The Russian Financial Crisis and Workers' Remittances to Tajikistan and the Kyrgyz Republic

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Abstract: In this paper, we estimate the link between remittances and key macroeconomic variables of the host country (Russia) and the world's most remittance-dependent economies of Tajikistan and the Kyrgyz Republic. We mostly focus on the relationship during the ongoing Russian financial crisis. In particular, we estimate the responses of remittances to a shock in the exchange rate and per capita income in Russia and those of the key macroeconomic fundamentals of Tajikistan and the Kyrgyz Republic to a shock in remittance inflows. The empirical findings show that remittances serve as a channel to transfer the negative effects of the global and the Russian financial crises from the Russian macroeconomic fundamentals to the macroeconomic indicators of Tajikistan and the Kyrgyz Republic.

Keywords: Russian financial crisis, remittance, Tajikistan, the Kyrgyz Republic.

1. INTRODUCTION

In 2015, remittance flows to developing countries were estimated to be USD 401 billion. About 25 developing countries had remittance inflows equivalent to more than 10% of their economy. Tajikistan and the Kyrgyz Republic, two neighbouring countries of Central Asia, were the most remittance-dependent economies measured by remittance inflows as a share of the gross domestic product (GDP). Remittance inflows were equal to 42% of the GDP in Tajikistan and 30% of the GDP in the Kyrgyz Republic (World Bank, 2015).

The annual number of remittances to Tajikistan and the Kyrgyz Republic were equal to 20.2%–49.6% and 12.7%–31.1% of the GDP, respectively, for the period of 2005–2015 (Figure **1**). Tajikistan is the world's top remittance-dependent economy since 2007. The Kyrgyz Republic ranks second since 2011. In 2014, remittance inflows were equal to 374.1% of exports in Tajikistan and 80.4% of exports in the Kyrgyz Republic. This considerable inflow of remittances could roughly affect important economic variables.

The comparison of data on remittance flows from Russia to other countries of the Commonwealth of Independent States (CIS) indicates that Russia is the origin of a significant share of remittance flows to Tajikistan and the Kyrgyz Republic. In the last two years, the remittance flows to Tajikistan and the Kyrgyz Republic reported by the World Bank were almost equal to the remittance flows from Russia as reported by the Central Bank of Russia. The Russian financial crisis, particularly the devaluation of rouble and the slowdown of the Russian economy, has caused a sharp decline in the real values of remittances.

In consideration of the high sensitivity of remittances to the exchange rate and per capita income in the host country and the firm link between remittances and the key macroeconomic fundamentals of remittance-dependent economies (especially the exchange rates), in this paper we estimates the relationship between remittances and macroeconomic variables of the host country (Russia) and the remittance-dependent economies of Tajikistan and the Kyrgyz Republic. We focus on the changes in the relationship during the Russian financial crisis, which has caused the nominal value of annual flow of remittances from Russia to Tajikistan and the Kyrgyz Republic to decrease by 42.4% and 32.3%, respectively (Central Bank of Russia, 2016). In particular, we estimate the responses of remittances to a shock in the exchange rate and per capita income in Russia and the responses of the key macroeconomic fundamentals of Tajikistan and the Kyrgyz Republic to a shock in remittance inflows. Considering the possible existence of information linkage, we also calculate the causality relationship among foreign exchange markets of Russia, Tajikistan and the Kyrgyz Republic for the Russian crisis period.

The microeconomic issues of migration and remittances in Tajikistan and the Kyrgyz Republic have been widely addressed because of the data collected by surveys of various national and international institutions. However, the shortage of time series and appropriate data is a great barrier to the emergence of worthy academic papers that deal with the issues of the

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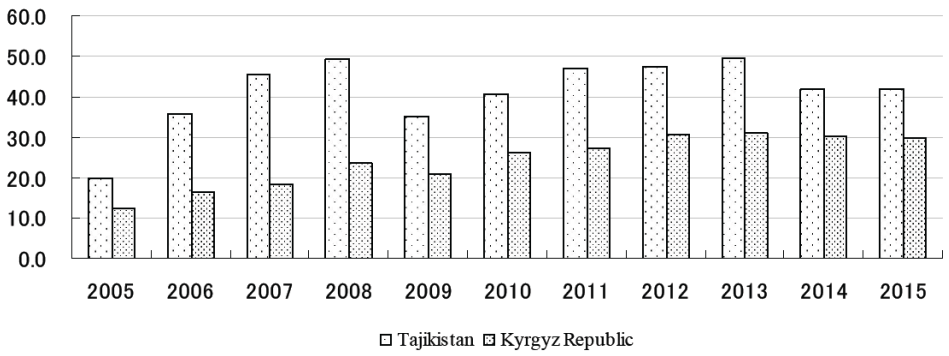

Source: World Bank.

Figure 1: Remittances as a Share of the GDP.

relationship between remittances and macroeconomic fundamentals.

In recent years, a few academic papers have assessed the macroeconomic issues of remittance flow to Tajikistan and the Kyrgyz Republic.

