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Remittances and financial development in transition economies

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1. Introduction

The enormous scale and remarkable growth of remittances to developing and transition economies in the last decade have attracted the attention of policy-makers and scholars. Ten years ago, recorded remittances to the developing world stood at US\$145 billion (World Bank 2006), but by 2016, the inflow of recorded remittances to developing countries had tripled, reaching US\$441 billion (Ratha et al. 2016). In some developing countries, recorded remittances now exceed foreign direct investment (FDI) and compete with exports as a source of foreign exchange revenue (Figure 1), even though a sizeable number of remittances are not recorded (Freund and Spatafora 2008).

A broad region in which remittances have been growing and having significant impacts on local economies is Central and Eastern Europe and the former Soviet Union. Remittance flows to the developing countries of Europe and Central Asia reached \$43 billion in 2013 (World Bank 2014b) and accounted for about 10 percent of the total remittance flows to developing countries. In the same year, the rate of growth in remittances to the developing countries of Europe and Central Asia reached 13 percent (World Bank 2014b). However, the growth rate of remittances in the region has been uneven in recent years because of the turmoil in Ukraine and the economic slowdown in Russia. In many of Europe's and Asia's transition economies, remittances constitute a significant part of GDP and may have a noticeable impact on several aspects of economic development.

Figure 1. Inflows to Central and Eastern Europe, Mongolia, and the former Soviet Union (% of GDP), 2001-2012

Data source: World Development Indicators (World Bank)

Migration and remittances have been important parts of the transition process in Central and Eastern Europe, with growth in migration and remittances in the former Soviet Union especially spectacular in recent years. Cross-border transfers from Russia to the ten countries of the Commonwealth of Independent States (CIS) and Georgia reached US\$21.6 billion in 2013, up from US\$8.6 billion in 2007 (Central Bank of Russia 2014).¹ By the end of the first decade of the twenty-first century, Russia had become one of the world's top five remittance-sending countries (World Bank 2011), and some remittance corridors from Russia to former Soviet countries had come to be among the largest "south-south" remittance corridors (Ratha 2006).

Remittances have facilitated the development of the financial sector in the former Soviet Union by prompting the development of sophisticated Money Transfer Operators (MTOs). Opening money-transfer markets for foreign and regional players has fostered healthy competition, and the cross-border money-transfer fees have come down markedly (Central Bank of Russia 2009, 2012). However, some experts argue that the contribution of remittances to the development of the national economies has been less than notable (Marat 2009). Anecdotal evidence suggests that opening a small retail outlet, buying an apartment and renting it out, opening a small internet cafe or restaurant, and buying a car to use as a taxi cab are the usual limits of investment for migrants investing in their home countries in the former Soviet Union. On the surface, it appears that local industries, large businesses, and infrastructure receive little benefit from remittances.

The primary purpose of this paper is to estimate empirically the impact of remittances on the financial development of Central and Eastern Europe, Mongolia, and the former Soviet Union. Arguably, cross-country studies that estimate average coefficients may produce erroneous results because this methodology may fail to reveal the diverse remittance flow patterns in the individual countries in a sample (Sayan 2006). The present paper contributes to the literature by focusing on a homogeneous set of transition countries with similar economic histories and significant cultural ties, thereby mitigating this heterogeneity problem. Moreover, this study focuses on a region where financial development took place simultaneously with the development of the typical financial institutions of a market economy. This allows us to see how remittances impact financial development in this unique situation. The financial systems of the countries under investigation in this study developed from one common ground: the ruins of the communist system, where the monobank financial system was prevalent.

¹ Russia is the main source of remittances for CIS countries and Georgia, accounting for 60-90 percent of the total remittances. See for details (Kakhkharov and Akimov 2015).

However, unlike other post-communist countries of Central and Eastern Europe, the post-Soviet republics (with the exception of Baltic states) had longer exposure to the monobank system, which resulted in much worse initial conditions for the beginning of financial reforms (Akimov and Dollery 2007; Ruziev and Ghosh 2009). Finally, the paper uses novel, high-quality data on bilateral remittances from Russia to the former Soviet Union to investigate their impact on a subsample of transition economies.

In investigating the link between remittances and financial development, this paper employs two panel data techniques to reveal that remittances have a significant positive impact on financial development. This impact is especially strong when the analysis uses high-quality data on bilateral remittances in the subsample of transition countries with a high ratio of remittances to GDP and a low level of institutional development in their financial sectors. Another important finding is that the impact of remittances on credit-related indicators of financial development is stronger than the impact on deposit-related measures.

The rest of the paper is organized as follows. Section 2 provides a backdrop for modelling the impact of remittances on the financial systems of the recipient economies in Central and Eastern Europe and the former Soviet Union. Section 3 briefly reviews literature on remittances and financial development. Section 4 describes the data and the methodology used. Section 5 presents and discusses the results of the study. Finally, section 6 draws conclusions based on the empirical findings.

2. Remittances and the financial systems in the transition countries of Central and Eastern Europe and the former Soviet Union

The significance of remittances for the individual countries in the region varies across the transition countries' economies, but it differs widely for the two major subgroups in the region: CIS (including Georgia) and the rest of the transition economies. According to the World Bank remittance database, the smallest ratio of remittances to GDP in 2013 was in Kazakhstan (0.1%), whereas the largest was in Tajikistan (52%). In Central and Eastern Europe, the Czech Republic's ratio of remittances to GDP was the smallest (1%), and Bosnia-Herzegovina was the largest (10.8%) (World Bank 2014a). Examining remittance inflows in Central and Eastern Europe and the former Soviet Union, Shelburne and Palacin (2008) concluded that the ratio of remittances to GDP is mainly associated with the countries' per-capita incomes, such that poorer countries have more remittance inflows than richer ones do. The scatter plot in Figure 2 depicts the relationship between GDP per capita and the ratio of remittances to GDP in Central

and Eastern Europe, Mongolia, and former Soviet Union; each dot representing a country in a certain year.

