



# REMITTANCE INFLOWS AND ECONOMIC GROWTH: THE CASE OF DEVELOPING COUNTRIES

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## *Abstract*

This paper investigates the long-run growth effect of remittance flows to developing countries using the dynamic panel generalized-method-of-moments (GMM) estimators with Windmeijer (2005) correction. Our results indicate that the link between remittance inflows and economic growth is conditional on the extent of financial depth and quality of governance of the recipient countries.

**Keywords:** *Remittances; Economic growth; GMM*

## **INTRODUCTION**

According to the World Bank, the officially recorded remittances to developing countries have increased from \$49 billion in 1990 to \$429 billion 2016. This amount represents about 75% of global remittance flows (World Bank, 2017) [1]. Furthermore, remittance flows to developing countries are more than three times the size of Official Development Assistance (ODA), which amounted to \$142.6 billion in 2016, and are relatively more stable than cyclical private debt and equity flows (see Figure 1 in the Appendix). The sheer size of remittances has been continuously growing and now represents the second largest source of external funding for developing countries, behind foreign direct investment (FDI), which totaled \$646 billion in 2016 (UNCTAD, 2017) [2]. It is also believed that billions more are transferred through unofficial channels.

Does this ever-growing remittance flow to developing countries enhance economic growth? Both theoretical and empirical research into the long-term economic impact of remittances has produced mixed results. On one hand, theory presents somewhat ambiguous explanations regarding the effects of remittance inflows on the economic growth of the recipient economy. The literature shows that remittances could be driven

by an altruistic motive (i.e., to help smooth consumption of the receiving family members), and/or a self-interest motive (i.e., as investment during good times) (Lucas & Stark, 1985; Rapoport & Docquier, 2006; Lueth & Ruiz-Arranz, 2008; Adams, 2009) [3]. Given that remittances are private financial flows that could be used to finance consumption and investment, they could potentially contribute to capital accumulation, both physical and human. This would then result in an increase in economic growth of the receiving economy by augmenting domestic sources of income, improving the creditworthiness of domestic investors (enhancing their collateral), and consequently, lowering the cost of capital in the domestic economy, and by improving domestic macroeconomic stability (or reducing output volatility). These effects, however, depend on the extent to which remittances are directed towards investment. If a significant portion of remittances goes to consumption, they could contribute towards poverty reduction and consumption smoothing and thus, short-run economic growth, but not necessarily to long-term economic growth (Barajas et al., 2009; Chami et al., 2005; IMF, 2005; World Bank, 2006) [4]. Remittance inflows could also exert a negative impact on labor force participation by encouraging consumption of leisure as the recipients can substitute unearned income for labor income, and could therefore dampen long-term economic growth (Chami et al., 2005). Theory also shows that remittance inflows may affect total factor productivity (TFP) growth through effects on the efficiency of domestic investments and the size of domestic production externalities generated by an economy (Barajas et al., 2009).

On the other hand, the empirical studies are also inconclusive. A number of empirical studies show that remittance inflows enhance investment, facilitate human capital formation, and total factor productivity and hence contribute positively to economic growth (IMF, 2005; World Bank, 2006; Ahortor & Adenutsi, 2009; Salahuddin & Gow, 2015; Borja, 2017). At the same time, a host of other empirical studies show that remittance inflows exert either no discernible or even negative effect on long-run economic growth (Barajas et al., 2009; Chami et al., 2005; Gupta, 2006; Lim & Simmons, 2015). Some of the studies show that remittances may hamper economic growth through a Dutch Disease effect (Acosta et al., 2009; Barajas et al., 2011) or by reducing labor supply and increasing investment risk (Chami et al., 2005), or by negatively affecting quality of domestic institutions (Abdih et al., 2012). Still other studies show that the growth effects of remittance inflows depend on the recipient countries' domestic factors (Catrinsecu et al., 2009; Giuliano & Ruiz-Arranz, 2009).

Against this backdrop, this study attempts to re-examine the growth effects of remittance inflows to developing countries using the most recent available data set and system GMM for panel data estimation with Windmeijer (2005) correction. In addition to applying the Windmeijer correction to the dynamic panel GMM regression to try to



minimize the potential instrument proliferation issue, which could bias the regression results downwards, this study contributes to the existing body of research in that it focuses only on developing countries (given that the growth impacts of remittances could differ between developed and developing countries), controls for six governance indicators besides the common control variables, examines if the growth effect of remittance is conditional on domestic factors including financial depth and quality of governance. The study also uses data averaged over five year period to minimize the effects of business cycle fluctuations from masking the long-run growth impact of remittance inflows.

Our results show that the effect of remittance inflow on economic growth depends on the extent of financial depth and the quality of governance of the recipient countries. Thus, any effort at boosting the growth effect of remittance should focus on strengthening the financial system and improving the quality of governance of the recipient countries.

