Spillover Effects of Sanctions on Migration and Remittances (the Case of Transition Economies)

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Abstract

This article aims to identify the effects of the economic sanctions against the Russian Federation on bilateral changes in migrant stock and remittance flows between this country and transition economies comprising twenty-seven countries of the former Soviet Union, and Central and Eastern Europe. We construct gravity models and use the Poisson pseudo-maximum likelihood (PPML) econometric technique to assess the impact over 2014–2019. Our research estimates that both Western and U.S. sanctions significantly reduced the flow of remittances to transition economies from Russia, increased the flow of remittances to Russia and contributed to a decline in the number of migrants in Russia. This paper analyzes the effects of sanctions imposed against individuals, entities, and sectors. The quantitative estimates suggest that each episode of individual/entity/sectoral Western sanction reduced the flow of remittances to transition economies by 1.0/2.0/2.9 (million USD) and the corresponding decline from U.S. sanctions was 0.4/0.8/1.2 (million USD). The flow of remittances to Russia from transition economies increased by 1.2/2.3/3.5 (million USD) and 0.5/1.0/1.4 (million USD), respectively. The decline in the number of migrants from transition economies corresponded to 5.1/10.1/15.2 (thousand individuals) and 2.6/5.1/7.7 (thousand individuals) per each episode of Western and U.S. sanctions, respectively.

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1. Introduction

The literature suggests that the estimated impact of economic sanctions, a strategic tool to impose a cost for the act of substantial violation of the internationally recognized laws, has been rising over time. There are two groups of thought in the literature on the impact of sanctions on target countries (Lopez and Cortright, 2007; Peksen and Drury, 2010; Afesorgbor, 2019; Chen et al., 2019). One group of studies measures the effectiveness of imposed sanctions as the depth of the economic shock produced in receiver countries (Afesorgbor, 2019; Chen et al., 2019). A second group of studies evaluates the overall improvements in political and/or human rights conditions that had caused the imposition of sanctions against the target (Lopez and Cortright, 2007; Peksen and Drury, 2010). More recent literature studies the impact of sanctions on sender economies (Soest von and Wahman 2015; Attia et al., 2020). However, the literature on spillovers of sanctions into third-party countries, particularly the impact on migration and the related change in private remittances, is scarce. The motivation for this study is to fill this gap by studying the spillover impact of Western sanctions against Russia on transition economies, where transition economies comprise twenty-seven countries of the former Soviet Union (FSU), and Central and Eastern Europe[1](Gevorkyan 2018). Specifically, we measure the change in migrant stock and corresponding shifts in private remittances received in transition economies from Russia, and vice versa, and estimate the impact of sanctions on these shifts for 2014-2019.

The first round of Western sanctions against the Russian Federation was imposed in March of 2014. Since then, researchers have thoroughly studied Russia's economic adjustments to these sanctions (Christie 2016; Makhmutova 2019; Portela et al. 2021). While there is agreement that the economy of Russia experienced significant contraction in 2014-2015, studies

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[1] The list of twenty-seven transition economies is provided in Figures 1 and 2.

disagree about the causes of the decline. Some studies relate recessionary conditions to a sharp reduction in the world price of oil. Other studies suggest that both the change in the price of oil and the imposition of Western sanctions are primary contributors to Russia's economic recession. Despite the described attention to Russia's economy from 2014 onward, the research on a wider scope of the impact, such as possible economic spillovers of sanctions into its smaller neighboring countries, is limited. More recent literature finds that the Western sanctions against Russia led to the contraction of GDP, reduced bilateral trade, decline in infrastructure development, and decrease in direct investments in transition economies (Makhmutova 2019; Veebel 2021; Sedrakyan, 2022).

One outcome of interest in this study is the impact of sanctions on migration between transition economies and Russia. The World Bank defines migrant stock as the number of people born in one country and residing in another one, which also includes refugees. According to Sen (1999) and de Haas (2009), the phenomenon of migration is multifaceted, with motivations beyond earning income. These studies suggest that broader societal issues are the driver of migration and corresponding change in remittances. These factors include but are not limited to income earning risks, income inequality, lack of investment in human capital (e.g., education), gender inequality, birth and death rates, ethnic relations, political instability, environmental issues, and protection of individual liberties.

The second factor analyzed in this study is the private remittance flow. Alfieri and Havinga (2006) define remittances as the personal transfers sent from a resident household to a household residing in a different country over one year period. Remittances represent the largest component of the financial contribution of an emigrated population to development and poverty reduction in the home country and remain a stable source of income insensitive to economic

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downturns. In the host country, the migrated population joins the diaspora of same origin, which may provide other forms of assistance to the country of origin. Diaspora programs include collective transfers of various kinds through charitable donations and home town associations, support through diaspora NGOs, social and political lobbying, and commercial and financial investments by diasporans in countries of origin (Van Hear, Pieke and Vertovec 2004). However, the lack of relatively precise and recurrent data associated with the listed assistance programs to countries of origin limits us to the analysis of private remittance flows.

To proceed with the study, we construct two gravity models – of bilateral migration and bilateral remittance flows. We use the Poisson pseudo-maximum likelihood (PPML) technique to econometrically estimate the medium-term spillover shocks from the Western sanctions against Russia into transition economies.

Despite the vast interest of researchers to the topic of sanctions, the literature has yet to determine the full scope of arising economic implications they may produce. This paper fills the void by focusing on the spillovers of Western sanctions against Russia into third-party countries and their medium-term impact on migration and remittances for the period of 2014-2019.

This paper is structured as follows. Section 2 reviews the literature. Section 3 provides information on the data and their transformations used in the analysis. Section 4 outlines the econometric methods used in the paper. Section 5 summarizes the research findings. Section 6 concludes the study.