Figure 2. Relationship between GDP per capita and the ratio of remittances to GDP, 1995-2012

Data source: World Development Indicators (World Bank)

In this paper, the full sample and one subsample are analysed separately. Averages for the ratio between remittances and GDP are presented in Table 1.

Table 1. Average share of remittances in GDP, 1996-2013

Subgroup	Central and Eastern Europe, former Soviet Union, and Mongolia (complete sample)	The CIS and Georgia (excluding Uzbekistan and Turkmenistan)
Mean	6.66%	9.76%
Median	3.26%	4.79%

Source: based on data from International Financial Statistics (IFS) of International Monetary Fund (IMF) and World Development Indicators of World Bank.

An examination of the World Bank database of bilateral remittances (World Bank 2013) shows that the sources of remittances for the two regions also differ. While Russia is by far the most important remittance source for the former Soviet Union, the sources of remittances for the rest of the transition countries in the sample are diverse. The main sources of remittances for Central and Eastern Europe and Mongolia are Germany, the US, the UK, Greece, Italy, Canada, Australia, Spain, and Turkey.

There are differences in the patterns of how various groups of migrant workers transfer money to their home countries. Transfers through MTOs like Western Union, MoneyGram, and especially the regional market players in the money transfer market have become the most frequent, the most convenient, and the cheapest way to transfer money in the CIS countries (Kakhkharov and Akimov 2015; Kakhkharov et al. 2017; Shelburne and Palacin 2008). In Central and Eastern Europe, other channels for transferring funds through banks, and particularly informal transfers, are more popular, as they account for up to half of total transfers (de Luna-Martinez et al. 2006; Hernandez-Coss 2006; Mansoor and Quillin 2006).

Although most of the post-Soviet economies have gradually embraced reforms in their financial sectors, the degree of success differs from country to country. Tables 2 and 3 illustrate the differences in the development of the financial sectors in transition economies.

Table 2. Financial sector transition indicators of selected former Soviet transition countries in 2012.

Financial sectors (across)/Countries (down)	Banking	Insurance and other financial services	MSME finance	Private Equity	Capital markets
Armenia	2+	2	2+	1	2
Azerbaijan	2	2	2	1	2-
Georgia	3-	2	3-	1	2-
Kyrgyzstan	2	2-	2-	1	2-
Moldova	2+	2+	2	2-	2+
Russia	3-	3-	2	2+	4-
Tajikistan	2	2-	1	1	1
Ukraine	3-	2+	2	2	3-
Uzbekistan	1	2	1	1	1

Data source: Transition Report (EBRD 2012). Note: The transition indicators range from 1 to 4+, with 1 representing little or no change from a rigid, centrally planned economy, and 4+ representing the standards of an industrialised market economy.

Table 3. Financial sector transition indicators of selected Central and Eastern European transition countries in 2012.

Financial sectors (across)/Countries (down)	Banking	Insurance and other financial services	MSME finance	Private Equity	Capital markets
Albania	3-	2	2+	1	2-
Bulgaria	3	3+	3-	3-	3
Hungary	3+	3	3	3	3+
Poland	4-	4-	3	3+	4
Romania	3	3+	3-	3-	3
Slovak Republic	4-	3+	3+	2+	3
Slovenia	3	3	3	3-	3

Data source: Transition Report (EBRD 2012). Note: The transition indicators range from 1 to 4+, with 1 representing little or no change from a rigid, centrally planned economy, and 4+ representing the standards of an industrialised market economy.

Despite scoring lower than the Central and Eastern European countries for transition indicators, the countries of the former Soviet Union enjoy a higher level of remittances than other countries from the communist camp do. How this higher level of remittances, paired with the lower level of development of financial institutions, impacts financial development is one of the puzzles investigated in the present paper.

3. Remittances and Financial System: Theoretical Debate and International Evidence

A spectacular rise in international remittances has resulted in a flurry of research aimed at analysing the impacts of these transfers on various economic variables, including those related to financial development. Although many studies have found evidence of the positive relationship between remittances and financial development in cross-country studies (Aggarwal et al. 2011; Gupta et al. 2009), some researchers posit certain reservations regarding the favourable impact of remittances on financial development (Brown et al. 2013; Coulibaly 2015). The country level inquiries into the link between remittances and financial development also yield contradictory results. For example, Chowdhury (2011) examines the relationship between remittances and financial development in Bangladesh using annual data for 1971–2008. The results suggest that remittances have a significant positive effect on financial development. However, Motelle (2011), in the case of Lesotho, comes to conclusion that remittances do not cause financial development. Anzoategui et al. (2014) study the impact of remittances on households' use of savings and credit instruments from formal financial

institutions using household-level survey data for El Salvador and find that although remittances have a positive impact on the use of deposit accounts, they do not have a significant effect on the demand for and use of credit from formal institutions.

Furthermore, on the one hand, some researchers have found empirical evidence of economic growth being facilitated by the positive impact of remittances in combination with well-developed financial systems (Bettin and Zazzaro 2012; Mundaca 2009; Noman and Uddin 2011) in Latin America, Sub-Saharan Africa, and Asia. On the other hand, Giuliano and Ruiz-Arranz (2009) research indicates that remittances boost growth in countries with less developed financial systems by providing an alternative way to finance investment and helping overcome liquidity constraints. Investigating the remittances and financial development nexus from a slightly different angle, Cooray (2012) finds that migrant remittances contribute to increasing the size and efficiency of the financial sector in a sample of 94 non-OECD economies. In addition, the results of the study suggest that remittances lead to larger increases in financial sector size in countries in which the government ownership of banks is lower, and increases in efficiency in countries in which the government ownership of banks is higher.

