

## The Long-Run Impact of Financial Development on Remittances: Evidence from Developing Countries

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**Abstract:** We investigate the long-run relationship between remittances and the overall as well as the different aspects of financial sector development including markets, institutions, access, depth, and efficiency for 85 countries from Africa, the Americas, Asia, and the Middle East for the years between 1995 and 2014. We first check for stationarity, co-integration, and the direction of causality. We find that all employed variables are stationary in levels and first difference, apart from the case of the host country per capita income which is only stationary in first difference. Our cointegration test results indicate robust evidence of a long-run relationship between the remittances and the covariates. Thus, establishing a case for the long run relationship between remittances and our covariates including financial services development. In terms of causality between remittances and financial services development, we find a mixture of results ranging from bi-directional, uni-directional, and no causality at all between remittances and the financial services development, depending on the region and type of financial services development in question. For the long-run impacts, we find that all the determinants are important including the financial services development. But the size, direction, and significance of the impact of financial services development and its different components differ by the type of financial development measures and region under consideration. Our estimate of the long-run elasticity of the financial development measures of remittances provides mixed results: it is either significantly positive, insignificant, or negative depending on the regions and measure of financial development employed. Further, we find that the migrant stock, exchange rate volatility, home and host country per capita income, and inflation all play significant roles in the determination of the remittance flows into a given country.

**Keywords:** Remittances; Financial development; Causality; Error correction model (ECM)

**JEL Classifications:** E21, F21, G22, J61, O16

## 1. Introduction

Remittance inflows over time have become the primary sources of foreign exchange for many countries. According to the 2018 Migration and Development Brief of World Bank, migration worldwide remittances rebounded to a record high of \$613 billion in 2017 after the recent global financial crisis. He also noted that remittances to low and middle-income countries are about three times more than official development flows. For many developing countries, remittances represent a significant part of international capital flows, surpassing foreign direct investment (FDI), export revenues, and foreign aid (Giuliano and Ruiz-Arranz, 2009). The evidence provided above indicates that remittances are a critical and more stable source of foreign earnings for the recipient countries.

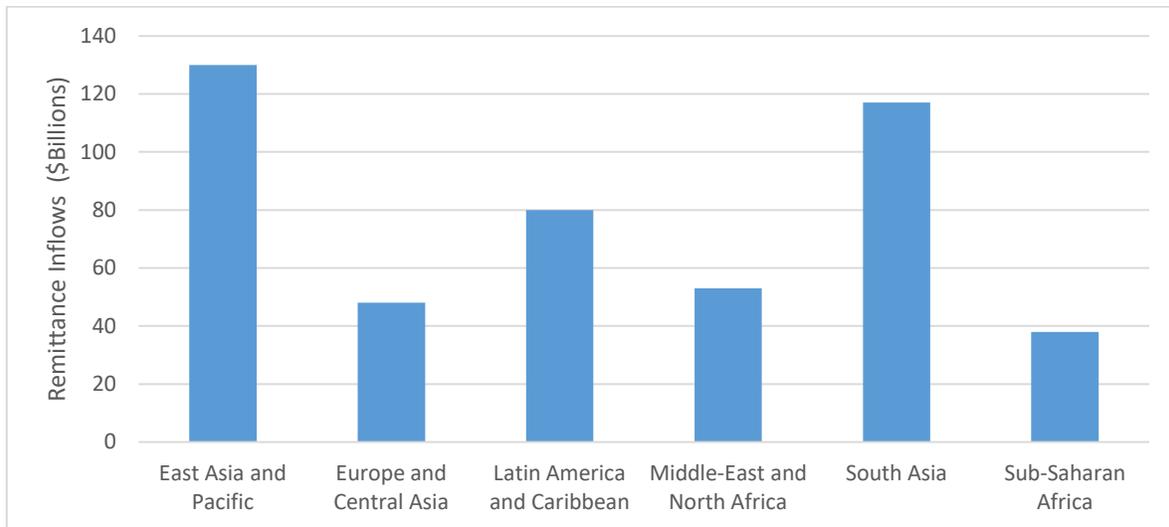
Some previous studies have noted that transaction cost negatively impact remittances (Freund and Spatafora, 2008) and a key driver of transaction cost is the state of the financial sector. However, the ways the financial sector development in the home country affects migrants' decisions to remit are very diverse and may be unidirectional, bi-directionally, or non-existent at all. This ambiguity warrants the confirmation of the existence of causation running from the development of the financial sector to remittances. As shown in the literature, an improvement in the home country's financial sector is likely to positively affect the level of immigrants' confidence in their country of origin and lead to a lower transfer (transaction) cost, thus positively impacting the frequency and magnitude of remittances. Conversely, it is shown by Giuliano and Ruiz-Arranz (2009) that remittances may serve as a substitute for financial intermediation and migrants may remit more money in the advent of adverse financial conditions at home to help their families make up for the lack of access to financial markets and institutions. Thus, presenting the possibility that improvements in less developed country's financial sector may induce a more substantial inflow of remittances to these countries. Another critical point to note is that there are different aspects of the financial sector development and each category may have a different relationship with remittances concerning the direction, magnitude, and significance. As shown in Fromentin, (2017), the link between remittances and financial development is sensitive to the choice of the financial development indicators. It is, thus, essential to analyze the relationships between these sub-categories of financial progress and remittances.