2. Literature Review

The existing literature suggests various socio-economic channels through which sanctions may impact target countries. A significant share of research in the field of sanctions concludes that their impact is produced through sharp contractions in trade of target countries. It is believed that higher economic integration between countries raises the self-imposed cost of sanctions, which comes about through the disruption of flow of commerce between trade partners. Therefore, higher economic integration reduces the likelihood of imposing sanctions against partner countries (Gartzke, Li and Boehmer 2001; Schneider and Troeger 2006; Lektzian and Biglaiser 2013 b). Literature also studies other factors sensitive to sanctions in target countries. For example, Neuenkirch and Neumeiers (2016) estimate the impact of sanctions on the poverty gap in target countries for the period of 1982-2011. They find the sanctions increase the poverty gap and that these effects have a long-lasting nature and become more severe if the sanctions are imposed multilaterally. Garfield (2002) estimates that sanctions may have negative consequences for reduced access to healthcare and pharmaceutical services. Lopez (2000) concludes that sanctions constrain access to food and clean water. Daponte and Garfield (2000) estimate that sanctions reduce the overall life expectancy and result in higher levels of infant mortality in target countries. The literature also finds that FDI sending countries are less inclined to impose sanctions against their partners. Lektzian and Biglaiser (2013 a) use the panel data for 171 countries over 1969-2000 and estimate two important relations. First, this study estimates that global FDI may substitute for the sanction-driven decline in the U.S. FDI. Second, this research assesses that the sanction-driven policy changes in targets are very moderate. It concludes that the U.S. sanctions are counterproductive specifically for those U.S. firms that forgo their profitable opportunities in targets. In another study, these authors estimate that having

higher levels of FDI from the United State will significantly diminish a country's likelihood of becoming a target of the U.S. sanctions (Lektzian and Biglaiser, 2013 b).

The positive link between the levels of migration and the value of remittances sent to source economies has been widely discussed in the literature (Brown R.P.C. 1997; Adams and Page 2005; Lim and Morshed 2015; Lim and Basnet 2017). Adams and Page (2005) construct a dataset on international migration, remittances, inequality and poverty from 71 developing countries. They find a positive welfare impact from migration and estimate that a 10% increase in the migrant population reduces the share of people living on $1 or less by 2.1% in origins.

The concept of remittance decay closely relates to the relation between migration and remittances. The literature review suggests certain disagreements among researchers. Brown R.P.C. (1997) studies the impact of the change in the level of migration on the volatility of remittances received in countries of origin Tonga and Western Samoa. This paper considers not only the level of migration but also the length of absence and migrant earnings. It derives the invalidity of the hypothesis for remittance decay in these countries and estimates that the level of remittances does not decline over time. Lim and Basnet (2017) use the panel data on five South Asian countries over 1975-2011 to estimate whether the duration of migration had impact on the propensities either to consume or to save in origins. They estimate that in countries of origin, the remittances from short-term work migrants tend to increase income and savings, and to hold consumption unaltered. Several studies focus on the duration of migration and the corresponding change in the level of remittances. They estimate that the size of remitted funds reaches its peak 15-20 years after migration (Brown 1994; de Haas and Plug 2006). Another study, by Lim and Morshed (2015), finds that the economic contractions in origins do not produce a rise in remittances from migrants residing in remitting countries. They determine that the higher value

of remittances in origins is driven by an increased number of new emigrants, who consider sending a share of their earnings to family members left behind to be a self-enforced contract.

The literature studying the impact of Western economic sanctions against Russia on migration and remittances of transition economies is very limited (Khitakhunov et al., 2017; Rakhmonov, 2023). Khitakhunov et al. (2017) discuss the political and economic situation in the Eurasian Economic Union (EAEU). This work covers the period when the first Western economic sanctions were imposed. It does not create a direct link between the sanctions and their impact on migration. This paper examines the effect of sanctions on the volatility of the exchange rate of Russian ruble and the further decline in the value of remittances received by the EAEU partner countries from Russia. Rakhmonov (2023) focuses on the impact of sanctions on the decline in the level of Tajik labor migration to Russia. This research suggests that Russia will remain the primary destination of labor migrants from Tajikistan due to its market capacity to absorb thousands of job seekers. We find studies that address other episodes of sanctions and their impact on migration in other regions. Schulz and Batalova (2017), and Connell, Moya and Shin (2021) focus on the U.S. economic sanctions against Haiti in early 1990s. They came as a response to the government coup which ousted then-President Jean-Bertrand Aristide. These sanctions had severe implications on the Haitian economy and caused an economic recession, accompanied by a contraction of trade and a sharp rise in unemployment rate and malnutrition. This significantly increased emigration from Haiti, with the United States becoming the top destination for these migrants. Connell, Moya and Shin (2021) use the data from the Threat and Imposition of Sanctions (TIES) database from Morgan et al. (2009) and estimate acceleration of emigration from targets in the years following sanctions.

3. Data

We use gravity models and construct a dataset that compiles socio-economic, geographic and demographic variables commonly used to run gravity models of migration and remittances. We utilize these gravity models to analyze the impact of the Western sanctions against Russia on changes in bilateral migration and remittances between the Russian Federation and transition economies. The data are summarized in *Table 1* and the corresponding discussion is provided below.

3.1. Dependent variables

3.1.1. Bilateral migration

We use the international migration stock dataset, a matrix reporting migrant populations by destination and origin compiled by the United Nations (United Nations 2019). The UN data are reported every five years beginning with 1990 and previous year is available at the time of download. We utilize this offered advantage and obtain the data for 2017 and 2019, in addition to 2015. These data allowed to run a two-year frequency analysis and to test the impact of sanctions for three consecutive periods from 2015 to 2019.

For comparison, the migrant population in the Russian Federation increased 4 percent between 2010 to 2015, rising from 11.19 million to 11.64 million. The latter date is 1 year after the first round of Western sanctions against Russia. The share of migrants from transition economies consistently comprised about 97 percent of the total migrant population residing in Russia. Notably, the total number of migrants of Russian origin in transition economies grew by 1.4 percent, from 10.21 million to 10.35 million, over 2010-2015. However, the migration from Russia increased by about 3 percent, from 10.21 million to 10.49 million, if the data for the

longer duration, 2010 vs. 2019, are considered. In 2019, 79 percent of all migrants from Russia settled in transition economies.

