Research Article

Workers' Remittances in Central and Eastern Europe (1993-2006): A Comparison to Latin America, and the Middle East

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Abstract

Despite the growing importance of workers' remittances in total capital flows, the relationship between growth and remittances has not been adequately studied empirically in the context of transitional economies, especially in a comparative framework with other recipient countries. This is surprising because migrants from the Central and Eastern European Economies (CEECs) contribute significantly to their home economies through remittances, influencing investment and consumption patterns. This paper examines the impact of workers' remittances on growth, investment and consumption in a number of CEECs in comparison to Latin America and the Middle East-North Africa-Turkey (MENAT) in a panel data framework. Using annual data ranging from 1993-2006, it is shown that as compared to Latin America, both investment and consumption are positively affected by the amount of remittances sent by workers' to their home countries in the CEECs after controlling for several important determinants of growth such as openness to trade, inflation, real interest, credit-GDP ratio as a measure of financial deepening. In the CEECs, as in the Middle East, the workers' remittances affect growth both through consumption and investment while the latter effect is stronger. By contrast, in Latin America, remittances mainly impact consumption rather than investment, even having a negative impact on growth. To gauge these differential effects, we use fixed and random effects estimation as well as GMM strategy to account for country-specific heterogeneity and to control for possible endogeneity among repressors. Our findings also suggest that workers' remittances could be a significant impetus for growth, working through the investment channel, and their significance conditional on credit in investment equations suggest that they can help overcome the liquidity constraints by providing an alternative to formal channels of financing.

Introduction

In the past two decades, since the collapse of communism, migrant workers' remittances have become an important source of external finance for transitional economies in Central and Eastern Europe (CEECs), second only to the FDI flows. In certain countries, such as Albania, Croatia, Macedonia and Moldova, their level has been a few times larger than that of foreign direct investment (FDI), sometimes reaching a significant part of GDP (Figures 1 and 2). Despite the proliferation of research work that explore the potentially beneficial impact of remittances in developing countries, and the growing significance of remittances for the CEECs in the past decades, only a limited number of papers assessed their macroeconomic effects in this region, especially in a comparative perspective with other recipient countries in Latin America, the Middle East, North Africa and Turkey (MENAT). Most work so far has been qualitative and at the cross-national level, there is, to the best of our knowledge, only one empirical study dedicated to the macroeconomic study of remittances in the CEECs. Piracha and Ledesma [1] analyze the impact of remittances on investment, and consumption in several countries of Central and Eastern Europe but their paper excludes the possible role of remittances on growth, especially after controlling for indicators of financial development.

On the other hand, the results of macroeconomic analyses of remittances in developing economies point in different directions: There are two contradictory views regarding the impact of remittances on the macro economy despite the encouraging results of several micro-studies.[1] One view stresses that remittances are primarily spent on consumption and residential investment, having little or no effect

on growth and capital formation. Remittances can even hurt the growth process by discouraging work effort, thereby reducing labor supply. Chami et al. [2], for instance, find that remittances are compensatory in nature and create moral hazard problems, thus negatively affecting economic activity and growth.

Yet, another strand of literature argues that remittances are potentially productive when directed towards investment in physical and human capital, both of which are important determinants of growth. Rapoport and Docquier [3] suggest that remittances can have a significant contribution to education, thus having a positive effect on growth through the human capital channel. Glystos [4] analyzes the impact of remittances on consumption, investment, output and imports in five countries and finds that remittances enhance growth, but there are also cases when remittances decrease growth or intensify recessions. Ziesemer [5] finds that remittances have a positive effect on growth and that this effect is more significant for poorer countries. In a recent paper, Acosta et al. [6], in a macro-panel framework, argue that remittances have so far boosted growth and reduced poverty and inequality in Latin America. Giuliano and Ruiz-Arranz [7], in a large sample study of developing countries in a macro setting, find

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[1]Micro-level studies find strong positive effect of remittances for financing start-up capital in developing countries [11].
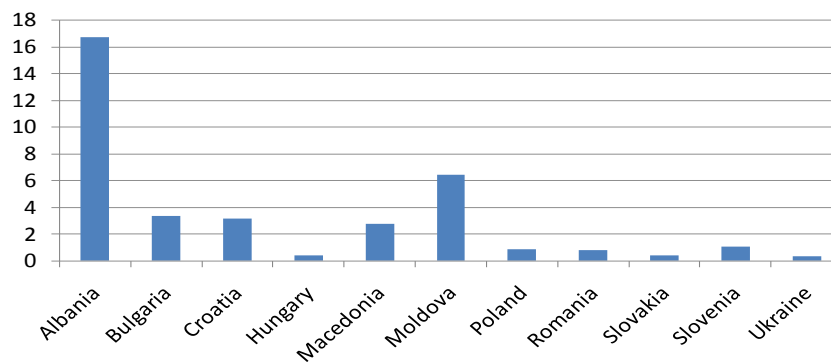
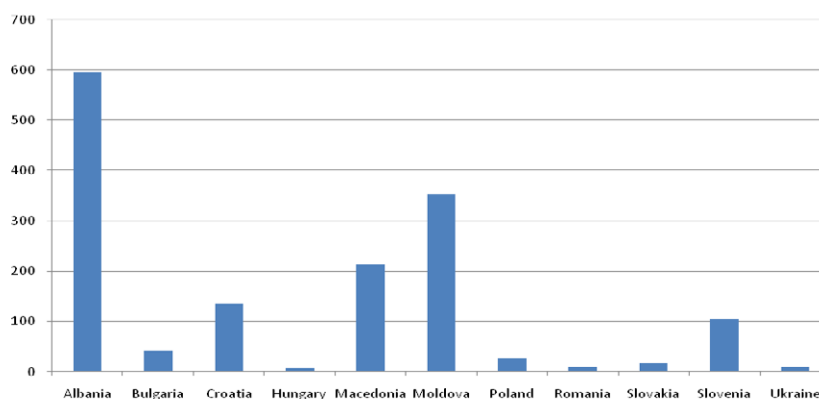**Figure 1:** Remittances as % of GDP in the CEECs.