Atabaev *et al*. (2014) examined the effects of remittance inflows on the economic growth of the Kyrgyz Republic using the vector autoregression approach (VAR) and monthly data for 2005–2012. The research found a positive effect of remittance inflows on output and import.

Qurbanalieva (2013) investigated the core factors affecting the price level in Tajikistan in the period of 2005–2012 using autoregressive distributed lags and the Johansen–Juselius co-integration models. The study shows that the GDP gap, remittance inflows and real wages significantly affect the price level in the long run.

Defining the macroeconomic determinants of remittance flows from Russia to Tajikistan, Sultonov (2013) demonstrated that the changes in the income available for migrants and the possibility of migrants involvement in the labour market of the host country have a significant effect on remittances.

Exploiting a panel data set spanning 2007 to 2009, Danzer and Ivaschenko (2010) investigated the effect of the financial crisis on migration and remittance patterns of Tajikistan. The results show that the economic recession in Russia has affected Tajikistan through decreased remittances.

Abazov (2009) assessed migration trends in CIS from 1999 to 2009. The research shows that Moldova, Tajikistan and the Kyrgyz Republic developed a high dependence on international remittances from their labour migrants from 2007 to 2009.

According to Espinosa-Bowen *et al*. (2009), Russia appears to influence regional growth through remittance and financial channels, and Russian growth shocks are associated with sizable effects on other countries of the region, including Tajikistan and the Kyrgyz Republic.

This study highlights the role of remittances as a channel to transfer the negative effects of the global and the host country's economic and financial crises to the macroeconomic indicators of the remittance-dependent economies. The next two chapters present the methodology and data used in estimating the impulse response functions (IRFs), causality-in-mean and causality-in-variance. Chapter four explains the empirical results, and chapter five concludes.

2. METHODOLOGY

In the beginning, we use the VAR for multivariate time series, in which each variable is a linear function of its own past lags and those of other variables. On the basis of Akaike information criterion (AIC), the Schwarz Bayesian information criterion (SBIC) and log-likelihood ratio our econometric model takes the form of

$$y_{it} = A_{i0} + A_{il}(L)y_{it-1} + \varepsilon_{it}\,, \tag{1}$$

where y_{it} is the vector of stationary variables, A_{i0} is the vector of the parameters representing intercept terms, $A_{il}(L)$ is the vector of the polynomials in the lag operator L and the terms ε_{it} are white noise disturbances. We incorporate two dummy variables into the model for the remarkable changes in remittance flows during the global financial crisis of 2008 and the ongoing Russian financial crisis. From the VAR

models, we compute the IRFs to visually represent the impulse response of a variable of interest to a positive shock in other variables of the model.

Afterwards, we apply the cross-correlation function (CCF) approach developed by Cheung and Ng (1996) to examine the causality-in-mean and variance among foreign exchange markets. We use an autoregressive model and an exponential GARCH (EGARCH) model (Nelson, 1991) to compute the conditional mean and the conditional variance. The mean equation is

$$y_t = \omega + \sum_{i=1}^{k} a_i y_{t-i} + \varepsilon_t \,, \tag{2}$$

and the variance equation is

$$\ln(\sigma_t^2) = \omega + \sum_{i=1}^{p} (\gamma_i \varepsilon_{t-i} / \sigma_{t-i} + \alpha_i (| \varepsilon_{t-i} / \sigma_{t-i} | - (2/\pi)^{1/2})) + \sum_{i=1}^{q} \beta_i \ln(\sigma_{t-i}^2) \tag{3}$$

The values of k, p and q in Equations 2 and 3 are chosen on the basis of AIC, SBIC, log-likelihood ratio and Ljung–Box Q test. We use the standardised residuals and their squared values from Equations 2 and 3 in CCF to examine the causality-in-mean and the causality-in-variance. A generalised version of Cheung and Ng's (1996) chi-square test statistic suggested by Hong (2001), with an asymptotic critical values of 1.645 at the 5% level and 2.326 at the 1% level, is used to test the hypothesis of no causality from lag 1 to a given lag of k in the cross-correlation coefficients[1].

3. DATA

Two different subsets of data are used in the estimations. The first subset comprises seasonally adjusted quarterly data beginning from the second quarter of 2005 to the third quarter of 2015. Given the low volatility in exchange rates of Tajikistan and the Kyrgyz Republic, the logarithmic return series of the average weekly nominal exchange rates of the rouble, somoni and som for the period of July 1, 2014 to December 31, 2015 are included in the second subset.

The exchange rates are from the Central Bank of Russia and national banks of Tajikistan and Kyrgyz Republic. The remained part of the data is based on the raw data of the Interstate Statistical Committee of CIS, the Federal State Statistics Service of Russia, the Statistical Agency under the President of the Republic of Tajikistan and the National Statistical Committee of Kyrgyz Republic.