In summary, the literature on the impact of remittances on financial development in various regions is not conclusive. Whether and how remittances might affect financial development is unclear. A rise in remittances may increase funds potentially available for banks to tap and convert into credits. Moreover, households in receipt of remittances through banks may become more familiar with the banking sector through their exposure to banking remittance services. This, in turn, can generate demand for bank loans and spur financial development. However, if remittance beneficiaries distrust financial institutions, which seems to be the case in at least some of the post-Soviet countries (Kakhkharov 2016), this may not result in increase in deposits. In addition, remittances may not contribute to credit expansion, if they crowd out credit from financial institutions. In other words, households may rely on remittances instead of borrowing funds from banks to finance their investments.

Table 4. A summary of empirical literature on the link between remittances and financial development

Author (s)	Method	Data	Findings
Aggarwal et al. (2011)	Panel techniques	data 109 developing countries	Positive, significant and robust link between remittances and financial development in developing countries.
Ahamada and Coulibaly (2011)	Panel techniques	data 87 emerging and developing countries	A high level of financial development in remittance recipient countries allows remittances to have a stabilizing effect on GDP growth.
Anzoategui et al. (2014)	Panel techniques	data El Salvador	Although remittances have a positive impact the use of deposit accounts, they do not have a significant and robust effect on credit.
Bettin and Zazzaro (2012)	OLS and GMM	System 66 developing countries	The impact of remittances on economic growth is negative in countries where bank efficiency is low.
Brown et al. (2013)	Probit and IV	Azerbaijan and Kyrgyzstan	Some evidence of a positive, albeit weak, relationship for Kyrgyzstan and a strong perverse relationship in Azerbaijan.
Chowdhury (2011)	Cointegration VECM	and Bangladesh	Remittances have a significant positive effect on financial development
Cooray (2012)	OLS and GMM	System 94 non-OECD economies	Remittances lead to larger increases in financial sector size in countries in which the government ownership of banks is lower, and increases in efficiency in countries in which the government ownership of banks is higher.
Coulibaly (2015)	Panel causality based Seemingly Unrelated Regressions	Granger tests Sub-Saharan African countries.	There is no strong evidence supporting the view that remittances promote financial development in SSA countries.
Giuliano and Ruiz-Arranz (2009)	OLS and GMM	System 100 developing countries	Remittance inflows are positively associated with economic growth only in countries where financial systems are not well developed
Gupta et al. (2009)	Panel techniques	data 24 countries from sub-	Remittances have a direct poverty-mitigating effect and promote

Author (s)	Method	Data	Findings
Saharan Africa financial development			
Motelle (2011)	Granger causality test and VECM	Lesotho	Remittances tend to have a long run effect on financial development; however, they do not cause financial development.
Mundaca (2009)	System GMM	25 countries of Latin America and Caribbean	Making financial services more available should lead to better use of remittances, thus boosting growth in these countries.
Noman and Uddin (2011)	Multivariate Granger causality tests and VECM	India, Lanka, Pakistan, Bangladesh	Sri- Remittances and banking sector development do have an impact on growth

4. Data and Methodology

The data set for this research endeavour covers twenty-seven countries, and the period is from 1996 to 2013. The main data sources for this study are the IMF Balance of Payments statistics, IMF IFS, and World Bank World Development Indicators (WDI).

The Balance of Payments statistics in some cases may suffer from inconsistencies and errors (Kakhkharov and Akimov 2015), so the data from the Central Bank of Russia on bilateral remittances from Russia to the CIS countries and Georgia via MTOs and postal services is also used for robustness checks of the baseline estimations that use IMF data for remittances. Surveys indicate that Russia is the main source of remittances for these countries, and money transfers from Russia via MTOs constitute 70-95 percent of remittances through financial intermediaries (Brown et al. 2008; Ibragimova et al. 2008; Kakhkharov and Akimov 2015; Tumasyan et al. 2008). The data on annual remittances from Russia covers the period from 2006 to 2012, but this study also uses the bilateral remittance data for the period from 2000 to 2005 estimated by Shelburne and Palacin (2007) based on data for bilateral remittances in 2006 and the total amount of transfers from Russia to the CIS during this period. Although Russia is not only one of the largest sources, but also one of the largest recipients of remittances, the country is not included in these estimations because the Russian unemployment rate is used in the instrumental variable estimations.

Financial development is measured by means of a number of indicators that serve as proxies for financial development: the ratios of transferable deposits to GDP, total deposits to GDP, private credit to GDP, and other claims to GDP. These indicators are modifications of the standard measures of financial depth used by the literature on the role of financial development (King and Levine 1993; Klein and Olivei 2008; Levine

1997). Data sources for these indicators are the IFS and WDI. Table A2 in the Appendix provides definitions and sources for each of the variables related to financial development and used in the estimations.

The availability of data varies from country to country, variable to variable, so the number of observations in the estimations differs. For example, data for the ratio of credit to GDP is available for twenty-seven countries, whereas data on the ratio of private credit to GDP is available for only eighteen cross-sections. The complete list of countries and years is given in Table A1 in the Appendix.

The independent variable of primary interest for this research is remittances. The ratio of remittances to GDP is used to control for the size of the economies in the sample. The data on remittances are from the Balance of Payments statistics of IMF. Figures 3 and 4 show the leading countries of the region in terms of the total volume of remittances and relative importance of remittances for the countries in the sample.

Figure 3. Top ten recipients of remittances in the full sample (in billions of US\$), based on average for the period 1995-2012

Data source: Balance of Payments Statistics (IMF)

Figure 4. Top ten recipients of remittances in the full sample, based on average % of GDP for the period 1995-2012

Data source: Balance of Payments Statistics (IMF) and WDI (World Bank)

The countries of Central and Eastern Europe are the top remittance-recipient countries in the region in terms of absolute amounts, but the countries of the CIS and Georgia and smaller South European economies are at the top of the rankings when remittances are expressed as a proportion of GDP.

