

# The nexus between Remittances, Institutional Quality and Financial

## Inclusion

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## Abstract

This paper uses the dynamic panel data method to investigate the nonlinear effect of remittance inflows on financial inclusion in high remittance-receiving developing countries during 2011-2017. We found that, at low values of remittances, an additional remittance inflow has a negative impact on financial inclusion. However, at some point, the effect becomes positive. In contrast with the existing literature, which states that remittances foster financial inclusion, the evidence in this study showed that the effect of remittances on the financial inclusion was conditional upon people's perception about institutions. The results suggested that the impact of remittances on financial inclusion was U-shaped.

**Keywords:** *Remittance; Institutions, Financial inclusion; U-shape.*

**JEL classifications:** G15; G21; C23

## **1. Introduction**

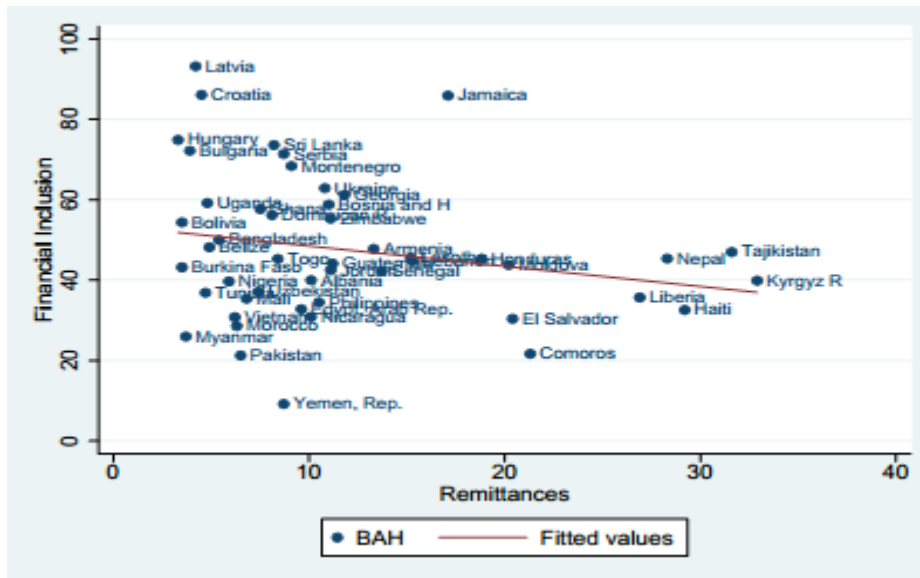
The money, earned by migrants outside the country and then sent back to the country of origin, remains a significant research area both for scholars and policymakers. This fact, supported by the World Bank 2018 reports, shows that global remittances have increased by 7% during the 2015 - 2016. For the same period, remittance inflows to low- and middle-income countries grew by 8.5% while to high-income countries grew only by 2%. Remittances seem to contribute to economic development by stimulating consumption, which, in turn, raises aggregate demand. Data show that about 70% of remittances received go toward consumption and other basic needs. McKenzie and Rapoport (2011) reported that remittances not only improve the welfare of recipients, but also benefit those with whom the recipients conduct transactions. Thus, they improve the recipients' budget constraints and consequently, generate a positive multiplier effect to the economy.

It is important to emphasize that financial inclusion is another equally important issue requiring as much global attention as remittances. According to the World Bank, the number of adults using bank accounts had increased from approximately 3.8 million (69% of adults globally) in 2014 to more than 515 million in 2018.

Several scholars have stressed the importance of remittances to financial inclusion. For example, Aggarwal et al. (2006) argued that migrants' remittances can lead to financial sector development in the less developed economies by boosting the total volume of deposits and loans granted by the banking institutions to financially excluded segment. Similarly, Orozco et al. (2005) stated that remittances may promote the financial development of the recipient country by stimulating the demand and access to various financial products. Furthermore, the provision of remittance transfer services allows banks and financial institutions to collect information about unbanked recipients and mitigate the adverse selection problem. In addition to money flows generated, the remittance channel can be used to sell financial service packages geared towards low-income individuals (Toxopeus and Lensink, 2007).