Patterns of migration differed substantially by transition economy. Some countries like Kazakhstan and Ukraine had substantial two-way migration. Other countries, like Armenia, sent many migrants to Russia but received few in return. *Figure 1* illustrates three different ratios. The first ratio shows the share of Russian migrant stock in each of twenty-seven transition economies in the population of Russia in 2019. The total population of Russia was 144.5 million people in 2019. Only in two transition economies, Kazakhstan (1.7%) and Ukraine (2.3%), did the share of Russian migrants exceed 1% of Russia's total population. The second ratio estimates the share of Russian migrants hosted by each of twenty-seven transition economies in the population of the corresponding transition economy in 2019. The migrants of Russian origin exceeded 5% of total population in five transition economies, Kazakhstan (13.5%), Estonia (9.2%), Ukraine (7.4%), Belarus (7.1%) and Latvia (6.2%). The third ratio estimates the share of migrant stock from each of twenty-seven transition economies residing in Russia in the total population of the corresponding transition economy in 2019. The migrant stock of nine transition economies residing in Russia exceeded five percent of the total population of those corresponding countries. These countries include Armenia (17.9%), Kazakhstan (14%), Georgia (12.1%), Moldova (10.9%), Kyrgyz Republic (9.4%), Belarus (8.1%), Azerbaijan (7.7%), Ukraine (7.3%) and Tajikistan (5.1%). Finally, the fourth ratio, not included in Figure 1, is the share of TE migrant stock in Russia in the total population of Russia. This ratio was close to 0 for all countries except for Kazakhstan (1.8%) and Ukraine (2.3%). The similarity of the first and fourth ratios for these two economies indicates the balanced nature of their migrant exchange with Russia.

Figure 1. Share of migrants in the population of sending and hosting countries (2019)
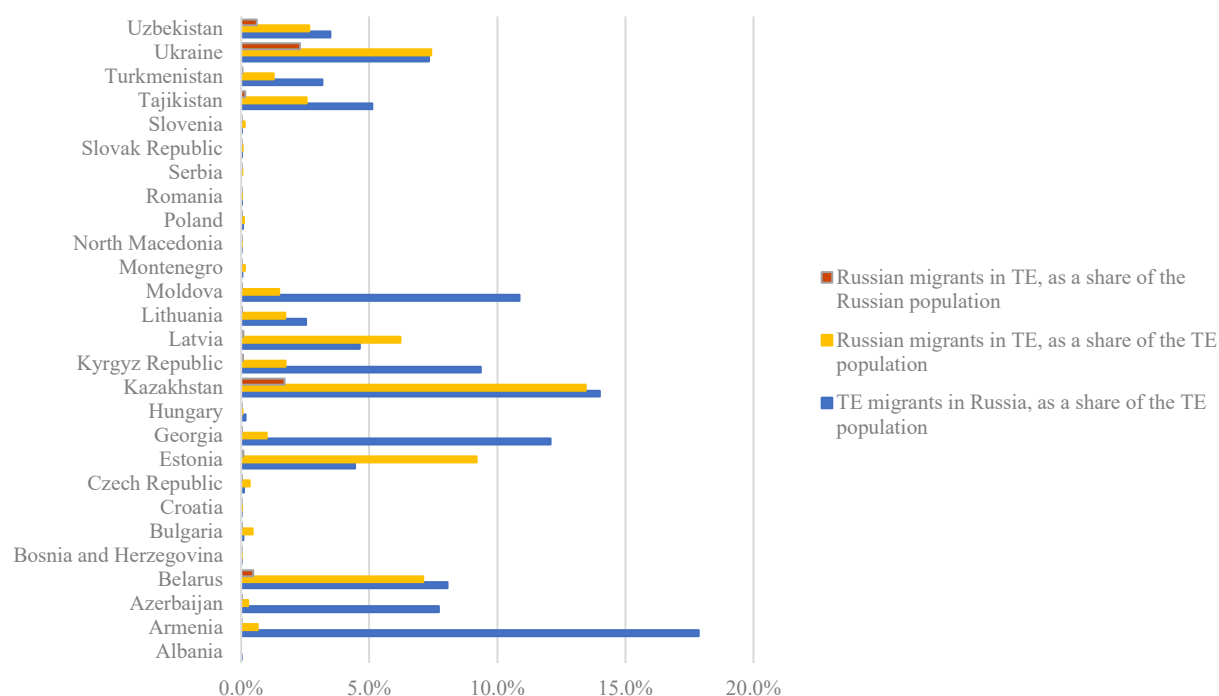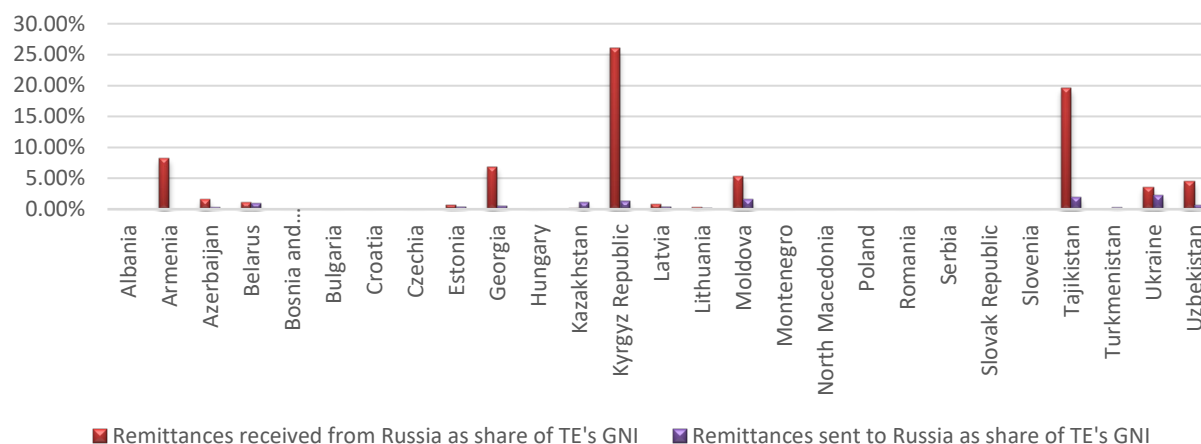

3.1.2. Bilateral remittances

According to the World Bank's data on bilateral remittances, Russia was the third largest source of remittance outflow in 2013, after the United States and Saudi Arabia, one year prior to becoming a target of the Western sanctions. The corresponding economic recession of 2014 impacted the level of remittance outflow from Russia, which declined by 38 percent, from $23,469 million to $14,547 million, over 2013-2015. This is in contrast to a 4.2 percent increase in the world remittance outflow for the same period. This sharp decline of remittances from Russia was particularly severe for transition economies, the destination of 95 percent of remittances sent from Russia in 2013. Of those, the countries of the former Soviet Union were the recipients of the largest share, about 99 percent, or about $22 billion.