Figure 2: Remittances as % of FDI in the CEECs.

that remittances not only enhance growth but also relieve borrowing constraints in countries with shallow financial markets.

Our paper contributes to the debate on the possible impact of workers' remittances on the macroeconomy in two important ways: First, we analyze the effect of remittances on consumption, investment and growth in a comparative context by dividing the sample into three regions: the CEECs (11 countries), and two other sets of top remittance – receiving regions, broadly grouped as Latin America (16 countries including those in the Caribbean region) and MENAT (7 countries) over the 1993-2006 period. Our objective is to analyze, using an panel-econometric approach, whether remittances have a strong positive effect on growth in the CEECs in comparison to other regions and whether this effect works mainly though investment. To this end, we estimate three equations on the determinants of consumption, investment and growth for each region to assess the possible differential impact of remittances in the CEECs relative to the other two regions. Our strategy is motivated by the observation that pooling a sample of developing countries to study the impact of remittances may be misleading as there may be substantial amount of variation across regions regarding the effect of remittances on growth, consumption and investment invariant country-specific heterogeneity for each region. In the meantime, we control for the indicators of financial development in all specifications, otherwise standard, to explore how financial sector development affects the ability of a country to benefit from remittances and whether this effect differs in these three remittance receiving regions. Our paper closely follows, in this respect that of Giuliano and Ruiz–Arranz that examines the impact of remittances on economic

growth for developing countries by looking at the way local financial sector development influences a country's capacity to take advantage of remittances.[2] We wish to study whether their results generalize to the CEECs in comparison to Latin America and the MENAT. Moreover, unlike Piracha and Ledesma, we perform dynamic Generalized Method Moments (GMM) estimation as in Arellano and Bond [8] and Arellano and Bover [9] for consumption and investment (also for growth equations), using internal instruments to control for simultaneity bias. We use data from the World Bank World Development Indicators.

Our key findings can be summarized as follows: Remittances impact growth in a significant manner via capital accumulation, and hence work through the investment link in both CEECs and the Middle East. Yet, remittances mainly finance consumption in Latin America, having a negative impact on growth (seemingly) in contrast to the results of Acosta et al., but this effect is insignificant.[3] There is also evidence that in CEECs and the Middle East, remittances raise consumption and this effect is statistically significant. In growth regressions, conditional on investment and human capital, the impact of remittances on growth (i.e. total factor productivity) is significantly positive only in one of the

[2]Their estimation shows that remittances have a positive impact on growth but only in countries with less developed financial systems, this effect being zero or even negative for countries with more developed financial systems.

[3]Acosta et al. [6] use pooled growth regressions for developing countries and assess the growth effects of remittances in Latin America by using a dummy variable approach. The differences in our results could be due to the fact that in our growth regressions, we control for both investment and human capital while they do not. Hence, they attempt to measure the direct effect of remittances on growth while we look at the impact of remittances on investment, and then growth after controlling for investment and other variables of interest.

specifications for CEECs and MENAT but insignificant and negative in Latin America. Hence, there is some evidence that remittances also affect total factor productivity in the CEECs and the Middle East but not in Latin America.

The rest of the paper is organized as follows: Next section presents the empirical analysis using fixed and random effects as well as GMM estimation methodology in the presence of country-specific heterogeneity within each region. First, we describe the variables used in each regression specification for consumption, investment and growth and their expected signs. Then, we proceed with the specification tests such as Hausman and Sargan tests after a brief discussion on the challenges associated with the potential endogeneity of remittances and growth in the presence of country-specific effects.

Significance of remittances in consumption, investment and growth regressions for CEECs in comparison to other regions is discussed based on the estimation results. Section 3 offers concluding remarks.

Empirical Analysis

Description of variables and their expected signs

We have performed panel data econometric estimation on 3 sub-samples of remittance receiving countries: 11 countries in Central and Eastern Europe, 16 countries in Latin America and the Caribbean, and 7 countries in the Middle East and North Africa, including Turkey using annual data for 1993-2006. We have chosen the countries in these three regions based on their high level of remittances as percentage of their GDP levels. There are missing data in some countries for certain variables, thus the number of observations changes according to the variables included.

