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Migrant Workers' Remittances and Economic Growth: The Role of Financial Development[1]

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Abstract

Although the growing importance of workers' remittance in international capital flow is indubitable, it is apparent that some countries can take full advantage from this cash flow while the others cannot attain any significant benefit from it. Financial development, which may facilitate the conversion of workers' remittance into a productive investment and thereby economic growth, can be considered to be one of the influential factors. However, there is no consensus in existing literature about the impact of workers' remittance on economic growth in the presence of financial development. This study therefore examines whether financial development catalyses the transmission channel from workers' remittance to economic growth. The system GMM and the fixed effects estimators are used for panel data analysis. Our analysis indicates that methods matter in studying the effect of workers' remittance and financial development on growth. Estimates based on system GMM indicate that the workers' remittance through financial development significantly accelerate economic growth. We also find that in the face of financial liberalization and trade openness the workers' remittance significantly fosters economic growth.

Keywords: workers' remittance, financial development, economic growth.
JEL Classifications: C23, F24, O43,

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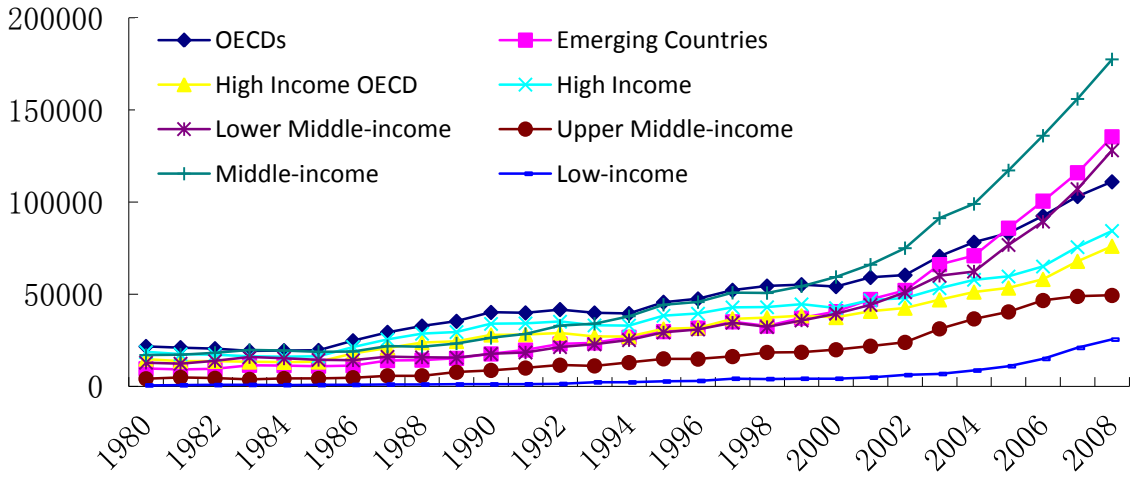
1. Introduction

Workers' remittances, defined broadly as money sent by migrant workers to their country of origin, have increased rapidly from around 36 billion US dollars in 1980 to 68 billion in 1990, 130 billion in 2000, and over 440 billion in 2010. From the mid-1990s onward, developing countries started becoming larger and larger as recipients of workers' remittance. The process gained its momentum in the 2000s. In 1990, developing countries received about 30 billion compared to 37 billion US dollars received by developed countries. At the end of the 1990s, while developing counties received about 3 times more remittance than what they received in the early-1990s, developed countries received only less than 1.5 times. At the end of the 2000s, developing countries have received about 3 times more remittance than developed countries. Subsequently, although a large sum of workers' remittance is transmitted within developed countries themselves, however, we do not deal with the implications of such North-North transfers.

Currently, among developing countries middle-income countries are the largest recipient of workers remittance, followed by lower middle-income, higher middle-income and low-income countries (see, Figure 1).

Figure 1: Remittance inflows 1980-2010 (US$ Million).