The remainder of the paper is organized as follows. Section 2 describes the data. Section 3 discusses the econometric methodology employed and Section 4 provides the empirical results of the study. Finally, Section 5 concludes the paper.

## **DATA AND PRELIMINARY ANALYSIS**

This study employs a panel of 48 countries for which we have complete data on remittance inflows and control variables for the period 1996-2016. Our growth regressions are estimated using five-year averages of all variables. The dependent variable is economic growth as measured by a country's annual percentage change in real GDP per capita. The control set is comprised of remittance inflows to GDP ratio along with other variables commonly found to be robustly significant in previous studies. Our World Bank remittance measure reflects annual inflows from personal transfers, employee compensation, and migrants' transfers. Additionally, the full set of explanatory variables includes initial real GDP per capita, government consumption expenditures to GDP ratio, domestic credit to GDP ratio, inflation rate, population growth rate, trade openness, average years of schooling, real effective exchange rates, and measures of governance. Six separate measures reflecting different dimensions of governance are explored. These include voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. In addition to these separate measures, we formed a single governance variable which gives the combined average of the six aforementioned dimensions.

The number of countries and years in our study are limited by data availability, specifically the education and governance measures. However, we feel it is important to

include these variables in our model. The measure of years of schooling serves as a proxy for a country's level of human capital, which economic theory tells us is important for growth. Analyzing the governance variables contributes to the existing literature as they are relatively new measures and have not been included in many studies. See Table 1 in the Appendix for a full list of variables along with descriptions and sources for each. Summary statistics for each variable are shown in Table 2 below.

TABLE 2. SUMMARY STATISTICS

<i>Variable</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Minimum</i>	<i>Maximum</i>
Real GDP per capita	3357.779	2901.554	239.729	12762.31
Economic growth	4.233	2.286	-5.142	11.810
Remittance inflows	0.042	0.054	0.00022	0.318
Schooling	5.714	2.363	0.822	9.816
Govt. size	14.588	5.438	4.954	37.078
Inflation	7.208	8.244	-1.800	74.101
Openness	69.447	31.687	18.454	191.126
Private credit	48.832	40.208	-63.123	215.026
Real effective exch. rate	104.356	18.348	62.644	210.826
Population growth	1.854	0.883	0.260	6.059
Governance	39.208	14.354	4.74	74.109
voice and accountability	41.225	18.308	2.494	85.220
Political stability	32.789	19.341	1.344	90.000
Govt. effectiveness	41.646	17.327	4.434	78.766
Regulatory quality	42.244	16.077	4.810	74.008
Rule of law	37.963	16.317	2.500	70.996
Corruption control	39.385	17.972	1.440	80.736

*Note:* Except real GDP per capita, schooling, real effective exchange rate, and governance indicators, all variables are expressed as percentage values.

## ECONOMETRIC METHODOLOGY

We examine the causal link between economic growth and remittance inflow using the dynamic panel generalized-method-of-moments (GMM) estimators [5]. The cross-country growth regression we estimate can be written as follows:

$$y_{i,t} - y_{i,t-1} = (\alpha - 1)y_{i,t-1} + \beta'X_{i,t} + \tau_t + \mu_i + \varepsilon_{i,t} , \quad (1)$$

where  $y_{i,t}$  is the logarithm of real per capita GDP in country  $i$  at time  $t$ ,  $X_{i,t}$  is a set of explanatory variables, including remittance inflow, average years of schooling, government consumption expenditure, inflation rate, trade openness, size of private credit provided by domestic financial institutions, population growth rate, quality of governance, and real effective exchange rate;  $\tau_t$  captures time-specific effects (time dummies are used),  $\mu_i$  represents time invariant country-specific effects, and  $\varepsilon_{i,t}$  is the idiosyncratic shocks.



Note that we can rewrite (1) as:

$$y_{i,t} = \alpha y_{i,t-1} + \beta' X_{i,t} + \tau_i + \mu_i + \varepsilon_{i,t} \quad (2)$$

So that the model can equally be thought of as being for the increase or level of  $y$ .