The control variables to evaluate the impact of remittances on the financial system used in this study are GDP and the ratio of FDI to GDP, both sourced from the World Bank WDI. The ratio of FDI to GDP is a good proxy for capital account openness, which is known to influence financial development (Klein and Olivei 2008). Although it is widely accepted that financial development results in economic growth (Levine 2005), it is also true that financial sector development requires paying fixed costs, which are sensitive to the size of the economy (Aggarwal et al. 2011). Therefore, GDP is included as a control variable. This study does not use a dummy for dual foreign exchange regimes, as none of the countries in the sample had such a regime during the period covered by this study.

A number of other variables found to have an impact on financial development are also used as control variables, including inflation, measured by the GDP deflator, and openness of the economy, measured by the ratio of exports to GDP. Estimations were also run using other World Bank indicators that measure credit information-sharing, such as the depth of the credit information index, the index of borrowers' legal rights, public registries' and private credit bureaus' coverage of borrowers, and the EBRD

index of finance/banking sector development. However, since these indicators are available only for limited periods, their use decreases the size of the sample significantly, so they are omitted from this paper.

Descriptive statistics of the indicators used in the model are presented in Table 5.

Table 5. Descriptive Statistics

Variable	Observations	Mean	Median	Standard deviation
Other claims/GDP	277	43.08%	40.94%	23.46
Private sector credit/GDP	189	33.27%	33.82%	18.09
Transferrable deposits/GDP	289	14.26%	12.14%	8.47
Total deposits/GDP	289	36.63%	37.90%	16.94
Remittances/GDP	273	6.63%	3.26%	8.62
GDP per capita (in thousands US\$)	324	5.04	3.38	4.60
GDP (in constant prices of 2005 in billions of US\$)	297	9.80	9.80	1.41
Inflation	297	13.21%	4.89%	65.72
Exports/GDP	287	47.33%	44.88%	17.22
Foreign Direct investment (FDI) inflows/GDP	288	7.16%	5.13%	8.15

The average ratio of all credit-related ratios for the region is higher than the one Aggarwal et al. (2011) reported for the world (25.5). The ratio of total deposits to GDP also exceeds a similar indicator for the world (31.4), so it may be an indicator of a higher-than-average level of financial development in the region. However, the standard deviation is quite high, so there appears to be notable diversity across countries in the sample.

Table 6 presents a correlation matrix of the sample.

Table 6. Correlation matrix

Variables	Other claims/ GDP	Private credit/ GDP	Transferable deposits/ GDP	Total deposits/ GDP	Total remittances/ GDP	Remittances from Russia/GDP	GDP constant prices	in GDP per capita	Inflation	Exports/ GDP	FDI inflows/ GDP
Other claims/GDP	1										
Private credit/GDP	0.98	1									
Transferable deposits/GDP	0.76	0.78	1								
Total deposits/GDP	0.86	0.86	0.93	1							
Total remittances/GDP	-0.15	-0.11	-0.14	-0.06	1						
Remittances from Russia/GDP	-0.24	-0.20	-0.30	-0.22	0.96	1					
GDP in constant prices	0.70	0.68	0.54	0.58	-0.51	-0.48	1				
GDP per capita	0.47	0.37	0.26	0.31	-0.62	-0.57	0.55	1			
Inflation	0.32	0.18	0.11	0.23	-0.08	-0.06	0.31	0.39	1		
Exports/GDP	0.34	0.22	0.32	0.36	-0.53	-0.59	0.51	0.57	0.53	1	
FDI inflows/GDP	-0.21	-0.18	-0.16	-0.17	-0.17	-0.17	-0.14	-0.08	-0.07	0.09	1

As expected, there is a significant degree of correlation among the model's dependent variables. Among other correlations, the data for remittances from Russia via MTOs to the CIS and Georgia are strongly correlated with data for remittances from the Balance of Payments statistics.

As in many macroeconomic models, endogeneity is an issue in studying the impact of remittances on financial development. In the case of remittances and financial development, an array of issues, including measurement error, reverse causality, and omitted variables, may lead to endogeneity. Accounts related to remittances in the Balance of Payment statistics may be subject to measurement error (Alfieri et al. 2006). As in any complex phenomenon, any number of factors that are impossible and/or difficult to measure or are simply not measured could affect remittances and financial development. For example, strength of intra-family ties, norms, traditions, habits, informal economic activities, and social networks may each play a role in shaping the patterns and amounts of remittance flows and impact financial development in different ways for different countries. This effect may result in an empirical econometric model that is prone to omitted-variable bias. Reverse causality is also a factor because remittance flows through official (recorded) channels may increase as a result of such factors as improvements in the financial infrastructure that

grow out of financial development stimulated by structural reforms in transition countries, or lower transfer fees charged by banks and MTOs, leaving the total flow of remittances, which also includes remittances through unofficial channels, relatively unchanged.

Two econometric techniques are used in this paper to address these potential endogeneity biases. The first empirical approach applies fixed effects panel data analysis techniques. When using fixed effects, it is assumed that some characteristics within the countries may impact or bias the outcome variables, so there is a need to control for this impact or bias. Using fixed effects removes the effect of time-invariant characteristics so the predictors' net effect on the outcome variable can be assessed. Another important assumption of the fixed effects model is that time-invariant characteristics are unique to the country, so each country is different; therefore, the country's error term and constant should not be correlated with the others. The general equation for the fixed effects model used to estimate the impact of remittances on financial development is shown in equation (1):

$$FD_{i,t} = \beta_1 Rem_{i,t-1} + \beta_2 X_{i,t-1} + \alpha_i + u_{i,t} , \quad (1)$$

where FD is a proxy for financial development, *i* identifies the cross-section (country), *t* is the time period, Rem is the ratio of remittances to GDP, *X* is the vector of control variables, α_i captures the country-specific effect, and $u_{i,t}$ is the error term. The term 'fixed' is used because the intercept does not change over time and is constant for each cross-sectional unit. The fixed-effects model is useful since it is easy to apply and it allows the unobservable individual (cross-sectional) effects to be correlated with the given variables. On the downside, this model may result in the loss of degrees of freedom when there are significant numbers of cross-sectional units—known as the incidental parameters problem.