Carling (2008) argues that the motivations for remittances can be categorized into three factors including pure-altruism, tempered-altruism (enlightened self-interest) and pure-self-interest motives. Under pure-altruistic motives, remittances serving as insurance for income smoothing and migrants derive utility from remitting to family members back home and as such care about family poverty and economic and personal shocks that affect the family. For the tempered-altruism instance, remittances are viewed as a part of inter-temporal, mutually beneficial contractual arrangements between the migrant and the family at the home country. In the case of pure-self-interest, remittances are motivated by economic/financial interests and opportunities (Lucas and Stark, 1985). Thus, the general economic conditions in the home country and the development of the financial markets play a critical role as the main ways of investing are either through private ownership of business and portfolio investment. Therefore, the impact of the financial development in recipient countries on the amount of remittances received, would depend on the motive to remit.

The first law of geography suggests that nearer things are more related than others (Tobler, 1970) it is reasonable to assume the countries in the same region would have more similarities in the motivation for remittances, demographic and economic performance, financial sector development, the main destination of migrants, and even remittances' magnitude and frequencies. For example, African culture is largely based on extended family relationships and coupled with the fact that they

have the highest age-dependency rate amongst the regions under consideration (Sub-Saharan Africa 85%<sup>1</sup>, South Asia 53%, Latin America and the Caribbean 50%, Middle East 46%). Therefore, it makes sense to expect that remittances to Africa are more altruism-driven than most other regions. Comparatively, remittances to Africa historically attracts he highest transaction costs, which can imply that migrants from this region may use more informal channels for remittances. As such, the development of financial institutions may lead to cost reductions, which result in increased remittances going through the official channels. On the other hand, access to financial institutions may lead remittance recipients to have alternate means to smooth their incomes and possibly reduce the need for altruistically motivated remittances. For other regions, however, economic development can be a catalyst for the growth of financial institutions and markets, which may make the financial sector development leading to a reduction in remittances. Therefore, we hypothesize that there is a regional difference in the impact of different aspects of the financial development on remittances.

Figure 1 presents remittances inflows to low and middle-income countries by region for 2017, which clearly show that there are regional differences in the magnitude of remittances received. Consistently, comparatively, Sub-Saharan Africa receives the least amount of remittances. This finding makes it essential to analyze the reasons for this substantial regional disparity in remittance inflows.



**Figure 1.** Estimates of remittances inflows to low and middle-income countries by region for 2017

**Notes:** Source - Migration and Development Brief 28 by the Global Knowledge Partnership on Migration and Development, 2017. [Online] Available at: <https://www.knomad.org/publication/migration-and-development-brief-28>

The primary objective of this study is to establish the direction of causality and explore the long-run relationships between remittances and its determinants, especially financial services development. Because financial progress has subtypes, we seek to find the differential impacts of these aspects on remittance inflows for our overall sample and also by the geographical region of the major recipients of remittances.

<sup>1</sup> The data are for 2017 from the World Development Indicators.

The study makes significant contributions to the existing literature on four fronts. First, it utilizes rich panel data covering four critical regions of the world (Africa, the Americas, Asia, and the Middle East) which heavily rely on remittances as one of the primary sources of their economic growth as a group, or individually. Second, we use a newly developed panel unit-root tests, cointegration tests, panel causality test, and Pooled Mean Group Estimation of Dynamic Heterogeneous Panel mean group model (PMG ARDL) to investigate the direction of causality and the long-run relationship between remittances and financial development. With PMG ARDL model, our estimates of long-run relationships between remittances and its determinants are consistent even with possible reverse causality as this model allows for the possible endogeneity for estimating the long-run relationship with finite-order autoregressive representations of the explanatory variables (see Assumption 3.1 in Pesaran, *et al.*, 1999). Lastly, this is the first study to use comprehensive financial development indices that cover all aspects of financial sector including overall financial development, financial markets progress, financial institutions progress, and improvements in access, depth, and efficiency of the institutions and markets. Therefore, it provides a more unified and comprehensive comparative analysis of the relative impact of the various financial services development measures for the whole sample and the four regions individually.

The rest of this paper is organized as follows: Section 2 discusses the existing literature. Section 3 describes the data and methodology. Section 4 presents and discusses the results. The final section summarizes the findings, draws a conclusion based on the results and makes some policy inferences.

## 2. Literature Review

In the literature, there are many studies that examine the magnitude and significance of the impact of migrant remittances on economic growth and development with mixed results. While the majority of studies on the effects of remittances (including Stark and Lucas, 1988; Taylor, 1992; Adams and Page, 2005; Meyer and Sherab, 2017) have found a positive relationship between remittances and economic growth, a few studies have documented a possible negative impact (Stahl and Arnold, 1986; Chami, *et al.*, 2005). Studies analyzing the determinants of remittances are, however, somewhat scarce. Since many developing countries rely on remittance inflows for poverty reduction, consumption smoothing, and investment for profit motives, a study of the factors which promote or impede remittance inflows is critical to inform policymakers. Factors such as financial services development, macroeconomic conditions of host and home countries, exchange rate stability, and the size of migrant stock may impact the magnitude and consistency of remittance inflows directly, or indirectly through transaction costs.