Table **1** demonstrates the descriptive statistics of the quarterly series for the VAR models. The data are real data based on the last quarter of 2004. The mean values are close to zero. The standard deviations show higher volatility for remittances. The exchange rates are given as numbers of national currency per 1 US dollar and an increase in the exchange rate data means the exchange rate's depreciation.

Table **2** shows the descriptive statistics of the logarithmic return series for the EGARCH models. The time period includes 79 observations. The mean values are close to zero and positive, that is, the depreciation of all three currencies against the US dollar. The rouble's depreciation rate is higher than that of the somoni and som. The standard deviations show higher volatility for rouble and som than for somoni. Skewness values show that the distribution is skewed on the right for som and somoni, thus demonstrating longer tails in higher returns. The skewness values for the rouble show that the distribution is skewed to the left. Kurtosis values are significantly higher than normal distribution. The Jarque–Bera test indicates that the null hypothesis of "normal distribution" is rejected at the 1% significance level. The standard Augmented Dickey–Fuller (ADF) test statistics (Dickey and Fuller 1979, 1981) rejects the null hypothesis of a unit root at the 1% significance level.

4. EMPIRICAL FINDINGS

Table **3** presents the results of the estimations for the VAR models with seasonally adjusted quarterly time series for the case of Tajikistan. The variables incorporated into the model are those used as the macroeconomic determinants of remittances by the literature (see Chami *et al*. 2008). The variables are explained in the data section. D1 and D2 are dummy variables for the effects of the global financial crisis of 2008 and the Russian financial crisis, respectively.

The estimated results indicate a positive and statistically significant effect of an increase in Russian GDP per capita as well as a negative and statistically significant effect of the crises on remittance inflows. The derived results show also a positive and statistically significant effect of exchange rate of rouble on exchange rate of somoni.

From the VAR models, we compute the IRFs to measure the response of remittances to a shock in

[1]See Hong (2001) for more information.

Table 1: Descriptive Statistics of the Quarterly Series for the VAR Models

Variables	Mean	Std. Dev.	ADF
Δ ln Remittance (TJ)	-0.0153	0.1224	-3.4610***
Δ ln Remittance (KG)	-0.0078	0.1199	-3.8340***
Δ ln GDP per capita (RUS)	-0.0310	0.0585	-5.3630***
Δ ln GDP per capita (TJ)	-0.0134	0.0993	-11.705***
Δ ln GDP per capita (KG)	-0.0315	0.0670	-4.5660***
Δ ln Exchange rate (RUS)	-0.0390	0.0779	-6.0770***
Δ ln Exchange rate (TJ)	-0.0325	0.0423	-3.1000**
Δ ln Exchange rate (KG)	-0.0365	0.0551	-3.1870**
Δ ln CPI (TJ)	0.0545	0.0262	-2.8580*
Δ ln CPI (KG)	0.0519	0.0448	-2.8540*

Notes: The time period is 2005q2 –2015q3. Seasonally adjusted data. Remittance and GDP per capita are real data in units of US dollar. The exchange rates are real bilateral exchange rates given as numbers of national currency per 1 US dollar. For the ADF test, ***, ** and * mean smaller than the critical value at the 1%, 5% and 10% significance levels.

Table 2: Descriptive Statistics of the Logarithmic Return Series for the EGARCH Models

Variables	Mean	Std. Dev.	Skewness	Kurtosis	Jarque–Bera	ADF
Rouble	0.0094	0.0356	-0.1457	6.5121	40.880***	-8.018***
Somoni	0.0044	0.0058	2.1070	8.2012	147.50***	-3.909***
Som	0.0047	0.0114	0.3382	6.1256	33.660***	-5.677***

Notes: The time period is July 1, 2014 – December 31, 2015. Based on average weekly data. *** in the Jarque–Bera test indicates that the null hypothesis of "normal distribution" is rejected at the 1% significance level. For the ADF test, *** indicate smaller than the critical value at the 1% significance levels.

Table 3: Estimate Results of the VAR Model for the Quarterly Series in the Case of Tajikistan