Figure 2 shows the share of remittances received/sent from/to Russia in GNI of transition economies in 2017. During that year, 93 percent of the total value of remittances sent to the world from the Russian Federation (USD 16,503 million) went to transition economies. In 2017, the share of remittances received from Russia exceeding 1 percent of destination GNI was reported in nine countries: Belarus (1.04%), Azerbaijan (1.55%), Ukraine (3.56%), Uzbekistan (4.48%), Moldova (5.29%), Georgia (6.82%), Armenia (8.2%), Tajikistan (19.53%) and Kyrgyz Republic (25.98%). In 2017, 78 percent of remittances received in Russia were sent from transition economies. The share of remittances sent to Russia exceeding 1 percent of sender GNI was reported in five countries: Kazakhstan (1.15%), Kyrgyz Republic (1.22%), Moldova (1.59%), Tajikistan (2.02%) and Ukraine (2.19%). Neither sent nor received remittances from any of twenty-seven transition economies exceeded 1 percent of Russia's GNI.

Figure 2. Share of remittances received/sent from/to Russia in TE's GNI (2017)

The availability of the data on bilateral remittances is limited. The annual aggregate data on inflows and outflows of remittances per country is publicly available from KNOMAD database of the World Bank. The disaggregated data on bilateral remittance matrix showing the flow between country pairs was discontinued in 2018. Recently, KNOMAD restarted publication

of the latest bilateral data. Thus, for this analysis we use the archived datasets on bilateral remittances, which cover the period of 2014-2017.

3.2. Independent variables

3.2.1. Sanctions

The first Western and U.S. sanctions against the Russian Federation were imposed on March 6, 2014. They retaliated against Russia's violation of Ukraine's sovereignty, which resulted in the annexation of the Crimean Peninsula. Initially, the sanctions took a targeted approach in the form of visa restrictions and asset freezes imposed against Russian and Crimean individuals. The March 2014 sanctions by the European Union and the United States were imposed against 21 and 11 individuals, respectively. During the same month, more individuals were added to that list. Very soon, the sanctions became broader, as they captured a wider scope of targets including specific entities in financial and oil extraction industries, such as Bank Rossia and Crimean Chernomorneftegaz oil company. Next, sanctions targeted specific sectors of economy, e.g., the U.S. sanctions against Russia's imports of the U.S. goods contributing to the former's military capabilities (April, 2014). In addition, responding to the Crimean crisis, the sanctions against Russian individuals were imposed for human rights violations, also known as the Global Magnitsky Act. Finally, the United States unilaterally imposed sanctions against Russia for interference in the 2016 U.S. presidential elections. Russia retaliated and enacted reciprocal sanctions against sanctioning countries in March 2014. These sanctions took the form of bans on imports of agricultural products and certain individuals' entry to Russia. In 2018, Russia expelled 60 U.S. and 16 E.U diplomats and declared the 23 U.K. diplomats personae non gratae. This analysis focuses on the Western sanctions against Russia.

The analysis incorporates sanctions from a dataset of the Western and U.S. sanctions against Russia constructed by Sedrakyan (2022) and Sedrakyan (2023). This dataset compiles the information on all sanctions imposed against Russia between 2014 and 2018. There were seventy-eight episodes of sanctions imposed in 2014-2018, of which forty-three went into effect in 2014. Sedrakyan (2022) assigns a value to each episode of sanction, where the value reflects several characteristics, including the level of pre-indictment economic integration with the sanctioning country, time coefficient of imposed sanction, and type of a sanction. The *level* of economic integration represents the sum of shares of bilateral trade between the sanctioning country and Russia in the latter's total imports and exports, respectively, for the last five years (2009-2013) preceding sanctioning. The *time* coefficient takes into consideration the month and year when the sanction was imposed. The *type* coefficient breaks down the sanction variable into four main subgroups: exclusively political context (expelling diplomats); those imposed against individuals; entities; and sectors of the economy. The literature suggests that the economic impact will diverge due to the type of sanctions (Neuenkirch and Neumeier 2016; Dreger et al. 2016; Sedrakyan, 2022). This notion is reflected in the dataset we use. Here, the coefficients assigned to a sanction type ascend with the severity of economic shock to the target. Thus, the sanctions imposed for political narrative or against individuals produce weaker economic volatilities; these shocks are assigned a coefficient of 1. In contrast, the dataset assigns order 3 coefficient to deeper economic shocks from sectoral sanctions. *Table 1* includes the descriptive statistics of both the Western and the disaggregated U.S. sanctions.

3.2.2 Other independent variables

The macroeconomic data included in this analysis as control variables are mostly available through the World Bank's World Development Indicators (WDI) online database.