Model (2) contains the lagged dependent variable as an explanatory variable in the same regression. Applying OLS estimator to this model results in biased and inconsistent estimates, since the lagged real per capita GDP is correlated with the country fixed effects in the error term. To remove this dynamic panel bias, Holtz-Eakin et al., (1988) and Arellano and Bond (1991) propose the first-difference transform of (2) as follows:

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta'(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (3)$$

Although the fixed effects are expunged, the lagged per capita GDP as well as any of the control variables in  $X$  are still potentially endogenous. To overcome this problem, Arellano and Bond (1991) uses the lagged levels of the explanatory variables as instruments under the assumptions that the error term,  $\varepsilon$ , is not serially correlated and that the explanatory variables are weakly exogenous (i.e., they are uncorrelated with future realizations of error terms). Specifically, this dynamic panel estimator commonly referred to as Difference GMM, uses the following moment conditions:

$$E[y_{i,t-l}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } l \geq 2; t = 3, \dots, T, \quad (4)$$

$$E[X_{i,t-l}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } l \geq 2; t = 3, \dots, T, \quad (5)$$

However, Blundell and Bond (1998) demonstrate that when explanatory variables are persistent over time, the untransformed lagged levels of these variables are weak instruments for transformed variables and this adversely affects the small- sample and asymptotic properties of Difference GMM.

To increase efficiency, Blundell and Bond develop a dynamic panel System GMM, originated in Arellano and Bover (1995), which augments the difference estimator by estimating simultaneously in differences and levels, with the two equations being distinctly instrumented. The addition of regression in levels also allows us to examine the cross-country relationship between our variables of interest. While the instruments for equation in differences are the same as above, the instruments for equation in levels are the lagged differences of the explanatory variables [6]. These are valid instruments under the following additional assumption: although there may be correlation between the levels of the explanatory variables and the country fixed effects in (2), there is no correlation between the differences of these variables and the country-specific effect [7]. This assumption results in the following stationarity properties:

$$E[y_{i,t+p}\mu_i] = E[y_{i,t+q}\mu_i] \text{ and } E[X_{i,t+p}\mu_i] = E[X_{i,t+q}\mu_i], \text{ for all } p \text{ and } q \quad (6)$$

The additional moment conditions for the regression in levels are:

$$E[(y_{i,t-l} - y_{i,t-l-1})(\mu_i + \varepsilon_{i,t})] = 0 \text{ for } l = 1, \quad (7)$$

$$E[(X_{i,t-l} - X_{i,t-l-1})(\mu_i + \varepsilon_{i,t})] = 0 \text{ for } l = 1. \quad (8)$$

The dynamic panel GMM-sometimes referred to as System GMM-, thus, uses the moment conditions in Eqs. (4), (5), (7), and (8) to generate consistent and efficient estimates.

The consistency of dynamic panel GMM rests on the validity of the instruments and the assumption that the error terms do not exhibit serial correlation. In particular, the estimator can suffer from a potential instrument proliferation; where by the instrument count may become equal to or larger than the number of cross-sectional units and thereby over-fitting the instrumented variables they may fail to remove the endogenous components of the variables and result in a biased parameter estimates towards those from non-instrumenting estimators. We can reduce this instrument count problem by either restricting the instruments to certain lags instead of all available lags or by collapsing the instrument matrix. The latter can be formally expressed as:

$$E[y_{i,t-l}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for each } l \geq 2, \quad (9)$$

$$E[X_{i,t-l}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for each } l \geq 2. \quad (10)$$

In dynamic panel GMM, we replace the moment conditions of the standard difference GMM (4 and 5) with (9) and (10). The new moment conditions state the same orthogonality assumption between the lagged levels and the differenced error term as (4) and (5) but we only want the estimator to minimize the magnitude of the empirical moments  $\sum_t y_{i,t-l}(e_{i,t} - e_{i,t-1})$  for each  $l$ , rather than separate moments  $\sum_{t,l} y_{i,t-l}(e_{i,t} - e_{i,t-1})$  for each  $l$  and  $t$  (Roodman, 2009). This method, known as the Windmeijer correction, significantly minimizes the potential biases that arise due to over identification problem and boosts the efficiency of our estimates without losing information, as no lags are actually dropped.

We also use two specification tests. The first relates to instruments and includes Hansen-J test of the joint validity of the instruments and Difference-in-Hansen tests of exogeneity of instrument subsets (null hypothesis that the lagged differences of the explanatory variables are uncorrelated with the residuals). The second test examines the hypothesis that the error term is not second-order serially correlated (by construction, the differenced error term is likely first-order serially correlated even if the original is not).



## EMPIRICAL RESULTS

To estimate the causal link between remittance inflow and economic growth, we use both dynamic panel difference and system GMM estimators with five-year averaged dataset. As can be seen in Table 3, the coefficient estimate of remittance inflow is statistically not significant, implying that remittance inflow has no significant effect on economic growth of the countries studied during the 1996-2016 period. This result holds true after we control for initial income per capita, average years of schooling, government size, inflation rate, trade openness, private credit, population growth, governance, real effective exchange rate, and time dummies (results not indicated in the table)[8]. Given that our sample countries are at different income strata

(9 are low-income while 39 are middle-income countries, according to the World Bank's official income classification)[9], we also investigate if remittance inflow exerts varying effects on economic growth depending on the income group of the sample countries. As can be seen in regression (2) of Table 3, the estimated coefficient of the interaction term between remittance inflow and an indicator variable LIC (LIC=1 if the country is a low-income, and 0 if middle income) is statistically not significant, implying that the growth effect of remittance inflow does not vary depending on the income group of the countries studied.

