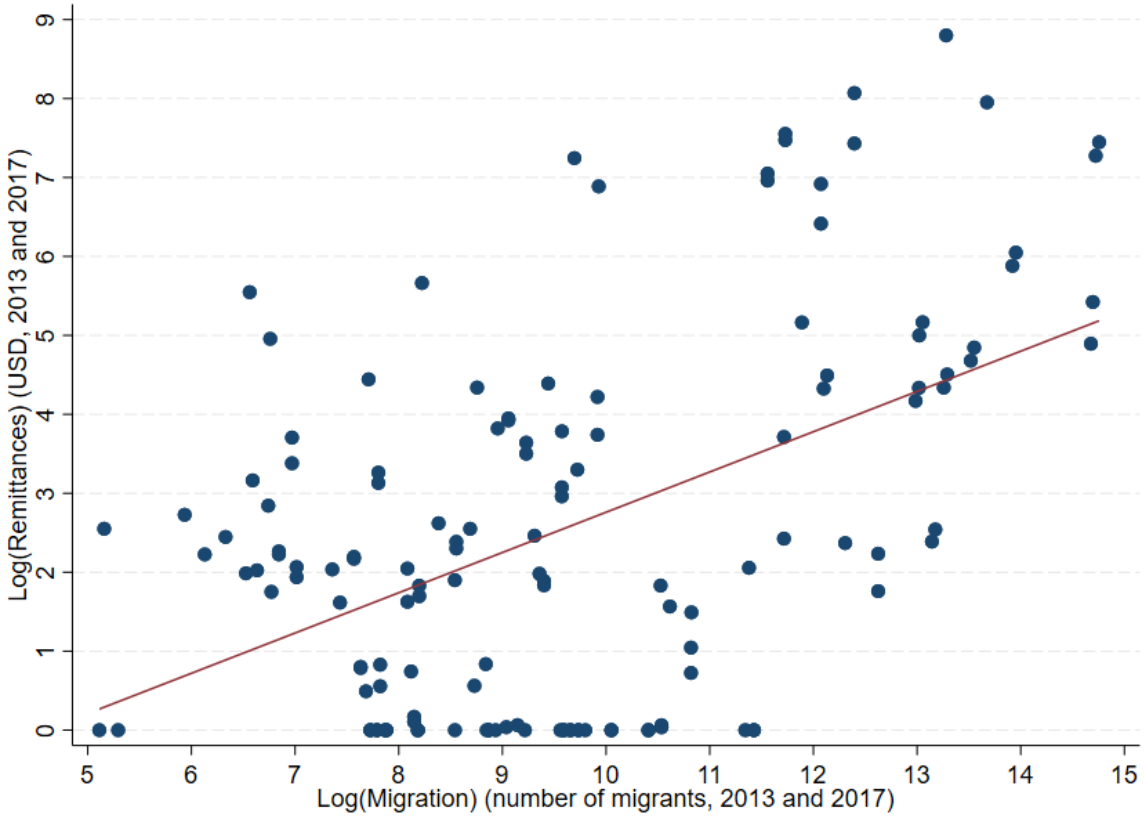
Note: Reported are inward remittances from the selected group of nine countries used in the analysis (Armenia, Azerbaijan, Georgia, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan).

Figure 2. Heat Map of Bilateral Remittances (in logs, 2017)



Source: World Bank and IMF Staff calculations.

Figure 3. Bilateral Remittances and Migration (2013 and 2017)



Source: World Bank and IMF Staff calculations.

Note: Reported are inward remittances from the selected group of nine countries used in the analysis (Armenia, Azerbaijan, Georgia, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan). Data on the number of migrants is available only for 2013 and 2017.