Table 1. Descriptive statistics and data sources

Variables	Description	Mean	Std. Dev.	Min	Max	Source
	Dependent variables					
Em_{it}	Emigration to Russia from TE (stock) (million)	0.419	0.779	0.00	3.272	United Nations
Imm_{jt}	Immigration to TE from Russia (stock) (million)	0.305	0.762	0	3.310	United Nations
R_{jt}	Remittances to TE from Russia (millions)	568.755	1021.728	0	5,653.000	World Bank, Migration and Remittances Data
R_{it}	Remittances to Russia from TE (million)	210.723	510.460	0	2,489.817	World Bank, Migration and Remittances Data
	Independent variables					
S^r_{jt}	Sanctions US (unit)	4.237	1.479	2.638	6.186	Sedrakyan G. (2022)
S^r_{jt}	Sanctions West (unit)	20.079	5.059	14.618	26.753	Sedrakyan G. (2022)
GDP_{it}	Real GDP in 2015 prices of TE (million)	74,329.48	101,430.2	3,920.01	544,288.9	World Development Indicators, World Bank
GDP_{jt}	Real GDP in 2015 prices of Russia	1,395,719	26,508.69	1,366,122	1,430,115	World Development Indicators, World Bank
Dis_{ij}	Direct distance (km)	1,731.544	639.865	676.89	2,992.61	Google Maps
Pop_{it}	Population size TE (million)	9.731	11.268	.622	45.272	World Development Indicators, World Bank
Pop_{jt}	Population size Russia (million)	144.213	.286	143.820	144.478	World Development Indicators, World Bank
$PopD_{it}$	Population density measured by number of people per sq. km.	73.741	34.106	6.404	137.6934	World Bank
$Unem_{it}$	Unemployment rate	9.979	6.170	0.5	28.03	World Bank
Inf_{it}	Inflation	3.260	4.535	-1.584	18.120	World Bank and UNCTAD
$ExchR_{it}$	Exchange rate of 1 unit of local currency to ruble	21.869	24.2142	.0152	74.174	UNCTAD
Edu_{it}	Share of population over 25 years with secondary education	91.983	4.234	69.841	99.82	World Bank
$LExp_{it}$	Life expectancy	74.743	3.050	67.552	81.378	World Bank
$GINI_{it}$	Level of income inequality measured by the Gini coefficient	33.154	5.796	24	42.08	World Bank
$PolSt_{it}$	Political stability and absence of violence	0.081	0.654	-2.021	1.039	World Governance Indicators (WGI), World Bank
$DepEld_{it}$	Old-age dependency ratio	19.526	7.920	4.811	31.307	UNCTAD
$DepCh_{it}$	Child dependency ratio	28.097	9.875	20.860	59.315	UNCTAD
CIS_i	Country of the Commonwealth of the Independent States (binary)	.297	.460	0	1	CIS official webpage (https://cis.minsk.by/map)
FSU_i	Country of the former Soviet Union (binary)	0.519	.503	0	1	Gevorkyan A., 2018
EU_i	Member of the European Union (binary)	0.407	0.494	0	1	europa.eu
$Cont_i$	Contiguity-Common border with Russia (binary)	.333	.474	0	1	The World Factbook, CIA
$Land_i$	Landlocked (binary)	0.519	.503	0	1	World Population Review
Rem_{it}	Remoteness	1.501	1.813	.107	7.590	Own calculations

These data include real GDP in 2015 prices of transition economies and Russia, population size, population density, unemployment rate, Gini coefficient, enrollment ratio in secondary education, and life expectancy of transition economies. We use the United Nations Conference on Trade and Development database (UNCTAD) to collect data on elderly and children dependency ratios. Both are calculated as ratios of the number of people in the mentioned groups of interest out of each hundred individuals aged 15-64. The rate of inflation is compiled using two sources- the WDI and UNCTAD datasets. The Gini coefficient is a measure of income inequality, and ranges from 0 to 100, where upper bounds classify the societies where the income distribution across population is more uneven, and the level of inequality is higher. Four transition economies without reported data are assigned coefficients in the range of $[41 - 42]$, which is 1 unit above the highest coefficient reported by any country included in the dataset. The distance is estimated by using the Google maps application, which assesses the direct distance between the capitals, where Moscow, the capital of Russia, is one of the capitals in each country pair.

The model also selectively includes a set of binary variables, indicating whether a country is a member of the European Union (EU), former Soviet Union (FSU), has a shared boarder with Russia, and is landlocked. Here, we assign 1 if the country belongs to the listed groups, and 0, if otherwise. In the model of migration, instead of FSU we use a binary variable which controls if a country is a member of the Commonwealth of Independent States (CIS), an organization that became the successor of the Soviet Union in 1993. This organization maintains some level of control over the trade, finance, lawmaking, and security of member states and also operates as a free trade area for the signatory countries. The list of the CIS member countries is inconsistent across available sources, we use the official website according to which the member

states include Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

4. Methodology

To explore the impacts of sanctions on bilateral migration and remittances, we construct two gravity models, for bilateral migration and remittances. To start constructing gravity model of migration, we consult literature and use logarithmic values of three independent variables: the population size of migrant sending and receiving countries and the distance between them (Poot et al. 2016). Gravity model of remittances typically include logarithmic transformation of GDPs of remitting and remittance receiving countries and the distance between them as independent variables (Lueth and Ruiz-Arranz 2007). This analysis builds on these basic models by adding information on sanctions and additional controls.

The impact of sanctions on bilateral *migration* (M_{ijt}) between the Russian Federation (j) and transition economies (i) is analyzed by using the model described in Eq. [1]. This model analyzes both emigration to Russia from transition economies at time (t) and immigration to transition economies from Russia at time (t). The data on bilateral migration flow were not available. Following Beine et al. (2016) views on migrant stock as a proxy for migration flows and Grogger and Hanson (2011) conclusions on migrant stock data being representative of long-term equilibrium and more reliable due to their collection via national census, we use the variable of migrant stock in this analysis.

$$M_{ijt} = \alpha + \beta_1 S_{jt-1}^r + \beta_2 dis_{ij} + \beta_3 pop_{it-1} + \beta_4 pop_{jt-1} +$$

$$\beta_5 Gini_{it-1} + \beta_6 unem_{it-1} + \beta_7 popd_{it-1} + \beta_8 GDP_{it-1} + \beta_9 rem_{it-1} + \beta_{10} edu_{it-1} + \beta_{11} inf_{it-1} +$$

$$\beta_{12} lexp_{it-1} + \gamma A_i + \varepsilon_{it} \qquad [1]$$

This model analyzes the impact of Western and U.S. sanctions against Russia ($S^r{}_{jt}$) on changes in the level of migrant stock of transition economies. This change is studied in terms of both emigration (Em_{it}) of transition economies' (i) population to the Russian Federation and immigration (Imm_{jt}) of Russian (j) population to these countries at time (t). The logarithmic transformation is applied to all macroeconomic variables. All time-varying controls are one-year lagged variables. Hence, the models of migration studying the effects of sanctions on changes in corresponding migrant stocks include the following independent variables: the ratios of life expectancy ($LExp_{it-1}$), population density ($PopD_{it-1}$), Gini coefficient ($Gini_{it-1}$), GDP (GDP_{it-1}) and education of transition economies (Edu_{it-1}) to that of Russia, and, due to the deflation in some of the countries, the determinant of inflation ($Infl_{it-1}$) is estimated as the mean of this variable of the countries in pair. These controls are used in both models of migration. These data transformations allowed to better define the model of migration in terms of comparative characteristics that sender and destination countries offered to migrants.