Data Source: Migration and remittance, the World Bank, November 2010[6]

[6] Data on remittances are available at *www.worldbank.org/prospects/migrationandremittances*

The World Bank estimated that in 2010 the total value of remittance globally received by developing countries was $325 billion, more than three times that of foreign aid. It is believed that such remittances have become the second largest source of external finance for developing countries, second only to foreign direct investment (FDI) and far exceeding bank transfers and equity investment, both in absolute term and as a proportion of GDP (Aggarwal, Demirgüç-Kunt and Peria, 2006; Giuliano and Ruiz-Arranz, 2009). One of the attractions of workers' remittances is that unlike private capital flows, they are less subject to cyclical fluctuations and tend to be stable without being affected by economic slumps in richer countries where most all LDC migrants work. The resilience of remittance is potentially due to consumption smoothing; when negative income shocks occur migrant workers still continue to send their savings home because they believe that their families at home need it for their own consumption. In addition, the World Bank identifies the 'home bias' factor where returning migrants often repatriate their whole savings to their home country.

During the last global financial crisis, remittances fell by only 5% between 2008 and 2009, while FDI fell by over 40% and other private financing such as debt and foreign equity investment fell by over 46% during the same period. Although there are concerns regarding the so-called phenomenon of the 'Dutch disease', some studies have shown that foreign capital (including remittances) may not have a serious adverse effect on competitiveness (see, for example, Prasad, Rajan and Subramanian, 2005). However, this hypothesis is debatable and needs further empirical testing.

Remittances could potentially have huge developmental impact on the recipient country's economy. Not only could they add to domestic investment, but also by creating effective demand raise the rate of growth by utilising excess capacity of capital and underemployment of labour – both endemic in developing countries..

There is now considerable attention from both academic and policy circles to examine the impact of migrant workers' remittances on economic growth and development. However, results of those studies are mixed; while some studies (for example, Stark and Lucas, 1988; Taylor, 1992; and Faini, 2002) indicate that there is a positive relationship between remittances and economic growth, other studies (such as Chami, Fullenkamp and Jahjah, 2003; IMF, 2005) report a negative relationship.

Moreover, a few studies examine what happens to the effect of workers remittance on economic growth if financial development plays a catalytic role. Those studies also do not provide uniform results. For example, using developing countries' data for the period 1975-2002, Giuliano and Ruiz-Arranz (2009) find that remittances boost growth in countries with less developed financial systems. The study indicates that a weak domestic or local financial sector increases the productivity of workers remittance since the latter may be the only or major conduit of foreign capital as well as a major supplementary source for total aggregate capital stock in the economy. On the contrary, Ahamada and Coulibaly (2011) find that a high level of financial development helps remittances to have a high stabilizing impact. They use developing and emerging countries' data for the period 1980-2008.

We therefore examine whether financial development catalyses the transmission channel from workers remittance to economic growth. Moreover, we examine whether the estimated results remain unchanged when financial liberalization and trade openness are taken into account. We know that FDI is the largest source of external finance for developing countries. We therefore compare the effect of FDI with the effect of workers' remittance on economic growth. The study uses data over the period 1980-2009.

It is expected in our study that financial development would speed up workers' remittance to be translated into economic growth. The greater the width and depth of financial development, the more it creates positive externalities to the impact of remittance on growth. First, more remittance would be channelled towards productive investment, rather than conspicuous consumption, if the financial sector was ready to absorb the funds sent by migrant workers home. Instead of 'wasting' the extra income received by recipients in developing countries, they would be incentivised by financial institutions offering higher returns. Second, recipients of foreign income would access financial institutions simply to collect their revenue streams but in the process they could demand other financial services as their knowledge and trust increase. Third, banks will be able to resolve their asymmetric information problems (between customers and banks) by increasing the knowledge of new customers who have access to foreign incomes sent by relatives and friends working abroad. Fourth, banks will be able to increase their overall lending based on new deposits created via remittance and these financial

multipliers will increase the supply of loanable funds to the rest of the economy. Fifth, remittances are often lumpy and recipients might wish to utilise 'financial products that allow for the safe storage of these funds' (Aggarwal, Demirgüç-Kunt and Peria, 2006. p3); this allows for the growth of new and innovative financial products even when the original remittances were not received through normal commercial channels. Sixth, the risks associated with such transfers via the curb market (common to many poor developing countries and regions) is eliminated with higher quality of financial services accessible to senders and recipients alike. This could potentially increase the total supply of such transfers.

