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Do remittances really attract foreign direct investments? Evidence from panel cointegration

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Abstract. *This paper examines the long-run relationship between remittance inflows and Foreign Direct Investments (FDI) for 47 developing countries over the period 1980-2014. Panel co-integration techniques that are robust to omitted variable bias, slope heterogeneity and cross-sectional dependency are employed. The main results are that remittance flows have some small but positive effects on FDI; however, the results vary by both region and country. Specifically, the positive relationship strongly holds in African countries and high remittance recipient countries but not for Asian and Latin American countries. The causality test suggests that the relationship is bidirectional. These results have important policy implications to developing countries. For example they suggest that policies aimed at increasing remittance inflows also attracts more FDI in some countries and also that remittance inflows be viewed as being both a cause and a consequence of FDI.*

Keywords: Remittance, FDI, Panel cointegration.

JEL Classification: F21, F23, C23.

1. Introduction and background

For the past three decades, globalization has resulted in a remarkable increase in capital flows, such as Foreign Direct Investment (FDI) and remittances, to developing countries. For example, recent data from the World Bank shows that remittance inflows to developing countries constituted more than three times the Official Development Assistance (ODA) (World Bank, 2016). And in most developing countries, FDI inflows were not far behind. This observation has spurred interest among economists and policy makers who analyze the impact of these international capital flows on economic welfare, growth and poverty. While the positive effects of remittance on the welfare of recipient households are undebatable, the most important question remains: do these individual effects aggregate to spur economic growth?

This question arises for several reasons: the effects of remittance on economic growth depend on whether the funds are used for investment or pure consumption purposes; whether the funds actively stimulate employment or the recipient household substitute leisure for work; whether they result in currency appreciation; and whether the sending countries lose more people as they migrate. The ambiguity has translated into empirical studies on the remittance-growth nexus and has produced mixed results (see e.g. (Barajas and Chami 2009); (Jahjah, Chami, and Fullenkamp 2003); and (Giuliano and Ruiz-Arranz 2009)). This, in turn, calls for more investigation on channels through which remittances can influence economic growth. Therefore, this paper contributes to the literature by focusing on the effect of remittance on FDI. The literature investigating the effect of FDI on economic growth is also extensive. Although the results are mixed, most studies document positive effects of FDI on economic growth (see e.g. (Alfaro, Kalemli-Ozcan, and Sayek 2009); (Alfaro et al. 2010), and (Herzer, Klasen, and Nowak-Lehmann D. 2008).

The nature of the relationship between FDI and remittance is ambiguous a priori. On the one hand, remittance inflows can either crowd out private investment or complement existing physical capital, which, in turn, raises productivity (Jahjah, Chami, and Fullenkamp 2003). The latter is true especially when remittance-receiving families invest the funds in education or health. Numerous studies suggest that a typical remittance-receiving family invests a portion of the receipts on education, health care and housing Adams and Cuecuecha (2010). Furthermore, other studies documents that the quality and size of the workforce, as measured by population health and population, respectively, positively affect FDI inflows (Alsan, Bloom, and Canning 2006). However, remittance can also work to reduce FDI. This is especially true when the increase in remittance results from large emigration, or remittances cause receiving families to substitute leisure for work.

On the other hand, it might be the case that FDI inflow deters or attracts remittance inflows. For example, Wang and Wong (2011) document that FDI inflows decrease the outward migration of individuals with secondary and tertiary education. These results suggest that since certain groups of people do not migrate, then it might be the case that remittance inflows would be reduced. However, FDI inflows might attract remittance inflows in circumstances in which FDI complements existing capital and yields high returns to capital. This creates a window of investment opportunity for emigrants in their home country.

Clemens and Ogden (2014) argues that emigration occurs because of the lack of investment opportunity in one's home country.

Clearly, an understanding of the nature of the relation between FDI and remittance is important for several reasons. First, it casts more light on the determinants of these international capital flows. For example, it explains why private individuals choose to remit or invest abroad. Although there is an extensive literature on the determinants of remittance and FDI, the literature on how these two flows affects each other in the long-run is limited. Yet the results of such studies could hold the key to explaining why there is still mixed evidence on whether or not remittances are growth enhancing.