Independent variables	Dependent variables					
	Δ ln Remitt. (TJ)	Δ ln GDP per capita (RUS)	Δ ln GDP per capita (TJ)	Δ ln Exchange rate (RUS)	Δ ln Exchange rate (TJ)	Δ ln CPI (TJ)
Δ ln Remittance (TJ) $_{t-1}$	0.134 (0.68)	0.176 (1.37)	0.006 (0.03)	-0.177 (1.20)	-0.085 (1.59)	0.032 (0.74)
Δ ln GDP per capita (RUS) $_{t-1}$	0.535* (2.14)	-0.041 (0.25)	0.295 (1.26)	-0.040 (0.21)	-0.134* (1.97)	-0.017 (0.31)
Δ ln GDP per capita (TJ) $_{t-1}$	-0.151 (1.18)	-0.081 (0.96)	-0.647** (5.42)	0.040 (0.41)	-0.046 (1.33)	0.044 (1.55)
Δ ln Exchange rate (RUS) $_{t-1}$	-0.128 (0.51)	0.043 (0.26)	-0.073 (0.31)	-0.481* (2.53)	0.186** (2.71)	0.004 (0.08)
Δ ln Exchange rate (TJ) $_{t-1}$	1.156* (2.37)	0.366 (1.14)	0.585 (1.29)	-1.382** (3.77)	0.572 ** (4.33)	-0.184 (1.71)
Δ ln CPI (TJ) $_{t-1}$	-0.608 (0.77)	-0.125 (0.24)	-0.695 (0.94)	-1.303* (2.18)	0.178 (0.83)	0.345 * (1.97)
D1	-0.112** (3.38)	-0.014 (0.65)	-0.036 (1.18)	0.047 (1.89)	0.004 (0.48)	-0.014 (1.92)
D2	-0.150** (2.98)	-0.049 (1.49)	-0.035 (0.75)	0.132 ** (3.50)	-0.009 (0.67)	0.007 (0.63)
Constant	0.159** (3.25)	0.004 (0.14)	0.072 (1.57)	-0.081* (2.20)	-0.023 (1.76)	0.039** (3.60)

Notes: The time period is 2005q2–2015q3. The numbers in parentheses are t-statistics. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