Does the growth effect of remittance inflow depend on the state of financial deepening and the quality of governance of the recipient countries, among other institutions? To examine this case, we include interaction terms for remittance inflow and financial depth, and remittance inflow and the quality of governance indicator, in two separate growth equations with the same specification as before. As regression (3), both difference and system GMM, shows the coefficient estimate of the remittance inflow is negative and statistically not significant. However, the coefficient estimate of the interaction term between remittance inflow and private credit is statistically significant at 5% (system GMM) and 10% (difference GMM), indicating that remittance inflow exerts a significant and positive effect on economic growth in countries with better financial deepening. The coefficient estimate of private credit is also statistically significant showing that financial deepening promotes economic growth. This finding may indicate that well-functioning financial institutions channel remittance flows into uses that do enhance economic growth. This finding is in agreement with earlier work by Giuliano and Ruiz-Arranz (2009) in that the growth effect of remittance depends on the level of financial depth of the recipient countries [10].

Similarly, the coefficient estimate of remittance inflow is negative and statistically not significant (regression 4) whereas the estimated coefficient of the interaction term between remittance inflow and governance is statistically significant at 10% (system GMM), indicating that remittance inflow enhances economic growth in those countries that possess a higher quality governance.

TABLE 3. REMITTANCE INFLOW AND ECONOMIC GROWTH: GMM REGRESSION RESULTS

<i>Dependent variable: per capita real GDP growth rate</i>								
<i>Variable</i>	<i>Difference GMM</i>				<i>System GMM</i>			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Remittance inflow	1.790 (1.342)	0.380 (3.396)	-0.331 (1.897)	-0.032 (5.403)	-0.063 (0.891)	-0.352 (0.968)	-1.585 (1.152)	-2.873 (1.866)
Per capita income, t-1	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)	-0.002* (0.001)
Schooling	-1.702 (2.253)	-1.906 (2.738)	-2.723 (4.628)	-1.281 (2.878)	3.202 (2.932)	2.266 (4.922)	0.499 (2.671)	-0.061 (1.455)
Government size	-0.100 (0.314)	0.870 (0.924)	0.062 (0.125)	0.360 (0.363)	0.115 (0.152)	0.086 (0.207)	0.060 (0.206)	-0.956 (2.763)
Inflation	0.020 (0.054)	-0.124 (0.139)	0.022 (0.106)	0.010 (0.101)	-0.035 (0.064)	-0.047 (0.049)	-0.026 (0.066)	0.011 (0.086)
Trade openness	-0.057 (0.050)	0.029 (0.088)	0.012 (0.076)	0.006 (0.067)	0.007 (0.032)	0.009 (0.050)	0.023 (0.033)	0.019 (0.033)
Private credit	0.129** (0.053)	0.106* (0.063)	0.200** (0.096)	0.134* (0.075)	0.055** (0.021)	0.058** (0.027)	0.155** (0.062)	0.037** (0.016)
Governance	0.002 (0.172)	-0.015 (0.143)	0.062 (0.125)	0.071 (0.583)	0.163* (0.088)	0.151* (0.081)	0.173* (0.098)	0.432* (0.227)
Real effective exchange rate	-0.011 (0.061)	0.019 (0.080)	0.014 (0.041)	-0.002 (0.044)	-0.012 (0.037)	-0.011 (0.051)	0.001 (0.030)	-0.002 (0.032)
Population growth	-0.775 (2.368)	2.834 (3.765)	-0.934 (1.877)	-0.153 (2.207)	0.312 (1.070)	-0.067 (0.993)	-1.474 (1.431)	-1.431 (1.186)
Remit*LIC		0.117 (3.440)				-0.023 (1.417)		
Remit*private credit			0.043* (0.024)				0.030** (0.015)	
Remit*Governance				0.009 (0.114)				0.074* (0.039)
Constant					-5.855 (10.358)	-3.685 (11.455)	-6.048 (8.945)	-6.338 (20.154)
Observations	144	144	144	144	144	144	144	144
AR(2) test <sup>a</sup>	0.310	0.733	0.391	0.602	0.318	0.300	0.876	0.714
Hansen J test <sup>b</sup>	0.582	0.969	0.543	0.878	0.325	0.139	0.254	0.517
Diff. in Hansen test <sup>b</sup>					0.771	0.792	0.755	0.992

Notes: All variables are five-year averaged log values; (1) is baseline regression and controls for income per capita (t-1), remittance inflow, schooling, government size, inflation, trade openness, private credit, governance, real effective exchange rate, and population growth; in addition to those in (1), the





regressions include interaction terms between remittance inflow and a dummy variable for low-income countries (LIC=1 if low income country and 0 otherwise) in (2), private credit in (3), governance in (4); all regressions incorporate Windmeijer correction (2005), with robust standard errors in parentheses; \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively; P-values of post-estimation tests are reported; (a) The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation; (b) The null hypothesis is that the instruments used are not correlated with the residuals.