Finding evidence of a positive relationship between the two private capital inflows would suggest that the two might be complementary and that if the resources are used for investment purposes, they can spur growth. A negative relationship, however, might indicate that the two variable are substitutes and, thus, might crowd-out one another. Finally, findings that the relationship is bidirectional might imply that remittances could be both a cause and a consequence of FDI. In either case, the findings are important for economic development policies in developing countries. This paper resolves this issue by empirically examining the long-run causal relationship between remittance and FDI in developing countries, using data from 1980 to 2014. The focus is on developing countries because they receive more capital inflows relative to their GDP than most of the developed countries.

This paper contributes to the literature by employing heterogeneous panel cointegration techniques whose estimators are robust (under cointegration) to a variety of estimation problems common to cross-country and panel regression analysis, such as omitted variables bias, slope heterogeneity and endogenous regressors. The statistical methods used in previous papers raised these methodological issues. For instance, studies make a priori assumptions about the direction of causality when, in fact, the causality between the two variables might run in both directions. We fill this gap in the literature by empirically examining the long-run causal relationship. To the best of my knowledge, this is the first paper to apply panel cointegration techniques to the relationship.

This paper is closely related to Bosnet and Upadhyaya (2014), who use data for 35 developing countries from 1970-2000 to analyze the effects of FDI on remittance and find no evidence of relationship between the two. These results are similar to evidence provided by Buch and Kuckulenz, (2010) on the effects of capital inflows on remittance. It is also related to Coon and Neumann (2015), who use data from 79 developing countries and find positive effects of FDI on remittances.

Using data spanning 1980-2014 for 47 developing countries, we find evidence that the causal relationship between remittance and FDI is bidirectional. Furthermore, the evidence shows that that, on average, there is a positive relationship between remittance and FDI. However, this result does not hold in subsamples. For instance, we find evidence of a negative relationship between the two variables when we focus on Latin American and Asian countries.

The rest of this paper is organized as follows: Section 2 describes the model and data; Section 3 includes the empirical analysis; and Section 4 concludes.

2. Empirical model and data

2.1. The Model

Following the literature, we assume that remittance inflows attracts more FDI and thus, the long-run relationship between FDI and Remittance can be expressed as the bivariate model below:

$$Ln\left(\frac{FDI}{GDP}\right)_{it} = \alpha_i + \delta_i t + \beta Ln\left(\frac{Remittance}{GDP}\right)_{it} + \varepsilon_{it}, \quad (1)$$

When i=1, ..., N denotes country and t=1...T denotes times in years. Equation 1. Equation 1 states that FDI as a percentage share of GDP(FDI/GDP), depends on deterministic terms which include country-specific fixed effects α_i and time-specific fixed effects, $\delta_i t$, as well as remittances as a share of GDP, ($Remittance/GDP$). The last term $\varepsilon_{it}$is white noise random errors. Considering the short-run effects and adjustments to the long-run are accommodated in the error term , the long-run effect of remittance on FDI as measured by β.

In order to obtain consistent estimates of long-run effects (as measured by the β coefficient), remittances and foreign direct investments must share similar stochastic trends. This is possible if remittances and FDI are integrated of the same order and cointegrated. Thus, detecting cointegration means that the estimated β coefficient is not biased by any omitted relevant integrated variables. Therefore, it follows that the empirical analysis will involve the following four steps:

i Testing for stationary of remittances and FDI
ii Testing for a cointegration relation, are integrated of the same order.
iii Finding the long run relationship, if remittances and FDI are co-integrated.
iv Determining the long-run direct of causality.

2.2. Data

We use data on remittances as a percentage share of GDP from the World Bank's World Development Indicators (available at: http://www.worldbank.org) and data on FDI stocks as a share percentage share of GDP are from UNCTAD (available at: Available at: http://unctadstat.unctad.org). Remittance inflows are defined as the sum of worker's remittance, compensation of non-resident employees for work performed for residents of other countries and migrants' transfers. we use FDI stocks rather than flows because the literature suggest that stocks captures the long-run effects more effectively that annual FDI flows which might fluctuate considerably in the short run (Chintrakarn et al., 2012).