The remittance variable, REM, represents the sum of workers' remittances and compensation of employees working abroad as it appears in the World Bank WDI database. In the investment regression, the dependent variable is gross fixed capital formation, INV. Other set of control variables, in addition to REM, include the following variables: We proxy the user cost of capital by the real interest rate, RI and financial depth by the credit provided by the banking sector as a measure of financial intermediation performed by the banking sector, CRED. We also control for the real GDP growth, GRWTH and foreign direct investment, FDI. We expect REM to have a positive effect on investment along with CRED, GRWTH and FDI while RI is expected to have a negative effect on investment. Our findings confirm these expectations with the exception of the impact of the real interest rate which is negative only in Latin America.

In the CONSUMPTION equation, the dependent variable is final consumption expenditure, CONS. We include GDP per capita, GDPPC; the real interest rate, RI; inflation rate defined as the annual percentage change in the consumer price index, INFL and unemployment rate, UNEMP together with lagged consumption, LAGC and remittances, REM as explanatory variables. We expect GDPPC and REM to have a positive effect on consumption while RI, INFL and UNEMP to have a negative effect. Later, we show that our expectations are confirmed in all regions regarding the signs of these coefficients in consumption equations.

For the GROWTH regressions, the real GDP growth, GRWTH, is our dependent variable. In addition to remittances, REMG (as a percentage to GDP), our set of control variables include lagged value of GDP per capita, GDPPC; inflation rate, INFL; openness to international trade, defined as the sum of exports and imports as percentage of GDP, TO; log of secondary school enrollment a measure of human capital, ED;

gross fixed capital formation as a percentage of GDP, INVG; domestic credit provided by banking sector as a percentage of GDP as a measure of financial depth, CREDG. This last variable shows how much financial intermediation is performed by the banking sector, as a proxy for financial sector development.

The variables in the investment and consumption equations appear in level terms; for the growth equations we use ratios (to GDP). All variables are specified in natural logs (Tables 1 and 2).

Growth is expected to be positively affected by remittances, openness, human capital, investment and financial development but negatively by the lagged value of real GDP (in the case of conditional convergence in the regional sample), and inflation (a measure of uncertainty and instability in economic environment or policies). We find evidence for conditional convergence only for CEECs and Latin America but not for MENAT. Similarly, inflation affects growth process negatively only in CEECs and Latin America but positively in MENAT. But this effect is insignificant in most specifications. Openness to trade is highly significant with a positive coefficient in Latin America, and to a lesser extent in CEECs but insignificant in MENAT despite having the correct sign. Surprisingly, human capital enters with a negative

Country	N	Mean	St. Dev	Minimum	Maximum
CEEC	**139**	**4.25918**	**6.99135**	**0.01347**	**36.1957**
Albania	14	16.7129	3.450217	11.85068	27.03427
Bulgaria	11	3.370482	3.464496	0.33215	8.596169
Croatia	14	3.135812	0.486956	2.109586	3.840063
Hungary	12	0.407833	0.099217	0.271827	0.585927
Macedonia	11	2.722273	0.926549	1.53771	3.967632
Moldova	12	6.39409	11.38547	0.057045	36.19567
Poland	13	0.851937	0.310054	0.491242	1.288331
Romania	13	0.805208	1.582761	0.025369	4.788317
Slovakia	14	0.408205	0.416863	0.0883	1.285743
Slovenia	14	1.043288	0.351805	0.410327	1.897722
Ukraine	11	0.330573	0.286596	0.013466	0.69076
Latin Am.	**217**	**4.45215**	**5.46377**	**0.00206**	**27.0343**
Argentina	14	0.093175	0.091155	0.020944	0.238721
Brazil	14	0.355574	0.10597	0.19459	0.538749
Bolivia	14	1.377308	1.100001	0.0698	3.580049
Chile	7	0.013466	0.005699	0.00206	0.0178
Colombia	14	1.926007	1.099072	0.72562	3.873527
Costa Rica	14	1.19353	0.643308	0.161023	2.30751
Dominican R.	14	9.214676	2.25619	6.666728	14.2484
Ecuador	14	4.458553	2.216555	1.347653	8.292747
El Salvador	14	13.17695	2.442688	10.50842	18.13598
Guatemala	14	4.802633	0.307414	2.114046	10.27479
Haiti	14	13.27629	8.354016	1.807672	27.03427
Jamaica	14	12.58535	3.914443	4.886311	18.29431
Mexico	14	1.763926	0.659136	0.977414	2.947156
Paraguay	14	3.441956	0.855236	1.38186	4.839211
Peru	14	1.310148	0.311694	0.829633	1.956705
Venezuela	14	0.025545	0.030958	0.002671	0.102194
MENA+T	**98**	**3.62159**	**2.24411**	**0.21132**	**12.1601**
Algeria	14	2.161311	0.56654	1.214186	3.279068
Egypt	14	4.903253	2.379421	2.856612	12.16008
Morocco	14	7.174604	1.450961	5.498064	9.619148
Pakistan	14	3.042074	1.179514	1.466159	4.972064
Syria	14	2.324092	1.33703	0.625514	5.285506
Tunisia	14	4.230652	0.684213	3.052924	5.090784
Turkey	14	1.51517	0.910313	0.211318	2.682912

Table 1: List of Countries and Worker Remittances as % of GDP, 1993-2006.

