REMITTANCES AND INEQUALITY: THE POST-COMMUNIST REGION

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Abstract

This study aims to investigate the impact of international remittances on income inequality in the post-communist region. The association between the variables is examined via static and dynamic panel models. Using macroeconomic data from 27 countries over the period 1991–2014, we discover that income inequality progresses along a U-shaped course as a country becomes more dependent on remittances. For most of the countries, the relationship between remittances and inequality is inverse. When remittances account for more than 20% of GDP, they exacerbate economic inequality. This finding challenges the view that remittances should only be viewed as a pro-poor redistribution mechanism because in certain cases, additional migrant transfers may actually increase income inequality.

Keywords: Income inequality, migration, international remittances, post-communism
JEL Classification: F24, E25, O15

1. Introduction

Nearly three decades have passed since the states with a centrally-planned economy in Asia and Europe started the transition to capitalism. The drastic change resulted in uncertainty and caused a significant decline of economic activities (Katchanovski, 2000). Considering this in conjunction with high unemployment levels, we can see why the population of some of these countries experienced vast welfare losses. In the course of the transition period, therefore, a significant number of individuals were forced to leave their communities in search of job opportunities, while the income of even more people became dependent on remittances (Kakhkharov *et al*., 2017). This tendency is peculiar not only to the post-communist region. Due to internal market distortions and various non-economic reasons, migration is now a global phenomenon. The international migration stock of nearly 250 million people accounted for 3.4% of the world population in 2013 (World Bank, 2016).

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Even at present, remittances remain one of the main sources of income for many families left behind in certain post-communist countries. Indeed, some of these countries in Central Asia and Eastern Europe were among the top countries of the world in terms of the remittances-to-GDP ratio: Tajikistan (1st), Kyrgyzstan (2nd) and Moldova (5th); remittances also appear to be noteworthy when we consider the absolute numbers, for example, Poland and Russia received more than 7 billion dollars annually in remittances (World Bank, 2016).

Given the sizeable amount of international remittance inflows to the post-communist countries, their effects on easing budget restraints and the well-being of people can be significant and deserve attention of policymakers. The purpose of this article is to investigate how international remittances affect economic inequality patterns in the post-communist countries. The communist era was characterized by the rhetoric of equality; the collapse of the ideology and the subsequent turn towards a market-based economy contributed to the growing within-country inequalities in the region (Solt, 2016). However, an additional stable source of income, especially for the poor, could promote economic equality and counterbalance initial negative consequences of economic liberalization. At the same time, many households could become reliant on remittances, affecting negatively productivity in their countries and the income of people not receiving remittances. Hence, the question about the effects of remittances on inequality should be viewed with respect to national income. We suppose that a measure of a country's dependence on remittances can reflect this and consider the remittances-to-GDP ratio. It is also difficult to draw conclusions on the issue of economic inequality because this concept is comprehensive and comprises numerous economic variables. The choice of the indicator might eventually determine the results of the study. Since we are interested in capturing outcomes of established economic disparities that hinder prospects of individual economic agents and development of countries, we limit our analysis to inequality of income distribution. Indeed, in addition to ethical considerations, there are several instrumental reasons for concern about income inequalities such as decreased marginal productivity of capital, political inequality and instabilities (Lee and Song, 2016).

While the interest in exploring economic effects of remittances is increasing, few studies have concentrated on the post-communist region. Moreover, the conclusions are diverging even within well-examined settings. The contribution of this study is to explore the regional effects of remittances, mostly in less researched countries, and to test whether the impact varies across countries with different levels of exposure to remittances. We collect a relatively new longitudinal dataset and employ robust empirical tools using the Stata software to improve the existing knowledge about the remittances-inequality nexus.

2. Literature

The literature on the migration-development nexus does not provide a conclusive answer whether migration in general or migrants' remittances in particular induce positive or negative effects on source countries. Historically, classical (Ravenstein, 1885) and neoclassical (Harris and Todaro, 1970) economic paradigms emphasized a positive contribution of migration to prosperity of migrant-sending communities. A similar point of view can be found in the generally accepted new economics of labour migration theory (Stark and Bloom, 1985). However, there is another milestone in the migration literature, characterized by a profound swing from a positive to a pessimistic view on the impact of migration, according to which migrant-sending communities are expected to become economically dependent since migrant transfers are mostly spent inefficiently (Bohra-Mishra, 2013).

Previous research on remittances/inequality is mostly based on exogenous assumptions regarding the economic environment where migrants operate. The proposed specifications are embedded within multiple equilibria and various scenarios might materialize depending on preliminary conditions.

The first component determining the migration-inequality relationship is related to household income (Mckenzie and Rapoport, 2007). In initial stages of migration, financial constraints might limit access to migration for a majority of the population, and only a small fraction of households has the means to migrate. As the first cohort successfully migrates, this creates initial foundations for a migration network to be formed, allowing households from other income groups to migrate. Therefore, migration initially escalates existing income discrepancies and then reduces inequalities. Several cross-country regressions by Koechlin and Leon (2007) confirm that the effects of remittances on income inequality follow an inverted-U pattern. However, if higher-income households are not willing to supply migrants, then we should expect the relationship between remittances and inequality to be continuous, linear and inverse as only lower-income households attempt to access external sources of income. Indeed, according to Bang *et al.* (2016), "the impact [of remittances] is unambiguously greatest for poorer households" (p. 394).