Identification and estimation of cointegrating relationship requires using time series data with a long period. To this end, all developing countries with complete data from 1980 to 2014 are included in the analysis and Table 1 in the appendix lists the countries along with the average values of remittances and FDI over the observed period. For the empirical estimation we transformed data into their natural log form, by multiplying the shares by 1000 and then taking a natural log because in some year's remittances as shares of GDP were close to zero for some countries. With this transformation, the estimated coefficient from equation 1 represents the long-run elasticities.

3. Empirical results

3.1. Panel unit root test

The first step in the empirical investigation involves pre-testing the variables to determine the order of integration. For most macroeconomics data, it is reasonable to assume that the time series are non-stationary unit root processes. To this end, we verify the non-stationarity of the variables by using Im, Pesaran, and Shin (2003) test (IPS), which controls for cross-sectional heterogeneity in the estimated coefficients. The ADF regression for the IPS can be expressed as follows:

$$\Delta x_{it} = z'_{it}\gamma + \alpha_i \Delta x_{it-1} + \sum_{j=1}^{p_i} \emptyset_{ij}\, \Delta x_{it-j} + \upsilon_{it}, \tag{2}$$

Where x_{it} is each variable of interest; z'_{it} represents deterministic terms, such as individual time trends and fixed effects; and p_i is lag length for each country. The null hypothesis for the IPS test is the unit root for all i (e.g., $H_0 : \alpha_i = 0$), and the alternative is the presence of stationarity in at least one of the panels (e.g., $H_1 : \alpha_i < 0, \forall\, i = 1, 2, \ldots, \mathrm{N};\ \alpha_i = 0, i = N_1 + 1,\ N_2 + 2, \ldots, N$). The IPS test statistics combine individual unit root tests to obtain a panel-specific result. The IPS test statistics are expressed as:

$$\Gamma_i = \frac{\sqrt{N}[\bar{t}_{NT} - \mu]}{\sqrt{v}}, \tag{3}$$

where $\bar{t}_{NT}$ is the average of individual country ADF *t*-statistics; and μ and *v* are the mean and variance of the individual *t*-statistics, respectively. One drawback of the IPS test is that it does not control for cross-sectional dependence in the error term. Maddala and Wu (1999) and Choi (2001) propose other methods that control for cross-sectional heterogeneity; the Fisher-ADF and the Fisher-PP tests. These tests are non-parametric tests for panel unit root, and the tests are based on combining individual p-values from the individual unit root tests. However, the results from these tests, although not reported in this paper, are similar to those of IPS and provides similar conclusions.

The main drawback of the above-mentioned tests is that they still do not control for cross-sectional dependence. Considering the possibility that the world is highly connected, we report the results for the test of cross-sectional dependence tests, based on Pesaran (2007) in Table 2. The results provide substantial evidence of cross-section dependency. Because we found that there is substantial cross-sectional dependence, we use cross-sectionally demeaned data for the Panel cointegration tests, long run estimated effects, and the causality tests. Furthermore, although not reported in the paper, we performed the same analysis on raw data and the qualitative implications are similar.

Table 2. *Cross-cross sectional dependence tests based on Pesaran (2004)*

Variable	*CD*-statistics	ρ^*
$Ln(\frac{FDI}{GDP})_t$	91.88***	0.60
$Ln(\frac{Remittance}{GDP})_t$	23.78***	0.51

Notes: Under the null hypothesis of cross-sectional independence *CD*-statistics is distributed N (0,1). *p*-values are in parenthesis. ρ^*, denotes robust autocorrelation. ***, (**, *) denotes significance at the 1%, (5%, 10%) level.