Table 1. Variables and Their Sources

Variable	Definition	Source
REM_{ijt}	Remittances from sending country i to receiving country j in year t (mln USD, 2010-17)	World Bank
GDP_{it}	Nominal GDP in sending country i in year t (mln USD, 2010-17)	World Bank
GDP_{jt}	Nominal GDP in receiving country j in year t (mln USD, 2010-17)	World Bank
$DIST_{ij}$	Geographical distance between capitals of sending country i and receiving country j (kilometers)	CEPII
$COMLANG_{ij}$	Dummy = 1 if sending and receiving countries i and j share a common official language	CEPII
$CONTIG_{ij}$	Dummy = 1 if sending and receiving countries i and j share common border	CEPII
MIG_{ijt}	Number of migrants from receiving country j in sending country i in year t (# of people, 2013 and 2017)	World Bank
MIG_FSH_{ij}	Share of female migrants from receiving country j in sending country i (ratio, 2000)	World Bank
$INFL_{jt}$	Inflation rate of receiving country j in year t (GDP deflator, log difference)	World Economic Outlook, IMF
ER_{jt}	Nominal exchange rate in receiving country j in year t (vis-a-vis USD, increase indicates depreciation)	Penn World Table, 9.1.
DEP_{jt}	Dependency ratio of receiving country j in year t (share of elderly and young in working age population, percent)	World Bank
OIL_t	Sport price of Brent in year t (USD)	Datastream

Table 2. The Baseline Gravity Model

	(1)	(2)	(3)	(4)	(5)
log(GDP_USD) in sending country	0.89***	0.31**	-0.20	0.33**	-0.18
	(0.15)	(0.15)	(0.83)	(0.15)	(0.88)
log(GDP_USD) in receiving country	0.27	1.25**	0.38	1.25**	0.38
	(0.18)	(0.62)	(0.49)	(0.62)	(0.52)
log(Distance)	0.08	-1.31***	-1.30***		
	(0.95)	(0.30)	(0.31)		
Contiguity dummy (=1 if countries share border)	-0.59	-0.85***	-0.84**		
	(0.51)	(0.33)	(0.33)		
Language dummy (=1 if countries share official language)	0.23	1.91***	1.91***		
	(0.54)	(0.50)	(0.50)		
Intercept	-25.15***	-24.88	9.52	-32.47*	2.50
	(6.21)	(17.57)	(29.24)	(17.84)	(33.55)
Observations	576	576	576	448	448
Pseudo R-squared	0.651	0.895	0.908	0.915	0.930
Log-likelihood	-67473	-20346	-17754	-14464	-11893
AIC	134958	40735	35566	28933	23793
BIC	134984	40831	35692	28946	23805
Country FE		YES	YES		
Country-Pair FE				YES	YES
Year FE			YES		YES

Note: The dependent variable is the volume of bilateral remittances from sending to receiving countries (in USD). Estimations are performed using the Pseudo Poisson Maximum Likelihood (PPML) estimator. Robust standard errors clustered at country pair level are in parentheses. The interpretation of the coefficients is as follows: a unit change in the independent variable leads to a $100*(e^{\beta}-1)$ percent change in bilateral remittances. *** p<0.01, ** p<0.05, * p<0.1.