If the independent variable of main interest and other explanatory variables are measured with error, it is quite possible that the lagged values of these explanatory variables suffer from the same measurement error. Therefore, instrumental variable (IV) estimations are made in this study in order to address simultaneously the issues related to measurement error, omitted variables, and reverse causality. The study adopts one instrumental variable from Aggarwal et al. (2011), the unemployment rate in the remittance-sending countries, which is related to macroeconomic conditions' affecting remittances in the main remittance-sending countries. This instrumental variable is more exogenous to financial development in remittance-receiving countries compared to remittances. The unemployment level in host countries has a strong effect

on its outgoing remittances. High unemployment lowers the amount of remittances sent to other countries because migrants find it more difficult to earn income to send home.

In this study's IV regressions, the unemployment rate in Russia is used as IV for remittances to the CIS and Georgia because Russia is responsible for 60-90 percent of remittances to these countries. For Central and Eastern Europe and Mongolia, the study constructs IVs by multiplying the unemployment rate in each of the top five remittance-sending countries by the share of remittances sent by each of these five countries. These top remittance-sending countries are identified based on the bilateral remittance matrix created by the World Bank (2013), which estimates these bilateral flows based on the number of migrants in each of the migrant-receiving countries.

5. Results and Discussion

Tables 7 and 8 present fixed effects estimations. Table 7 reports the results of regressions that estimate the impact of remittances (measured by IMF's Balance of Payments data) on the ratio of credit to GDP, other claims to GDP, private credit to GDP, transferable deposits to GDP, and total deposits to GDP for the full sample with country and time effects. The effect of the independent variables on the money outside depository corporations is also reported. Table 8 shows the estimations made using remittances from Russia to the CIS and Georgia using data from the Central Bank of Russia. Remittances from Russia consist of the bilateral remittance data through MTOs and postal services, as reported by the Central Bank of Russia. Control variables in all regressions include GDP per capita in constant 2005 prices, the GDP level in constant 2005 prices, the ratios of exports to GDP, and the FDI inflows as a share of GDP. All estimations are run by lagging independent variables one period to address in part the issue of reverse causality.

Tables 7 and 8. Fixed effects estimations. The estimated equation is $FD_{i,t} = \beta_1 Rem_{i,t-1} + \beta_2 X_{i,t-1} + \alpha_i + u_{i,t}$, where i identifies the cross-section (country); t is the time period; Rem is the remittances, measured as a percentage in GDP; and X is the vector of control variables (including **GDP per capita**, measured in constant dollars; **GDP** stated in constant dollars; **Inflation**, defined as the % change in the GDP deflator; **Exports to GDP**, measured as the share of total exports in GDP, **FDI inflows to GDP**, and FDI as a % of GDP). α_i captures the country-specific effects, and $u_{i,t}$ is the error term. FD refers to financial development, measured by indicators like the % of credit to GDP, % of other claims to GDP, % of private credit to GDP, % of transferable deposits to GDP, other deposits to GDP, and total deposits to GDP. The impact of remittances on money outside depository corporations is also estimated using the model. t-statistics are in brackets. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 7. Fixed effects estimations for Central and Eastern Europe, former Soviet Union, and Mongolia.

Variables	Other claims/GDP	Private credit/GDP	Transferable deposits/GDP	Total deposits/GDP
Total remittances/GDP	0.40*** [2.73]	0.68*** [3.77]	0.22** [2.53]	0.24*** [2.65]
GDP per capita	10.64*** [9.16]	13.67*** [4.17]	0.85 [1.22]	4.94*** [4.81]
GDP in constant 2005 prices in US\$	0.0003 [0.45]	-0.0007 [0.18]	0.0008*** [2.92]	0.00004 [0.94]
Inflation	0.02 [0.34]	-0.08 [-1.02]	-0.12*** [-5.57]	-0.17*** [-6.34]
Exports/GDP	-0.26** [-2.05]	-0.24*** [-2.65]	0.13** [2.14]	0.12 [1.31]
FDI inflows/GDP	0.22*** [3.16]	0.39*** [6.36]	0.01 [0.50]	0.06 [1.58]
Constant	-8.4 [-1.93]	-4.66 [-0.79]	-0.62 [-0.19]	2.05 [0.41]
Observations	238	159	249	249
Number of countries	26	18	27	27
R-squared	0.88	0.85	0.90	0.92

Table 8. Fixed effects estimations for CIS and Georgia using remittances from Russia as an independent variable.

Variables	Other claims/GDP	Private credit/GDP	Transferable deposits/GDP	Total deposits/GDP
Remittances from Russia/GDP	0.55** [2.47]	0.63** [2.77]	0.34*** [4.79]	0.52*** [3.67]
GDP per capita	13.67*** [3.01]	11.21** [2.79]	0.79 [1.43]	5.82*** [3.07]
GDP in constant 2005 prices in US\$	0.001 [0.21]	0.0008 [0.19]	0.001 [1.27]	0.0008 [0.53]
Inflation	0.13* [1.73]	0.02 [0.19]	-0.06*** [-3.8]	-0.05 [-1.17]
Exports/GDP	0.58*** [3.86]	-0.51*** [-4.03]	0.03 [1.1]	-0.06 [-0.64]
FDI inflows/GDP	0.22** [2.27]	0.22** [2.25]	0.05** [2.16]	0.17** [2.76]
Constant	17.51** [2.58]	16.88** [2.4]	1.29 [0.79]	5.69 [1.51]
Observations	86	86	86	86
Number of countries	9	9	9	9
R-squared	0.83	0.78	0.83	0.88

All estimations indicate that remittances have a strong and positive impact on various measures of financial development. Particularly notable is the fact that this effect of

remittances in the CIS and Georgia stays robust to using remittance data from the Central Bank of Russia on bilateral remittances from Russia to the CIS and Georgia via MTOs and postal services, despite the fact that this subsample constitutes only a third of the original sample.