Therefore, we also check for the stationarity of the series using the cross-sectionally-augmented IPS (CIPS), which is based on the cross-sectional augmented ADF (CADF) regression. The CADF regression can be expressed as:

$$\Delta x_{it} = z_{it}'\gamma + \alpha_i x_{it-1} + \sum_{j=1}^{p_i} \emptyset_{ij}\, \Delta x_{it-j} + \eta_i \bar{\bar{x}}_{it-1} + \sum_{j=0}^{p_i} \varphi_{ij}\, \Delta \bar{x}_{it-j} + \xi_{it}, \quad (4)$$

where $\bar{\bar{x}}_i = N^{-1} \sum_{I=1}^{N} x_{it}$ is the country mean of time series x_{it}. The cross-sectionally augmented IPS is the average of the individual country CADF statistics and can be expressed as:

$$CIPS = N^{-1} \sum_{I=1}^{N} t_i, \quad (5)$$

where t_i is the OLS t -ratio of $\alpha_i$in Equation (4), and the corresponding critical values are given by. I proceed with testing for panel unit roots based on proposed method by Pesaran (2007) which controls for cross sectional dependency. We report panel unit root test results in Table 3. These test statistics results indicate that remittance and FDI are integrated in the same order one, *I (1).*

Table 3. *Panel unit root tests*

Variables	*Deterministic terms*	*IPS*	*CIPS*
Levels			
$Ln(\frac{FDI}{GDP})_t$	Constant , trend	-1.45 (0.19)	6.125 (1.00)
$Ln(\frac{Remittance}{GDP})_t$	Constant , trend	-0.61 (0.27)	-2.19 (0.20)
First difference			
$\Delta\, Ln(\frac{FDI}{GDP})_t$	Constant	-10.83*** (0.00)	-2.67*** (0.00)
$\Delta\, Ln(\frac{Remittance}{GDP})_t$	Constant	-9.23*** (0.00)	-8.61 *** (0.00)

Notes: Three lags were included in the estimation in order to control for autocorrelation. The p-values are in parenthesis. ***, (**, *) denotes significance at the 1%, (5%, 10%) level.

3.2. Panel cointegration tests

After establishing that the series are integrated of the same order, the next step is to test for the presence of a long run relationship. There are several methods proposed in the literature, however I adopt a two-step cointegration test procedure suggested by Pedroni, (1999) The first step involves estimating the long-run equation individually for each country

$$Ln\left(\frac{FDI}{GDP}\right)_{it} = \alpha_i + \delta_i t + \beta_i Ln\left(\frac{Remittance}{GDP}\right)_{it} + \varepsilon_{it}, \quad \textbf{(6)}$$

The second step involves testing the stationary of the residuals from Equation (4). The null hypothesis is that the variables are not cointegrated, and Pedroni (1999) has proposed seven test statistics. The first four test statistics are within-dimension statistics based on pooling the autoregressive coefficients across countries, restricting the autoregressive parameters to be homogeneous across countries. The remaining three test statistics are between-dimension statistics based on individually estimating the autoregressive coefficients for each country, thus allowing for cross-sectional heterogeneity.

Table 4. *Panel Cointegration Tests based on Pedroni (1999)*

Independent variable is $Ln(\frac{FDI}{GDP})$					
	All	High remittance recipient countries	Asian Countries	Latin American Countries	Sub-Saharan African Countries
Panel *v* statistic	-1.24	-0.731	-2.25**	-1.001	-0.64
Panel PP *rho* statistic	0.54	0.56	-0.50	0.24	1.39
Panel PP *t* statistic	-2.08**	-2.63**	-3.39***	-1.53*	2.18**
Panel ADF *t*-statistic	-2.09**	-1.60*	-3.36***	-1.13	2.20**
Group PP *rho* statistic	1.35	-0.33	-1.16	0.77	2.44**
Group PP *t* statistic	-2.58**	-3.43***	-2.75**	-1.64	2.10**
Group ADF *t* statistic	-3.39***	-2.75**	-2.56**	-1.66*	1.79*

Notes: Cross-sectionally demeaned data were used, to account for cross sectional dependence. All the Pedroni (1999) tests statistics are distributed N (0,1), under a null of no cointegration. ***, (**, *) indicates rejection of the null of a no cointegration at the 1%, (5%, 10%) level respectively.

Based on Table 4 using all the data both the within and between test statistics reject the null hypothesis that the remittance and FDI are not cointegrated. These results also hold after splitting the data in subgroups mainly for African countries and high remittance countries (we defined higher remitting countries as those with larger than average remittance over the three-decade period). However, they do not hold in Latin American and Caribbean countries.