Freund and Spatafora (2008) was a pioneer attempt in its analysis of the impact that the development of financial services can have on remittances by including the size of migrant stock and transaction costs. They find that a rise in transaction costs due to less advanced financial services and exchange rate volatility will reduce the inflow of remittances to developing countries.

Coulibaly (2015) investigates the causality between remittances and financial sector development for 19 sub-Saharan African countries for 1980-2010, finding that remittances positively impact financial sector development in different numbers of nations when different proxies for the financial development are used. Using a sample of 66 mostly developing countries from 1980-2005, Beine, *et al.* (2012) investigate the relationship between remittances and financial openness. They find a robust positive impact of remittances on financial openness with the conclusion that the more remittances a country receives, the more likely it will be financially open because financial liberalization reduces the costs of remitting and, hence, boosts remittances.

In their study of 36 countries in Africa over the period 1980–2009, Nyamongo, *et al.* (2012), find that remittances improve economic growth, but then they conclude that remittances appear to be working as a complement to financial services development. Using the balance of payments data on remittances and aggregate data on bank credit and deposit amounts for 109 developing countries over the period 1975–2007, Aggarwal, *et al.* (2011) argue that remittances may influence the financial services development of recipient countries based on the fact that some remittance recipients may seek to deposit their remittances with financial services institutions, thus, making more funds available for financial intermediation.

The closest study to our analysis is that of Fromentin (2017), which analyzes the long-run impact of remittances on financial development using domestic credit and liquid liabilities to GDP ratios as proxies for financial development with panel data (17 low-income countries, 43 lower-middle-income countries, and 42 upper-middle-income countries) over the 1974–2014 period. He finds substantial evidence that remittances promote financial development in developing countries in the long term, but the effect may be different in the short-term. However, similar to the Coulibaly (2015) paper, Fromentin’s (2017) findings may not paint a complete picture of the relationships between remittances and the financial sector development because they use few proxies to the financial development.

### 3. Methodology and Data

#### 3.1 Panel unit root, cointegration, and causality tests

To investigate the causal relationship and co-movements between remittances and its determinants, we first check for the stationarity of our data series using the recently developed panel-based unit root tests then conduct panel cointegration tests. For brevity purposes, we run the estimation only using the various financial development indices for the whole sample without other control variables. Thirdly, we implement the Granger causality analysis proposed by Dumitrescu and Hurlin (2012) to gain some insights about the direction of causality between our financial development indices and remittance inflows. This model supports the presence of heterogeneity across the cross-sections while requiring two data series to be stationary and balanced.

#### 3.2 Pooled mean group estimation of dynamic heterogeneous panel model

After completing the tests above, we then employ an autoregressive distributive lag (ARDL) dynamic panel specification in the following form:

$$r_{it} = \sum_{j=1}^p \gamma_{ij} r_{i,t-j} + \sum_{j=0}^q \delta_{ij}' x_{i,t-j} + \mu_i + \varepsilon_{it} \quad (1)$$

where  $r_{it}$ ,  $i = 1, \dots, N$ ,  $t = 1, \dots, T$ , denotes remittances of the  $i^{\text{th}}$  country in period  $t$ , respectively.  $X_{it}$  is a  $K \times 1$  vector of explanatory variables;  $\gamma_{ij}$ ’s are scalars and  $\delta_{it}$  are a  $K \times 1$  vector of coefficients. If the variables in equation (1) are  $I(1)$  and cointegrated, then the error term is an  $I(0)$  process for all of our groups  $i$ . An important feature of variables that are cointegrated is their responsiveness to deviations from the long-run state, suggesting an error-correcting model where the short-run dynamics (shocks) of our variables will adjust to the long-run equilibrium are influenced by deviations from long-run equilibrium. This allows us to re-parameterize equation (1) into an error correction model written as:

$$\Delta r_{it} = \phi_i (r_{i,t-1} - \theta_i' X_{it}) + \sum_{j=1}^{p-1} \gamma_{it} \Delta r_{i,t-1} + \sum_{j=0}^{q-1} \delta_{ij}' \Delta X_{i,t-j} + \mu_i + \varepsilon_{it} \quad (2)$$

where  $\phi_i$  denotes the error-correcting speed of adjustment term. If  $\phi_i = 0$ , then there is no evidence for a long-run relationship between the dependent variable and our regressors. The parameter  $\phi_i$  is

expected to be significantly negative under the previous assumption that the variables return to a long-run equilibrium. The vector  $\theta_i'$  is important because it contains the long-run relationships (elasticities) between the per capita remittances and our explanatory variables.<sup>2</sup>

This autoregressive distributed lag ARDL specification can accommodate the endogeneity and is suitable for our analysis as we suspect that there exists bi-directional causality between remittances and financial development. We then choose to use the pooled-mean group (PMG) estimator for the dynamic ARDL model proposed by Pesaran, *et al.* (1999) to estimate the long-run remittance elasticity of financial services development.