Country	N	Mean	St. Dev	Minimum	Maximum
CEEC	**128**	**142.268**	**219.248**	**0.58477**	**1119.751**
Albania	13	595.5515	226.8642	337.1925	1119.751
Bulgaria	10	41.65461	42.32544	5.251664	130.1042
Croatia	13	135.0843	127.8403	38.18386	475.9405
Hunagry	11	7.104419	2.929812	3.16393	13.54922
Macedonia	10	212.8793	194.7942	16.5334	606.6013
Moldova	11	353.9157	242.288	3.859514	823.4058
Poland	12	27.56623	14.37447	11.34801	57.85574
Romania	12	11.42634	19.24993	1.316872	71.39011
Slovakia	13	18.13389	21.37042	0.584767	75.81374
Slovenia	13	105.7915	73.84001	13.07779	233.8931
Ukraine	10	11.65894	10.99594	1.151631	30.15873
Latin Am.	**200**	**494.191**	**2675.98**	**-22596**	**15796.61**
Argentina	13	4.4456	5.015705	0.266803	16.58585
Brazil	13	28.83625	29.41323	5.030623	96.51703
Bolivia	13	28.81531	97.86302	-122.189	320.9537
Chile	6	0.277452	0.106215	0.167301	0.4706024
Colombia	13	71.35888	44.37945	13.91532	175.0043
Costa Rica	13	31.65905	14.99965	5.712366	55.81979
Dominican R.	13	316.7139	221.6511	121.9166	997.9275
Ecuador	13	108.7562	42.0542	42.85232	183.6035
El Salvador	12	-608.566	7049.809	-22596.2	4844.193
Guatemala	13	695.4328	614.1406	67.92509	1675.966
Haiti	13	6063.658	5949.494	-2607.14	15796.61
Jamaica	13	277.4232	95.85931	150.8497	443.0122
Mexico	13	63.07807	27.05244	37.38187	116.7537
Paraguay	13	429.7657	519.1667	83.65019	2020
Peru	13	43.63352	2.12764	14.38045	88.67517
Venezuela	13	0.984063	1.356571	0.183234	5.005073
MENA+T	**91**	**403621**	**2198955**	**8.67925**	**1.40E+07**
Algeria	13	2811712	5379189	60.19226	1.40E+07
Egypt	13	489.0336	341.9813	93.32912	1247.262
Morocco	13	12048.57	23428.64	156.2687	73080.63
Pakistan	13	332.0905	158.0628	139.2661	742.3221
Syria	13	251.2095	135.012	66.66667	555.625
Tunisia	13	186.8769	67.43648	79.3739	308.8054
Turkey	13	324.8493	222.2305	8.679245	578.4163

Table 2: Workers' Remittances as % of FDI, 1993-2006.

sign into the growth equations for CEECs although it is insignificant in all specifications as in Latin America. In MENAT, it has a positive effect on growth but only significant in one specification. The impact of remittances, after controlling for investment in physical and human capital is significantly positive (under GMM specification) only for CEECs and MENAT but not for Latin America. In addition, for Latin America, remittances variable carries a negative sign, but is insignificant (Tables 5a-5c).

Regression Analysis: Fixed versus Random Effects Estimation

We run three regional regressions for CEECs, Latin America and the Middle East for three equations pertaining to consumption, investment and growth. Based on the F-test, we reject the hypothesis of pooled estimation in favor of fixed effect (FE) estimation. Pooled OLS estimates are biased in the presence of country specific heterogeneity and fixed effect estimation should be favored under these conditions [10]. This result implies that a significant amount of country heterogeneity is present in all three regions for these dependent variables during 1993-2006. In order to control for common shocks, or external disturbances (like changes in world interest rates), we estimated all fixed effect equations with common time dummies

captured by λ_t but later dropped them due to their joint insignificance. We also performed Hausman specification tests for each equation and region: For CEECs and MENAT, the test favored fixed effects (FE) over random effects (RE) for the consumption equation. For Latin America, random effects estimation was the preferred choice. For the investment equation, Hausman test favored fixed effects for Latin America and MENAT but random effects for the CEECs. For growth equations, random effects, again, is favored for CEECs but fixed effects for Latin America and the Middle East. We report the results for both FE and RE in the Tables 3-5.

$$cons_{i,t} = \alpha + \beta_1 rem_{i,t} + \beta_2 gdppc_{i,t} + \beta_3 inf_{i,t} + \beta_4 unemp_{i,t} + \beta_5 ri_{i,t} + \beta_6 cons_{i,t-1} + u_{i,t} \quad (1)$$

$$inv_{it} = \alpha + \beta_1 rem_{it} + \beta_2 cred_{it} + \beta_3 fdi_{it} + \beta_4 grwth_{it-1} + \beta_5 ri_{it} + u_{it} \quad (2)$$

$$grwth_{it} = \alpha + \beta_1 gdppc_{it-1} + \beta_2 remg_{it} + \beta_3 invg_{it} + \beta_4 credg_{it-1} + \beta_5 \inf_{it} + \beta_6 ed_{it} + \beta_7 to_{it} + u_{it} \quad (3)$$

where $u_t = \alpha_i + \lambda_t + \eta_t$ and $\eta_t \sim N(0, \sigma_\eta^2)$