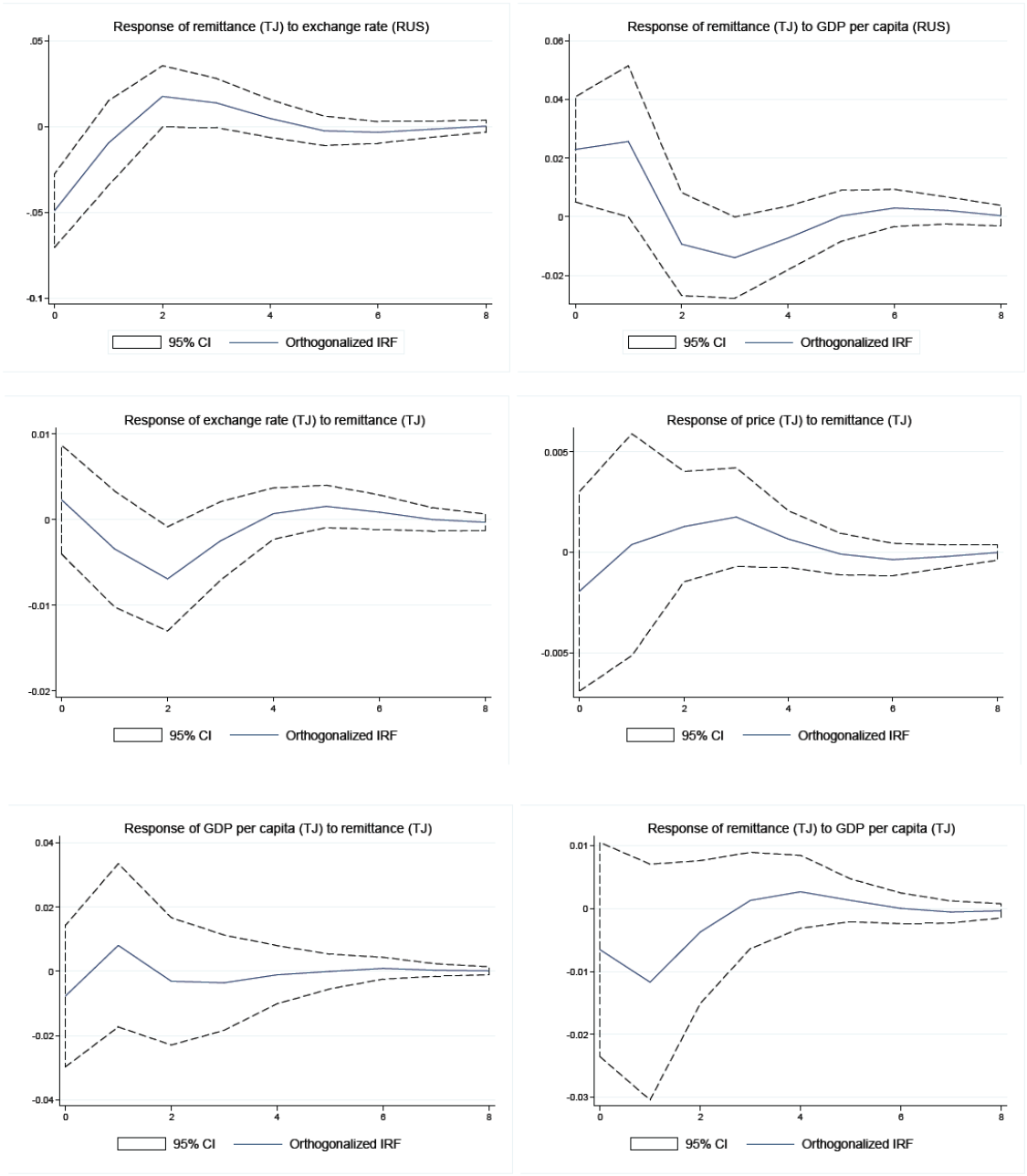

Figure 2: Impulse Responses in the Case of Tajikistan

Note: The solid line plots the impulse response of a variable of interest to a positive shock in other variables in the system. The dashed lines indicate five standard confidence bands around the estimate. Estimated regressions use one lag of each variable. The Cholesky decomposition ordering is Δ ln Exchange rate (RUS) Δ ln GDP per capita (RUS) Δ ln Remittance (TJ) Δ ln Exchange rate (TJ) Δ ln CPI (TJ) Δ ln GDP per capita (TJ) for the first five and Δ ln Exchange rate (RUS) Δ ln GDP per capita (RUS) Δ ln Exchange rate (TJ) Δ ln CPI (TJ) Δ ln GDP per capita (TJ) Δ ln Remittance (TJ) for the last one.

their key macroeconomic determinants and the response of the important macroeconomic fundamentals of the economy of Tajikistan to a shock in remittance inflows.

Figure **2** illustrates the impulse responses in the case of Tajikistan. Remittances negatively respond to a shock in the exchange rate of the rouble and the GDP per capita of Tajikistan but positively respond to a shock in the GDP per capita of Russia. The response of remittances to a shock in the exchange rate of the rouble is statistically significant. After one period it becomes positive, after two periods positive and statistically significant. The response becomes statistically insignificant after three periods. The response of remittances to a shock in the GDP per capita of Russia is also statistically significant. After

one period, it becomes statistically insignificant, after two periods negative and statistically insignificant. The response of remittances to a shock in the GDP per capita of Tajikistan is statistically insignificant.

The response of the exchange rate of somoni to a shock in remittances is positive and statistically insignificant, but it becomes negative after one period and negative and statistically significant after two periods. The response becomes statistically insignificant after three periods. The responses of price and GDP per capita of Tajikistan to a shock in remittances are negative and statistically insignificant; the responses become positive after one period. All responses expire after six or seven periods.

Table **4** presents the results of the estimations of the VAR models with a quarterly series in the case of the Kyrgyz Republic. A statistically significant relationship is observed between dummy variables and remittance inflows. Similar to the case of Tajikistan, the global and Russian financial crises have caused remittance flows into Kyrgyz Republic to decrease. To assess the relationship between the variables more precisely, we apply IRFs.

The response of remittances to a shock to the exchange rate of the rouble is negative and statistically significant (Figure **3**). After one period, the response becomes positive and statistically insignificant. The response of remittances to a shock to the GDP per capita of Russia and the Kyrgyz Republic is positive and statistically significant. After one period, the response becomes statistically insignificant and negative.

The responses of the exchange rate of the som and the GDP per capita of the Kyrgyz Republic to a shock in remittances are positive and statistically significant. After one period, the response to the exchange rate shock, and after two periods the response to the GDP per capita shock becomes statistically insignificant. The response of prices to a similar shock is negative and statistically significant. The response becomes statistically insignificant after one period. All effects expire after six or seven periods.

Considering statistically significant relationship between remittances and exchange rates and the possible existence of information linkage among foreign exchange markets we examine the causality relationship between the rouble and the national currencies of Tajikistan (somoni) and the Kyrgyz Republic (som). Table **5** presents the results obtained from the estimation of the AR-EGARCH models for the

Table 4: Estimate Results of the VAR Model for a Quarterly Series in the Case of the Kyrgyz Republic

Independent variables	Dependent variables					
	Δ ln Remitt. (KG)	**Δ ln GDP per capita (RUS)**	**Δ ln GDP per capita (KG)**	**Δ ln Exchange rate (RUS)**	**Δ ln Exchange rate (KG)**	**Δ ln CPI (KG)**
Δ ln Remittance (KG) $_{t-1}$	0.539 (1.57)	0.263 (1.33)	0.236 (1.01)	-0.220 (0.79)	-0.223 (1.41)	0.123 (0.90)
Δ ln GDP per capita (RUS) $_{t-1}$	0.037 (0.13)	-0.198 (1.22)	-0.053 (0.28)	0.023 (0.10)	-0.067 (0.52)	0.007 (0.06)
Δ ln GDP per capita (KG) $_{t-1}$	-0.104 (0.33)	0.350 (1.93)	0.095 (0.44)	0.002 (0.01)	-0.080 (0.55)	-0.006 (0.05)
Δ ln Exchange rate (RUS) $_{t-1}$	0.710 (1.90)	0.252 (1.17)	0.235 (0.92)	-0.369 (1.21)	-0.144 (0.84)	0.054 (0.36)
Δ ln Exchange rate (KG) $_{t-1}$	0.285 (0.44)	0.114 (0.31)	0.516 (1.17)	-0.392 (0.75)	-0.275 (0.92)	0.030 (0.12)
Δ ln CPI (KG) $_{t-1}$	-0.482 (0.57)	0.240 (0.49)	0.188 (0.32)	-0.326 (0.47)	-1.122** (2.86)	0.771* (2.29)
D1	-0.076* (2.11)	0.008 (0.41)	-0.028 (1.16)	0.044 (1.49)	0.021 (1.29)	-0.005 (0.38)
D2	-0.125** (2.63)	-0.049 (1.78)	-0.042 (1.29)	0.087* (2.25)	0.020 (0.92)	0.001 (0.08)
Constant	0.120** (3.04)	-0.024 (1.06)	0.014 (0.53)	-0.090** (2.79)	-0.016 (0.87)	0.019 (1.21)