The coefficient estimate of the quality of governance indicator is also statistically significant (system GMM), indicating the importance of institutions in facilitating economic growth. All control variables, with the exception of private credit, governance, and lagged per capita income, enter all of the regressions with statistically insignificant coefficients.

The governance index is composed of six indicators (voice and accountability, political stability, government effectiveness, regulation quality, rule of law, and control of corruption) and we are interested in identifying if some of the indicators are more important than others in boosting the effect of remittance inflow on economic growth of the recipient countries. Table 4 displays the regression results.

As we can see, the coefficient estimates of voice and accountability, political stability, government effectiveness, rule of law, and the interaction terms between remittance inflow and voice and accountability, remittance inflow and political stability, remittance inflow and rule of law are all statistically significant while the coefficients of regulation quality, control of corruption, and the interaction terms between remittance inflow and regulation quality, and remittance inflow and control of corruption are not significant. This indicates that, having a government structure that promotes voice and accountability, ensures political stability, and upholds rule of law is an important prerequisite to the realization of the potential growth effects of remittance inflows. This finding is in line with the works of Kaufmann and Kraay (2002), and Liu et al., (2018) that conclude that good governance can promote economic growth by nurturing systems and government policies that foster enabling environment for efficient resource utilization; or as Liu et al., (2018) describes it by encouraging the “helping hands” of power while inhibiting the “grabbing hands” of power.

Just like in Table 3, the coefficient estimate of remittance inflow is not significant while that of private credit is statistically significant. The results indicate that the effect of remittance inflows on economic growth is conditional on a number of domestic factors including the extent of financial deepening and the quality of governance. These findings are in line with earlier studies by Catrinescu et al., (2009), Giuliano & Ruiz-Arranz (2009),

World Bank (2006), to mention a few, that also found that the growth effect of remittances depends on a variety of domestic factors, including political and economic policies and institutions. The post-estimation tests also confirm that our results are robust and valid.

TABLE 4. REMITTANCE INFLOW, GOVERNANCE, AND ECONOMIC GROWTH: SYSTEM GMM REGRESSION RESULTS

<i>Dependent variable: per capita real GDP growth rate</i>						
<i>Variable</i>	<i>System GMM</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
Remittance inflow	-1.522 (0.969)	-1.489 (0.992)	-2.949 (2.048)	-2.792 (1.759)	-3.977 (2.475)	0.075 (1.747)
Per capita income, t-1	-0.001 (0.001)	-0.002** (0.001)	-0.002* (0.001)	-0.001* (0.001)	-0.002*** (0.001)	-0.001 (0.001)
Schooling	-0.608 (0.558)	0.711 (0.669)	1.328 (3.369)	0.007 (0.731)	0.005 (0.674)	-0.509 (0.440)
Government size	-0.796 (2.781)	0.759 (2.782)	1.097 (3.510)	0.396 (3.399)	0.919 (3.607)	-0.064 (0.129)
Inflation	-0.021 (0.064)	-0.031 (0.075)	-0.135** (0.062)	-0.111 (0.076)	-0.457 (1.002)	-0.058 (0.069)
Trade openness	-0.398 (1.232)	-0.001 (0.029)	-0.012 (0.057)	-0.833 (1.920)	-0.039 (0.036)	-0.004 (0.019)
Private credit	0.022* (0.012)	0.056** (0.028)	0.043* (0.022)	0.025* (0.015)	0.060* (0.031)	0.024* (0.013)
Voice and accountability	0.223** (0.093)					
Remit*Voacc	0.054** (0.025)					
Political stability		0.218** (0.104)				
Remit*Polst		0.040* (0.020)				
Govt effectiveness			0.210* (0.123)			
Remit*Goveff			0.051 (0.042)			
Regulation quality				0.294 (0.194)		
Remit*Regqual				0.069 (0.048)		
Rule of law					0.485* (0.242)	
Remit*rulaw					0.107* (0.059)	
Corruption control						0.045 (0.185)
Remit*corrcon						0.002