The remittance inflows are believed to increase the ability of recipient households to gain access to financial services, thereby encouraging further growth and expansion of financial inclusion. Though remittances are hypothesized to have positive impact on financial inclusion, the observations in our sample claim the opposite (See Figure 1). This is to say that the sample

correlation between the workers' remittances and financial inclusion across countries in 2017 is estimated to be negative. However, it is crucial to remember that a negative correlation between the remittances and financial inclusion does not necessarily imply a strong negative (linear) relation between the two.



**Figure 1: Sample correlation between Remittances and Financial Inclusion in 2017**

Note: List of the countries is provided in Table A1 in Appendix.

Source: Authors' compilation from World Bank data (2018)

The current study proposes the idea that a low expansion of financial inclusion may be affected by poor institutional quality. This is to say that low quality institutions are unable to manage bureaucratic processes such as reducing the amount of documentation or paperwork and sustaining clients' trust during the remittance transactions. It is true that institutional quality is, especially in developing nations, an important factor that influences on individual decisions to get access to various services of financial institutions. Otherwise, the public distrust in financial institutions along with long bureaucratic processes involved in remittance transactions, would encourage them to consider alternative channels for financial services. Therefore, in this study we also examine the joint impact of remittances and institutional quality on financial inclusion.

This paper will contribute to the existing literature in at least two ways. First, to the best of our knowledge, the existing literature didn't consider the nonlinear effects of workers' remittance on financial inclusion. Our paper found that the marginal impact of remittances on financial inclusion is estimated to be not constant. That is, initially when remittances are received in a

small amount, there is not much necessity to open bank accounts. Instead, people would prefer to use them for daily consumption immediately. However, further increase in workers' remittances should surely influence on people's (workers, households) decision on demand for financial services. For keeping a large amount of money in house is less safe than saving them in bank accounts. This is especially true in developing nations. Second, the existing studies have failed to examine the impact of remittances associated with institutional quality on financial inclusion. Hence, this paper's aim is to fill these gaps by means of dynamic panel data framework. To this end, a panel-GMM method was employed is estimating the major results of our findings and reveal that remittances interacted with institutional quality significantly contribute to financial inclusion.

The rest of the paper is organized as follows: Section 2 provides a brief literature review on remittances and financial inclusion. Section 3 introduces the empirical methodology used in paper analysis. In conclusion section, we summarize the main findings of the paper and suggest further extensions for future work.

## **2. Literature Review**

Remittances have kept drawing attention among development policy experts. Though, according to World Bank 2014 reports, workers' remittances account for the second largest capital inflows after Foreign Direct Investment (FDI) in developing nations, Meyer and Shera (2017) argue that remittances sometimes exceed the FDI flows. In their study, Meyer and Shera (2017) found that remittances have a positive impact on economic growth, which is consistent with Goschin (2014). Another similar finding is supported by Tahir et al (2015), which investigated the effects of both workers' remittances and FDI on economic growth in Pakistan. Other literatures point out the impact of remittances on investment on human capital and labor supply (Azizi, 2018). Although these papers find evidence of a positive impact of remittance flows on overall domestic economy, Bahadir et al. (2018) found the opposite by calling the remittance flows as curses. Recently, research interests on the link between remittances and financial inclusion have been raising attention among researchers and policy analysts (Ajefu and Ogebe, 2019; Anzoategui et al. 2014). The empirical findings provided mixed results on the impact of remittances on financial inclusion.