Table 3. The Baseline Gravity Model with Additional Controls

	(1)	(2)	(3)	(4)	(5)
log(GDP_USD) in sending country	0.45**	0.57***	-0.08	0.59***	-0.06
	(0.23)	(0.19)	(0.80)	(0.20)	(0.87)
log(GDP_USD) in receiving country	-0.17	1.47**	0.18	1.50**	0.21
	(0.32)	(0.75)	(0.59)	(0.74)	(0.61)
log(Distance)	-0.25	-1.19***	-1.20***		
	(0.70)	(0.36)	(0.35)		
Contiguity dummy (=1 if countries share border)	-0.90*	-0.74**	-0.73**		
	(0.47)	(0.36)	(0.35)		
Language dummy (=1 if countries share official language)	-0.14	1.15***	1.15***		
	(0.47)	(0.42)	(0.42)		
Log(Number of migrants) in sending country	0.57***	0.08	0.05	0.16	0.06
	(0.18)	(0.11)	(0.11)	(0.16)	(0.13)
Share of female migrants in sending country	-0.47*	-0.46***	-0.47***		
	(0.25)	(0.13)	(0.13)		
Inflation rate in receiving country	0.04	0.55	4.05*	0.66	4.08**
	(1.52)	(0.76)	(2.09)	(0.79)	(2.08)
Exchange rate depreciation in receiving country	-0.17	0.47	-0.90**	0.44	-0.89*
	(0.31)	(0.50)	(0.45)	(0.47)	(0.47)
Age dependency ratio in receiving country	-0.01	0.09***	-0.01	0.09***	-0.01
	(0.04)	(0.02)	(0.10)	(0.02)	(0.11)
Intercept	-5.61	-43.06*	10.11	-52.73**	3.08
	(9.49)	(22.06)	(29.01)	(23.21)	(31.80)
Observations	504	504	504	392	392
Pseudo R-squared	0.726	0.912	0.927	0.926	0.943
Log-likelihood	-49058	-15765	-13001	-11636	-8937
AIC	98139	31584	26067	23286	17888
BIC	98185	31698	26206	23314	17916
Country FE		YES	YES		
Country-Pair FE				YES	YES
Year FE			YES		YES

Note: The dependent variable is the volume of bilateral remittances from sending to receiving countries (in USD). Estimations are performed using the Pseudo Poisson Maximum Likelihood (PPML) estimator. Robust standard errors clustered at country pair level are in parentheses. The interpretation of the coefficients is as follows: a unit change in the independent variable leads to a $100*(e^{\beta}-1)$ percent change in bilateral remittances. *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Are Remittances Countercyclical?

	(1)	(2)	(3)	(4)	(5)
Difference in output gaps (sending versus receiving)	0.13***	0.05**	0.10*	0.05**	0.10*
	(0.04)	(0.02)	(0.05)	(0.03)	(0.05)
log(Distance)	0.29	-1.19***	-1.21***		
	(0.62)	(0.35)	(0.35)		
Contiguity dummy (=1 if countries share border)	-0.73	-0.73**	-0.74**		
	(0.78)	(0.36)	(0.35)		
Language dummy (=1 if countries share official language)	-0.17	1.14***	1.15***		
	(0.59)	(0.43)	(0.42)		
Log(Number of migrants) in sending country	0.68***	0.09	0.05	0.19	0.04
	(0.14)	(0.11)	(0.10)	(0.20)	(0.10)
Share of female migrants in sending country	-1.90**	-0.46***	-0.47***		
	(0.88)	(0.13)	(0.13)		
Inflation rate in receiving country	-3.63	-2.75	-0.12	-2.72	-0.16
	(3.08)	(1.92)	(1.88)	(1.83)	(1.89)
Exchange rate depreciation in receiving country	0.03	-0.17	-0.94**	-0.23	-0.95**
	(0.36)	(0.37)	(0.39)	(0.33)	(0.40)
Age dependency ratio in receiving country	0.04*	-0.02	-0.06	-0.02	-0.06
	(0.02)	(0.05)	(0.11)	(0.05)	(0.11)
Intercept	-4.95	13.33***	16.07**	5.66***	9.89
	(4.41)	(3.84)	(6.40)	(2.19)	(6.19)
Observations	504	504	504	392	392
Pseudo R-squared	0.636	0.906	0.927	0.919	0.942
Log-likelihood	-65284	-16750	-13107	-12635	-9041
AIC	130588	33552	26278	25282	18094
BIC	130630	33662	26413	25305	18118
Country FE		YES	YES		
Country-Pair FE				YES	YES
Year FE			YES		YES

Note: The dependent variable is the volume of bilateral remittances from sending to receiving countries (in USD). Output gaps are estimated using the Hodrick-Prescott filter with a smoothing parameter 6.5. Estimations are performed using the Pseudo Poisson Maximum Likelihood (PPML) estimator. Robust standard errors clustered at country pair level are in parentheses. The interpretation of the coefficients is as follows: a unit change in the independent variable leads to a $100*(e^{\beta}-1)$ percent change in bilateral remittances. *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Do Oil Prices Have a Direct Effect on Remittances?