						(0.044)
Real effective	-1.715	-0.024	-0.043	-0.030	-0.055	0.001
exchange rate	(3.164)	(0.025)	(0.061)	(0.034)	(0.041)	(0.023)
Population	-0.640	-0.222	-1.208	-2.026*	-2.846**	-2.803
growth	(1.115)	(1.205)	(2.013)	(1.185)	(1.271)	(1.945)
Constant	14.071	-3.732	-1.769	4.228	0.886	9.764*
	(21.983)	(12.585)	(21.510)	(22.179)	(21.040)	(5.428)
Observations	144	144	144	144	144	144
AR(2) test <sup>a</sup>	0.803	0.435	0.227	0.777	0.957	0.483
Hansen J test <sup>b</sup>	0.757	0.875	0.240	0.327	0.762	0.597
Diff. in	0.269	0.488	0.819	0.119	0.528	0.529
Hansen test <sup>b</sup>						

*Notes:* All variables are five-year averaged log values; all regressions control for income per capita (t-1), remittance inflow, schooling, government size, inflation, trade openness, private credit, real effective exchange rate, and population growth; in addition (1) controls for voice & accountability and its interaction term with remittance inflow, (2) controls for political stability and its interaction term with remittance inflow, (3) controls for government effectiveness and its interaction term with remittance inflow, (4) controls for regulation quality and its interaction term with remittance inflow, and (5) controls for rule of law and its interaction term with remittance inflow; all regressions incorporate Windmeijer correction (2005), with robust standard errors in parentheses; \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively; P-values of post-estimation tests are reported; (a) The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation; (b) The null hypothesis is that the instruments used are not correlated with the residuals.

## CONCLUSION AND POLICY IMPLICATIONS

This article examines the long-run growth effect of remittance flows to 48 developing countries using the dynamic panel generalized-method-of-moments (GMM) estimators with Windmeijer (2005) correction and five-year averaged data spanning from 1996-2016. The empirical results show that the growth effects of remittance inflow depend on the extent of financial deepening and the quality of governance of the recipient countries. Hence, any effort at boosting the growth effects of the huge remittance that flows into the developing countries should first focus on strengthening the financial system and other infrastructure that channel remittances into growth-enhancing activities, and promoting the quality of governance and domestic institutions that facilitate economic growth.

## NOTES

- [1] The World Bank 2018 report also shows that the remittance flow to developing countries equals \$466 billion in 2017 and is projected to grow throughout 2018 due to the stronger economic performance in the host countries (World Bank, 2018).

- [2] Excluding China, the remittance flows to low-and middle-income countries (LMICs) are also significantly larger than FDI in LMICs (World Bank, 2018).
- [3] The literature also includes a third motive for remittance as informal arrangements between the migrant and family members regarding migration and remittance whereby the former appears to remit a fraction of their earned income on a regular basis (Lucas & Stark, 1985).
- [4] In addition, if remittances are perceived to be permanent, they may tend to stimulate additional consumption rather than investment (Barajas et al., 2009).
- [5] For a detailed description of the various GMM estimators, refer to Arellano & Bond (1991); Arellano & Bover (1995); Blundell & Bond (1998); Hansen (1982); and Roodman (2009).
- [6] The new instruments seem more valid for variables that are very persistent over time, random walk-like variables, as past changes may be more predictive of contemporaneous levels than past levels are of current changes.
- [7] Remember that we have assumed error term is not serially correlated.
- [8] The results hold true when we also control for labor force participation rate (instead of population growth), and gross fixed capital formation-to-GDP ratio, which proxies for investment rate.
- [9] See the appendix for the list of the countries included in the study.
- [10] Giuliano & Ruiz-Arranz (2009), however, found a significant negative interaction term between remittance and financial deepening and argue that remittances boost growth in countries with less developed financial systems by providing an alternative way to finance investment and relaxing credit constraints.

## REFERENCES

- Abdih, Y., Chami, R., Dagher, J., & Montiel, P. (2012). Remittances and institutions: Are remittances a curse?. *World Development*, 40(4), 657-666.
- Acosta, P. A., Lartey, E. K. K., & Mandelman, F. S. (2009). Remittances and the Dutch Disease. *Federal Reserve Bank of Atlanta Working Paper*.
- Adams, H. (2009). The determinants of international remittances in developing countries. *World Development*, 37(1), 93-101.
- Ahortor, C., & Adenutsi, D. (2009). The impact of remittances on economic growth in small-open developing economies. *Journal of Applied Sciences*, 9(18), 3275-3286.
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, 58(2), 277-297.
- Arellano, M., & Bover, O. (1995). Another look at the instrumental-variable estimation of error-components models. *Journal of Econometrics*, 68, 29-52.
- Barajas, A., Chami, R., Fullenkamp, C., Gapen, M., & Montiel, P. (2009). Do workers' remittances promote economic growth?. *IMF Working Paper 153*. Washington: International Monetary Fund.
- Barajas, A., Chami, R., Hakura, D., Montiel, P., & Tressel, T. (2011). Workers' remittances and the equilibrium real exchange rate: theory and evidence. *Economia*, 11(2), 45-99.