In general, the effect of remittances on credit-related indicators of financial development is greater than that on deposit-related indicators, perhaps because of the weaker institutional development of the sector in many transition economies, leading to low levels of depositor trust. On the other hand, even if remittances have a smaller effect on deposits than on credit, they may have a bigger indirect effect on credit expansion. For instance, a family may buy a car or other assets using proceeds from remittances and use the car as collateral to borrow money for a small business. The fact that the share of private sector credit in the GDP appears to be the most positively affected by remittances could be pointing to this phenomenon as well.

As expected, the estimations show that per-capita GDP is positively associated with indicators of financial development. In general, the size of a country's economy, measured by GDP in constant prices, and the share of FDI inflows to GDP, which indicates capital account openness, are also positively associated with financial development, but not as firmly as remittances and the level of income are.

The fixed effects estimation results show that the measure of current account openness, represented by the share of exports to GDP, is negatively correlated with the financial development indicators that are related to private credit. Empirical research finds evidence that only in an environment characterized by a combination of a higher level of legal and institutional development will the positive link between financial openness and financial development be readily detectable (Chinn and Ito 2006). Since many transition economies of the Soviet Union lag behind developed countries in terms of legal and institutional development (Kakhkharov 2016), this result is not surprising. On the one hand, faced with backward institutional and legal environment, banks may be reluctant to lend to the private sector even if exports are burgeoning. On the other hand, exports could decrease the need for additional funding for competitive and successful enterprises engaged in exports by allowing the businesses to generate their own internal funds out of their revenue streams. The higher cost of financing in Central and Eastern Europe, especially the CIS and Georgia, compared to that of the developed markets also may have discouraged the use of external funding from banks for businesses that are competitive in export markets (Kakhkharov 2016).

The present estimations indicate that the effect of inflation on credit-related measures of financial development is positive and significant at the 10% level in one of the estimations for the CIS and Georgia and statistically insignificant in others. At first glance, this result may appear surprising. However, research in this area finds evidence that the relationship between inflation and financial development is nonlinear. As inflation rises, the marginal impact of inflation on bank lending and stock market development diminishes rapidly (Boyd et al. 2001). One possible intuitive explanation for this phenomenon is that, in some of the countries of the CIS and Georgia, an administrative system of setting interest rates and credit allocation and the presence of sticky interest rates are still prevalent. Under these conditions, borrowers have an incentive to borrow during the periods of high inflation in order to pay off their loans at lower real interest rates. In addition, if higher inflation results in devaluation of the local currency, in dollarized economies, where transactions are indexed in hard currency, the borrowers also make extraordinary foreign exchange gains by paying off debt in devalued currency.

Next the present study attempts to address an issue of endogeneity in a more elaborate way by using IV estimations. Although the lagging of the independent variables partially addresses the issues of endogeneity and reverse causality, the use of IV methodology addresses these problems in a more comprehensive and systemic way. IV estimations could tackle the measurement error bias that is endemic in remittance-related data. The study uses the economic conditions in remittance-sending countries as an instrument. In particular, the unemployment rate in the top five remittance-sending countries, weighted by each country's share of those remittances, is used as a proxy for economic conditions in remittance-sending countries in Central and Eastern Europe and Mongolia. These top five remittance-sending countries account for 70-90 percent of remittances to these countries. The unemployment rate in Russia is used as the instrumental variable for the CIS and Georgia because these economies source about 80 percent of their remittances from Russia (Kakhkharov and Akimov 2015). Table 9 presents the results of the first-stage IV estimations.

Table 9. First-stage IV estimations.

The results are first-stage estimates of the equation $FD_{i,t} = \beta_1 Rem_{i,t-1} + \beta_2 X_{i,t-1} + \alpha_i + u_{i,t}$, where i identifies the cross-section (country); t is the time period; Rem is the remittances, measured as a percentage of GDP; X is the vector of control variables (including **GDP per capita**, measured in constant dollars; **GDP** stated in constant dollars; **Inflation**, defined as the % change in the GDP deflator; **Exports to GDP**, measured as the share of total exports in GDP; **FDI inflows to GDP**; and FDI as % of GDP). α_i captures the country-specific effect, and $u_{i,t}$ is the error term. FD refers to

financial development measured by several indicators, such as the % of credit to GDP, % of other claims to GDP, % of private credit to GDP, % of transferable deposits to GDP, other deposits to GDP, and total deposits to GDP. First-stage estimates are obtained by running $Rem_{i,t-1} = d_1 Z_{i,t-2} + d_2 X_{i,t-1} + a_i + e_{i,t}$, where Z is an IV—namely, the unemployment rate in the remittance-sending countries. t -statistics are in brackets. *, **, and *** denote significance at the 10, 5, and 1% levels, respectively.

Variables	Dependent variable: Share of remittances in GDP	
	CEE, former Soviet Union, and Mongolia	CIS and Georgia
Unemployment in remittance-sending countries	-1.42*** [-6.38]	-1.64*** [-3.13]
GDP per capita	-1.05*** [-3.21]	2.10 [0.91]
GDP in constant 2005 prices US\$	0.0001 [1.08]	-0.00001 [-0.02]
Inflation	-0.07* [-1.77]	-0.14*** [-2.9]
Exports/GDP	0.23*** [4.73]	0.41*** [6.13]
FDI inflows/GDP	0.02 [1.07]	0.31*** [3.52]
Constant	11.52*** [3.6]	-0.54 [-0.06]
Observations	226	89
Number of countries	26	9
R-squared	0.86	0.89

Table 9 shows that remittances to Central and Eastern Europe, the former Soviet Union, and Mongolia are associated with the economic conditions in the labour markets of the remittance-sending countries. As expected, higher unemployment rates in remittance-source countries affects remittances negatively, so this external indicator is used to run the second-stage instrumental variable estimations with the two samples. The results of the second-stage instrumental variable estimations are presented in Tables 10 and 11, which point to the strong impact of remittances on the majority of measures of financial development.