An important complementary factor, which may have an independent effect on development, is financial liberalization per se. With a more liberalized financial sector, workers' remittance may find an easier access to investible sectors rather than spending on conspicuous consumption. Traditional and poorer societies have numerous sociological reasons for one-off spending on large consumption projects (marriages for example) and these tendencies are exacerbated by the lack of a liberalized and accessible financial sector where investment can easily take place. It is worth noting that workers' remittances are often intra-family transfers and their impact would be different from corporate transfers such as FDI by multinational corporations. Hence, ease of investment, as pre-supposed in the financial liberalization literature, would increase the rate of growth. We use financial liberalization as an independent control variable in our estimation. We also examine whether workers remittance can foster economic growth in the presence of financial liberalization.

Trade openness may increase export demand which generates investment opportunity in exporting industries. We therefore examine whether workers' remittance accelerates economic growth if trade liberalization increases.

Section 2 gives a brief literature survey, Section 3 discusses the data and the structure of empirical model, Section 4 provides the empirical results and policy implications, and Section 5 concludes briefly.

2. The Literature

Remittance flow has grown faster over past three decades most of which has been flowing to developing economics particularly middle income countries. Similarly there is a growing body of theoretical and empirical literature which examine whether workers' remittance positively affects economic growth and whether financial development plays any significant role in the growth process. Existing literature produced highly mixed results. A group of studies suggest a positive effect of workers' remittance on economic growth through higher consumption, savings and investment. For example, Aggarwal, Demirgüç-Kunt and Peria (2011), assuming the hypothesis that financial development enhances economic growth, find that remittance inflow promotes financial sector development in developing countries. Similarly, Catrinescu, Leon-Ledesma, Piracha, and Quillin (2006) reject the existence of negative effect of remittance inflow on long-run economic growth. However, Rao and Hassan (2011) find that remittance has no direct effect but small indirect effect on economic growth.

Second group of studies find a negative impact of workers' remittance on economic growth. These studies indicate that workers' remittance appreciates real exchange rate and reduces international competitiveness (i.e, Dutch Disease). It also reduces workers' participation in the labour market. Lopez, Molina, and Bussolo (2007) and Chowdhury and Rabbi (2014), for instance, suggest that remittance inflow significantly appreciates real exchange rate of recipient country, which ultimately reduces international competitiveness in export sector. Chami, Fullenkamp and Jahjah (2005) also develop and test a model which indicates that remittance is a non-profit driven compensatory transfer and therefore has a negative correlation with economic growth. Barajas, Chami, Fullenkamp, Gapen, and Montiel (2009) suggest that although remittance has an undeniable effect on poverty alleviation and consumption smoothing, it does not significantly affect economic growth.

Third bunch of literature estimate the relationship between remittance inflow and financial development. Aggarwal, Demirgüç-Kunt and Pería (2011) find a positive association between remittance flow and financial development. Chowdhury (2011) suggests that there is a positive relationship between remittance inflow and financial development; however, the reverse causation is absent in Bangladesh data.

There is yet fourth group of research which examines the role of workers' remittance in investment, productivity, employment and import. For instance, Lucas (2005) and Glytsos (2002) show that remittance inflow accelerates investment. Leon-Ledesma and Piracha (2004) show that workers' remittance increases productivity and employment through investment. Roberts and Banaian (2004) shows that average propensity to save from remittance is 40 percent. Glytsos (2002) states that remittance acts as a source of financing for imports and decreases the balance of payments deficit in LDCs. On the contrary, Russell (1986) indicates that remittance increases imports and widen balance of payments deficit.

A further group of research estimates impact of workers' remittance on economic growth through institutional development. Catrinescu, Leon-Ledesma, Piracha, and Quillin (2006) suggest that a sound institutional environment enhance efficiency of investment leading to higher output. Giuliano and Ruiz-Arranz (2009) find that workers' remittance positively affects economic growth however in less financially developed countries. On the contrary, Ahamada and Coulibaly (2011) find that although the effect of financial development varies across country, a high level of financial development helps remittances to have a high stabilizing effect on GDP growth.

Hence, there is still considerable debate on the effect of remittances inflow on macroeconomic variables. Kireyev (2006), perhaps, correctly argues that the impact of remittance depends on the structural characteristics such as consumption and investment patterns as well as the capacity to manage large financial inflows of the recipient country. Our study therefore investigates whether financial structure of countries assists remittance in influencing economic growth.