Previous studies tend to confirm that there is a relationship between pre-migration income and migration decision. Giannetti *et al.* (2009) empirically found that in the case of Central-Eastern Europe (Czechia, Hungary, Poland and Slovenia), the odds ratio in favour of receiving remittances is higher for poor households. Concomitantly, we can refer to the studies of Piracha and Saraogi (2015) and Kumo (2011), which indicate that

in remittance-dependent countries (Moldova and Tajikistan), higher-income households are more likely to supply migrants and receive remittances.

Secondly, if the value of remittances received by higher-income households is persistently higher than their non-remittance income and they receive proportionately more remittances than lower-income households, then over time, remittances are expected to deteriorate the level of inequality in migrant-sending regions (Milanovic, 1987).

The next element of the remittances-inequality nexus is remittance propensity: characteristics of migrants and remittance-receiving households (Milanovic, 1987). Since the probability to send remittances is a function of various economic variables, the effects of remittances might vary. The significance of a specification selection is demonstrated by Barham and Boucher (1998): when migrant transfers are modelled in an exogenous setting, remittances tend to reduce income inequality and when domestic environments are explicitly considered, the relationship is inverse.

There is also a possibility that the relationship between remittances and income inequality is U-shaped. According to the cumulative causation theory of Myrdal (1957), emigration causes long-term damages to economic productivity and inflation levels of remittance-receiving communities. With the passage of time, remittance-dependent regions are trapped in the vicious cycle of poverty, which is characterized by increased inequality. Several studies based on data from the post-Soviet states have found that households receiving remittances are economically less efficient compared to the behaviour of households without remittances (Clement, 2011; Justino and Shemyakina, 2012). If we consider a short-run perspective, it has been shown that emigration can reduce income inequality due to a decrease in the domestic unemployment rate and an increase in the wage rate (Zaiceva, 2014).

3. Data, Measurement and Sources

The data for the research are obtained from several cross-country databases of economic indicators. The constructed dataset contains statistics over the period 1991–2014. To avoid short-term fluctuations peculiar to annual data and reduce the impacts of structural breaks due to discontinuities, the observations are averaged over 3-year periods. Table 1 provides a list of 27 examined countries. It is not possible to include all post-communist countries (such as Kosovo in the Balkans, and Turkmenistan and Uzbekistan in Central Asia) due to unavailability of data.

Table 1: List of countries investigated in the study

Balkans EU	Balkans non-EU	Baltics	Caucasus	Central Asia	Eastern Europe post-USSR	Visegrad Group
Bulgaria	Albania	Estonia	Armenia	Kazakhstan	Belarus	Czechia
Croatia	Bosnia and Herzegovina	Latvia	Azerbaijan	Kyrgyzstan	Moldova	Hungary
Romania	Montenegro	Lithuania	Georgia	Mongolia	Russia	Poland
Slovenia	North Macedonia	–	–	Tajikistan	Ukraine	Slovakia
–	Serbia	–	–	–	–	–

Source: Existing country groupings

3.1 Variables

We concentrate mainly on a single type of dependent variable – quantitative measures of income inequality. According to Deininger and Squire (1996), an indicator that is aimed to measure income inequality in a cross-country setting should: (i) be estimated using microdata from household surveys; (ii) be representative at the country level; (iii) be comprehensive and include all income sources. Using the Luxembourg Income Study as a benchmark, Solt (2016) provides a statistical measure of nations' income distribution (the Gini index) that satisfies these conditions.

Measuring income inequality is not a straightforward task and each empirical indicator has certain deficiencies. Even though the Gini index is the most prevalent inequality indicator, it has its own disadvantages that may prevent identifying true effects of remittances on income inequality. On this occasion, we also consider an alternative measure of income inequality, the Palma ratio. It is calculated by comparing the income of the richest 10% of the population with the income of the poorest 40%.[1] When the Palma ratio is compared with the Gini index, the emphasis is shifted from the middle class to the extremities of income distribution, introducing additional variation to the estimation (an illustration of these differences can be found in Cobham and Sumner (2013), Table 6).

The key independent variable is a measure of significance of remittances for the country's economy: personal remittances received from migrants abroad as a percentage of GDP. To allow comparability with the existing literature, as suggested by Koechlin

1 This particular specification is based on the observation that in most countries, the national income is equally concentrated between the 40th and 90th income percentiles, and among the richest 10% and the poorest 40% of the population (Cobham and Sumner, 2013).

and Leon (2007), in addition to remittances, we estimate income inequality as a function of national average income, democracy, economic growth, government spending, human capital and redistribution. Similarly, the selection of control variables is based on cross-country studies of the income inequality determinants (Anderson *et al.*, 2017; Chong and Calderon, 2000; Deininger and Squire, 1996). There is an option to include additional controls, but we specify the model with a limited number of regressors so as to achieve variability in the estimation. This is particularly because the available sample is limited by the number of countries in the region and the period of observation, and new variables and additional instruments would significantly reduce the degrees of freedom. Moreover, due to model uncertainty, there is a lack of consensus regarding the determinants of income inequality and which of the possible variables should be explicitly considered (Furceri and Ostry, 2019). As a result, previously derived conclusions about the effects of particular variables cannot be extrapolated to the post-communist region.

3.2 Data

The description of variables and respective statistics are presented in Table 2. Real GDP per capita is expected to measure a country's standard of living. In addition to the level effects, we also trace the changes in the GDP. The economic growth should reflect macroeconomic changes adequately since the variable is highly correlated with short-term shocks. In contrast, mean years of schooling lack this feature and can therefore be considered as a proper proxy for human capital and its accumulation process (Delgado *et al.*, 2013). There are several measures of democracy; the particular variable is selected for practical reasons: the FIW data are indexed and evidently interpreted. To capture the immediate and incidental effects of government policies to reduce income inequality, we also consider overall government spending and specific taxes and transfers that are aimed to reduce income inequality.