- Barro, R., & Lee, J.W. (2013). A New Data Set of Educational Attainment in the World, 1950-2010. *Journal of Development Economics*, 104, 184-198.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87, 115-143.
- Borja, K. (2017). Corruption indicators, foreign capital, and economic growth in developing countries. *The Journal of Developing Areas*, 51(4), 95-107.
- Bruegel. (2018). Real effective exchange rates for 178 countries: a new database. <http://bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database/>. (Accessed September 12, 2018, at 10:30).
- Catrinescu, N., Leon-Ledesma, M., Piracha, M., & Quillin, B. (2009). Remittances, institutions, and economic growth. *World Development*, 37(1), 81-92.
- Chami, R., Fullenkamp, C., & Jahjah, S. (2005). Are immigrant remittance flows a source of capital for development?. *IMF staff papers* (53). International Monetary Fund, 1.
- Giuliano, P., & Ruiz-Arranz, M. (2009). Remittances, financial development, and growth. *Journal of Development Economics*, 90(1), 144-152.
- Gupta, P. (2006). Macroeconomic determinants of remittances: evidence from India. *Economic and Political Weekly*, 41(26), 2769-2775.
- Hansen, L.P., (1982). Large sample properties of generalized method of moments estimators. *Econometrica*, 50(4), 1029-1054.
- Holtz-Eakin, D., Newey, W., & Rosen, H. (1988). Estimating vector autoregressions with panel data. *Econometrica*, 56(6), 1371-1395.
- International Monetary Fund. (2005). *World economic outlook, April 2015: globalization and external imbalances*. World Economic and Financial Surveys, Washington.
- Kaufmann, D., & Kraay, A. (2002). Growth without governance. *Economia*, 3(1), 169-229.
- Lim, S., & Simmons, W.O. (2015). Do remittances promote economic growth in the Caribbean community and Common market?. *Journal of Economics and Business*, 77, 42-59.
- Liu, J., Tang, J., Zhou, B., & Liang, Z. (2018). The effect of governance quality on economic growth: Based on China's provincial panel data. *Economies*, 6(5), 56.
- Lucas, R. E. B., & Stark, O. (1985). Motivation to remit: evidence from Botswana. *Journal of Political Economy*, 93, 901-918.
- Lueth, E., & Ruiz-Arranz, M. (2008). Determinants of bilateral remittance flows. *The B.E. Journal of Macroeconomics*, 8(1), 1-23.
- Rapoport, H., & Docquier, F. (2006). The economics of migrants' remittances. In S.C. Kolm, and J.M. Ythier (Eds.), *Handbook of the economics of giving, altruism and reciprocity* (2, 1135-1198). North-Holland, Amsterdam.

Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, 71, 135-158.

Salahuddin, M. & Gow, J. (2015). The relationship between economic growth and remittances in the presence of cross-sectional dependence. *The Journal of Developing Areas*, 49(1), 207-221.

United Nations Conference on Trade and Development (UNCTAD). (2017). *World investment report: Investment and the digital economy*. United Nations Publication, Geneva.

Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics*, 126, 25-51.

World Bank. (2016). *Global economic prospects: economic implications of remittances and migration*. <http://documents.worldbank.org/curated/en/507301468142196936/Global-economic-prospects-2006-economic-implications-of-remittances-and-migration>. (Accessed September 12, 2018, at 13:50).

World Bank (2017). *Migration and remittances: recent developments and outlook*. <http://pubdocs.worldbank.org/en/992371492706371662/MigrationandDevelopmentBrief27.pdf>. (Accessed September 12, 2018, at 15:40).

World Bank (2017). *World Bank Migration and Remittances Data*. <https://www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-remittances-data>. (Accessed August 24, 2018, at 9:50).

World Bank (2017). *World Bank World Development Indicators Dataset*. <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#>. (Accessed August 24, 2018, at 10:55).

World Bank (2018). The world governance indicators project. <http://info.worldbank.org/governance/wgi/index.aspx#home>. (Accessed October 3, 2018, at 9:40).

World Bank. (2018). *Migration and remittances: recent developments and outlook*. <https://www.knomad.org/sites/default/files/2018-04/Migration%20and%20Development%20Brief%2029.pdf>. (Accessed September 12, 2018, at 13:20).