3. Data, Model Specification and Method

The study applies annual unbalanced panel data for 72 countries over the 1980-2009 period. However, when all variables are included the data for 54-56 countries are found valid in different empirical models. The valid sample size in different models is between 342 and 422.

Data for GDP growth rate, the ratio of workers' remittance to GDP (remittance/GDP), the ratio of FDI to GDP (FDI/GDP), exports of high-tech

manufactured goods (Tec) are collected from world development indicators of World Bank (see, ANNEX 1). Data for the sum of government collective and government individual consumption expenditure (Gov), and openness are collected from Penn World Table (PWT). Data for financial liberalization comes from Bekaet, Harvey and Lundblad (2005) and data for financial development indicators are collected from Beck, Démirguc-Kunt and Levine (2009). Descriptive statistics for the variables are given in Table 1.

Table 1: Descriptive Statistics

Variable		Obs	Countries	Mean	Std. Dev.	Min	Max
GDP Growth Rate		1982	72	3.211	3.892	-19.01	27.46
Remittance/GDP		1855	69	2.592	4.116	0.0001	28.692
Inv		2022	72	21.513	10.406	-18.864	60.475
Gov		2022	72	7.80e+12	3.06e+13	4.60e+08	2.20e+14
Tec		1825	65	14.81	14.71	0.01	74.95
FDI/GDP		1411	71	19.31	2.322	10.60	25.80
Openness		2022	72	67.107	47.248	10.316	426.723
Financial Liberalization [a]		2088	72	0.614	0.486	0	1
Financial Development Indicators	*Cagdp*	1548	72	-2.369	6.012	-42.89	23.17
	Bdgdp	1446	72	0.457	0.317	0.0452	2.301
	Pcrdbgdp	1441	72	0.469	0.367	0.0140	2.006
	Llgdp	1440	72	0.530	0.325	0.0691	2.422
	Fdgdp	1446	72	0.478	0.328	0.045	2.301

[a] Financial liberalization is a dummy variable; where the value in liberalization period is one (1) otherwise zero (0).

Sierra Leone was found as the most volatile economy in terms of economic growth rate. The growth rate of Sierra Leone in 1992 was as low as -19.01 percent and in 2002 it was as high as 27.46 percent. In this study we have used five standard financial development indicators namely Current Account Balance to GDP (CAGDP), Bank Deposits to GDP (BDGDP), Private Credit by Deposit Money in Banks to GDP (PCRDBGDP), Liquid Liabilities to GDP (LLGDP) and Financial System Deposits to GDP (FDGDP) (see, ANNEX 2). CAGDP shows negative mean value and negative minimum values because the current account of many countries is negative. Financial

liberalization is a dummy variable, which takes the value of 1 if financial regime remains liberalized and 0 otherwise (see, ANNEX 4).

The most significant financial development indicator is picked to use in our step-wise regression. We first estimate our empirical model using full-sample without introducing the financial development variables. The study then introduces the financial development variables in empirical model. We then test standard financial development variables suggested by existing literature (see, ANNEX 2). Our study mainly focuses on the impact of remittance, financial development, the cross-product of remittance and financial development, and finally the cross product of remittance and financial liberalization variables.

Our main hypothesis is that the existence of financial development (FD) will enhance the (positive) impact of workers remittance (WR) on economic growth (EG). Since financial liberalisation (FL) may have independent effects on economic growth, irrespective of the quality of financial development, we use it as a separate independent variable. Moreover, we have tested whether workers' remittance affects the economic growth differently during the period when financial sector remains liberalized. We also examine whether workers' remittance positively affects economic growth when trade openness (OPEN) exists in the country. The basic empirical model is the following:

$$EG = \alpha + \beta(WR) + \gamma\ (FD) + \eta\ (WR).(FD) + \varphi FL + \delta(WR).(FL) + \lambda OPEN + \theta\ (WR).(OEPN) + \tau\ (Z) \quad (1)$$

If β and η are both positive, then we can estimate (in the long-run):

$$EG/WR = \beta + \eta\ (FD) > \beta$$

Alternatively, if η is negative, we could contemplate a situation where workers remittance has lowered impact for economies with high levels of financial development. Essentially, we are asking whether workers' remittances are substitutes or complements to local financial development with either a re-enforcing positive cycle of growth enhancement or a negative impact where one source of finance replaces the other. Overall, therefore, we empirically test the impact of workers remittance on economic growth (or levels of economic development) in the presence or absence of financial development. We analyse the impact of such inflows when the recipient country has

undergone some financial development. The third situation arises when η appears to be an insignificant coefficient. This would then indicate that financial development does not have anything to do with the causal link between workers' remittance and economic growth.