The sample is unbalanced. The baseline analysis is based on 169 observations and the number of observations per country is approximately 5.3; while in the case of alternative specifications, the respective estimations are based on more and fewer data points with a minimum value of 127. A reduction in the number of observations is caused by the use of lagged values and missing entries. There is also a high variability within the variables. Particularly, the range of certain variables is much higher than their mean.

Macroeconomic trends are verified by the collected dataset. The post-communist countries are characterized by lower within-country inequality in comparison with the unweighted average of all national Gini indices (Solt, 2016). When we consider the changes in statistics over the course of nearly 30 years, the average value of the Gini

index in the world has decreased slightly from 39.6 to 38.6 (Hasell, 2018); while in the post-communist states, the value has increased notably from 27.8 to 32.9. As for the dependence on international migrant transfers in these countries, it is much higher than the unweighted average remittances-to-GDP ratio in the world according to the WDI. The tendency is preserved if we consider the magnitude of changes: the global value of the remittances-to-GDP ratio varied around 0.5%, while the regional value increased from nearly 1% to 8%.

Table 2: Description of variables

Variable	Description	Source	Obs.	Mean	St. dev.
Gini index	Inequality index measured on a scale from 0 (perfect equality) to 100 (perfect inequality) of the aggregated household equalized disposable income	SWIID[1]	169	32.26	5.72
Palma ratio	Ratio of the share of the national income held by the richest 10% of the population divided by the share of the poorest 40%	WDI[2]	127	0.84	0.16
Remittances	Personal transfers and compensation of employees expressed as a percentage of GDP	WDI	169	5.43	8.19
Remittances²	Remittances as a percentage of GDP squared	WDI	169	96.13	270.19
ln(*Income*)	Natural logarithm of real GDP per capita at constant 2011 national prices	PWT[3]	169	9.27	0.64
Democracy	Composite measure of civil liberties and political rights	FIW[4]	169	2.94	1.62
Economic growth	Annual percentage growth rate of real GDP	WDI	169	3.83	4.61
Government	Government spending as a percentage of GDP	WDI	169	17.58	3.96
Redistribution	Relative difference between the Gini index of disposable and market income inequality due to taxes and transfers	SWIID	169	25.71	14.59
Education	Mean years of schooling	HDR[5]	169	10.57	1.24

Note: 1 Standardized World Income Inequality Database; 2 World Development Indicators; 3 Penn World Table; 4 Freedom in the World; 5 Human Development Reports

Source: Authors' own calculations

4. Estimation Strategy

After reviewing the literature, we do not exclude a possibility that the relationship between international remittances and income inequality can be nonlinear, and construct the empirical strategy accordingly. The chosen framework is adapted from Koechlin and Leon (2007) and represents a two-way error component model with the composite error term:

$$Y_{i,t} = \alpha + \beta_i X_{i,t} + \gamma_1 Rem_{i,t} + \gamma_2 Rem_{i,t}^2 + u_i + \varepsilon_{i,t} \quad (1)$$

where $Y_{i,t}$ measures income inequality for the period t in the country i, X is the set of controls and Rem and Rem^2 are the remittance variables.

However, the remittance variables might be endogenous in relation to fundamental macroeconomic variables due to a variety of reasons such as reverse causality (Adams and Page, 2005) or simultaneity (Rao and Hassan, 2011); to address this, we initially perform a regression with lagged explanatory variables. This might ensure that the causality originates from remittances to income inequality (Bellemare *et al.*, 2017):

$$Y_{i,t} = \alpha + \beta_i X_{i,t-1} + \gamma_1 Rem_{i,t-1} + \gamma_2 Rem_{i,t-1}^2 + u_i + \varepsilon_{i,t} \quad (2)$$

There are several estimation techniques that can be applied to Equation (2), fixed effects (FE) and random effects (RE) models being one of the standard choices. However, it is problematic to estimate Equation (1) with these models because inequality is usually persistent over time, causing the error term to be serially correlated (Koechlin and Leon, 2007). The bias caused by serial correlation can be avoided if we introduce lagged values of the dependent variable as an independent variable:

$$Y_{i,t} = \alpha + \theta Y_{i,t-1} + \beta_i X_{i,t} + \gamma_1 Rem_{i,t} + \gamma_2 Rem_{i,t}^2 + u_i + \varepsilon_{i,t} \quad (3)$$

There is still a high probability that $Y_{i,t}$ and $\varepsilon_{i,t}$ are correlated. Even if the assumption of exogeneity between the lagged value of the dependent variable and the error term is met, Monte Carlo simulations show that FE and RE models are inconsistent for panels that have a small number of time periods and are persistent over time (Forbes, 2000). Since data for the post-communist countries are limited by the presence of missing values and there are only 8 periods when the observations are averaged, the likelihood that static regression methods generate inconsistent estimates is high; and thus, we should also consider a dynamic configuration.

4.1 System GMM estimation

This study uses a dynamic panel data estimator introduced by Arellano and Bond (1991) to tackle the above-mentioned issues and ensure that the estimates are robust. At the basics, the proposed technique accounts for country-specific fixed effects by taking first differences of the variables:

$$\Delta Y_{i,t} = \theta \Delta Y_{i,t-1} + \beta_i \Delta X_{i,t} + \gamma_1 \Delta Rem_{i,t} + \gamma_2 \Delta Rem_{i,t}^2 + \Delta \varepsilon_{i,t} \quad (4)$$

Even after differencing, the possibility of initial endogeneity is still present. The solution is to construct internal instrumental variables from the lagged values of the introduced variables with the purpose of uncovering exogenous variation in data. If the initial error term is truly idiosyncratic, the instruments are thought to be relevant and exogenous with respect to the differenced, lagged variables and the new error term.