In the presence of endogenous remittances (remittances affect growth but growth or investment may also affect remittances), FE and RE estimates are inconsistent as they assume strictly exogenous regressors. Hence, we also estimate these equations using Arellano and Bond -Generalized Method of Moments (GMM) to address endogeneity problem and gauge the possible dynamic structure in the equations. GMM yields consistent estimates under these circumstances. There exists considerable difference in the estimated coefficients in these three cases- FE, RE and GMM in CEECs (consumption, and investment) and all growth regressions which suggest that a dynamic panel specification via GMM is most suitable in terms of generating consistent estimates.

Dynamic Panel Estimation: Generalized Method of Moments (GMM)

In order to account for the possible persistence in consumption and investment and their dynamic structure, we performed GMM estimation as in Arellano and Bond (1991).[4] We reran the above regressions by using lagged values of consumption, investment and growth variables as instruments for dynamic equations in differences. Fixed or random effect models generate biased results in the presence of lagged dependent variables in the regression equations.[5] FE model is appropriate for static models in which the regressors are correlated with the country-specific effects but FE requires strict exogeneity of the explanatory variables with respect to the random error term. Ideally, we should have conducted a Durbin-Wu-Hausman test to determine if some explanatory variables are endogenous. If they are, then FE and RE are both inconsistent. It is important then to use estimators that are consistent in the presence of endogenous regressors and country specific effects. GMM offers a robust solution to the endogeneity problem since it yields consistent estimates in the presence of endogenous regressors.[6]

Are remittances endogenous in growth, consumption and investment regressions? Does it depend on the income per capita in the recipient countries as a negative relation with poorer countries receiving more remittances? Theoretically, both the magnitude of

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[4]For dynamic panels, Anderson and Hsiao [12] propose differencing to remove country specific effects and then using lagged values of the regressors as instruments to generate consistent estimates. Specifically, under the assumption that explanatory variables are predetermined, their lagged values (one-period) are valid instruments and if explanatory variables are endogenous, then two period lagged values are valid.
[5]In FE, the presence of country specific effect leads to a correlation between a lagged regressor and the error term, generating biased estimates.
[6]Besides, if explanatory variables are strictly exogenous, then there should be no significant differences between the FE and the GMM results.

Dep. variable: ln(cons)	LSDV1 w/out d1	RE	FE	GMM
ln(gdppc)	.6168115*** (2.88)	0.015286 (0.07)	1.573008 *** (5.86)	0.672628 (0.8)
ln(rem)	.0782774*** (3.24)	0. 0071502 (0.11)	.1268257 *** (3.67)	.0642453*** (2.68)
ln(ri)	-0.0141885 (-0.49)	-.4152403*** (-2.99)	0.062049 (1.45)	-0.03992 (-1.11)
ln(infl)	0.0093833 (0.2)	-0.14214 (-1.00)	.0297686 (0.43)	-0.04011 (-0.87)
ln(unemp)	-.152085** (-2.14)	-.6101889** (-2.29)	-0.18053 (-1.60)	-0.15216 (-1.48)
lagc	.7557432*** -7.05			
constant	0.0071928 0	25.92848 (9.14)	8.188365 (3.58)	-0.00609 (-0.18)
# Obs.	42	43	43	34
R² overall	0.9876	0.3626	0.1066	
F-test			0.0005	
BP LM test		0		
Hausman test			0	
Sargan test				0

Table 3a: Panel Estimation of the Consumption Equation for CEECs.

Dep. variable: ln(cons)	LSDV1 w/out d1	RE	FE	GMM
ln(gdppc)	1.158215*** (4.73)	1.62901*** (7.56)	1.697104*** (6.55)	1.910376*** (6.85)
ln(rem)	-0.0300462 (-1.25)	.0474396* (1.93)	0.0397069 (1.53)	.0760231*** (2.6)
ln(ri)	-.0402092** (-2.26)	-.0383525* (-1.75)	-.0403772* (-1.82)	-.0449652** -0.027
ln(infl)	-.0903968*** (-4.72)	-.1310658*** (-5.97)	-.1316398*** (-5.89)	-.0854351*** (-4.96)
ln(unemp)	-.1593294*** (-2.65)	-0.0756426 (-1.10)	-0.0626717 (-0.87)	-0.0797975 (-1.60)
lagc	.445042*** (6.74)			
constant	5.176751 (2.54)		10.47435 (5.33)	-0.0267487 (-3.66)
# Obs.	113	123	123	85
R² overall	0.9952	0.4013	0.3944	
F-test			0	
BP LM test		0		
Hausman test		0.9408		
Sargan test				0.0007

Table 3b: Panel Estimation of the Consumption Equation for Latin America.

remittances and the efficiency of financial markets as proxied by the credit variable should increase with higher growth rates. In this case, their effect on growth can be overestimated. Then if remittances depend on the level of income and if there is conditional convergence towards the steady state in per capita income, remittances can not be considered exogenous with respect to growth as traditionally assumed. At most, we may hope it is predetermined such that remittances may be influenced by random events in past growth rates but not by contemporaneous events. In the absence of good instruments, the endogeneity problem can be tackled with system GMM (SGMM) following Arellano and Bover. We also have tried to estimate growth equations in differences with using lagged values of endogenous variables as instruments. In GMM estimations, Sargan test of over-identifying restrictions also confirm the validity of the internal (lagged values of endogenous variables) used as instruments.