Notes: The time period is 2005q2–2015q3. The numbers in parentheses are t-statistics. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

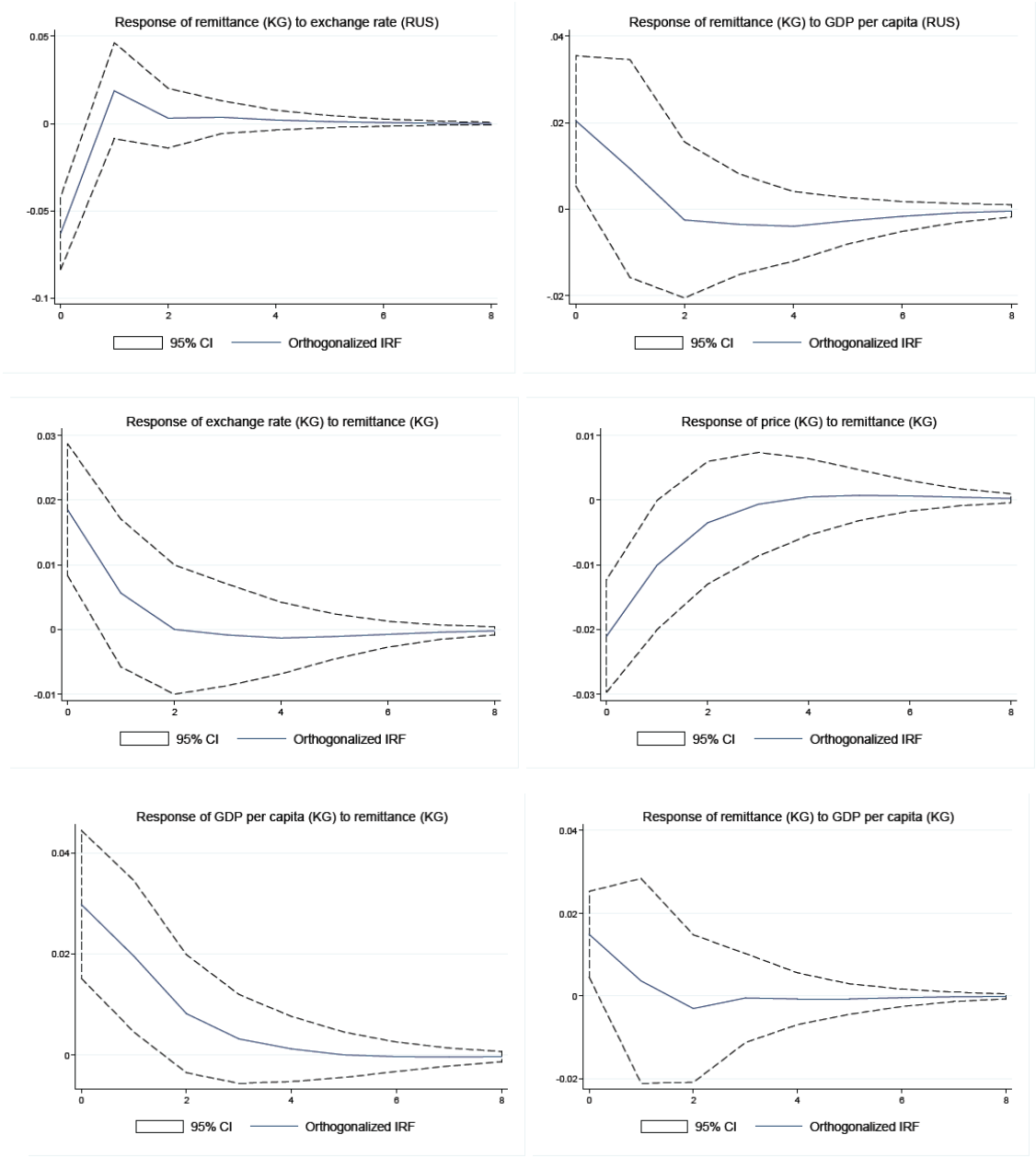

Figure 3: Impulse Responses in the Case of the Kyrgyz Republic

Note: The solid line plots the impulse response of a variable of interest to a positive shock in other variables in the system. The dashed lines indicate five standard confidence bands around the estimate. Estimated regressions use one lag of each variable. The Cholesky decomposition ordering is Δ ln Exchange rate (RUS) Δ ln GDP per capita (RUS) Δ ln Remittance (KG) Δ ln Exchange rate (KG) Δ ln CPI (KG) Δ ln GDP per capita (KG) for the first five and Δ ln Exchange rate (RUS) Δ ln GDP per capita (RUS)Δ ln Exchange rate (KG) Δ ln CPI (KG) Δ ln GDP per capita (KG) Δ ln Remittance (KG) for the last one.

crisis period. In the mean equation, the exchange rates of the rouble and somoni are defined by their previous period returns. The dummy variables for the structural breaks included in the mean and variance equations for the rouble and somoni improve the estimation results, but their effect on the return series of the dependent variables is statistically insignificant.