3.3. Long-run relationship

To estimate the long-run effect of Remittance on FDI, we use the between-group mean panel dynamic OLS (DOLS) estimator, which allows estimators to vary by country (Pedroni 2001). The procedure involves the inclusion of leads and lags, as well as of current values of the first differences remittance variable in Equation (1). This is intended to control for possible endogeneity and serial correlation. Thus, Equation (1) can be rewritten as:

$$Ln\left(\frac{FDI}{GDP}\right)_{it} = \alpha_i + \delta_i t + \beta Ln\left(\frac{Remittance}{GDP}\right)_{it} + \tag{7}$$

$$+ \sum_{j=-q}^{q} \emptyset_{ij}\, \Delta Ln\left(\frac{Remittance}{GDP}\right)_{it-j} + \epsilon_{it},$$

where $\emptyset_{ij}$ is a vector of coefficients of leads and lag differences. An advantage of the DOLS procedure is that the estimated coefficients are unbiased and consistent, even in the presence of endogenous reggressors.

Table 5. *Estimates of the long-run relationship between FDI and Remittance*

	Demeaned data
Region	β_1 *−DOLS*
All data	0.088*** (3.42)
High Remittance Recipient Countries	0.143*** (6.19)
Asian Countries	-0.021 (-0.16)
Latin American	-0.094*** (-3.58)
Sub-Saharan African Countries	0.012*** (6.63)

Notes: The dependent variable is $Ln\,(\frac{FDI}{GDP})$. *t*-statistics are in parenthesis, ***, (**, *) indicates statistical significance at the 1%, (5%, 10%) level respectively. The DOLS regression was estimated with two leads and two lags.

Table 5 reports the DOLS results, which show that, on average, there is a positive relationship between remittance and FDI. More specifically, the results show that a one-percentage-point increase in remittance as a shared of GDP leads to a 0.088-percentage-point increase FDI stock as a share of GDP and the results are statistically significant at the 1% level. However, exploring the subgroups of the data, these positive results only hold for a sample of African countries and high remittance recipient countries. In Latin America, and Asian countries however there is evidence of a negative relationship between remittance and FDI.

To investigate the cross-country heterogeneity in relationship, the individual country dynamic OLS estimates are reported in Figure 1 in the appendix. Clearly, Figure 1 shows that there is substantial heterogeneity in effects of remittance on FDI. Though disentangling the individual sources and causes of the variation in the effects for each country is interesting, it is beyond the scope of this current paper.

One draw-back of using the DOLS estimators is that it can be influenced by outliers, especially when there are small number of countries in the sample. Although our sample of countries is large, we verify that the results are not influenced by outliers by re-estimate the DOLS (with cross sectionally demeaned data), excluding one country at a time from the sample. The estimated coefficients and their *t*-statistics are presented in Figure 2 in the appendix. Since the coefficients are stable and always statistically significant at least at the five percent level, then we conclude that overall positive effects of remittances on FDI is not due to possible outliers.

3.4. Long-run granger causality test

Along with finding unbiased estimates of the long run relationship between international remittances and FDI, another objective of this paper is to show the direct of the long-run causality. The DOLS does not require that regressors are exogenous and the estimation procedure controls for endogeneity issues. The cointegration from the DOLS results implies long-run Granger causality in at least one direction, as discussed in the introduction, the causality might run in either direction. Thus, to test the direction of the long-run causality and the short-run dynamics between the variables, residuals from the individual DOLS of the long-run relationship, are used as an error-correcting term in a simple panel vector error-correcting model (VECM) in the form:

$$\begin{bmatrix} \Delta Ln\left(\frac{FDI}{GDP}\right)_{it} \\ \Delta Ln\left(\frac{Remittance}{GDP}\right)_{it} \end{bmatrix} = \tag{8}$$

$$= \begin{bmatrix} c_{1i} \\ c_{2i} \end{bmatrix} + \sum_{j=1}^{k} \Gamma_j \begin{bmatrix} \Delta Ln\left(\frac{Remittance}{GDP}\right)_{it-j} \\ \Delta Ln\left(\frac{FDI}{GDP}\right)_{it-j} \end{bmatrix} + \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} Ec_{it-1} + \begin{bmatrix} \varepsilon_{1i} \\ \varepsilon_{2i} \end{bmatrix}.$$