	(1)	(2)	(3)
log(GDP_USD) in sending country	0.47**	1.04	1.06
	(0.23)	(0.90)	(0.91)
log(GDP_USD) in receiving country	-0.17	1.43**	1.48**
	(0.32)	(0.63)	(0.66)
log(Distance)	-0.27	-1.20***	
	(0.70)	(0.35)	
Contiguity dummy (=1 if countries share border)	-0.90*	-0.75**	
	(0.46)	(0.36)	
Language dummy (=1 if countries share official language)	-0.14	1.14***	
	(0.47)	(0.42)	
Log(Number of migrants) in sending country	0.57***	0.06	0.10
	(0.18)	(0.11)	(0.09)
Share of female migrants in sending country	-0.46*	-0.47***	
	(0.25)	(0.13)	
Inflation rate in receiving country	0.31	0.97	1.07
	(1.51)	(1.08)	(1.12)
Exchange rate depreciation in receiving country	-0.35	0.21*	0.20*
	(0.29)	(0.12)	(0.11)
Age dependency ratio in receiving country	-0.01	0.04	0.05
	(0.04)	(0.07)	(0.07)
Log(oil prices)	-0.13	-0.42	-0.42
	(0.15)	(0.63)	(0.63)
Intercept	-5.25	-49.57	-60.05*
	(9.55)	(30.68)	(33.42)
Observations	504	504	392
Pseudo R-squared	0.727	0.913	0.927
Log-likelihood	-48983	-15556	-11437
AIC	97989	31169	22890
BIC	98040	31287	22922
Country FE		YES	
Country-Pair FE			YES

Note: The dependent variable is the volume of bilateral remittances from sending to receiving countries (in USD). Estimations are performed using the Pseudo Poisson Maximum Likelihood (PPML) estimator. Robust standard errors clustered at country pair level are in parentheses. The interpretation of the coefficients is as follows: a unit change in the independent variable leads to a $100*(e^{\beta}-1)$ percent change in bilateral remittances. *** p<0.01, ** p<0.05, * p<0.1.

Table 6. The Baseline Gravity Model with Lagged GDP Variables

	(1)	(2)	(3)	(4)	(5)
log(GDP_USD) in sending country	0.50**	0.76***	0.30	0.77***	0.27
	(0.22)	(0.21)	(0.69)	(0.21)	(0.69)
log(GDP_USD) in receiving country	-0.11	1.53**	0.52	1.55**	0.54
	(0.30)	(0.73)	(0.56)	(0.72)	(0.59)
log(Distance)	-0.34	-1.20***	-1.20***		
	(0.67)	(0.36)	(0.35)		
Contiguity dummy (=1 if countries share border)	-0.91**	-0.74**	-0.73**		
	(0.46)	(0.36)	(0.35)		
Language dummy (=1 if countries share official language)	-0.13	1.16***	1.15***		
	(0.47)	(0.42)	(0.42)		
Log(Number of migrants) in sending country	0.53***	0.06	0.05	0.14	0.05
	(0.17)	(0.11)	(0.11)	(0.11)	(0.10)
Share of female migrants in sending country	-0.49*	-0.46***	-0.47***		
	(0.26)	(0.13)	(0.13)		
Inflation rate in receiving country	0.97	3.88**	4.69**	3.97**	4.70**
	(1.61)	(1.84)	(2.23)	(1.88)	(2.19)
Exchange rate depreciation in receiving country	-0.26	-1.41***	-1.25***	-1.47***	-1.27***
	(0.49)	(0.20)	(0.32)	(0.21)	(0.32)
Age dependency ratio in receiving country	-0.01	0.10***	0.00	0.11***	0.01
	(0.04)	(0.02)	(0.09)	(0.02)	(0.09)
Intercept	-7.51	-49.89**	-8.12	-59.21**	-14.90
	(9.28)	(23.66)	(26.14)	(24.07)	(28.46)
Observations	504	504	504	392	392
Pseudo R-squared	0.729	0.917	0.928	0.931	0.943
Log-likelihood	-48459	-14917	-12927	-10790	-8864
AIC	96940	29889	25919	21594	17742
BIC	96986	30003	26059	21621	17769
Country FE		YES	YES		
Country-Pair FE				YES	YES
Year FE			YES		YES