The system generalized method of moments (GMM) approach is an appropriate choice in this case as it uses a combination of difference and level equations (Law *et al.*, 2018). This model estimates equations in differences and levels at the same time via unique GMM-style instruments for each equation (Koechlin and Leon, 2007). These instruments are lagged levels for the equation in differences and lagged differences for the equation in levels. The standard form of instrument generation may significantly increase the number of instruments. Hence, as suggested by Lee and Song (2016), we 'collapse' the instrument set to reduce over-fitting bias. To account for the differences between countries, we augment the model with region indicator variables.

Despite the stated advantages, the consistency and robustness of the GMM estimation are highly dependent on the validity of certain assumptions. For this, we consider two specification tests: the Sargan test of overidentifying restrictions and the serial correlation test.

4.2 U-test

The inclusion of a quadratic term in a regression model has become a conventional approach of detecting the existence of a nonlinear relationship between variables. However, in certain cases, this method might provide incorrect results. For example, when "the true relationship is convex but monotone over relevant data values", the standard quadratic specification might actually yield a maximum point (Lind and Mehlum, 2010, p. 110).

Instead, we use the new test proposed by Lind and Mehlum (2010) with explicit considerations of necessary and sufficient conditions to detect nonlinear relationships. For this test, we should return to a basic nonlinear formulation of Equation (1):

$Y_{i,t} = ... + \gamma_1 Rem_{i,t} + \gamma_2 f(Rem_{i,t}) + ...$. Depending on the characteristics of f, we can expect the relationship to be linear or nonlinear. Initially, we consider a U-shaped type of nonlinearity and test whether the estimates are in line with the specified condition or the association is inversely U-shaped or monotone.

The prerequisite for the convex shape is that the effects of remittances should be negative at low values of the remittances-to-GDP ratio (Rem_l) and transform to being positive at higher values (Rem_h). Additionally, it is necessary for f' to be monotone in the chosen interval to confirm that at most one extreme point is observed in $[Rem_l, Rem_h]$. Then, we can impose a condition when the relationship is U-shaped:

$$\gamma_1 + \gamma_2 f'(Rem_l) < 0 < \gamma_1 + \gamma_2 f'(Rem_h) \tag{5}$$

This condition can be verified by the test of linear restrictions on γ with the null hypothesis of $((\gamma_1 + \gamma_2 f'(Rem_l) \leq 0), (\gamma_1 + \gamma_2 f'(Rem_l) \geq 0))$ and the alternative hypothesis of $((\gamma_1 + \gamma_2 f'(Rem_l) < 0), (\gamma_1 + \gamma_2 f'(Rem_l) > 0))$.

5. Empirical Results

5.1 Fixed effects regressions

As in Koechlin and Leon (2007), to eliminate the effects of country-specific characteristics which might determine the structure of within-country income distribution, we only consider a FE model. The results of the FE regressions for the Gini index are reported in Table 3. Since there is a time lag between remittances and inequality, rather than interpreting the coefficients of estimates, we concentrate on the direction and strength of the relationship. Given the respective signs and statistical significance of the variables of interest, we can conclude that remittances and income inequality progress according to a U-shaped trajectory. We can see that the sign of the linear term is negative, while the quadratic term is positively connected with the Gini index. Even though the effects of both variables are statistically significant, in the case of the quadratic term, the magnitude is less pronounced. Consequently, the income-equalizing effects of remittances are relatively high at low values of the remittance variable.

To evaluate whether the relationship between remittances and income inequality is robust with respect to various combinations of control variables, each covariate is introduced gradually in Table 3. Column (1) presents a correlation between remittances and income inequality, which is shown to be negative for low values of remittances and positive for high values. In Column (2), we include a measure of redistribution. The results indicate that redistribution policies can indeed reduce income inequality. Column (3)

provides the results when a measure of human capital is included. In this case, the impact of the new covariate is not statistically significant. This might be explained by the specific characteristics of the region: over the communist period, these countries could achieve high levels of education (Pop-Eleches, 2014) and the variation in mean years of schooling between countries is insignificant. In Columns (4) and (5), we additionally consider the effects of GDP per capita and GDP growth. Both variables are characterized by negative and statistically significant coefficients. The result is in contrast with the empirical evidence provided by Koechlin and Leon (2007). This might indicate that the post-communist countries could foster inclusive economies. In Column (6), the regression also controls for the effects of democracy. Given the results, it is suggested that higher levels of democracy do not necessarily result in lower levels of income inequality. This finding is similar to the conclusion of Medve-Balint and Boda (2014) that in East-Central Europe "relatively low inequality is accompanied by low levels of institutional trust" (p. 419). After explicitly considering the effects of democracy, the impact of economic growth becomes insignificant, possibly indicating that the previously observed inverse relationship is caused by institutional differences across countries. Therefore, a further investigation is required to reveal the true association between economic growth and income inequality. Finally, Column (7) reports the results of the regression with government spending. To explain the insignificance of the government spending variable, we can refer to the meta-regression study of Anderson *et al*. (2017), where it is shown that the impact of government spending on income inequality is generally moderate and depends on the choice of empirical specification. Overall, even after conditioning on the conventional determinants of income inequality, the effects of remittances remain unaffected and similar to Column (1).

Although some of the coefficient estimates are not statistically significant based on conventional confidence limits, the FE specification actually yields a relatively high value of R^2 for the panel with a relatively small number of countries and time periods. We attribute the remaining part of the variation in the dependent variable to time-invariant, country-specific effects.