Remittances can affect positively financial inclusion in at least two ways. First, remittances might increase the demand for savings instruments (Anzoategui et al. 2014; Muktadir-Al-Mukit and Islam, 2016; Misatiet al., 2019). Second, remittances might increase the recipients' chances of obtaining a loan from formal financial institutions/banks (Anzoategui et al. 2014). Also, they may be able to assess the creditworthiness of the remittance recipients (Giuliano and Ruiz-Arranz, 2009). However, remittances might have a negative impact on financial inclusion by reducing the demand for loans as a result of relaxed households' financing constraints (Chami & Fullenkamp, 2012). Generally, the literature supports the view that both the sending and receiving of remittances increase the senders' and recipients' use of financial services (Giuliano and Ruiz-Arranz, 2009; Orozco et al., 2005; Anzoategui et al., 2014; Aggarwal et al., 2006; Gibson et al., 2006). In addition, some scholars have considered long-run and short-run linkages between remittances and financial development. For instance, Fromentin (2017) analysed the dynamic impact of remittances on financial development for emerging and developing countries over the period 1974–2014. He found out that a positive long-run relationship between remittances and financial development coexists with a significant (and slightly positive) short-run relationship, except for low-income countries. Consequently, there is strong evidence supporting the view that remittances promote financial development in developing countries in the long term, but the effect may be different in the short term.

### **3. Methodology**

#### **3.1 Data**

This study uses data from mainly the *World Development Indicators (WDI)* of the World Bank and the International Monetary Fund (IMF). Data was collected for 87 high remittance-recipient countries and for the period from 2011 to 2017. The list of selected counties is provided in Table A1 in Appendix.

Our dependent variable is financial inclusion (*FI*), measured by bank account holders per 1000 people. The average number of bank account holders per 1000 people is 682.5, but the overall (between) standard deviation of 565.4 (565.6) indicates that there is a significant heterogeneity across countries in our sample. Most of the links between the macroeconomic variables in this

area are based mainly on financial development (see Beck et al., 2009; Cull & Effron, 2008), which encompasses financial inclusion. As Ajefu and Ogebe (2019) notices that financial inclusion is positively correlated with financial development, the discussion here is centred on both. Therefore, based on the existing literature, the common explanatory variables that we employ for the explanation of financial inclusion behaviour are the determinants of financial development, which are migrant workers' remittances, institutional quality, human capital, interest rate and income of the remittances recipient countries.

Primary regressor - workers' remittances ( $R$ ) - refer to the ratio of personal remittances inflow to the total population. The average ratio of it is \$151.3 US, but the overall (218.6) and between (217.07) standard deviations are even higher. Studies on the impact of remittances on financial inclusion find ambiguous effects. On the one hand, the remittances tend to boost financial development by creating a demand to open bank accounts and saving instruments (Anzoategui et al., 2014), and the recipients' exploration of bank services (Giuliano and Ruiz-Arranz, 2009; Orozco et al., 2005; Aggarwal et al., 2011; Gibson et al., 2006). Aggarwal and Ryoo (2011)'s finding is consistent with that of Mundaca (2009) in that the nexus between financial development and remittance is positive and significant in developing countries. On the other hand, Brown et al. (2014) revealed that remittances have negative impact on the use of bank accounts, which implies that the remittance inflows might not result into a more inclusive financial system. Furthermore, Calderon et al. (2007) mentions that remittances could reduce demands for credit and even impose dampening effect on the credit markets. Finally, remittances can serve as a substitute for credits and thus are not linked to financial inclusion (Ambrosius & Cuecuecha, 2013; Brown, Carmignani, & Fayad, 2013). In sum, the mixed results of the said existing papers regarding the remittance impact on financial inclusion further motivates us to test if there is a nonlinear relationship between the two.

Second explanatory variable - Institutional quality ( $INQ$ ) - is the measure of institutional development in terms of governance indicators, proxied by the *rule of law* and *government effectiveness*, as created by Kaufmann, Kraay & Mastruzzi, (2010). According to Cull and Effron (2008) and other authors alike, high  $INQ$  has been found to foster financial development in developing countries. Thus,  $INQ$  is hypothesized to influence positively on financial inclusion since the latter is positively correlated with financial development.