Similarly, if β and δ both are positive, then we can estimate

$EG/WR = \beta + \delta (FL) > \beta$

If β and θ both are positive, then we can estimate

$EG/WR = \beta + \theta (OEPN) > \beta$.

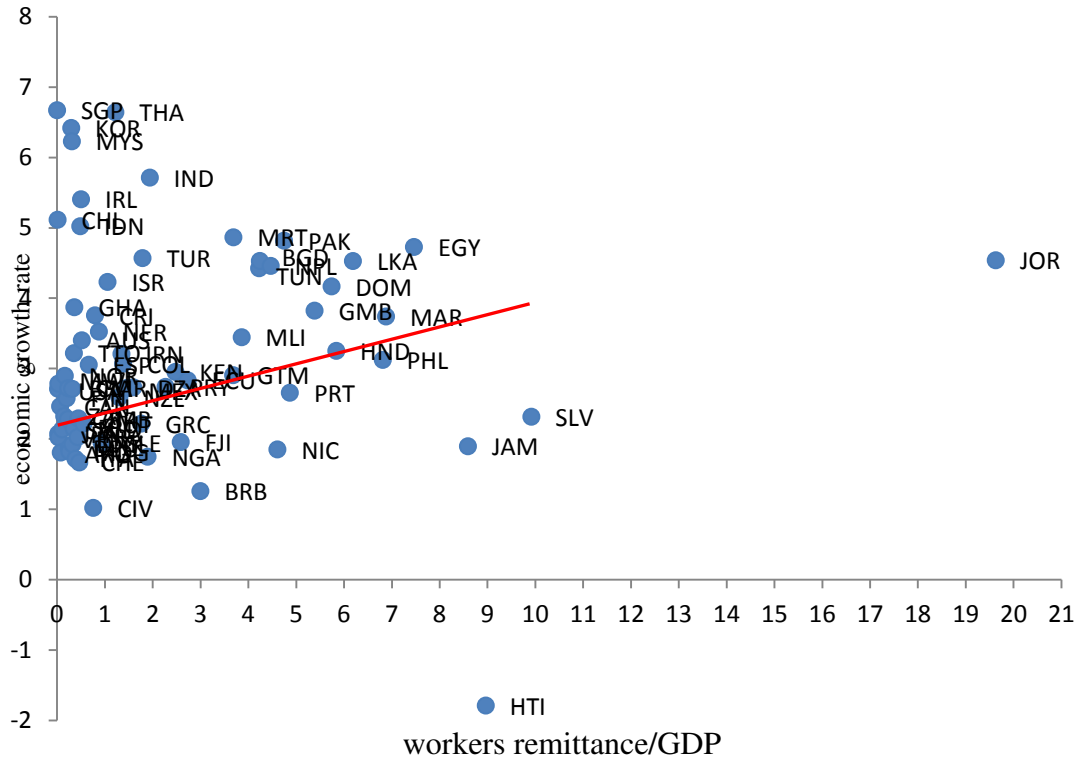
Z stands for a group of control variables which includes private investment (Inv), government expenditure (Gov), technology improvement (Tec), and foreign direct investment (FDI/GDP).

Some existing studies (e.g. Catrinescu et al., 2009) on workers' remittance have used cross-section regression analysis whilst others (e.g. Giuliano and Ruiz-Arranz, 2009) have employed panel data methods to estimate the relationship between workers' remittance and economic growth. Since panel study offers the opportunity to use time dimension, it can be regarded as superior to cross-sectional estimate. This study applies the panel data analysis approach. Since the data for all variables are not available for full-sample period, we used an unbalanced panel approach. The Least Square Dummy Variable (LSDV) approach is inconsistent for dynamic panel data with individual effects irrespective of whether we use fixed or random effects specification (Nickell, 1981). In this context, GMM approach is more appropriate (Arenallo and Bond, 1985). However, we apply both LSDV as well as the System Generalized Method of Moment (SGMM) estimator to examine the consistency in findings. Empirical results are reported and discussed below.