We can now plot the progression of exposure to remittances over time and investigate the effects of remittances in each country. Figures A1–A7 (Appendix) present time-series plots of the remittances-to-GDP ratio (to construct comparable samples for the regressions, several plotted data points were not considered previously). Based on the Gini index estimations, we can conclude that the remittances-to-GDP ratios for Bosnia and Herzegovina, Kyrgyzstan, Moldova and Tajikistan reach the turning point. Also, in the case of Albania, Armenia and Georgia, the income-equalizing effects of remittances are low. For the remaining countries, the value of the remittances-to-GDP ratio is lower than 10% and the effect of the positive quadratic term therefore becomes

negligible. However, the exposure to remittances is too low in certain countries and actual capacity of remittances to reduce income inequality is observed in the case of Balkans EU, Baltics and Visegrad Group.

Table 3: FE regressions with lagged independent variables (Gini index)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Remittances	−0.215*** (3.54)	−0.174*** (2.92)	−0.182*** (2.96)	−0.216*** (3.72)	−0.202*** (3.52)	−0.191*** (3.48)	−0.181*** (3.29)
Remittances²	0.0034** (2.41)	0.0022* (1.80)	0.0024* (1.86)	0.0029** (2.41)	0.0028** (2.34)	0.0028** (2.48)	0.0025** (2.13)
Redistribution	– –	−0.313*** (3.40)	−0.257** (2.76)	−0.330*** (3.84)	−0.348*** (4.51)	−0.315*** (3.52)	−0.318*** (3.61)
Education	– –	– –	0.121 (0.35)	0.299 (0.97)	0.316 (1.20)	0.344 (1.33)	0.445 (1.65)
ln*(Income)*	– –	– –	– –	−3.263* (2.05)	−4.278** (2.53)	−3.632** (2.29)	−3.647** (2.37)
Economic growth	– –	– –	– –	– –	−0.088* (1.72)	-0.066 (1.32)	−0.074 (1.58)
Democracy	– –	– –	– –	– –	– –	−0.525** (2.17)	−0.569** (2.31)
Government	– –	– –	– –	– –	– –	– –	0.077 (1.16)
Constant	32.05*** (30.33)	41.79*** (13.89)	38.73*** (13.77)	68.75*** (4.70)	78.51*** (4.96)	73.07*** (4.66)	70.91*** (4.49)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs. per country	5.30	5.30	5.30	5.30	5.30	5.30	5.30
R^2(within)	0.14	0.34	0.29	0.36	0.39	0.43	0.45

Note: Robust t-statistic in brackets; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' own calculations

5.2 System GMM regressions

Since FE estimations might be biased, we also present the results of the system GMM approach in Table 4. As we expect a reduction in the degrees of freedom, we only consider income per capita as a proxy for economic development and stability. Before proceeding

to the actual results, it is necessary to check validity of the instruments and ensure consistency of the system GMM estimation. We can see that the dynamic regression estimations are in line with the specification tests. Therefore, the lagged values of variables should serve as valid instruments and the obtained system GMM estimators can be considered to be consistent. However, the GMM estimation is redundant if there is no need to address the problems of endogeneity caused by serial correlation. Income inequality measured by the Gini index can be regarded as a persistent time series as illustrated by statistical significance of the lagged Gini index, indicating that the dynamic specification is relevant.

Turning to the variables of interest, it is clear that the estimated coefficients of remittances are similar to the results of the FE specification, although the impact of remittances in the case of both linear and quadratic coefficients intensifies slightly. On average, a percentage point increase in remittances in proportion to GDP is associated with a 0.25-unit decrease in the Gini index. The inequality-reducing effect of remittances reaches a peak approximately when the value of the remittances-to-GDP ratio is 20%. After this point, an increase in remittance inflows is associated with an increase in income inequality. At first glance, the percentage may seem high, but the derived turning point is within the data range, confirming the convex relationship hypothesis. The derived results highlight a notable capacity of remittances to reduce within-country inequalities; however, given the standard deviation of the Gini index, remittances are less likely to reduce between-country income inequality. Not only is there a change in the magnitude of the variables, but also the respective statistical significance increases. Overall, the system GMM results show that even after accounting for the endogeneity of remittances, the relationship between remittances and income inequality remains U-shaped.

The FE and system GMM regressions are also comparable in terms of control variables. It can be observed that the GDP per capita in real terms appears to be associated with the Gini index in a strongly negative way. For every additional percentage increase in the GDP per capita, the Gini index would decrease by approximately 0.024 units. By the same token, as redistribution taxes and transfers in particular and government spending in general increase by a percentage point, the Gini index would decrease by 0.04 and 0.056 units respectively. Even though we cannot meaningfully interpret the coefficient of the categorical democracy variable, we can still conclude that the correlation between democracy and income inequality is positive. As in the FE estimation, the effects of mean years of schooling remain statistically insignificant.

In the second column of Table 4, we present the re-estimated system GMM regressions with the Palma ratio as a measure of income inequality. Despite a notable decrease in the statistical significance of the estimated coefficients, the pattern

of income inequality progression is preserved and confirms the main results. We explain the differences in the observed magnitudes by the standardization that is conducted in the process of constructing the Gini index (Solt, 2016); conversely, to generate the Palma ratios, we use unprocessed income data from the WDI. The changes may also be explained by the limited data coverage and subsequent sizeable reduction in degrees of freedom.