As for the impact of human capital (*HC*) on financial development, the empirical findings provided mixed results. For instance, while Evans et al. (2002) claim positive influence of human capital on financial development, Arora (2012) found the opposite. For the measurement of human capital, we use average number of years of education completed by adult household members for all countries (Anzoategui et al. 2014; Ajefu and Ogebe, 2019). Taking the whole sample, the mean years of education by adults is 7.45.

Deposit interest rate (*IDR*) denotes the cost charged by banks. Theoretically, high interest rates affect the stability of the macro economy, and hence, negatively affect the demand for financial services. Because high interest rates lead to adverse selection and financing of risky projects, they are expected to have a devastating impact on economic growth. Operational inefficiencies in relation to high administrative charges are an impediment to financial inclusion as they restrict the availability of financial products and increase their prices, hence making access to them more difficult. The high cost of opening and maintaining an account, as well as the requirement for a high minimum balance, also discourages some people from getting access to formal financial services and products (Rojas-Suarez and Amado, 2014).

Income refers to GDP per capita (*GDPPC*) and it is measured in constant US\$. We expect this variable to be positively correlated with financial inclusion because the volume and sophistication demanded of financial activities are greater in richer countries and, on the supply side, richer economies can better exploit economies of scale in the provision of financial services (Rojas-Suarez & Amado, 2014; Demetriades & Hussein, 1996; Calderon & Lui, 2002; Yang & Yi, 2008; Law & Azman-Saini, 2012).

We begin our estimation analysis with descriptive statistics in Table 1. All the series showed considerable variations both across and within the countries that were included in the sample. This further justified the need to use a *heterogeneous panel data estimation technique*, which permits endogeneity issues. In addition, Table 2 presents a simple correlation analysis of the series that was included in the sample. Overall, the correlation exercise revealed that the correlation estimates were within a reasonable range.

**Table 1. Summary of descriptive statistics**

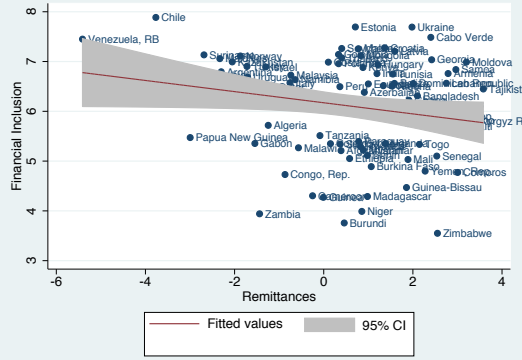
Variables	Mean	Overall Std. Dev	Between Std. Dev	Within Std. Dev	Minimum	Maximum
<b>FI</b>	682.50	565.40	550.60	134.50	8.60	3379.81
<b>R</b>	151.30	218.60	217.07	29.89	0.33	1495.10
<b>INQ</b>	4.30	1.40	1.40	0.19	1.29	9
<b>GDPPC</b>	7812.01	13438.00	13412.00	4583.30	212.50	91218.00
<b>HC</b>	7.45	3.01	3.01	0.19	1.40	13.00
<b>IDR</b>	41.90	33.35	32.40	7.80	9.50	243.04

**Table 2. Correlation between series**

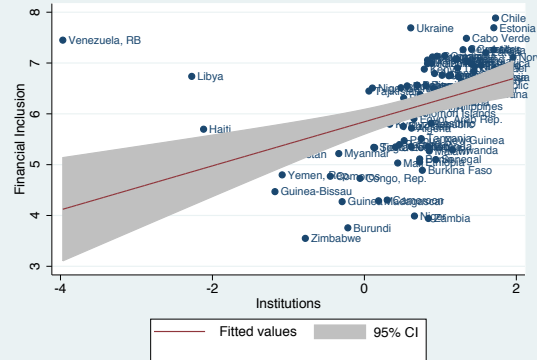
Variables	FI	R	INQ	GDPPC	HC	IBD
<b>FI</b>	1					
<b>R</b>	-0.09	1				
<b>INQ</b>	0.57	0.26	1			
<b>GDPPC</b>	0.36	0.47	0.32	1		
<b>HC</b>	0.35	0.08	0.62	0.28	1	
<b>IDR</b>	0.65	0.45	0.58	0.3	0.46	1