We construct a consistent time-series from 2015 to 2019 with the frequency of recurrence of two years. To balance this described dataset, the model specifications were adjusted to set up the time as delta 2, versus more commonly applied yearly periodicity. Because this analysis uses the PPML technique developed in Santos-Silva and Tenreyro (2006), we follow their recommendation and specify the model in the level-log format. The final model of migration is described by Eq. [1] above:

where,

S^r_{jt}-sanction imposed against Russia, where r stands for Western or unilaterally imposed U.S. sanctions at time (t).

A_i -vector of binary variables which assign 1, if a country is a member of the European Union, former Soviet Union, landlocked and shares border with Russia, and 0, if otherwise.

ε_{it} -robust error clustered by country pairs.

All other variables are described in *Table 1*.

To assess the impact of sanctions (S_{jt}^r) on bilateral private *remittance flow* (R_{ijt})between Russia and transition economies in 2014-2017, we construct the following model described in $Eq.\,[2]$

$$R_{ijt} = \alpha + \beta_1 S_{jt-1}^r + \beta_2 dis_{ij} + \beta_3 GDP_{it-1} + \beta_4 GDP_{jt-1} +$$

$$\beta_5 pop_{it-1} + \beta_6 lexp_{it-1} + \beta_7 edu_{it-1} + \beta_8 Gini_{it-1} + \beta_9 inf_{it-1} + \beta_{10} exchr._{it-1} + \beta_{11} polst_{it-1} +$$

$$\beta_{12} depeld_{it-1} + \beta_{13} depch._{it-1} + +\beta_{14} unem_{it-1} + \beta_{15} rem_{it-1} + \gamma A_i + \varepsilon_{it} \qquad [2]$$

The basic model of remittances is constructed on the logarithmic transformation of the GDP of Russia (GDP_{jt-1}) and transition economies (GDP_{it-1}), and the distance (dis_{ij}) between each county pair. The majority of determinants controlled in model [2] are similar to those used for testing the impact of sanctions on bilateral migration. However, according to the variance inflation factor (VIF) tests outcomes, obtained through an OLS regression, the variable of population density is replaced by two other demographic variables, which control for old-age dependence ($depeld_{it-1}$) and child dependence ($depch_{it-1}$). Both variables are added with log transformation. Another macroeconomic determinant added to this model is the exchange rate ($exchr_{it-1}$) of the domestic currency to the Russian ruble. In the binary variables (represented as vector A_i), we replace the FSU with an indicator of whether a country is a member of the Commonwealth of Independent States (CIS_i). The rest of binary variables is similar to those

described in Eq. [1]. In this model, to be able to test a longer time horizon (four years), the data on sanctions are not lagged.

The data analysis is conducted by using the Poisson pseudo-maximum likelihood (PPML) econometric technique described in Santos-Silva and Tenreyro (2006). The authors note that PPML is well-suited when the data are heteroscedastic or the endogenous variables are equal to zero. We use the PPML technique to mitigate the heteroscedasticity issues that could arise because of the difference in country sizes. In addition, this econometric method performs well with the gravity models that include limited time series, which is reflective of both datasets used in this analysis. Here, we also follow the recommendations of Anderson and van Wincoop (2003) about the need to control for multilateral resistance terms (MRT) in gravity models. The literature offers alternative methods to address MRTs in gravity models (Anderson and Van Wincoop 2003; Head 2003; Santos-Silva and Tenreyro 2006; Baier and Bergstrand 2007). Most frequently, authors choose to introduce sender receiver country fixed effects. Due to the specifics of the datasets used in this analysis, where one country- Russia- is one side of either migrant/remittance receiving or sending relation in each country pair, controlling for sender or receiver country fixed effects would not be useful, as it will produce a constant dummy variable, which will not be identified in the model. Therefore, we use an alternative option to control for remoteness, which is discussed in Head (2003) and Baier and Bergstrand (2007), and estimate the spatially weighted GDP share calculated as $rem_{it} = \sum_i (dis_i \frac{GDP_{it}}{GDP_{Wt}})$, where GDP_{it} is the GDP of transition economy in the world GDP (GDP_{wt}) at time t. The descriptive statistics of the variable is included in *Table 1*.

Finally, Santos-Silva and Tenreyro (2006) suggest conducting heteroscedasticity-robust RESET postestimation tests to confirm the proper specification of the model. These tests are

evaluated in terms of the significance of an additional regressor assessed as $(xb)^2$, where b is the vector of estimated values. Overall, the $p - value > 0$ of the tested model including $(xb)^2$ regressor reflects properly specified gravity equations. Next section discusses the results of our analysis and summarizes them in *Tables 2* and *3*, including the last rows with *RESET p − value*s of described post estimation tests.

5. Results

The Western and U.S. sanctions against the Russian Federation spilled over into transition economies through the contraction of total number of *migrants* moving to Russia from transition economies (*Table 2*). Thus, with other independent variables held constant, a 1% increase in the U.S. and Western economic sanctions corresponded with the fall in the stock of migrant population in Russia from transition economies reaching about 30 and 40 individuals per transition country, on average. These outcomes are also consistent with the literature which suggests that multilateral sanctions imposed by a large group of economies usually produce stronger shocks than the ones indicted by a single country (e.g. Neuenkirch and Neumeier (2015)). The population of landlocked countries and those of the former Soviet Union strongly contributed to the rise in migration to Russia from transition economies. The positive link was also found between the increase in population of Russia and number of migrants. These outlined results were consistent across the models of Western sanctions and U.S. sanctions.