To this end, c_{1i}s are fixed effects; Ec_{it-1} is the error-correction term that captures the error in or the deviation from the equilibrium; therefore, α_1 and α_2 are the adjustment coefficients that capture the extent to which FDI and Remittances deviates from the long-run or equilibrium relationship, respectively. A significant error-correcting term suggests long-run Granger causality, and thus, long-run endogeneity and a non-significant adjustment coefficient imply long-run Granger non-causality from the independent variable to the dependent variable.

The results are reported in Table 6 and Table 7. Because the error correction term is statistically significant in all equations, based on Hall and Milne (1994) causality test, this exemplifies that both remittance and FDI are endogenous and thus the long-run causality is bidirectional. These results are also observed when we also focus on high remittance recipient countries.

Table 6. *Vector-error-correction model, long-run causality and short run dynamic using all data*

		Dependent variables
Independent variables	$\Delta Ln(\frac{FDI}{GDP})_t$	$\Delta Ln(\frac{Remittance}{GDP})_t$
Ec_{it-1}	-0.023 (-2.70)	-0.044 (-4.61)
$\Delta Ln(\frac{FDI}{GDP})_{t-1}$	-	0.011 (1.09)
$\Delta Ln(\frac{Remittance}{GDP})_{t-1}$	0.031 (0.44)	-

Notes: *t*-statistics are in parenthesis, ***, (**, *) indicates significance at 1% (5%, 10%) level respectively. The maximum number of lag 1 was obtained by using a general to specific procedure. Thus, the insignificant short-run dynamics were dropped. Cross-sectionally demeaned data were used.

Table 7. *Vector-error-correction model, long-run causality and short run dynamic in high remittance recipient countries*

	Dependent variables	
Independent variables	$\Delta Ln(\frac{FDI}{GDP})_t$	$\Delta Ln(\frac{Remittance}{GDP})_t$
Ec_{it-1}	-0.044 (-4.60)	-0.038 (-2.41)
$\Delta Ln(\frac{FDI}{GDP})_{t-1}$		.0093 (0.40)
$\Delta Ln(\frac{Remittance}{GDP})_{t-1}$	0.011 (1.09)	

Notes: *t*-statistics are in parenthesis, ***, (**, *) indicates significance at 1% (5%, 10%) level respectively. The maximum number of lag 1 was obtained by using a general to specific procedure. Thus, the insignificant short-run dynamics were dropped. Cross-sectionally demeaned data were used.

2. Conclusion

We reexamine the long-run causal relationship between remittance and FDI in developing countries, using data from 1980-2014. This study is closely related to studies that examine the determinants of FDI and remittance flows to developing countries. In particular, it is closely related to Basnet and Upadhyaya (2014), who use data from developing countries and find little or no evidence that remittance inflows affect FDI.

This study contributes to the literature in several ways. First, to my knowledge, this is the first study that employs panel cointegration techniques that are robust to omitted variable bias, slope heterogeneity and endogenous variables to explore the long-run causal relationship between remittance and FDI. Second, we also formally test for causality.

Overall, we find strong evidence that the causal relationship is bidirectional. An implication is that remittance flows are both a cause and a consequence of FDI. Although, on average, we find evidence of a positive long-run relationship between remittance and FDI in developing countries, these results vary by region and country. For both Asian and Latin and Caribbean countries, we find the remittances deter FDI inflows. The results have important policy implications for developing countries. They suggest that remittance might affect growth indirectly through their effect of FDI. They also suggest that that remittance and FDI might be compliments in African countries context and substitutes in Asian countries.