The PMG estimators have some critical advantages over other commonly used estimators in the literature as they allow for dynamics when compared to the static estimators, and enable the short-run dynamics (shocks) and error variances to differ across the cross-sections in comparison to the dynamic estimators. Secondly, the PMG estimates of an ARDL specification will yield consistent estimates for variables that are either  $I(1)$  or  $I(0)$  as long as there is a unique vector that defines the long-run relationships among the variables of interest.<sup>3</sup> Furthermore, when compared with Mean group (MG) estimator, PMG allows for homogeneity in long-run coefficients and controls for the dynamic effects, which are essential for the remittances model. Statistically, we cannot reject the homogeneity restriction on the long-run elasticity for four financial indices (FID, FMD, FMA, and FME) out of six using the Hausman test so the PMG estimator is further validated for our model.

### 3.3 Data

We employ annual panel dataset over the period between 1995 and 2014 for 85 countries including 33 from Africa, 29 from the Americas, 15 from Asia, and 8 from the Middle East. Data availability dictates the selection of these countries and the time duration. Using annual data is critical for our analysis because they help us circumvent problems associated with seasonality (Vanegas & Croes, 2003) and avoid unwarranted assumption of homogeneity among the countries in the sample. Most data come from the World Bank's 2017 *World Development Indicators (WDI)* and the financial indices are from the *International Financial Statistics (IFS)*. In the case of the selection of host countries, we used the World Bank's 2013 bilateral estimates of migrant stock to determine the host country with the most migrants who remit. We then used those countries' per capita income from the *WDI* as the proxy for the host country's income level. Table 1 provides the descriptions of our variables and the summary statistics.

$$^2 \phi = -(1 - \sum_{j=1}^p \gamma_{it}), \theta_i = \frac{\sum_{j=0}^q \delta_{ij}}{(1 - \sum_k \gamma_{ik})}, \gamma_{ij}^* = -\sum_{m=j+1}^p \gamma_{im} \quad j = 1 \dots P - 1, \text{ and } \delta_{ij}^* = -\sum_{m=j+1}^q \delta_{im} \quad j = 1 \dots q - 1.$$

<sup>3</sup> Reverse causality is not a problem if the variables are  $I(1)$  because in that case the superconsistent property exist.

**Table 1.** Descriptive statistics of variables

Variable	Description	Obs.	Mean	Std. Dev.	Min	Max
MTP	Personal remittances, received (% of GDP)	1,700	4.547	6.256	0.003	53.826
DPI	Home GDP per capita (constant 2010 US\$)	1,700	4358.767	5800.278	182.709	46466.120
FPI	Host GDP per capita (constant 2010 US\$)	1,700	29952.310	18797.300	170.582	64176.480
MSK	International migrant stock (% of Total Population)	1,700	4.159	6.317	0.036	43.604
XRV	Official exchange rate volatility	1,700	0.045	0.136	-0.332	1.440
INF	Inflation, consumer prices (annual %)	1,700	8.605	16.985	-35.837	411.760
FD	Financial Development Index	1,700	0.228	0.159	0.024	0.873
FI	Financial Institutions Index	1,700	0.318	0.170	0.048	0.902
FM	Financial Markets Index	1,700	0.135	0.184	0.000	0.903
FID	Financial Institutions Depth Index	1,700	0.195	0.186	0.002	0.916
FIA	Financial Institutions Access Index	1,700	0.224	0.222	0.003	1.000
FIE	Financial Institutions Efficiency Index	1,700	0.540	0.136	0.102	0.857
FMD	Financial Markets Depth Index	1,700	0.133	0.179	0.000	0.899
FMA	Financial Markets Access Index	1,700	0.129	0.208	0.000	1.000
FME	Financial Markets Efficiency Index	1,700	0.139	0.262	0.000	1.000

## 4. Estimation Results

### 4.1 Unit-root, co-integration, and panel causality tests

Our unit-root test results show that all variables are stationary in levels and first difference, apart from the case of the host country per capita income which is only stationary in first difference.<sup>4</sup> It is, thus, reasonable to assume that these variables are co-integrated of order zero or one.

Table 2 shows our estimation results of the panel cointegration analysis using the three primary financial indices (*IFD*, *IFI*, and *IFM*) as proxies for financial development. As shown in Table 2, it is only in two out of the 27 estimated instances that we fail to reject the null of no cointegration. Note, however, the fact that we reject the null hypothesis of no cointegration for the whole panel does not mean some cross-sections are not cointegrated. We can, thus, conclude that

<sup>4</sup> We did not report the results here due to the space limitation, but they are available upon request.

our results exhibit robust evidence of a long-run relationship between the remittances and the covariates.