To further obtain a good sense of the relationship among the series in the dataset, the average of these data for each country included in our sample was taken to present a cursory graphical relationship between financial inclusion and workers' remittances considered in our model specification. Figure-2a and -2b plot log of financial inclusion against log of workers' remittances and log of institutional quality, respectively. Figure-2a showed that countries with high inflows of workers' remittances seem to have lower rates of returns on financial inclusion their migrants' destination. Contrary, Figure-2b revealed that countries that experienced higher level of institutional quality seem to positively associate with workers' remittances.





**Figure 2a.** Financial Inclusion (Bank account holders per 1000) and Workers' Remittances (Share to GDP)



**Figure 2b.** Financial Inclusion (Bank account holders per 1000) and Institutional Quality (Scale -2.5 to 2.5)

### 3.2 Empirical Methodology

Since our panel data consists of  $N > 25$  countries and  $T < 25$  time periods, we employ dynamic system GMM method (Badi Baltagi). Another reason for using it is its' ability to control for endogeneity issue and to remove country specific effects from the regressions which are the main problems of other panel data techniques. In this paper we empirically examine the link between financial inclusion and remittances by estimating the benchmark equation (1) below and modifying it in subsequent equations. So:

$$\log(FI_{it}) = \gamma \log(FI_{it-1}) + \beta_1 \log(R_{it}) + X'_{it}\boldsymbol{\beta} + u_{it} \quad (1)$$

$$u_{it} = c_i + \varepsilon_{it}$$

Here the disturbance term consists of one-way error component which is assumed to capture cross country heterogeneity in this model. All the variables are logarithmic form.  $FI_{it-1}$  is the lagged dependent variable of financial inclusion.  $R_{it}$  denotes workers' remittance inflows to country  $i$  in period  $t$ .  $X_{it}$  is the vector of the other control variables, namely, the human capital ( $HC$ ), interest deposit rates ( $IDR$ ), and GDP per capita ( $INC$ ).

Before applying dynamic system GMM method, this study verifies the nonlinear relationship between real remittances and financial inclusion using the *U-Shaped test* suggested by Lind and Mehlum (2010). It also conducts two diagnostics tests, such as *AR (2) Test* and *Hansen Test* to

check the consistency and efficiency of the long run (estimated) parameters of interest. The results of GMM are valid if these two tests are insignificant.

The results of the U-shaped test in Table 3 indicate that the estimated coefficients were significantly negative for real remittances and positive for its' square term.

**Table 3. U-Shaped Test**

Variables	
Real Remittances per capita	-0.00717*** (0.000943)
Real Remittances per capita (Square)	0.00551*** (0.000379)
Appropriate U test	10.28 0.001
Extreme point	4.18
95% confidence interval, Fieller method	[-1.1, 7.3]

Note: Standard errors in parentheses \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

Source: Authors' compilation from software

The lagged dependent variable is statistically significant in all 5 models in Table-4, which implies that the dynamic system GMM is an appropriate estimator and the empirical results can be relied upon statistical inference. The insignificance of (AR2) Test and Hansen test shows that all our models are robust; the Hansen test did not reject the over-identification restriction at 5% significance level. As expected, the null hypothesis of the second order serial correlation (AR2) is not rejected. Generally, the estimated models in Table 3 are nearly well specified.

The estimated regression coefficients of model (1) are given in Column 1 of Table 4. Except for GDP per capita, all other variables are estimated to be statistically significant. The coefficient of remittance, our primary concern, implies when remittance inflows increase by 1%, the financial inclusion falls by 0.0072%, ceteris paribus.