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Appendix

Table 1. Country means of remittances and FDI stocks over the 1980-2014 period

Country	Code	Remittance	FDI		Country	Code	Remittance	FDI
	Africa					*Latin America*		
Botswana	BWA	1.78	41.43		Argentina	ARG	0.08	13.48
Burkina Faso	BFA	3.89	3.11		Barbados	BRB	2.35	27.12
Cameroon	CMR	0.39	13.76		Belize	BLZ	4.73	40.23
Congo, Rep.	COG	0.19	51.84		Bolivia	BOL	1.85	32.18
Cote d'Ivoire	CIV	0.84	18.26		Brazil	BRA	0.19	16.99
Ghana	GHA	0.86	13.94		Colombia	COL	1.35	14.75
Lesotho	LSO	57.28	23.08		Dominican Reb.	DOM	5.97	73.20
Madagascar	MDG	1.33	13.91		El Salvador	SLV	11.02	16.20
Morocco	MAR	6.29	25.68		Guatemala	GTM	4.77	17.00
Mozambique	MOZ	1.53	26.47		Honduras	HND	7.66	4.36
Nigeria	NGA	3.37	18.03		Jamaica	JAM	9.74	40.89
Senegal	SEN	5.49	7.65		Mexico	MEX	1.49	16.35
Seychelles	SYC	0.92	85.58		Paraguay	PRY	1.69	11.53
South Africa	ZAF	0.16	23.72		Venezuela, RB	VEN	0.03	15.33
Sudan	SDN	2.78	7.94					
Swaziland	SWZ	6.03	30.66			*Asia*		
Togo	TGO	4.51	19.31		Bangladesh	BGD	4.86	3.40
					China	CHN	0.19	8.85
	Mena				India	IND	2.17	19.35
Jordan	JOR	18.64	46.29		Fiji	FJI	3.06	39.60
Morocco	MAR	6.29	25.68		Indonesia	IDN	0.61	34.04
Oman	OMN	0.28	16.26		Malaysia	MYS	0.41	32.02
Tunisia	TUN	4.17	55.71		Pakistan	PAK	4.94	7.02
Turkey	TUR	1.54	11.48		Papua New Guinea	PNG	0.22	29.83
Syria	SYR	2.70	8.16		Philippines	PHL	7.26	10.71
					Sri Lanka	LKA	6.53	9.88
					Thailand	THA	1.20	20.43

Note: all the data are represented as a percentage share of GDP. For empirical estimation, the numbers are transformed to natural logarithm form. Since the ratio are at times close to 1 and sometimes less than zero in certain years, for empirical analysis we multiply all numbers by 1000 before conducting the natural logarithm transformation.

Figure 1. *DOLS estimates of cross sectional heterogeneity in long run effects of remittance on FDI.*