**Table 2.** Cointegration Analysis

Test	Statistic	All Variables & FD		All Variables & FM		All Variables & FI	
		Value	P value	Value	P value	Value	P value
Kao	Modified Dickey-Fuller	-3.369	0.000	-3.365	0.000	-3.370	0.000
	Dickey-Fuller	-5.022	0.000	-5.020	0.000	-5.024	0.000
	Augmented Dickey-Fuller	-5.234	0.000	-5.233	0.000	-5.235	0.000
	Unadjusted modified Dickey-Fuller	-4.710	0.000	-4.707	0.000	-4.710	0.000
	Unadjusted Dickey-Fuller	-5.709	0.000	-5.707	0.000	-5.709	0.000
Pedroni	Modified Phillips-Perron	12.396	0.000	12.829	0.000	12.955	0.000
	Phillips-Perron	-0.730	0.233	0.280	0.390	-1.945	0.026
	Augmented Dickey-Fuller	-3.224	0.001	-2.096	0.018	-3.782	0.000
Westerlund	Variance ratio	7.408	0.000	7.658	0.000	7.252	0.000

**Notes:** The dependent variable in each model is a log of remittances per capita. For all the Kao and the Pedroni models, we use Akaike to select the optimal lag structure. We also eliminate the cross-sectional means. For the Westerlund models, we include a panel trend term and subtract the cross-sectional means.

Table 3 presents the causality test results and they depict a mixture of findings with cases of bi-directional, uni-directional, and no causality at all between remittances and the financial services development. For the overall sample, we find a significant causal relationship running from financial services development to remittances, mainly through progress and efficiency in the depth of the financial institutions and financial markets. This finding suggests that, on average, the state of financial development progress impacts remittance inflows to all regions. Conversely, on average, we find that remittances cause improvements in the financial sector via all other aspects of financial progress except efficiency indices. Thus, there is evidence of feedback between remittances and most aspects of financial development in all regions.

We now shift our attention to the breakdown of our analysis based on the geographical regions of the study. We find a seemingly significant difference between the geographic regions in the causal link between remittances and the financial development indicators. For Africa, we see that all but access to and the depth of financial institutions cause remittances while remittances cause all other aspects of financial progress apart from financial markets access and efficiency. In the case of the Americas, financial market efficiency, and financial market depth drive remittances indicating that overall financial development causes remittances through improvements in the financial markets depth and efficiency but the remittances promote slightly the overall development via the depth of the institutions. For Asian countries, we find no direct causation running from financial development to remittances, but a causal relation from remittances to financial market access. Perhaps, this finding is a reflection of the East-Asian countries whose economies are mostly government controlled including China and North Korea and semi-open economies like India, Indonesia, Thailand, and Viet Nam. For the Middle-East, we find that financial development causes remittance inflows to the region, mainly through improvements in financial markets depth and efficiency while remittances are seen to impact the progress of access to the financial institutions. From the above empirical observation, we can draw several implications.

Table 3. Panel Causality Test

Mnemonic	Overall		Africa		Americas		Asia		Middle East	
	w-bar	zt	w-bar	zt	w-bar	zt	w-bar	zt	w-bar	zt
<b><i>H0: Financial services development do not cause remittances</i></b>										
<i>IFD</i>	1.8576	***	2.8071	*	1.6269		1.0760		0.2425	
<i>IFI</i>	1.4300		1.9862	*	1.2394		1.1580		0.3371	
<i>IFM</i>	1.7206	***	2.6860	*	1.4932		0.8428		0.2084	
<i>FIA</i>	1.0177		1.3918		0.7304		1.1441		0.2790	
<i>FIE</i>	0.9821		1.1316		0.9518		0.7476		0.9146	
<i>FID</i>	1.7479	***	2.4108	***	1.7710	*	1.0557		0.2274	
<i>FMA</i>	1.2857		1.8966	**	1.0512		0.8886		0.3608	
<i>FME</i>	1.7971	***	2.3347	***	1.8136	**	1.1980		31.9142	***
<i>FMD</i>	2.4938	***	3.2287	***	2.0454	***	2.6017		13.9253	***
<b><i>H0: Remittances do not cause financial services development</i></b>										
<i>IFD</i>	0.538	***	0.5171	*	0.552	*	0.559		0.5344	
<i>IFI</i>	0.5582	***	0.5157	**	0.6754		0.5964		6.6716	**
<i>IFM</i>	0.556	***	0.5388	*	0.6059		0.3689	*	0.7966	
<i>FIA</i>	0.6178	***	0.5917	*	0.738		0.4635		7.2497	**
<i>FIE</i>	2.5618		5.624	***	2.8824		3.3551		0.1798	
<i>FID</i>	0.562	***	0.5815	*	0.5814	*	0.6179		0.3065	
<i>FMA</i>	0.5689	***	0.6665		0.6248		0.289	*	0.4886	
<i>FME</i>	1.0465		0.9471		1.248		0.7046		1.367	
<i>FMD</i>	0.6317	***	0.5961	*	0.7688		0.3989		0.7183	

Notes: (1) \*, \*\*, and \*\*\* denotes the significance of the causal link ( $\bar{W}$ ) based on  $\bar{Z}$  test statistic at the 10%, 5%, and 1% levels, respectively.

(2) Mnemonics and corresponding indices used: IFD = Financial Development Index; IFI = Financial Institutions Index; IFM = Financial Markets Index; FIA = Financial Institutions Access Index; FIE = Financial Institutions Efficiency Index; FID = Financial Institutions Depth Index; FMA = Financial Markets Access Index; FME = Financial Markets Efficiency Index; FMD = Financial Markets Depth Index.