Table 4: System GMM regressions

	Gini index	***Palma ratio***
lag(*Gini index*)	0.644*** (7.62)	– –
lag(*Palma ratio*)	– –	0.414*** (2.60)
Remittances	−0.339*** (4.17)	−0.036*** (3.12)
Remittances²	0.0084*** (4.00)	0.0007*** (2.67)
Redistribution	−0.0399*** (3.07)	0.0003 (0.20)
Education	0.009 (0.10)	0.025 (1.49)
ln*(Income)*	−2.379*** (5.59)	−0.212*** (2.61)
Democracy	−0.374*** (3.45)	−0.015 (1.17)
Government	−0.056** (2.19)	0.002 (0.40)
Constant	37.01*** (5.46)	2.26*** (2.98)
Time effects	Yes	Yes
Region effects	Yes	Yes
Sargan test: *p*-value	0.21	0.17
AR(1) test: *p*-value	0.03**	0.02**
AR(2) test: *p*-value	0.21	0.88
Obs. per country	5.56	3.00

Note: z-statistic in brackets; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' own calculations

The Palma ratio results provide evidence for the hypothesis that the observed income inequality series tends to depend on its lagged values, indicating that income inequality is persistent over time. Moreover, the assumptions required for the appropriate specification of the system GMM model hold. The results also confirm that the relationship between remittances and income inequality is U-shaped. Particularly, the sign of the linear term is negative, and the sign of the quadratic term is positive; in both cases, the null hypothesis of "no effect" is rejected. The linear and quadratic terms are less marginally significant, generating a higher value of the turning point (25%). The percentage is still within the boundaries of the observed data. On average, a percentage point increase in the remittances-to-GDP ratio is associated with a 0.03 percentage point decrease in the Palma ratio. Given the lower value of the standard deviation, the between-country inequality-reducing effect of remittances on the Palma ratio is more pronounced than in the case of the Gini index. As for the control variables, the impact of national income is still negative and statistically significant. However, the variable is a less important determinant of income inequality when compared to the specifications with the Gini index, both in terms of statistical significance and magnitude of the estimate. The impacts of the remaining covariates are not statistically significant.

5.3 Robustness tests

As a first robustness test, we examine whether the previously derived conclusions about the U-shaped relationship are in line with necessary and sufficient conditions to observe this type of nonlinearity. The results of the U-test based on the system GMM estimation are presented in Table 5. Given the significance of the overall test statistics, we can reject the hypothesis of linearity and concavity in favour of convexity. The presented differences in the signs of the lower and upper bound slopes highlight the changing nature of the relationship between remittances and income inequality. The reported interval for the estimation is taken as the data range; the results of the test are also robust within other artificially set intervals.

Table 5: U-test

	Gini index	***Palma ratio***
T-statistic	3.78***	2.08**
Lower bound slope	−0.338	−0.036
Upper bound slope	0.392	0.027

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' own calculations

It is also necessary to check whether the impact of remittances varies across different economic environments. In this regard, we evaluate the association between remittances and income inequality for several sub-samples based on the level of GDP. We assume that various economic settings can be characterized by or result from different levels of economic development. The initial sample is divided into 3 groups such that the next in the order comprises countries with a higher level of income than the previous one. The lower-income group includes observations approximately in the 30th percentile, the middle-income group is based on the 70th percentile and the highest-income group comprises the top 30%. The separating income values are USD 9,200 and USD 18,400. As the number of observations decreases significantly, we only estimate a FE model and consider the Gini index. The results of the estimations, presented in Table 6, are in line with the full-sample results. Although the magnitude of coefficients differs from the previous estimations, the relationship is convex and statistically significant in each case.

Table 6: Split-sample regressions by income level (Gini index)

	Lower	Middle	Higher
Remittances	−0.110*** (3.41)	−0.195** (2.90)	−1.789*** (3.35)
Remittances²	0.002** (2.19)	0.003** (2.08)	0.245*** (3.22)
R^2(within)	0.78	0.65	0.85
Observations	44	100	42

Note: Robust t-statistic in brackets; regressions include controls; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
Source: Authors' own calculations

6. Conclusions

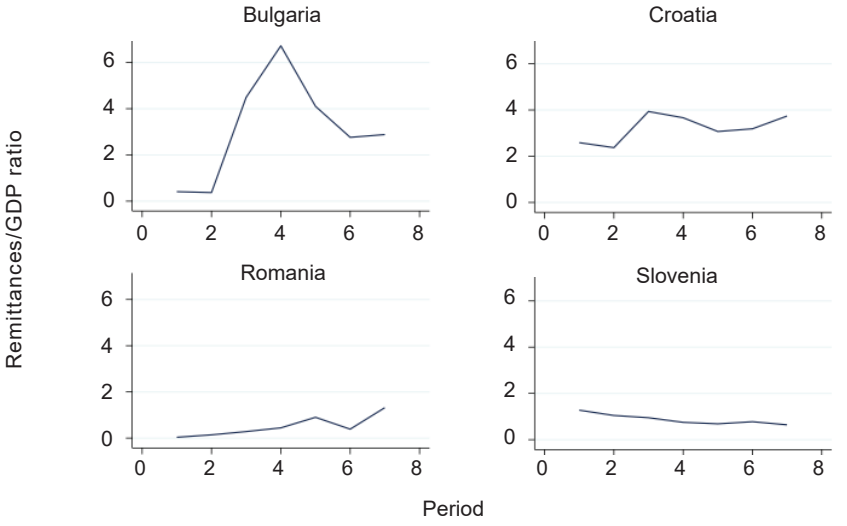
Despite the increasing significance of remittances for the economies of developing and emerging countries, existing studies on the relationship between income inequality and remittances have been conducted mainly for a relatively small number of countries and offer diverging conclusions. Also, limited research has been done to study the remittances-inequality association beyond linear specifications. To contribute to the existing knowledge about this relationship, we investigate empirically in a nonlinear setting how international remittances affect the income inequality

patterns in migrant-sending communities in a comparatively less explored region, composed of post-communist countries. The specific characteristic of this study is that the collected sample centres on a new type of economic system, the transition economies, that emerged at the beginning of the 1990s.