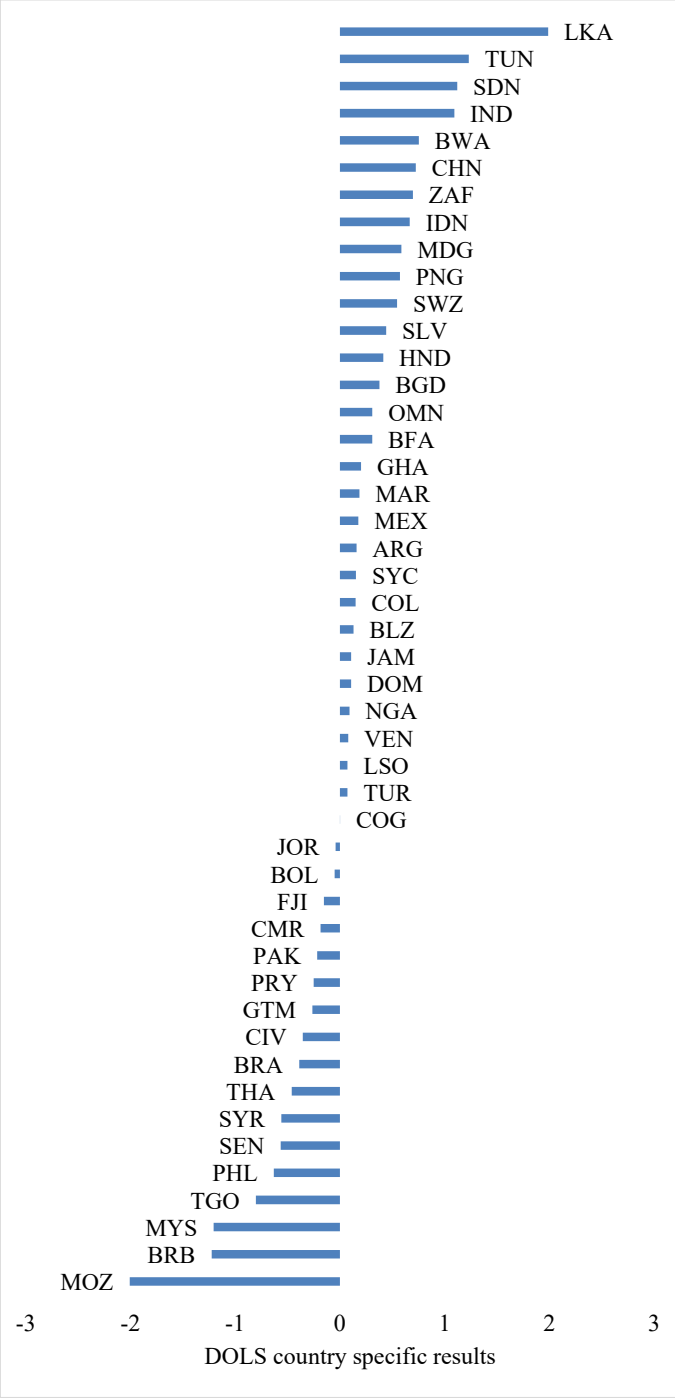
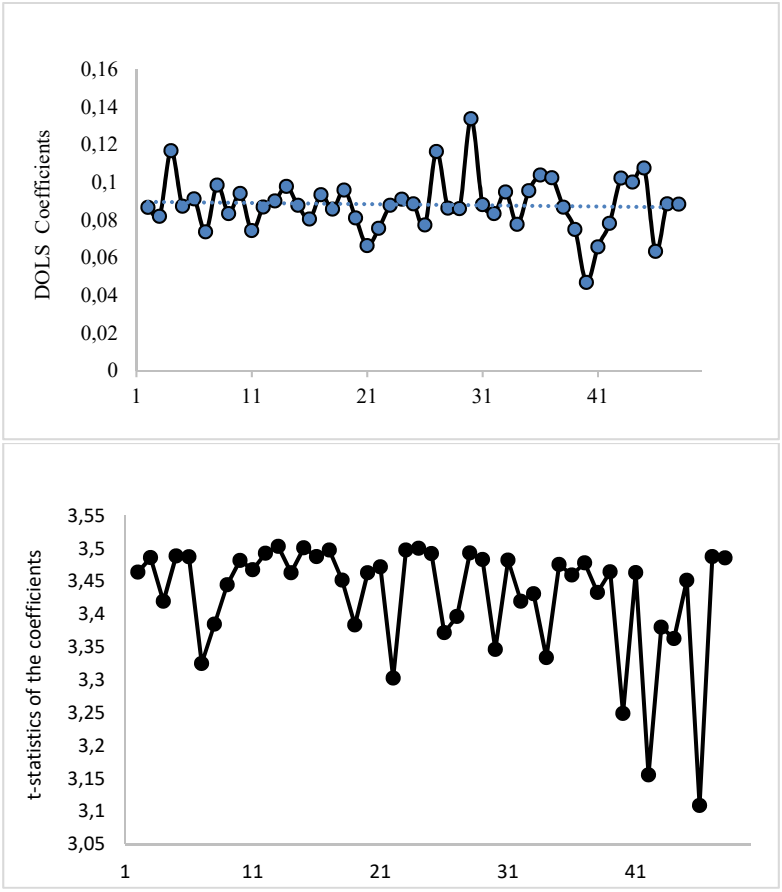


Figure 2. *DOLS estimates and associated t-statistics of the effect of remittance on FDI with single country removed for the sample. The top panel shows that DOLS estimated coefficients and the bottom panel is the associated t-statistics.*


DOLS Coefficients
0,16
0,14
0,12
0,1
0,08
0,06
0,04
0,02
0
1
11
21
31
41
t-statistics of the coefficients
3,55
3,5
3,45
3,4
3,35
3,3
3,25
3,2
3,15
3,1
3,05
1
11
21
31
41