First, since remittances to Africa entail the highest cost than for any of the other regions, the development of financial institutions will have a larger marginal impact in reducing the transaction costs of remittances to Africa. Secondly, for most of the other regions, which already have well developed financial institutions, it is the development of financial markets, which will lead to increased remittance flows for investment purposes to these regions, including Africa. Further, we find evidence that remittance inflows to Africa especially provides a capacity for financial intermediation. This is mainly due to two possible reasons. First, bank funds from remittances lead to more funding for the financial intermediation process. Secondly, the recipients can use remittances as collateral for leveraging more access to financial resources for investments.

We are aware there are possible structural breaks in remittances, which we aspire to investigate (Altinay, 2005). However, there are none in the literature for our ARDL model. As a check, we performed the Elliott-Müller efficient test for general persistent time variation in linear regression coefficients and the Clemente-Montañés-Reyes unit-root test with single mean shift for each individual country and find for most of the countries that there have structural breaks with different breakpoints in remittances. However, this just means there is a structural break issue with

the linear regression estimator and does not imply the same issue with our estimation model. Further, it is not feasible for us to adjust those breaks in our estimation and they warrant further future investigation.

Table 4 presents our elasticities estimates for our overall sample. Because of the inconsistency of our covariates in the short-run due to the possible reverse causality, we only report the long-run elasticities of our PMG estimates. Our speed of adjustment parameter ( $\Phi$ ) is consistently significantly negative in all of our models, indicating a return to long-run equilibrium after short-run shocks.

**Table 4.** Disaggregated Panel Fully Modified OLS Long-Run (PMG) Estimates for the Full Sample

LR	Full sample							
DPI	-0.460*** (0.150)	-0.838*** (0.169)	-0.202* (0.109)	-0.481*** (0.117)	-0.290** (0.123)	-0.332** (0.132)	-0.538*** (0.152)	0.041 (0.263)
FPI	1.916*** (0.221)	2.225*** (0.223)	0.783*** (0.168)	0.955*** (0.172)	0.783*** (0.198)	0.950*** (0.215)	1.171*** (0.236)	0.981*** (0.377)
MSK	-1.948*** (0.097)	-1.228*** (0.148)	-1.709*** (0.097)	-1.664*** (0.092)	-1.731*** (0.089)	-1.690*** (0.095)	-1.661*** (0.110)	-1.700*** (0.124)
XRV	1.503*** (0.189)	1.797*** (0.215)	1.670*** (0.182)	1.534*** (0.175)	1.602*** (0.181)	1.696*** (0.204)	1.703*** (0.201)	0.119 (0.213)
INF	-0.009*** (0.002)	-0.014*** (0.002)	-0.007*** (0.002)	-0.008*** (0.002)	-0.007*** (0.002)	-0.008*** (0.002)	-0.010*** (0.002)	0.011*** (0.003)
IFI	-0.120** (0.063)							
IFM		0.287*** (0.064)						
FID			0.068 (0.053)					
FIA				-0.121*** (0.038)				
FIE					-0.067 (0.063)			
FMD						-0.007 (0.054)		
FMA							0.174*** (0.051)	
FME								0.524*** (0.122)
$\Phi$	-0.205*** (0.030)	-0.195*** (0.024)	-0.235*** (0.029)	-0.239*** (0.030)	-0.230*** (0.030)	-0.231*** (0.029)	-0.224*** (0.028)	-0.256*** (0.060)

**Notes:** \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and the 1% levels of confidence, respectively. The numbers in parenthesis are the standard errors. Our estimations are based on a double log format.

We find that per capita income for the host and home countries positively (pro-cyclical) and negatively (counter-cyclical) impact remittances respectively, thus, supporting a pure altruistic remittances motive (Carling, 2008). Unexpectedly, we find that that migrant stock elasticities are negative, thus, perhaps indicating that on a per capita basis smaller countries remittance receipts are relatively higher. Exchange rate volatility (XRV) which reflects the risk associated with unexpected movements in exchange rates has a significantly positive impact on remittances (Jehan and Hamid, 2017). XRV may have several macroeconomic impacts including on inflation targets, individual wealth accumulation, investments, and economic growth. Further, in countries where imports play a key role in domestic consumption, devaluation of domestic currencies can cause hardships leading to increases in migrant remittances for altruistic reasons. Also, in some cases, XRV may be indicative of deteriorating domestic macroeconomic conditions, thus, also increases migrant altruistic remittances. Contrarily, however, Ahamada and Coulibaly (2011) indicate that XRV causes volatility in the returns from home country investment, thus limiting physical and financial capital inflows including remittances for investment reasons. Our finding, therefore, indicates that for our overall sample, remittances are primarily for altruistic purposes. However, interestingly, we find that increases in home country inflation cause a decrease in remittances.