As identified by the variance equation, variations of somoni's exchange rate returns are defined by their past information and volatility. The variations in the exchange rate returns of the rouble are influenced significantly by its previous period's volatility. The Ljung–Box Q statistics for the null hypothesis states that no autocorrelation exists up to five orders for the standardised residuals and their squared values.

The standardised residuals and their squared values are used for the estimation of causality-in-mean and causality-in-variance based on the standardised

Table 5: Results of the AR-EGARCH Models in the Crisis Period

	Rouble	Somoni	Som
Model	**G(1, 2, 1)**	**G(1, 1, 1)**	**G(1, 1, 1)**
Mean			
α_1	0.2601*** (0.0924)	0.9702*** (0.0559)	0.6598 (0.0906)
D	-0.0003 (0.0044)	0.0001 (0.0003)	
Constant	0.0086** (0.0036)	0.0003 (0.0003)	0.0018** (0.0007)
Variance			
γ_1	0.2837 (0.2913)	0.1964 (0.2296)	0.3469 (0.2823)
γ_2	-0.1783 (0.3040)		
α_1	0.3742 (0.4110)	1.9707*** (0.3783)	0.8010* (0.4510)
α_2	0.4370 (0.3988)		
β_1	0.9016*** (0.1632)	0.7743*** (0.1434)	0.7538*** (0.1857)
D	-0.1258 (0.2405)	-0.4452 (0.3560)	
ω	-0.5354 (1.1442)	-2.4273 (1.7827)	-2.2941 (1.6856)
GED parameter	-0.0245 (0.2396)	0.9881** (0.4604)	0.1054 (0.2250)
Diagnostic			
Q (5)	4.346 (0.5007)	0.757 (0.9797)	0.460 (0.9935)
Q^2 (5)	7.818 (0.1666)	3.295 (0.6546)	0.164 (0.9995)

Notes: The numbers in parentheses are standard errors. Q (5) is the Ljung–Box Q statistics for the null hypothesis, which states no autocorrelation exists up to five orders for standardised residuals. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

version of Cheung and Ng's (1996) chi-square test statistic proposed by Hong (2001). The derived results are presented in Table **6**.

Estimation statistics reveal causality-in-mean from the rouble to the som (at lags 1 to 4) and causality-in-variance from the rouble to the somoni (at lags 2 and 3) and som (at lags 4 and 5) for the financial crisis period. This finding indicates that the exchange rate returns of the som are significantly influenced by the exchange rate returns of the rouble, and the variations of the exchange rate returns of the som and somoni are significantly influenced by the variations of the rouble's exchange rate returns during the Russian financial crisis. Test statistics for the causality-in-mean and variance from the somoni and som indicate no causality from the somoni to the rouble and som, and causality-in-mean and variance from the som to somoni.

5. CONCLUSION

In this paper, we examined the relationship between remittances and a number of macroeconomic fundamentals of the host country (Russia) and the remittance-dependent economies of Tajikistan and the Kyrgyz Republic. We focused on the changes in the relationships during the ongoing Russian financial crisis. The empirical findings demonstrated the high dependency of Tajikistan and Kyrgyz Republic on the Russian economy through remittance flows.

The IRFs computed from the VAR models show that remittances serve as a channel to transfer the negative effects of the global and the Russian financial crises from the Russian macroeconomic fundamentals to the macroeconomic indicators of Tajikistan and the Kyrgyz Republic. In particular, the global and the Russian financial crises devaluating the rouble and decreasing the per capita income of the host country have decreased the flow of remittances. The macroeconomic fundamentals of Tajikistan and the Kyrgyz Republic, especially the exchange rates, are very sensitive to a shock in remittances.

The CCF test results show that the devaluation of the rouble during the financial crisis has devaluated the som, and the variations in the exchange rates of the rouble significantly influenced the variations of the exchange rates of somoni and som.