The empirical findings based on data from 27 post-communist states over the period 1991–2014 suggest that the advancement of income inequality with respect to remittances has a U-shaped pattern. This challenges the view that remittances ought to decrease income inequality in remittance-receiving countries via inverted-U or inverse linear associations. Considering the effects of remittances, we can elaborate that the relationship between remittances and income inequality depends on the level of exposure to remittances. After analysing previous literature and derived results, we can hypothesize that in the remittance-receiving, post-communist countries with low economic dependence on remittances (EU states such as the Baltic, Balkan and Visegrad Group countries), remittances are expected to reduce income inequality due to a combination of two effects: remittances are mostly skewed in favour of lower-income households and the distortionary nature of migration does not materialize. Therefore, policy responses to poverty and inequality should be planned and implemented in a manner that ensures the existing effects of remittances are not altered. In contrast, remittances exert a negative influence on income inequality where remittance flows account for a relatively large proportion of the national income (lower income post-Soviet and Balkan countries such as Kyrgyzstan, Moldova, Tajikistan and Bosnia and Herzegovina). This might be happening because higher-income households mainly supply migrants and receive remittances, and there is a tendency for 'non-productive' use of remittances. In this case, the respective country is also predicted to stagnate economically, causing a persistent difference between external remittance income and domestic earnings. Accordingly, in addition to policies aimed at increasing income of the poor, a specific attention should also be paid to prevalent uses of remittances, for instance, by establishing a favourable economic environment so that more households are motivated to save and invest.