The model studying the effects of sanctions on immigration to transition economies from the Russian Federation did not find any significant impact produced by sanctions. During this period, the Russian people immigrated more to those countries with higher GDPs than in Russia. They also left for the EU, FSU and landlocked countries. There is a significant negative relation between the migration from Russia and remoteness.

Table 2. Impact of sanctions on bilateral migration between the Russian Federation and transition economies 2015-2019

	Emigration to Russia from TE	Emigration to Russia from TE	Immigration to TE from Russia	Immigration to TE from Russia
lnS_{jt-1} (Sanc. West)	-.004*** (.001)		-.093 (.112)	
lnS_{jt-1} (Sanc. US)		-.003*** (.001)		-.073 (.087)
$lnPop_{it-1}$	.046 (.045)	.046 (.045)	.911 (.873)	.911 (.873)
$lnPop_{jt-1}$	.359*** (.110)	.405*** (.116)	-8.267 (8.557)	-7.054 (9.561)
$lnDist_{ij}$	-1.092 (.712)	-1.092 (.711)	-.259 (.665)	-.259 (.665)
$lnGDP_{it-1}$	.002 (.003)	.002 (.002)	3.331*** (.997)	3.331*** (.997)
$lnLExp_{it-1}$	-.023 (.030)	-.023 (.030)	-2.494 (3.153)	-2.494 (3.153)
$lnPDens_{it-1}$	-.043 (.042)	-.043 (.042)	-.053 (.096)	-.053 (.096)
$lnEdu_{it-1}$	-.001 (.002)	-.001 (.002)	-.137 (.543)	-.137 (.543)
$lnGini_{it-1}$	-.001 (.002)	-.001 (.002)	.291 (.305)	.291 (.305)
$lnInfl_{it-1}$	-0.0001 (0.0001)	-0.0001 (0.0001)	-.003 (.004)	-.003 (.004)
$lnUnem_{it-1}$	0.0001 (0.0002)	0.0001 (0.0002)	.008 (.007)	.008 (.007)
Rem_{it-1}	-0.004 (0.004)	-0.004 (0.004)	-.190* (.083)	-.190* (.083)
EU_i	1.238 (1.445)	1.237 (1.445)	1.749* (.742)	1.749* (.742)
FSU_i	6.073*** (1.292)	6.073*** (1.292)	3.883** (1.318)	3.883** (1.318)
$Land_i$	1.365* (.557)	1.365* (.557)	1.089* (.531)	1.089* (.531)
$Cont_i$	.242 (.475)	.242 (.475)	.756 (1.029)	.756 (1.029)
$Const$	12.911* (5.926)	12.678* (5.932)	51.627 (40.355)	45.420 (44.994)
N groups/observations	27/81	27/81	27/81	27/81
Pseudo log-likelihood	-651.889	-651.889	-5767.38	-5767.38
RESET p-val.	0.00	0.00	0.05	0.05

*Note: clustered robust standard errors in parenthesis; *, ** and *** indicate significance at 0.05, 0.01 and 0.001, respectively.*

Thus, the further distance to a more prosperous destination country was a discouraging factor to migrate there from Russia (*Table 2*).

Our research estimates that both Western and U.S. sanctions had a strong negative impact on inflow of *remittances* received in transition economies from Russia (*Table 3*). A 1 percent increase in Western sanctions contracted the remittances from Russia to transition economies by $0.008 million. We observed that the U.S. sanctions alone reduced the remittances by a lower amount of about $0.005 million. This divergence was expected, as the multilaterally imposed sanctions produce more profound economic shock than the unilateral ones. The transition economies where the local currency depreciated against the Russian ruble experienced a rise in the volume of remittances received. This outcome may also suggest that the cost of the depreciated currency in countries of origin was partially redistributed to the remitting migrants. Politically stable and low violence transition economies also received higher levels of remittance inflow. The inflow of remittances was lower in countries with higher levels of inflation. This signals that the purchasing power of the Russian ruble to the domestic currency of some of the transition economy was stronger, which reduced the remittances. This model also finds that the dependence ratios of old-age population and of children significantly impacted the inflow of remittances to transition economies where these ratios were high. This may lead to further research on the management of public sector and strategies on implementation of welfare programs. These results held for both models of Western and U.S. sanctions.

The Western and U.S. sanctions had a significant effect on the remittances sent to the Russian Federation from transition economies. The rise in the U.S. and Western sanctions by 1% increased the inflow remittances to Russia from transition economies by about $0.006 million and $0.009 million, respectively.

Table 3. Impact of sanctions on bilateral remittance flows between the Russian Federation and transition economies 2014-2017