We modify benchmark model (1) by considering institutional quality and its interaction with remittances as:

$$\log(FI_{it}) = \gamma \log(FI_{it-1}) + \beta_1 \log(R_{it}) + \beta_2 \log(INQ_{it}) + \beta_3 (\log(R_{it}) * \log(INQ_{it})) + X'_{it}\beta + u_{it} \quad (2)$$

We borrow the idea about the role of institutional quality from Demetriades and Law (2006), where they conclude that financial development with high institutional quality is more effective in middle-income economies. This view leads us to estimate the joint impact of remittances and institutional quality on financial inclusion and to test whether an increase in remittances with higher institutional quality will lead to an increase in financial inclusion (Ruiz, Shukralla & Vargas-Silva, 2009). The estimated regression coefficients of model (2) are given in Column 2 (without interaction term) and Column 3 (with interaction term). Without interaction term, the coefficients of human capital and deposit interest rate are statistically insignificant. On the contrary, adding the interaction term makes the coefficients of those variables highly significant. The marginal impact of remittance on financial inclusion is given by:

$$\frac{\partial \log(FI_{it})}{\partial \log(R_{it})} = \beta_1 + \beta_3 \log(INQ_{it}) \quad (3)$$

The partial derivative in equation (3) implies that the elasticity of financial inclusion with respect to remittance depends on institutional quality. The estimates ( $\hat{\beta}_1 < 0$  and  $\hat{\beta}_3 > 0$ ) in column (3) of Table 4 are highly statistically significant and consistent with Ruiz et al. (2009). Positive (negative) coefficient of the interaction term indicate that the marginal impact of remittances on financial inclusion is enhanced in recipient countries with strong (weak) institutional quality. In other words, positive (negative) coefficient of interaction term suggests that remittances and institutional quality are complements (substitutes) in shaping financial inclusion in remittance recipient developing countries in our sample. Then the sign of the partial derivative in equation (3) depends on the magnitude of institutional quality. More precisely,

$$\frac{\partial \log(FI_{it})}{\partial \log(R_{it})} \begin{cases} \geq 0, & \text{if } INQ \geq INQ^* \\ < 0, & \text{if } INQ < INQ^* \end{cases}$$

where the threshold level of institutional quality is given by  $INQ^* = e^{\frac{-\hat{\beta}_1}{\hat{\beta}_3}}$ .

As the estimated coefficients of institutional quality are positive in all models and statistically significant (except in Column 4) in all models, this suggests that level of economic condition and socio-political stability in the migrant country of origin, have positive effect on financial inclusion. So, the role of remittances in promoting long-run financial development increases as the quality institutions improves in remittance-recipient countries (Land and Azman-Saini, 2012; Ramirez, 2013; Ruiz et al. 2009; Hamma, 2018).

Considering the potential nonlinear relationship between remittances and financial inclusion, we further modified our model by adding the square of the remittances,  $(\log(R))^2$ , in columns (4) and (5) of Table-4, respectively as:

$$\log(FI_{it}) = \gamma \log(FI_{it-1}) + \beta_1 \log(R_{it}) + \beta_2 \log(INQ_{it}) + \beta_4 (\log(R_{it}))^2 + X'_{it}\boldsymbol{\beta} + u_{it} \quad (4)$$

$$\log(FI_{it}) = \gamma \log(FI_{it-1}) + \beta_1 \log(R_{it}) + \beta_2 \log(INQ_{it}) + \beta_3 (\log(R_{it}) * \log(INQ_{it})) + \beta_4 (\log(R_{it}))^2 + X'_{it}\boldsymbol{\beta} + u_{it} \quad (5)$$

Then the partial derivatives from both equations (4) and (5) show that the marginal impact of remittances on financial inclusion is not constant. That is, from (4) and (5), respectively:

$$\frac{\partial \log(FI_{it})}{\partial \log(R_{it})} = \beta_1 + 2\beta_4 \log(R_{it}) \quad (6)$$

$$\frac{\partial \log(FI_{it})}{\partial \log(R_{it})} = \beta_1 + \beta_3 \log(INQ_{it}) + 2\beta_4 \log(R_{it}) \quad (7)$$