For our financial sector development metrics, we find that for the overall sample while the overall financial institution's development (IFI) significantly negatively impact remittances, improvements in financial markets (IFM) increase remittances. Specifically, we find that a percentage increase in IFI and IFM lead to -0.120% and 0.287% change in remittances respectively. For the sub categories, we find that a percentage improvement in financial markets access (FMA) and financial markets efficiency (FME) leads to 0.174% and 0.524% increase in remittances respectively. These findings suggest that improvements in these areas significantly reduces transaction costs, and also provides investment opportunities, ultimately increasing remittances. Contrarily, we find that the main cause of the negative impact of improvements in financial institutions is an improvement in access to financial institutions (FIA), perhaps suggesting improvement in access to financial institutions leads to a reduction in the need for remittances, thus indirectly supporting the altruistic motive to remit.

Turning our attention to regional differences in our results that are presented in Table 5, as expected we find significant regional differences in the long-run elasticities for both our financial sector development metrics and other covariates. We find that while domestic income has a positive impact on remittances flows to Africa and Asia, contrarily, it negatively affects the Americas and the Middle East. These findings suggest that while a significant portion of remittances to Africa and Asia is for investment purposes, those to the Americas and the Middle east are largely for altruistic purposes. Contrastingly, we find that improvements in host country's per capita income consistently increase remittances to all regions, indicating that the increase in migrants' income improves their financial wellbeing and ultimately results in larger remittances. This is supported by the realized slight reduction in global remittances during the recent global recession (2007-2008). XRV has consistent significantly positive impact on remittances only in the Americas and the Middle East. Specifically, a percentage increase in XRV leads to between 1.57% - 2.94% and 0.32% - 0.38% increase in remittances to the Americas and the Middle East respectively, thus supporting the altruistic rationale that is found with the domestic income. For inflation, we find a significantly negative impact on remittances for all regions except for Africa, suggesting that as macroeconomic conditions worsen at home, it triggers increased altruistic remittances to Africa.

**Table 5.** Disaggregated panel fully modified OLS long-run estimates for regions

LR	Africa (33 countries)						Americas (29 countries)					
DPI	2.255*** (0.265)	0.041 (0.263)	0.522 (0.190)	0.714** (0.293)	1.009*** (0.244)	1.017*** (0.192)	-1.386*** (0.308)	-0.937*** (0.193)	-1.185*** (0.303)	-1.523*** (0.276)	-1.582*** (0.288)	-1.238*** (0.248)
FPI	0.978*** (0.348)	0.981*** (0.377)	3.875*** (0.487)	0.430* (0.249)	1.024*** (0.356)	0.871** (0.355)	1.632*** (0.439)	1.689*** (0.341)	1.139** (0.448)	2.060*** (0.440)	2.096*** (0.430)	2.050*** (0.398)
MSK	-1.216*** (0.115)	-1.700*** (0.124)	-1.086*** (0.113)	-1.687*** (0.127)	-1.381*** (0.127)	-1.446*** (0.129)	-1.464*** (0.224)	-1.842*** (0.239)	-1.882*** (0.265)	-1.573*** (0.233)	-1.723*** (0.241)	-1.726*** (0.223)
XRV	-0.209*** (0.062)	0.119 (0.213)	-0.067 (0.136)	-0.024 (0.158)	0.097 (0.169)	-0.206 (0.139)	2.954*** (0.429)	1.569*** (0.239)	2.584*** (0.405)	2.427*** (0.392)	2.494*** (0.363)	1.958*** (0.307)
INF	-0.002 (0.003)	0.011*** (0.003)	0.007*** (0.002)	0.015*** (0.004)	0.007** (0.003)	0.010*** (0.002)	-0.018*** (0.003)	-0.160*** (0.002)	-0.016*** (0.003)	-0.017*** (0.003)	-0.017*** (0.003)	-0.014*** (0.003)
FID	-0.028 (0.055)						0.341*** (0.080)					
FIA		0.524*** (0.122)						-0.165*** (0.045)				
FIE			0.060 (0.088)						-0.141 (0.101)			
FMD				0.551*** (0.117)						0.311*** (0.087)		
FMA					0.204** (0.085)						0.209** (0.067)	
FME						0.122** (0.057)						0.264** (0.062)
Φ	-0.289*** (0.055)	-0.256*** (0.060)	-0.291*** (0.068)	-0.257*** (0.063)	-0.284*** (0.060)	-0.288*** (0.065)	-0.207*** (0.036)	-0.283*** (0.045)	-0.221*** (0.037)	-0.221*** (0.037)	-0.241*** (0.038)	-0.247*** (0.040)