	Remittances sent to TE from Russia	Remittances sent to TE from Russia	Remittances sent to Russia from TE	Remittances sent to Russia from TE
lnS_{jt} (Sanc. West)	-.773** (.282)		.908*** (.074)	
lnS_{jt} (Sanc. US)		-.473** (.173)		.556*** (045)
$lnGDP_{it-1}$	.946 (.823)	.946 (.823)	-.053 (.280)	-.053 (.280)
$lnGDP_{jt-1}$	1.330 (2.712)	.258 (2.620)	1.171 (1.741)	2.430 (1.702)
$lnDist_{ij}$	-1.556 (2.792)	-1.556 (2.792)	-1.920** (.754)	-1.920** (.754)
$lnPop_{it-1}$	-.572 (1.734)	-.572 (1.734)	.469 (.387)	.469 (.387)
$lnLExp_{it-1}$	-23.187 (13.813)	-23.187 (13.813)	-9.303 (5.248)	-9.303 (5.248)
$lnEdu_{it-1}$	.046 (1.404)	.046 (1.404)	-.793 (1.179)	-.793 (1.179)
$lnGini_{it-1}$	-.516 (.705)	-.516 (.705)	-.286 (.233)	-.286 (.233)
$lnInfl_{it-1}$	-.044* (.023)	-.044* (.023)	.003 (.024)	.003 (.024)
$lnExchR_{it-1}$	-.446* (.229)	-.446* (.229)	.042 (.108)	.042 (.108)
$lnPolSt_{it-1}$	.448* (.179)	.505** (.166)	.856*** (.091)	.789*** (.091)
$lnDepEld_i$	5.710*** (1.228)	5.710*** (1.228)	.358 (.777)	.358 (.777)
$lnDepCh_i$	9.892** (3.825)	9.892** (3.825)	3.202** (1.190)	3.202** (1.190)
CIS_i	4.829* (2.161)	4.829* (2.161)	2.858** (.955)	2.858** (.955)
EU_i	-.294 (1.688)	-.294 (1.688)	.833 (.542)	.833 (.542)
$lnUnem_i$	.009 (.054)	.009 (.054)	-.016 (.017)	-.016 (.017)
$Land_i$	-.253 (1.649)	-.253 (1.649)	-1.046 (.584)	-1.046 (.584)
$Cont_i$	1.523 (.816)	1.523 (.816)	1.608* (.716)	1.608* (.716)
Rem_{it-1}	.179 (.491)	.179 (.491)	.307** (.120)	.307** (.120)
$Const$	41.113 (72.544)	54.472 (70.239)	26.809 (38.896)	11.116 (38.746)
N groups/observations	27/108	27/108	27/108	27/108
Pseudo log-likelihood	-586.699	-586.699	-354.190	-354.190
RESET p-val.	0.361	0.361	0.020	0.020

Note: clustered robust standard errors in parenthesis; *, ** and *** indicate significance at 0.05, 0.01 and 0.001, respectively.

Greater distance between countries resulted in a lower inflow of remittances to Russia from transition economies. The transition economies of the CIS and having a shared boarder with Russia sent a significantly higher volume of remittances to Russia. The remoteness was another significant contributor to the rise in flow of remittances to Russia. This outcome suggests that the economies with higher GDP, including those located further apart, had a significant contribution to the increase in Russia's remittances. Finally, the Russian migrants from the transition economies with higher dependence ratio of children had tendency to remit more back home.

To illustrate the practical application of this study, we calculate the impact of sanctions on transition economies. The sanctions are not imposed in percentages, they are imposed by types against individuals, entities or sectors. The type of sanction with a larger scope, such as against sectors, has stronger economic impacts on the target. We combine the estimated impact of sanctions from *Tables 2* and *3* with the corresponding shock from each type of sanction. Then, we use the original dataset of sanctions from Sedrakyan (2023) to calculate the comparative impact of the sanction shock for each type of sanction. With an assumption that the sanctions were imposed in the beginning of the year, we estimate that each episode of individual, entity, and sectoral sanction will correspond to the 4.69, 9.37 and 14.06 (Western) and 3.18, 6.35 and 9.53 (U.S.) coefficients, respectively. Then, these coefficients are applied to the results of our analysis outlined in *Tables 2 and 3* and multiplied by 27, the number of transition economies included in the analysis. *Table 4* summarizes our results, which do not include the estimates associated with the change in number of migrants to transition economies from Russia because the sanctions were not a significant factor impacting this relocation.

Table 4. Depth of the economic shock in transition economies corresponding to each type of sanction

Factor/sanction imposing unit/ measure	Effect by type	Effect by type	Effect by type
	Individual	Entity	Sector
Emigration to Russia from TE/West/ number of individuals	-5,060	-10,120	-15,179
Emigration to Russia from TE/ U.S./ number of individuals	-2,572	-5,144	-7,715
Remittances to TE from Russia/ West/ U.S. dollars	-977,806	-1,955,613	-2,933,419
Remittances to TE from Russia/ U.S./ U.S. dollars	-405,479	-810,959	-1,216,438
Remittances to Russia from TE/ West/ U.S. dollars	1,148,575	2,297,149	3,445,724
Remittances to Russia from TE/ U.S./ U.S. dollars	476,631	953,262	1,429,893

6. Conclusions

This analysis assessed the spillovers of the 2014 Western and U.S. sanctions against the Russian Federation into transition economies. We focused on assessing the impact of the sanctions on the change in migrant stock and flow of remittances between Russia and transition economies.

Our analysis, which captured 2015-2019, estimated a significant impact of sanctions on emigration, assessing that each episode of individual, entity or sectoral sanction caused a significant decline in the migrant stock in Russia with origins from transition economies (*Table 4*). Each individual, entity or sectoral Western sanction reduced the number of these migrants in Russia by 5,060; 10,120; and 15,179 individuals. The impact of the U.S. sanctions was weaker and the reduction per each episode of individual, entity or sectoral sanction was 2,572; 5,144; and 7,715 individuals, respectively.

We also estimated contractions in the flow of remittances for the period of 2014-2017. Our analysis assessed that each episode of individual, entity or sectoral sanction imposed by the West significantly reduced the flow remittances to transition economies from Russia by $977,806; $1,955,613; and $2,933,419, respectively (*Table 4*). Each episode of individual, entity

or sectoral U.S. sanction reduced the flow remittances to transition economies by $405,479; $810,959; and $1,216,438, respectively. Interestingly, the sanctions also increased the outflow of remittances to Russia from transition economies. Thus, each episode of individual, entity or sectoral sanction imposed by the West increased the outflow of remittances to Russia from transition economies by $1,148,575; $2,297,149; and $3,445,724, respectively. Each episode of individual, entity or sectoral U.S. sanctions resulted in the increase of remittances to Russia by $476,631; $953,262; and $1,429,893, respectively (*Table 4*).

According to our estimates, the main drivers of remittances to transition economies had a socio-economic nature. High dependence of old-age and child population were the most significant motivating factors that facilitated higher levels of remittance inflow to transition economies. Another important takeaway was that the transition economies took the toll of sanctions dually, since they not only experienced a decline in the inflow of remittances from Russia, but also increased the outflow of remittances to Russia.

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