Do remittances have an impact on growth? To answer this question, we include several variables in the growth regression. The result is that, conditional on investment in physical and human capital as well as other variables that proxy financial development, the impact of remittances on growth is significant only in one of the specifications for CEECs and MENAT but almost negligible in Latin America. If remittances have an effect on growth, conditional on investment and human capital, then remittances work through channels that impact on total factor productivity or the Solow residual. We interpret this finding as supportive of the view that remittances affect growth via some of the control factors such as through their impact on capital formation or alternatively, on investment in physical capital.

Hence, we conjecture that remittances impact growth via capital accumulation, such that remittances work through the investment link. This implies that our estimation results should indicate that 1)

Dep. variable: ln(cons)	LSDV1 w/out d1	RE	FE	GMM
ln(gdppc)	-0.5163297 (-1.12)	2.850368*** (6.10)	2.286184*** (4.42)	2.059083** (1.99)
ln(rem)	0.0614286 (1.38)	.2346272*** (2.8)	0.0058346 (0.06)	.0706712** (2.01)
ln(ri)	-0.061375 (-0.83)	.4334042** (2.04)	0.0246157 (0.17)	-0.0862492 (-1.30)
ln(infl)	-0.0135542 (-0.37)	0.1473951 (1.56)	-0.0625405 (-0.83)	-0.0170374 (-0.58)
ln(unemp)	-0.0720066 (-0.80)	-.5451023*** (-2.46)	-0.0657156 (-0.38)	-.1992247** (-2.16)
lagc	.9911579*** (7.05)			
constant	3.264694 (1.37)		2.977991 (1.27)	-0.0590278 (-2.64)
# Obs.	23	25	25	15
R² overall	0.9942	0.9029	0.4808	
F-test			0.0002	
BP LM test		0.7587		
Hausman test			0	
Sargan test				1

Table 3c: Panel Estimation of the Consumption Equation for MENAT.

Dep.variable: ln(inv)	LSDV1 w/out d1	RE	FE	GMM	GMM
ln(rem)	0.0264615 (1.5)	0.005024 (0.21)	.0323219 (1.18)	0.015158 (0.95)	.0249302* (1.65)
ln(cred)	.3068385*** (5.78)	.7921998*** (19.72)	.7200371*** (13.43)	.3528811*** (7.71)	.3292005*** (7.81)
ln(ri)	0.0369406 (1.6)	.0628744* (1.76)	.0588078 (1.65)	.0361845* (1.93)	0.026296 (1.64)
ln(fdi)	0.0213651 (1.26)	.0808486*** (3.22)	.0749797*** (2.98)	0.000692 (0.04)	
ln(grw)	.0955764*** (4.85)	.0585144* (1.95)	.0518667* (1.74)	.0804809*** (5.49)	.0750993*** (5.04)
laginv	.6018088*** (10.19)				
constant	.6623902 (1.04)		3.449413 (3.63)	0.01045 (1.45)	0.006378 (1.09)
# Obs.	86		87	70	76
F test			0		
BP LM test		0			
Hausman test		0.8078			
R² overall	0.9961	0.9682	0.9656		
Sargan test				0.0805	0.0841

Table 4a: Panel Estimation of the Investment Equation for CEECs.

Dep.variable: ln(inv)	LSDV1 w/out d1	RE	FE	GMM
ln(rem)	0.0254038 (1.34)	-0.0037942 (-0.16)	0.0252462 (0.95)	0.024949 (0.76)
ln(cred)	.08322* (1.89)	.4654617*** (9.34)	.3512484*** (6.16)	.2853827*** (3.9)
ln(ri)	-0.0028384 (-0.17)	-.0553971** (-2.08)	-.0450623* (-1.73)	0.0299624 (1.6)
ln(fdi)	.0521318*** (2.91)	.1722576*** (6.72)	.1684958 *** (6.78)	.0526528*** (2.92)
ln(grw)	.0808074*** (6.52)	.054892*** (2.81)	.0481745 *** (2.55)	.0568764*** (4.65)
laginv	.7237957*** (13.9)			
constant	3.038745 (3.23)		10.50455 (10.38)	0.0057656 (0.413)
# Obs.	131	142	142	100
F test	0.9961	0.9209	0.9222	
BP LM test			0	
Hausman test		0		
R² overall			0.0002	
Sargan test				0.0025

Table 4b: Panel Estimation of the Investment Equation for Latin America.