The signs of the estimated regression coefficients in columns (4) and (5) are:

$$\hat{\beta}_1 < 0, \quad \hat{\beta}_3 > 0 \text{ and } \hat{\beta}_4 > 0 \quad (8)$$

They are also highly statistically significant. This tells us that the relationship between remittances and financial inclusion is in U-shape form. Intuitively, this implies for small amount of remittance flows there is not huge demand for bank accounts. So, the financial inclusion is predicted to decrease,  $\hat{\beta}_1 = -0.0419$  and  $\hat{\beta}_1 = -0.0384$ , in columns (4) and (5), respectively. However, a further increase in remittance flows tends to create demand for bank accounts,  $\hat{\beta}_4 = 0.00551$  and  $\hat{\beta}_4 = 0.00473$ , in columns (4) and (5), respectively. That is, this coefficient in both equations is significantly different from zero even at a 1% significance level. So, the remittance flows in huge amounts to recipient countries is risky to keep them in pockets, which, in turn, increases demand for financial inclusion. Thus, allowing for non-constant returns to remittance flows has improved our model both statistically and in terms of meeting our expectations about how financial inclusion will respond to changes in remittances.

Furthermore, the estimated results of equation (5) implies that the elasticity of financial inclusion with respect to remittance flows depends on both the level of remittances and the level of institutional quality,  $\hat{\beta}_3 = 5.94e^{-0.5}$ . This would seem more reasonable to assume that with better institutional quality, the marginal impact of remittance flows on financial inclusion

becomes higher. That is, as institutional quality improves, more of each extra dollar remittance is expected to create demand for bank accounts.

It can be observed from Table 4 that remittances carried the expected negative signed in all models. The evidence of negative impact of remittances found in this study is in line with the results of (Calderon et al. (2007); Brown et al. (2013); Ambrosius & Cuecuecha, (2016); Chami & Fullenkamp, 2013; Giuliano & Ruiz-Arranz, 2009) who reported that remittance inflows might not contribute to a more inclusive financial system.

Finally, the signs of the estimated coefficients of other control variables in the model such as deposit interest rates, GDP per capita and human capital are consistent, though they are not all statistically significant. That is, the higher GDP per capita is positively associated with financial inclusion. The positive sign of human capital coefficient implies that educated people can comprehend the various financial products and tend to get more access to financial inclusion. The sign of the interest rates coefficient indicates that an increase in the interest rates for deposits may encourage the opening of bank accounts and improve the financial inclusion in remittance-recipient countries.

**Table 4. Results of GMM estimations of the impact of remittances on financial inclusion**

	1	2	3	4	5
<b>Variables</b>	<b>Dependant Variable: <math>\log(FI_{it})</math></b>				
$\log(FI_{it-1})$	5.304*** 0.0422	5.581*** 0.0309	5.476*** 0.0376	5.559*** 0.0313	5.469*** 0.0362
$\log(R_{it})$	-0.00717*** 0.000943	-0.00389*** 0.000941	-0.00572*** 0.000787	-0.0419*** 0.00147	-0.0384*** 0.0019
$(\log(R_{it}))^2$				0.00551*** 0.000379	0.00473*** 0.000304
$\log(INQ_{it})$		0.00454* -0.00229	0.0134*** -0.0033	0.0028 -0.00233	0.0114*** -0.00306
$(\log(R_{it}) * \log(INQ_{it}))$			6.20e-05*** 0.00000976		5.94e-05*** 0.00000976
$\log(GDP\ per\ capita)$	0.000265 0.00538	0.0239*** 0.00481	0.0126*** 0.00443	0.0257*** 0.00574	0.0190*** 0.00556
$\log(Human\ capital)$	0.120*** 0.0165	0.0071 0.0098	0.0526*** 0.0107	-0.0025 0.00877	0.0352*** 0.0106