Note: The dependent variable is the volume of bilateral remittances from sending to receiving countries (in USD). Estimations are performed using the Pseudo Poisson Maximum Likelihood (PPML) estimator. Robust standard errors clustered at country pair level are in parentheses. The interpretation of the coefficients is as follows: a unit change in the independent variable leads to a $100*(e^{\beta}-1)$ percent change in bilateral remittances. *** p<0.01, ** p<0.05, * p<0.1.

Table 7. The Gravity Model including Belarus, Moldova, and Ukraine

	(1)	(2)	(3)	(4)	(5)
log(GDP_USD) in sending country	0.57***	0.40***	0.11	0.41***	0.12
	(0.17)	(0.15)	(0.43)	(0.14)	(0.45)
log(GDP_USD) in receiving country	0.18	0.77**	0.07	0.78**	0.09
	(0.17)	(0.32)	(0.27)	(0.31)	(0.28)
log(Distance)	-0.74*	-0.56***	-0.56***		
	(0.40)	(0.18)	(0.18)		
Contiguity dummy (=1 if countries share border)	-0.94*	-0.33	-0.33		
	(0.55)	(0.24)	(0.24)		
Language dummy (=1 if countries share official language)	-0.14	1.01***	1.02***		
	(0.68)	(0.31)	(0.31)		
Log(Number of migrants) in sending country	0.50***	0.16**	0.15**	0.15	0.09
	(0.15)	(0.07)	(0.06)	(0.20)	(0.13)
Share of female migrants in sending country	-0.63**	-0.41***	-0.41***		
	(0.28)	(0.12)	(0.12)		
Inflation rate in receiving country	1.68**	-0.04	1.07*	-0.02	1.09*
	(0.83)	(0.34)	(0.59)	(0.36)	(0.60)
Exchange rate depreciation in receiving country	-0.07	0.21	-0.83***	0.20	-0.82***
	(0.26)	(0.19)	(0.18)	(0.17)	(0.18)
Age dependency ratio in receiving country	0.05**	0.09***	-0.00	0.09***	0.00
	(0.02)	(0.01)	(0.09)	(0.01)	(0.09)
Intercept	-15.57**	-25.92***	3.10	-30.07***	0.26
	(6.19)	(7.93)	(15.73)	(9.54)	(16.66)
Observations	924	924	924	763	763
Pseudo R-squared	0.774	0.919	0.927	0.948	0.958
Log-likelihood	-70241	-25186	-22514	-14517	-11893
AIC	140504	50439	45107	29048	23799
BIC	140557	50598	45295	29081	23832
Country FE		YES	YES		
Country-Pair FE				YES	YES
Year FE			YES		YES

Note: The dependent variable is the volume of bilateral remittances from sending to receiving countries (in USD). Estimations are performed using the Pseudo Poisson Maximum Likelihood (PPML) estimator. Robust standard errors clustered at country pair level are in parentheses. The interpretation of the coefficients is as follows: a unit change in the independent variable leads to a $100*(e^{\beta}-1)$ percent change in bilateral remittances. In addition to Russia and CCA countries, the sample includes Belarus, Moldova, and Ukraine. *** p<0.01, ** p<0.05, * p<0.1.

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