Tables 10 and 11. Second-stage IV. Estimations of the equation $FD_{i,t} = b_1 Rem_{i,t-1} + b_2 X_{i,t-1} + \alpha_i + u_{i,t}$, where i identifies the cross-section (country); t is the time period; Rem is the remittances, measured as a percentage in GDP; X is the vector of control variables (including **GDP per capita**, measured in constant dollars; **GDP** stated in constant dollars; **Inflation**, defined as the % change in the GDP deflator; **Exports to GDP**, measured as the share of total exports in GDP; **FDI inflows to GDP**; and FDI as % of GDP). α_i captures the country-specific effect, and $u_{i,t}$ is the error term. FD refers to financial development, measured by several indicators, such as the % of credit to GDP, % of other claims to GDP, % of private credit to GDP, % of transferable deposits to

GDP, other deposits to GDP, and total deposits to GDP. The unemployment rates in the top five remittance-sending countries, weighted by the share of total remittances sent from these countries, are used as instruments. t-statistics are in brackets. *, **, and *** denote significance at the 10, 5, and 1% levels, respectively.

Table 10. IV estimations for Central and Eastern Europe, the former Soviet Union, and Mongolia.

Variables	Other claims/GDP	Private credit/GDP	Transferable deposits/GDP	Total deposits/GDP
Remittances/GDP	2.1** [1.9]	2.6*** [2.82]	1.19*** [3.05]	0.88 [1.26]
GDP per capita	9.77*** [7.17]	16.79*** [4.26]	0.69 [0.91]	5.19*** [4.55]
GDP in constant 2005 prices in US\$	0.0003 [0.45]	-0.49 [-1.18]	0.0001*** [2.86]	0.00003 [0.65]
Inflation	0.06 [0.81]	-0.06 [-0.6]	-0.1** [-2.77]	-0.16*** [-4.54]
Exports/GDP	-0.31* [-1.94]	-0.35*** [-2.65]	0.11 [1.34]	0.12 [1]
FDI inflows/GDP	0.17* [1.94]	0.32*** [4.38]	0.005 [0.17]	0.05 [0.96]
Constant	-9.52 [-1.33]	-11.51 [-1.1]	-4.36 [-1.17]	-2.23 [-0.51]
Observations	210	139	220	220
Number of Countries	25	17	26	26
Kleibergen-Paap statistic for weak instruments	F 16.29	12.27	15.86	15.86
Kleibergen-Paap under-identification test	10.35	7.2	10.19	10.19
P-value of Kleibergen-Paap under-identification test	0.00	0.01	0.00	0.00
R-squared	0.86	0.79	0.83	0.92

Table 11. IV estimations for CIS and Georgia, using remittances from Russia as the instrumented variable.

Variables	Other claims/GDP	Private credit/GDP	Transferable deposits/GDP	Total deposits/GDP
Remittances/GDP	2.55* [1.71]	2.64* [1.69]	0.95*** [3.41]	1.4** [2.59]
GDP per capita	0.01 [1.32]	0.007 [1.03]	-0.0007 [-0.52]	0.005* [1.74]
GDP in constant 2005 prices in US\$	-0.00008 [-0.02]	-0.00008 [-0.0005]	0.0001 [1.04]	0.00002 [0.01]
Inflation	0.26* [1.66]	0.16 [1.04]	-0.02 [-0.58]	-0.02 [-0.28]
Exports/GDP	-0.81*** [-2.88]	-0.79*** [-2.83]	-0.05 [-0.88]	-0.1 [-0.91]
FDI inflows/GDP	-0.25 [-0.78]	-0.3 [-0.9]	-0.09 [-1.22]	0.03 [0.22]
Constant	0.26** [2.14]	0.29** [2.35]	0.04 [1.06]	0.06 [1]
Observations	78	78	78	78
Number of Countries	9	9	9	9
Kleibergen-Paap statistic for weak instruments	F 3.96	3.96	3.96	3.96
Kleibergen-Paap under-identification test	2.74	2.74	2.74	2.74
P-value of Kleibergen-Paap under-identification test	0.1	0.1	0.1	0.1
R-squared	0.75	0.68	0.65	0.84

The values of the Kleibergen-Paap statistic for weak instruments and the Kleibergen-Paap under-identification test indicate that the external variable performs worse as an instrument in the CIS and Georgia sample, although both indicators are above critical values.

Overall, IV estimations indicate an even stronger effect of remittances on measures of financial development than fixed effects do. Virtually all coefficients that measure the positive link between remittances and financial development indicators increased. A large part of this increase could be attributed to the measurement error that is present in some methods for collecting data. The coefficient for the impact of remittances on private-sector credit continues to be the highest, indicating that private-sector credit is the most positively influenced of the measures of financial depth. The effect of control variables on financial development exhibits patterns similar to those observed in the results of the baseline fixed effects estimations. The IV estimations also continue to indicate that, using higher quality bilateral data from the Russian Central Bank, the impact of remittances on financial development in the CIS and Georgia is stronger than the impact on the full sample.

6. Conclusions

This research fills an important gap in empirical research on the impact of remittances in the transition economies of Central and Eastern Europe, the former Soviet Union, and Mongolia. Despite a relatively small sample, the findings of the paper indicate that there is a positive link between remittances and financial development. Particularly notable is that the positive impact of remittances on financial development remains more stable and more robust than other control variables using the two distinct estimation methods in both samples used in this research. The coefficients are especially large in the countries of the former Soviet Union, for which estimations were run using better quality data on bilateral remittances from the Russian Central Bank. This result occurs even though the financial systems of the CIS and Georgia are considered to be backward and lagging behind those of Central and Eastern Europe.