Review of Economics & Finance, Volume 16, Issue 2

LR	Asia (15 countries)						Mideast (8 countries)					
DPI	0.569*** (0.114)	0.571*** (0.130)	0.610** (0.271)	0.341 (0.256)	0.873*** (0.203)	-0.767* (0.419)	-2.508*** (0.525)	-2.630*** (0.566)	-2.627*** (0.581)	-2.361*** (0.456)	-2.101*** (0.356)	-2.253*** (0.411)
FPI	0.213 (0.312)	-1.419*** (0.182)	1.790*** (0.314)	2.764*** (0.349)	1.412*** (0.340)	1.242 (1.077)	2.593** (1.116)	3.000** (1.202)	3.199** (1.277)	2.390** (1.050)	1.460* (0.753)	1.657 (0.871)
MSK	0.214 (0.287)	1.403*** (0.247)	0.769*** (0.116)	0.755*** (0.113)	-1.048*** (0.332)	1.544*** (0.306)	1.107*** (0.410)	0.898* (0.471)	1.090** (0.453)	1.298*** (0.379)	1.255*** (0.321)	1.211*** (0.336)
XRV	0.574 (0.358)	-0.014 (0.085)	-0.055 (1.115)	0.176 (0.134)	2.806*** (0.815)	-8.478*** (1.790)	0.324*** (0.090)	0.305*** (0.085)	0.383*** (0.118)	0.307*** (0.092)	0.349*** (0.101)	0.351*** (0.105)
INF	0.001 (0.003)	-0.028*** (0.003)	-0.006* (0.004)	0.002 (0.004)	-0.010 (0.008)	0.024** (0.010)	-0.006** (0.003)	-0.008** (0.003)	-0.008** (0.004)	-0.005 (0.003)	-0.005* (0.003)	-0.004 (0.003)
FID	0.364** (0.159)						0.149 (0.171)					
FIA		-0.057** (0.027)						0.292 (0.185)				
FIE			-0.254*** (0.062)						-0.024 (0.208)			
FMD				-0.238*** (0.066)						0.021 (0.127)		
FMA					0.986*** (0.242)						0.129* (0.073)	
FME						-0.456** (0.217)						0.033 (0.061)
Φ	-0.231*** (0.066)	-0.234* (0.142)	-0.240** (0.109)	-0.260** (0.101)	-0.177*** (0.066)	-0.001 (0.075)	-0.249*** (0.088)	-0.248*** (0.083)	-0.228*** (0.081)	-0.0257*** (0.090)	-0.279*** (0.100)	-0.271*** (0.097)

Notes: \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels of confidence, respectively. The numbers in parenthesis are the standard errors.

For financial institutions development, we find that only improvements in access positively impact remittance to Africa. This finding may suggest that access to depository institutions for remitted hubs may serve as collateral, thus creating avenues for increased economic activity, which in turn attract more remittances for investment purposes. For the Americas, while access to institutions significantly reduces remittances, improved depth of institutions encourages remittances. These findings indicate that while improved access to financial institutions reduces altruistic demand for remittances, improved depth increases investment opportunities and ultimately remittances for investment purposes. For Asian, we find that while financial institutions depth improvements lead to a long-run increment in remittances, improvements in access and efficiency leads to reductions in remittances. We can, therefore, conclude that remittances to Asia are more likely to be for investment purposes and improvements in depth lead to a reduction in transaction cost, ultimately bring in more remittances, whereas, improvements in access to institutions and their efficiency reduces the altruistic need for remittances.

For financial market development, we find that improvements in financial markets access, depth and efficiency consistently increase the magnitude of remittances to Africa and the Americas, with improvements in market depth being the most important driver for remittances. This indicates the positive link between the investment opportunities and remittances and supports the investment motive to remit for these two regions. Furthermore, improved financial markets may lead to a decrease in transaction costs, thus increasing remittances to countries with less-developed financial markets (Freund and Spatafora, 2008). For Asia, we find that while financial markets access leads to long-run increases in remittances, improvements in depth and efficiency, however, lead to a reduction. For the Middle East, the only improvement in market access increases remittances in the long-run. This is indicative of the fact that remittances are likely to be invested in financial markets in these countries. With the improved economic conditions in most Middle Eastern countries because of their burgeoning oil revenues, remittances to this region are less likely to be for altruistic reasons.

## 5. Conclusions and Policy Directions

The primary objective of this study is to establish the direction of causality and explore the long-run relationships between remittances and its determinants, especially for financial services development. In particular, we explore the differential impacts of the proxies for the financial development sector including the index of financial development (IFD), index of financial institutions progress (IFI), and index of financial markets (IFM) on remittance inflows for our sample and by the geographical region of the major recipients of remittances. We also control for other commonly used determinants of remittances such as exchange rate volatility (XRV), the size of migrant stock (MSK), inflation (INF), the domestic per capita income of the recipient country (DPI), and the foreign per capita income of the primary host country (FPI).

We use annual panel data spanning over the 1995-2014 period and conduct panel causality tests to investigate the direction of causality between the remittances and financial indices. We also use the Autoregressive Distributed Lag Model (ARDL) model that can generate consistent estimates with possible endogenous independent variables to determine if a long-run relationship exists between remittances and the financial services development indicators and other control variables.

Overall, all our findings are consistent with other studies that have investigated the impact of financial services development on remittances but are much more reliable as we use a dataset covering a large group of countries, relatively long time series data, and employ newer and better estimation methodologies. The results indicate that the access, depth, and efficiency of the financial services sector do, indeed, have a positive and statistically significant long-run impact on

remittances by reducing the constraining transaction costs of remittances to all regions of the study including Africa, the Americas, and Asia.

In terms of policy implications, governments in these regions may find it very productive to implement policies which promote financial services development and exchange rate stability in order to ensure the external flow of resources in the form of remittances for the expressed purpose of poverty reduction, consumption smoothing, and the profit motive of private investment.

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