<i>Log (Deposit interest rate)</i>	0.000583*** 0.000153	0.000038 0.0000659	0.000370*** 0.0000908	0.0000764 0.000103	0.000261*** 0.0000733
<b>Constant</b>	-3.646*** 0.0576	-4.114*** 0.0426	-3.935*** 0.0514	-4.024*** 0.0347	-3.894*** 0.0466
<b>AR (2) Test</b>	0.16	0.23		0.089	0.17
<b>Hansen Test</b>	0.152	0.057		0.086	0.16

Source: Authors' compilation from software

## 5. Concluding remarks

Overall, our findings from GMM method are consistent with previous studies (ie. Ambrosius and Cuecuecha, 2013; Ambrosius et al., 2014; and Inoue and Hamori, 2016). The plausible explanation might be that remittances allow the recipients to save on cash, which leads to higher demand for deposit accounts. This also paves a way for them to get access to other potential products like payment or even credit (Ambrosius and Cuecuecha, 2016). These demands, in its turns, could be accommodated via an increase in the provision of financial services. Thus, remittances could enhance their recipients' accessibility to financial services. However, while this additional source of income could lead to the usage of saving accounts (Demirguc-Kunt et al., 2011), it also substitutes for credits in countries with larger credit constraints (Giuliano and Ruiz-Arranz, 2009), which eventually results into a fall in the demand for credits. Besides, according to Ambrosius and Cuecuecha (2016), the effect of remittances on borrowing is driven by informal finance rather than by traditional bank loans, explaining that an increase in remittances is unlikely to encourage the usage of formal financial services. Although remittances could induce negative impacts on the actual usage of financial products, these effects are weaker than the positive impacts they impose on the access side of financial inclusion. Thus, taking these effects all together, the beneficial impacts of remittances on financial inclusion are still witnessed.

In this study, the long run impact of remittances on financial inclusion is examined while accounting for the role of improved institutional quality in remittances receiving countries. This study attempts to achieve its' objective by using a panel dataset for 87 developing countries over the period of 2011-2017, employing GMM estimation technique. The results of our study showed that remittances alone are unable to generate greater financial inclusion. However, financial inclusion tends to increase with better institutional quality. Thus, high trust to financial

institution and government in the recipient countries encourages further opening of bank accounts in financial intuitions. To repeat, our study also suggests that there exists a nonlinear relationship between remittances and financial inclusion.

Based on concluding remarks, the main recommendation to policy-makers is to strengthen the institutional quality by reducing documentation works related to opening bank accounts and to intensify the remittances mobilization to use them as a source of financial funds in domestic markets. For future extensions, one could consider employing other control variables such as inflation rate and urbanization growth in explaining the financial inclusion behaviour.

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**Table A1** List of countries included in our sample

Afghanistan	Cote d'Ivoire	Kyrgyz	Papua New Guinea	Uganda
Algeria	Croatia	Lao	Paraguay	Ukraine
Argentina	Dominican Republic	Latvia	Peru	Uruguay
Armenia	Ecuador	Lebanon	Philippines	Venezuela,
Azerbaijan	Egypt,	Lesotho	Poland	Yemen,
Bangladesh	Estonia	Libya	Qatar	Zambia
Belize	Ethiopia	Madagascar	Rwanda	Zimbabwe
Benin	Gabon	Malawi	Samoa	
Bolivia	Georgia	Malaysia	Saudi Arabia	
Botswana	Ghana	Maldives	Senegal	
Brazil	Guinea	Mali	Seychelles	
Burkina Faso	Guinea-Bissau	Malta	Sierra Leone	
Burundi	Haiti	Moldova	Solomon Island	
Cabo	Hungary	Mongolia	Suriname	
Cameroon	India	Myanmar	Tajikistan	
Chile	Israel	Namibia	Tanzania	
Colombia	Italy	Niger	Thailand	
Comoros	Kazakhstan	Nigeria	Togo	
Congo, Rep	Kenya	Norway	Tunisia	
Costa Rica	Kuwait	Pakistan	Turkey	