Dep.variable: ln(inv)	LSDV1 w/out d1	RE	FE	GMM
ln(rem)	0.1018792 (1.7)	-0.0462207 (-0.58)	0.0660506 (0.83)	.0946408** (2.19)
ln(cred)	0.1348051 (0.75)	.4570562*** (4.91)	.5980138*** (5.68)	.7843866*** (3.08)
ln(ri)	.0469719* (1.97)	0.0063784 (0.17)	0.0311124 (0.93)	.0457568*** (2.72)
ln(fdi)	.0384277* (1.82)	.1242065*** (3.02)	0.0473043 (1.58)	.0600953*** (2.67)
ln(grw)	0.052867 (1.39)	-0.0620218 (-0.80)	0.0100841 (0.19)	0.0426176 (1.5)
laginv	.668268*** (3.36)			
constant	1.518562 (0.65)		6.150591 (2.18)	-0.0391014 (-3.04)
# Obs.	31	33	33	21
F test	0.9791	0.8681	0.833	
BP LM test			0	
Hausman test		0.0354		
R² overall				
Sargan test				1

Table 4c: Panel Estimation of the Investment Equation for MENAT.

Dep.variable ln(grw)	LSDV1 w/out d1	RE	FE	FE - IV (IV:lagremg)	FE - IV (IV:lagremg)	GMM Endogenous Remittances
laggdppc	-1.318034 (-1.47)	-.351842*** (-2.94)	-1.318034 (-1.47)	-1.383059 (-1.46)	-1.673303** (-2.56)	-11.69551*** (-3.05)
lnremg	-0.0244585 (-0.20)	-0.0583547 (-0.99)	-0.0244585 (-0.20)	0.0735341 (0.17)	.2989416*** (2.9)	0.0587748 (0.55)
lninvg	0.3595301 (0.54)	1.238705** (2.38)	0.3595301 (0.54)	0.2782602 (0.37)	0.1847494 (0.43)	2.107151** (2.03)
lncredg	0.7759712 (1.27)	0.1405249 (0.65)	0.7759712 (1.27)	0.5452078 (0.48)	0.274094 (0.89)	0.119248 (0.16)
lned	-0.4452894 (-0.16)	0.1513837 (0.11)	-0.4452894 (-0.16)	-0.2654467 (-0.09)		-4.430261 (0.275)
lnto	1.956926** (2.13)	0.3136361 (1.16)	1.956926** (2.13)	2.003522** (2.12)	0.7376033 (1.12)	-0.0106912 (0.993)
lninfl	-0.0785364 (-0.61)	-0.035346 (-0.36)	-0.0785364 (-0.61)	-0.0840609 (-0.64)	-0.0453619 (-0.55)	.2829787* (1.81)
constant	1.084648 (0.09)	-2.073726 (-0.35)	0.9177398 (0.07)	1.412942 (0.11)	9.603717 (2.56)	0.6615423 (2.71)
# Obs.	58	58	58	58	113	35
R² overall	0.4293	0.315	0.1888	0.1699	0.0564	
F test			0.524			
BPLM test		0.0752				
Hausman test		0.3526				
Sargan test						1

Table 5a: Panel Estimation of the Growth Equation for CEECs.

investment impacts growth and 2) remittances impact on investment. Tables 3-5 reveal that this is indeed the case: Remittances strongly affect investment in CEECs, and MENAT even after controlling for the level of financial deepening through the credit variable. But this effect is not present for Latin America (negative and insignificant). On the other hand, remittances do have a positive and significant effect on consumption for all regions, which is especially strong for Latin America. Combining these results with our earlier findings on growth, we confirm that remittances work through investment (capital accumulation) in influencing growth and in regions (Latin America) where remittances mainly influence consumption, their impact on growth is also negligible. In such countries, remittances are likely to be devoted to non growth generating activities such as consumption and even may reduce labor supply and discourage growth. We also find

such a negative (but insignificant) effect of remittances on growth in Latin America.

Do countries in each region converge in terms of real income? β_1 of initial real income per capita in the growth regressions is the convergence coefficient, which have been included in almost all empirical growth studies in the 1990s. If the log of initial level of income is significant and negative, this implies conditional income convergence among the countries in the sample. We find evidence that there is strong conditional convergence in the growth equations for CEECs but not for Latin America and for MENAT (possibly reflecting greater heterogeneity of these samples). Moreover, although in Latin America, the coefficient has the right sign (but insignificant), in the MENAT group, it is positive (but insignificant).