Table 6: Test Statistics for Causality-in-mean and Variance

Rouble				
Causality-in-Mean			Causality-in-Variance	
Lags	Somoni	Som	Somoni	Som
1	0.0469	0.2625***	-0.0548	0.0869
2	0.2055	0.0958**	0.2759**	0.0840
3	-0.0519	0.1228**	-0.1059**	0.0045
4	-0.0306	0.1460**	0.0729	0.3517***
5	0.0426	-0.0047	-0.0790	-0.0904**
Somoni				
Causality-in-Mean			Causality-in-Variance	
Lags	Rouble	Som	Rouble	Som
1	-0.0914	-0.0050	0.0219	-0.0476
2	-0.1716	0.0646	0.1168	0.0565
3	-0.0198	-0.2460	0.1013	0.0390
4	-0.1164	-0.0192	0.1573	-0.0346
5	0.0371	-0.1065	0.0492	-0.0032
Som				
Causality-in-Mean			Causality-in-Variance	
Lags	Rouble	Somoni	Rouble	Somoni
1	-0.1377	0.2302**	0.0139	-0.0472
2	0.0647	0.0027	-0.0200	-0.0191
3	0.0321	0.0336	-0.0819	-0.0247
4	-0.1118	0.1047	-0.0673	-0.1355
5	0.0151	-0.0204	-0.0290	-0.1205***

Notes: The ** and *** indicate significance at the 5% and 1% levels, respectively, based on the standardised version of Cheung and Ng's (1996) chi-square test statistic proposed by Hong (2001).

The findings of this research complementing those of earlier studies, clearly demonstrate vulnerability of highly remittance-dependent economies of Tajikistan and the Kyrgyz Republic to the changes in global economy, host country's macroeconomic fundamentals and remittance inflows. These findings have significant implications for economic policy analysis and decision making in small and open economies dependent on labour migration and inflow of remittances.

REFERENCES

Abazov, Rafis. 2009. "Current trends in migration in the Commonwealth of Independent States". UNDP Human Development Research Paper 2009/36. New York: UNDP. http://hdr.undp.org/sites/default/files/hdrp_2009_36.pdf

Atabaev, Nurlan, Atabaeva, Gulnaz. and Baigonushova, Damira. 2014. "Economic growth and remittances inflow: Empirical evidence from Kyrgyz Republic". Eurasian Journal of Business and Economics 7(14): 61–70. https://doi.org/10.17015/ejbe.2014.014.04

Central Bank of Russia. 2016. "Cross-border transfers of individuals in breakdown by countries. External sector statistics". Moscow. http://www.cbr.ru/eng/statistics/crossborder/print.aspx?file=C-b_trans_countries_07-1_e.htm

Chami, Ralph, Barajas, Adolfo, Cosimano, Thomas, Fullenkamp, Connel, Gapen, Michael and Montiel, Peter. 2008. "Macroeconomic consequences of remittances". IMF Occasional Paper No. 259, IMF: Washington DC. https://www.imf.org/external/pubs/ft/op/259/op259.pdf

Cheung, Yin-Wong and Lilian, K. Ng. 1996. "A causality-in-variance test and its application to financial markets prices". Journal of Econometrics 72(1): 33–48. https://doi.org/10.1016/0304-4076(94)01714-X

Danzer, Alexander and Ivaschenko, Oleksiy. 2010. "Migration patterns in a remittances dependent economy: Evidence from Tajikistan during the global financial crisis". Migration Letters, Transnational Press London, UK 7(2): 190–202. http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1110315015165/DanzerIvaschenko.pdf

Dickey A. David and Fuller A. Wayne. 1979. "Distribution of the estimators for autoregressive time series with a unit root". Journal of the American Statistical Association 74(366): 427–31. https://doi.org/10.2307/2286348

Dickey A. David and Fuller A. Wayne. 1981. "Likelihood ration statistics for autoregressive time series with a unit root." Econometrica 49(4): 1057–72. https://doi.org/10.2307/1912517

Espinosa-Bowen, Jaime, Ilahi, Nadeem and Alturki, Fahad. 2009. "How Russia affects the neighborhood - trade, financial, and remittance channels". IMF Working Papers 09/277. Washington DC: IMF. https://www.imf.org/external/pubs/ft/wp/2009/wp09277.pdf

Hong, Yonmiao. 2001. "A test for volatility spillover with application to exchange rates". Journal of Econometrics 103(1-2): 183–24. https://doi.org/10.1016/S0304-4076(01)00043-4

Nelson, B. Daniel. 1991. "The conditional heteroskedasticity in asset returns: A new approach". Econometrica 59(2): 347–70. https://doi.org/10.2307/2938260

Qurbanalieva, Nigina. 2013. "An empirical study of factors affecting inflation in Republic of Tajikistan". Journal of Applied Economic Sciences Quarterly, ASERS Publishing,. 2: 229–246. http://dx.doi.org/10.14505/tpref.v4.2(8).06

Sultonov, Mirzosaid. 2013. "The macroeconomic determinants of remittance flows from Russia to Tajikistan". Transition Studies Review, Springer 19 (4): 417–430. https://doi.org/10.1007/s11300-013-0257-7

World Bank. 2015. "Migration and remittances factbook 2016". Washington, DC, The World Bank. http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1199807908806/4549025-1450455807487/Factbookpart1.pdf

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