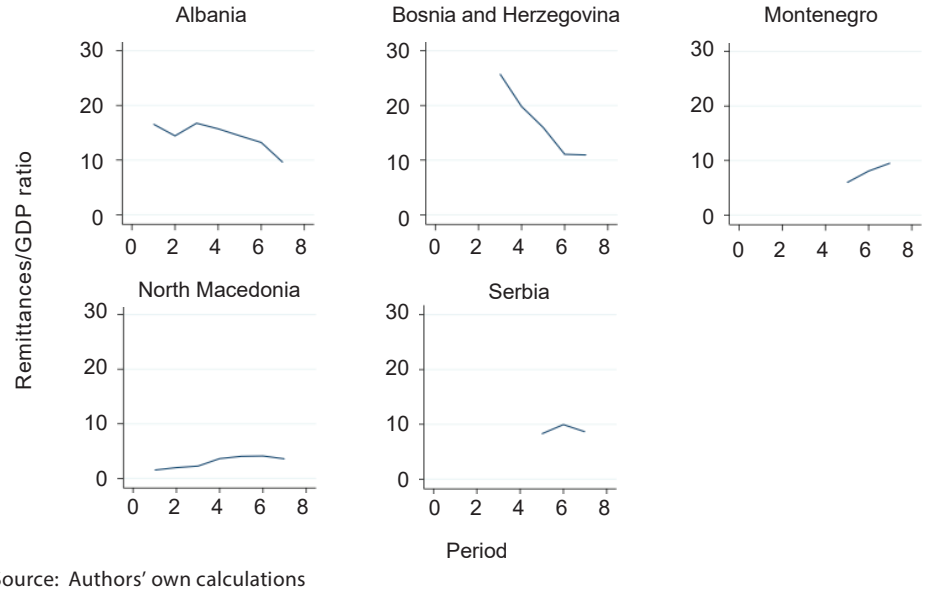
Appendix

Figure A1: Exposure to remittances, Balkans EU



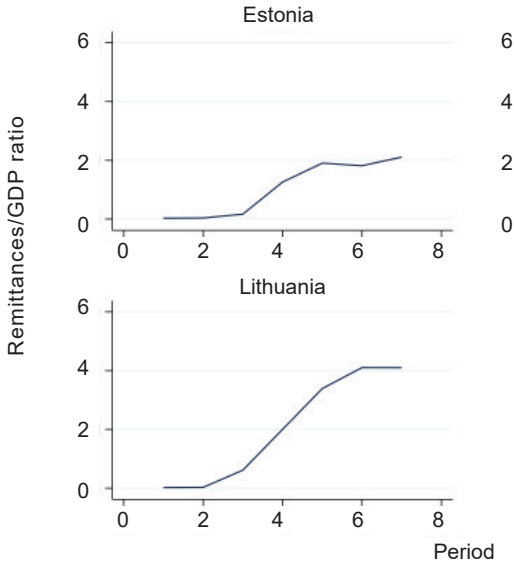
Source: Authors' own calculations

Figure A2: Exposure to remittances, Balkans non-EU



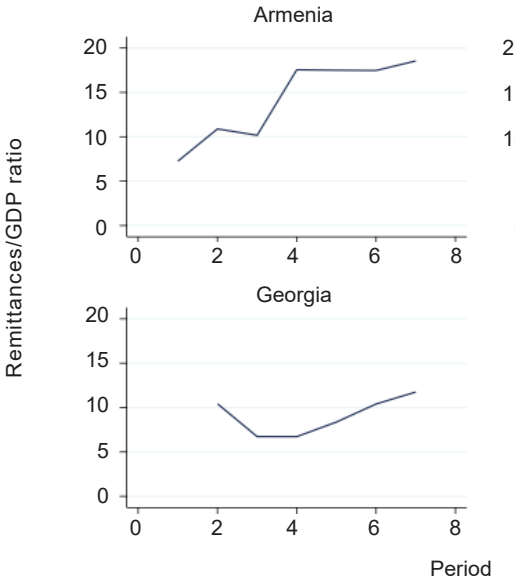
Source: Authors' own calculations

Figure A3: Exposure to remittances, Baltics



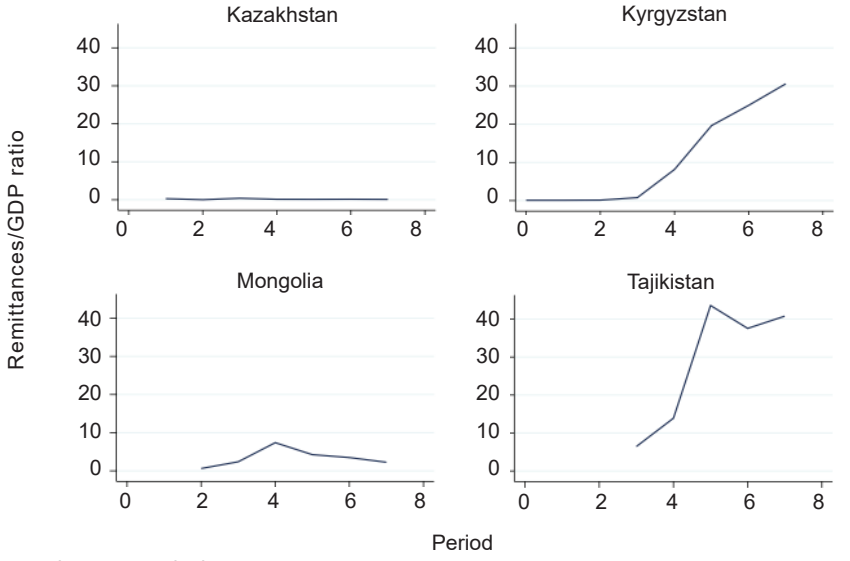
Source: Authors' own calculations

Figure A4: Exposure to remittances, Caucasus



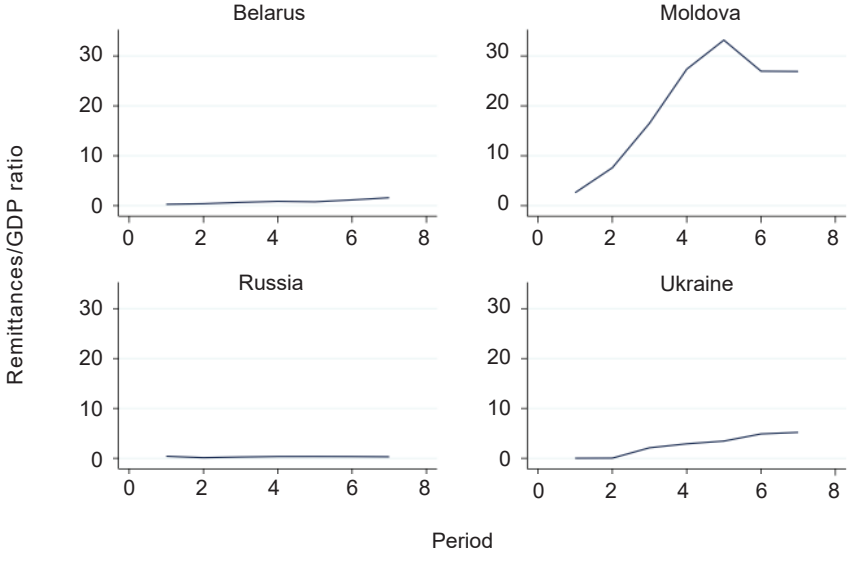
Source: Authors' own calculations

Figure A5: Exposure to remittances, Central Asia



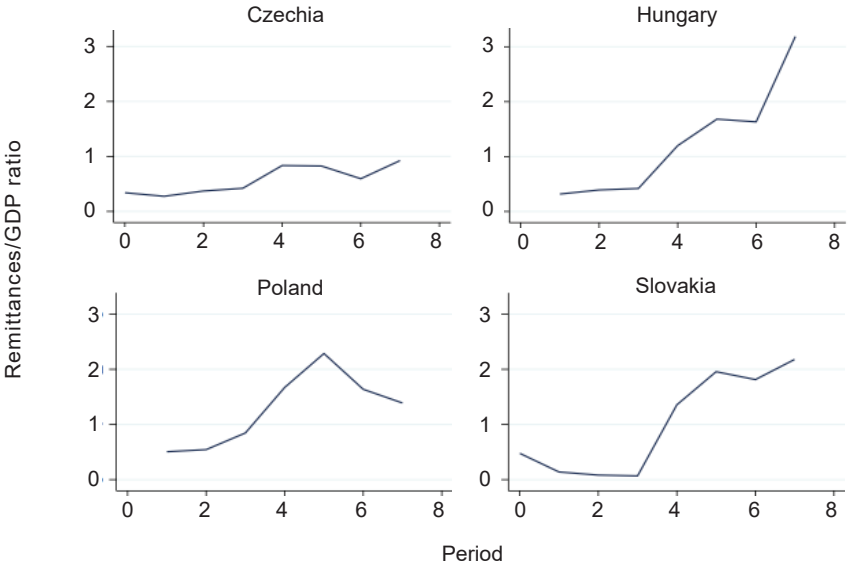
Source: Authors' own calculations

Figure A6: Exposure to remittances, Eastern Europe post-USSR



Source: Authors' own calculations

Figure A7: Exposure to remittances, Visegrad Group



Source: Authors' own calculations

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