## APPENDIX

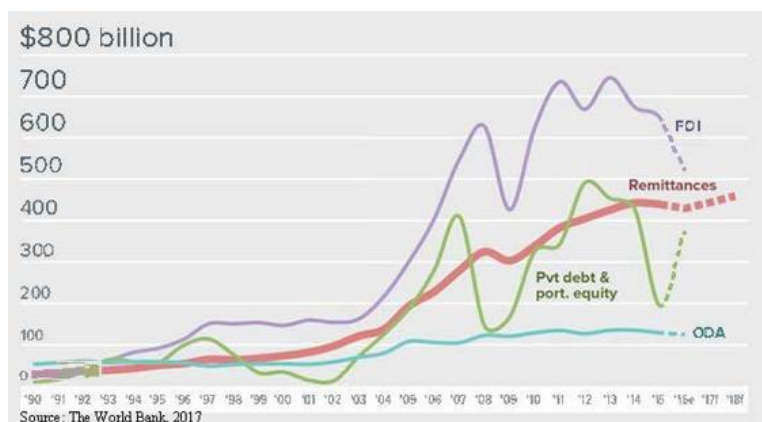


FIGURE 1. REMITTANCE AND OTHER FINANCIAL FLOWS TO DEVELOPING COUNTRIES



TABLE 1. VARIABLE DESCRIPTIONS AND SOURCES

<i>Variable</i>	<i>Description</i>	<i>Source</i>	<i>Notes</i>
Real GDP per capita	GDP per capita in constant 2010 US\$	World Bank. World Development Indicators Dataset	
Economic growth	GDP growth; annual %	World Bank. World Development Indicators Dataset	
Remittance inflows	Annual remittance inflows as a % of GDP; sum of 1) personal transfers, 2) employee compensation, 3) migrants' transfers	World Bank Migration and Remittances Data	
Schooling	Average years of total schooling for total population aged 25 and older	Barro-Lee Educational Attainment Dataset	5-year averages
Govt. size	General government final consumption expenditures as a % of GDP	World Bank. World Development Indicators Dataset	
Inflation	Annual % change in consumer price index (CPI)	World Bank. World Development Indicators Dataset	
Openness	Trade as a percent of GDP; sum of exports and imports as a % of GDP	World Bank. World Development Indicators Dataset	
Private credit	Domestic credit provided by the financial sector as a % of GDP	World Bank. World Development Indicators Dataset	
Real effective exchange rate	CPI-based real effective exchange rate	Bruegel Datasets. Real Effective Exchange Rates for 178 Countries: A New Database	Narrow index: 67 trading partners
Population growth	Annual population growth rate (annual %); all residents regardless of legal status or citizenship	World Bank. World Development Indicators Dataset	
Governance	Aggregate indicator reflecting overall quality of governance	World Bank. The Worldwide Governance Indicators Dataset	Author-calculated average of all World Governance Indicators (remaining variables listed below)

<i>Variable</i>	<i>Description</i>	<i>Source</i>	<i>Notes</i>
Voice and accountability	Extent to which citizens are able to participate in selecting government, freedom of expression, freedom of association, free media	World Bank. The Worldwide Governance Indicators	All World Governance Indicators are based on 30+ data sources that combine views from a large number of enterprise, citizen, and expert survey respondents
Political stability	Likelihood of political instability and/or politically motivated violence, terrorism	World Bank. The Worldwide Governance Indicators	
Government effectiveness	Quality of public and civil services, independence from political pressures, quality of policy formulation/implementation/commitment	World Bank. The Worldwide Governance Indicators	
Regulatory quality	Ability of government to formulate/implement policies that permit and promote private sector development	World Bank. The Worldwide Governance Indicators	
Rule of law	Quality of contract enforcement, property rights, police, and courts; likelihood of crime and violence	World Bank. The Worldwide Governance Indicators	
Corruption control	Extent to which public power is used for private gain	World Bank. The Worldwide Governance Indicators	

Countries included in the study: Algeria, Argentina, Bangladesh\*\*, Benin\*, Bolivia\*\*, Botswana, Brazil, Burkina Faso\*, Cameroon\*\*, China, Colombia, Costa Rica, Cote d'Ivoire\*\*, Dominican Republic, Egypt\*\*, El Salvador\*\*, Fiji, Ghana\*\*, Guatemala\*\*, Honduras\*\*, India\*\*, Indonesia\*\*, Jamaica, Jordan\*\*, Kenya\*\*, Lesotho\*\*, Madagascar\*, Mali\*, Mexico, Morocco\*\*, Mozambique\*, Niger\*, Nigeria\*\*, Pakistan\*\*, Panama, Paraguay, Philippines\*\*, Rwanda\*, Senegal\*, South Africa, Sri Lanka\*\*, Sudan\*\*, Suriname, Swaziland\*\*, Thailand, Togo\*, Tunisia\*\*, and Turkey.

\*represents low-income countries (LIC) (9);

\*\*represents lower-Middle income countries (L-MIC) (22) and the remaining are upper-middle income countries (U-MIC) (17).