Furthermore, the impact of remittances on credit-related indicators of financial development is stronger than deposit-related indicators in both samples even when using different remittance data. The literature on financial development shows that the institutional underdevelopment of the financial sector in some of the transition countries (mainly the former Soviet Union) results in a lack of depositor trust. Therefore, it is plausible that remittance recipients do not want to deposit their remittances in the banking sector, preferring to invest in real assets instead. It is also possible that they use these real assets as collateral to borrow funds, with eventual positive effect on lending-related indicators (particularly private credit) of financial development. Policies that seek to improve institutional development and depositors' trust may improve how recipients use the benefits of remittances in deposit expansion.

In general, the positive effect of remittances on financial development is in line with the conclusions of research that has been conducted with larger cross-national datasets. By estimating the effect of remittances on several measures of financial development, the present research also finds that the impact of remittances on private credit is especially strong and significant. Given that some of the transitional economies in the former Soviet Union are still struggling to nurture viable private-sector development, this finding is important for policy-making that seeks to increase the development impact of remittances in the private sector of transition countries.

7. Appendix

Table A1 Countries and Periods

The table shows the countries and periods included in the regressions. Asterisks indicate countries for which data on bilateral remittances from Russia via MTOs is available and used in this research.

Country	Years	Country	Years
Albania	2002-2013	Latvia	2003-2013
Armenia*	2001-2013	Lithuania	2004-2013
Azerbaijan*	2001-2013	Macedonia	2003-2013
Belarus*	2004-2013	Moldova*	2005-2013
Bosnia & Herzegovina	2006-2013	Mongolia	2005-2013
Bulgaria	2001-2013	Montenegro	2007-2013
Croatia	2001-2013	Poland	2004-2013
Czech Republic	2002-2013	Romania	2005-2013
Estonia	2004-2013	Serbia	2007-2013
Georgia*	2001-2013	Slovak Republic	2003-2013
Hungary	2003-2013	Slovenia	2004-2013
Kazakhstan*	2003-2013	Tajikistan*	2008-2013
Kosovo	2004-2013	Ukraine*	2002-2013
Kyrgyzstan*	1995-2007		

Table A2 Variables

Variable	Definition	Source
Other claims/GDP	The ratio of claims on other sectors to GDP. Other Claims comes from line 32s of IFS Claims on Other Sectors, which consists of Claims on Other Financial Corporations (line 32g), Claims of State and Local Governments (line 32b), Claims on Public Nonfinancial Corporations (line 32c), and Claims on Private Sector (line 32d).	International Financial Statistics, IMF
Private credit/GDP	The ratio of private credit to GDP.	International Financial

		Statistics, IMF
Transferable deposits/GDP	The ratio of transferable deposits to GDP. Transferable deposits consist of demand deposits (transferable by check, giro order, or similar means), bank checks (if used as a medium of exchange), Traveller's checks (if used for transactions with residents), and deposits otherwise commonly used to make payments.	International Financial Statistics, IMF
Total deposits/GDP	The ratio of the sum of transferable and other deposits to GDP.	International Financial Statistics, IMF
Money outside depository corporations/GDP	The ratio of currency outside depository corporations to GDP. Currency outside depository corporations includes notes and coins issued by the Central Bank, less the amounts held by other depository corporations. If an economy is partially or completely 'dollarized,' this account may include an estimated amount of foreign currency.	International Financial Statistics, IMF
Remittances/GDP	Ratio of remittances to GDP. Data for total remittances comes from the Balance of Payments Statistics from the IMF, collected or converted in accordance with Balance of Payment Manual 6 (BPM6). The main components of total remittances are employee compensation, credit (1CA000 C XA) and personal transfers, and credit (1DF000 C OA). During conversion from Balance of Payments Manual 5 (BPM5) to BPM6, an account related to remittances that was impacted became "Migrants transfers." In the process of conversion, IMF included "Migrants Transfers" in "Other capital transfers – financial corporation, nonfinancial corporations, households, and NPISHs (Non for Profit Institutions Serving Households)." Although migrants' transfers should not be included in the balance payments accounts under BPM6, the elimination of this account was not possible without impacting net errors and omissions.	Balance of Payments Statistics, IMF

GDP per capita (in thousands US\$)	GDP per capita in thousands of constant 2005 prices in US\$.	World Development Indicators (WDI), World Bank
GDP (in millions of constant US\$)	GDP in constant 2005 prices in US\$.	World Development Indicators (WDI), World Bank
Inflation (%)	GDP deflator (annual %).	World Development Indicators (WDI), World Bank
Exports/GDP	Total exports expressed as a percentage of GDP.	World Development Indicators (WDI), World Bank
FDI inflows/GDP (%)	FDI flows as a percentage of GDP.	World Development Indicators (WDI), World Bank
Unemployment in remittance- sending countries	Unemployment rate of the five principal remittance- sending countries for each Central and Eastern European country and Mongolia, weighted by their share of total remittances sent to these countries. To illustrate, if the top five remittance-sending countries to remittance-sending country Z are countries A, B, C, D and E, the weighted unemployment is constructed as: Sum of $i[\text{Unemployment for } i * (\text{remittances from } I \text{ to } Z) / (\text{sum of remittances received by } Z \text{ from } A \text{ through } E)]$, where $I = A \text{ to } E$. Since Russia accounts for 60- 90% of remittance inflows for the countries of the former Soviet Union (with the exception of Baltic States), the unemployment rate in Russia is used as an IV for this set of countries.	Bilateral remittance data from World Bank (2013), GDP per capita from WDI (World Bank)

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