Consistent with the previous literature, we find that financial

Dep. variableln(grw)	LSDV1 w/out d1	RE	FE	FE - IV (IV:lagremg)	GMM Endogenous Remittances
laggdppc	-3.632857 (-1.17)	.020155 (0.04)	-3.632857 (-1.17)	-5.70606 (-1.30)	-1.925991 (-0.25)
lnremg	-.2827049 (-0.75)	-.2488973 (-1.49)	-.2827049 (-0.75)	1.462406 (0.79)	-1.011484 (-1.28)
lninvg	.166049 (0.11)	-1.241062 (-1.43)	.166049 (0.11)	.6478027 (0.33)	.5680088 (0.22)
lncredg	-.7160751 (-0.76)	-.6658217 (0.126)	-.7160751 (-0.76)	-2.03723 (-1.14)	-.3206416 (-0.19)
lned	1.529338 (0.80)	.2118556 (0.29)	1.529338 (0.80)	-2.485197 (-0.52)	-2.156925 (-0.70)
lnto	4.875535*** (3.11)	1.834339** (2.45)	4.875535*** (3.11)	1.380868 (0.34)	7.332959 (0.021)
lninfl	-.3670645* (-1.72)	-.0748455 (-0.42)	-.3670645* (-1.72)	-.328119 (-1.23)	-.069447 (-0.20)
constant	-3.299439 (-1.90)		7.027886 (0.29)	55.17566 (0.95)	.32908 (1.23)
# Obs.	60	60	60	60	31
R² overall	0.5894	0.2436	0.0130	0.0006	
F test			0.0088		
BPLM test		0.7157			
Hausman test					
Sargan test					1.0000

Table 5b: Panel Estimation of the Growth Equation for Latin America.

Dep. variableln(grw)	LSDV1 w/out d1	RE	FE	FE	FE - IV (IV:lagremg)
laggdppc	2.438879 (0.27)	.5692951 (0.46)	2.438879 (0.27)	4.121234 (0.81)	2.086556 (0.23)
lnremg	-1.597992 (-1.44)	-.0148686 (-0.04)	-1.597992 (-1.44)	-1.703668** (-2.38)	-1.528932 (-1.34)
lninvg	-3.395252 (-1.17)	-.811759 (-0.35)	-3.395252 (-1.17)	-4.077343 (-1.65)	-3.408536 (-1.17)
lncredg	.0329688 (0.02)	-.1761047 (-0.34)	.0329688 (0.02)		-.0020308 (-0.00)
lned	6.678835 (1.77)	-.1446852 (-0.20)	6.678835 (1.77)	7.451272** (2.48)	6.472908 (1.67)
lnto	1.585579 (0.94)	-.3187314 (-0.41)	1.585579 (0.94)	1.588365 (1.17)	1.612279 (0.95)
lninfl	.0979344 (0.33)	.1909196 (0.90)	.0979344 (0.33)		.0856077 (0.29)
constant	-39.18312 (-0.52)	2.079865 (0.58)	-37.4792 (-0.52)	-50.04385 (-1.31)	-34.09443 (-0.46)
# Obs.	60	60	60	60	31
R² overall	0.7354	0.3153	0.0179	0.0062	0.0186
F test			0.2944		
BPLM test		0.5383			
Hausman test					
Sargan test					

Note: tstatistics in parentheses, * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 5c: Panel Estimation of the Growth Equation for MENAT.

development is conducive to growth via its impact on investment and growth in all regions. The coefficient of credit variable is consistently significant and positive in all specifications and regions. But it turns insignificant (even negative) in the presence of investment variable in growth equations displaying high level of multicollinearity with this variable. Moreover, credit is strongly significant in the investment equations in all regions but the coefficient is largest in MENAT, and larger in CEECs than in Latin America (sensitivity of investment to credit is highest in MENAT, and then CEECs). Combining these results, we can claim that remittances may alleviate credit constraints by providing an additional channel for investment financing in CEECs and MENAT more than Latin America where remittances finance mostly consumption.

Conclusions

This paper shows that pooling a sample of developing countries to study the impact of remittances may be misleading as there is substantial amount of variation across regions regarding the effect of remittances on growth and investment. While remittances affect positively investment, consumption, and growth (TFP) in the CEECs and the Middle East (MENAT), their main impact is on consumption in Latin America with a negative (albeit insignificant) impact on growth (reducing labor supply). This implies that remittances respond to profit opportunities at home (investment effect) and possibly alleviate credit constraints by financing start-ups. Consumption effect is strongest in Latin America, followed by the CEECs and the Middle East, but it discourages growth only in Latin America (but this effect is not statistically significant).

We also find that there is significant amount of conditional convergence in the CEECs and Latin America in terms of real per capita income but not in the Middle East. Consistent with the previous literature, we find that financial development is conducive to growth via its impact on investment in all regions. The coefficient of credit variable is consistently significant and positive in all specifications and regions but the coefficient is largest in MENAT, and larger in CEECs than in Latin America i.e. sensitivity of investment to credit is highest in MENAT, and then CEECs. Remittances may alleviate credit constraints by providing an additional channel for investment financing in the CEECs and MENAT (as it is significant even in the presence of the credit variable).

To summarize, remittances seem to finance both investment (profit-driven motive to remit) as well as consumption (compensatory transfers or altruistic motive to remit) in CEECs and MENAT where sensitivity to credit is larger (relieving financing constraints) than in Latin America where it finances mainly consumption rather than investment with remittances turning insignificant in investment equations. These interpretations are also in tune with our earlier findings on the growth effect of remittances in Latin America where remittances have a negative (but insignificant) effect on growth. It also confirms that when remittances affect growth, it does so through the

investment channel. If it mainly finances consumption, it can even discourage growth (reducing incentive for supplying labor).

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