4. Empirical Analysis

We plot countries' average economic growth rates (for full-sample) against their average ratios of workers remittance to GDP in Figure 2. The trend line shows a positive relationship between workers' remittance and economic growth.

Figure 2: Workers' Remittance and Economic Growth (1980-2010).



Financial Development Indicators

We subsequently test the financial development indicators in economic growth regression (see Table 2). Our study use five different financial indicators suggested by Beck and Démirguc-Kunt (2009) (see, ANNEX 3) which are Liquid Liabilities to GDP ratio (LLGDP), Private Credit by Deposit Money in Banks to GDP ratio (PCRDBGDP), Bank Deposits to GDP ratio (BDGDP), Current Account Balance to GDP ratio (CAGDP) and Bank Concentration (CONCENTRATION). Estimated results are presented in Table 2.

Estimated results (see Table 2) show that workers' remittance generally fosters economic growth. The financial development variable, depending on various proxies, may or may not play significant positive role on economic growth. However, the non-linear effect of workers remittance is found to be positive and significant (except Concentration). Specifically, workers' remittance along with financial development play positive and significant role in economic growth. Arellano – Bond test for second order auto-regression indicates that there is no serial auto-regression in the models considered in Table 2. Sargan test confirms the exogeneity of the instruments used in those models. The current account balance to GDP ratio (CAGDP) is found to be the most significant financial development indicator (among five indicators) in our standard growth regression (see Table 2). Moreover, this variable is available for most of the countries in our dataset. Since this variable, compared to other indicators of financial development, allows us to use the highest number of observations, we include it as the financial development variable in our further regressions.

Table 2: Testing Financial Development Indicator in economic growth regressions.

	Pcrdbgdp		Bdgdp		Llgdp		Cagdp		Fdgdp	
	FE	SGMM	FE	SGMM	FE	SGMM	FE	SGMM	FE	SGMM
L1. GDP Growth	0.047	0.015	0.058	0.032**	0.057	0.038***	0.046	0.015	0.060	0.022
Rate	(0.89)	(1.15)	(1.11)	(2.03)	(1.07)	(4.44)	(0.90)	(0.83)	(1.14)	(1.16)
Inv	4.19***	2.74***	4.11***	3.39***	4.09***	3.10***	4.01***	3.00***	4.09***	2.49***
	(4.63)	(5.39)	(4.53)	(6.51)	(4.52)	(7.27)	(4.61)	(5.32)	(4.53)	(4.18)
Gov	0.871	0.696***	0.972	0.656***	0.956	0.535***	0.940	0.676***	0.944	0.427***
	(1.24)	(4.75)	(1.16)	(5.38)	(1.14)	(2.92)	(1.15)	(4.57)	(1.13)	(3.88)
Tec	0.036	0.037***	0.045**	0.043***	0.044**	0.058***	0.043**	0.043***	0.046**	0.080***
	(1.79)	(3.25)	(2.21)	(4.90)	(2.16)	(5.27)	(2.18)	(3.44)	(2.27)	(4.67)
FDI/GDP	0.159	0.143***	0.151	0.107	0.149	0.089	0.188	0.092	0.140	0.060
	(0.94)	(5.60)	(0.89)	(0.23)	(0.88)	(1.06)	(1.19)	(1.24)	(0.82)	(0.68)
Remittance/GDP	0.300	0.378***	0.211	0.254	0.360	0.357*	0.103	0.036	0.239	0.107
	(1.46)	(2.85)	(0.82)	(1.50)	(1.18)	(1.66)	(0.98)	(0.16)	(0.92)	(0.03)
Financial	0.804	0.842	0.308	0.134***	0.322	0.575*	0.148***	0.099***	0.564	0.872***
Development	(0.78)	(0.78)	(1.21)	(2.46)	(1.18)	(1.79)	(2.43)	(4.69)	(1.49)	(2.39)
Indicators										
Remittance_Financia	0.601**	0.850***	0.504	0.592***	0.700	0.507*	0.037***	0.023***	0.534	0.317
l Development	(2.13)	(3.36)	(1.24)	(2.63)	(1.54)	(1.67)	(2.91)	(3.66)	(1.34)	(0.96)
Indicators										
Constant	-4.534*	-2.203***	-3.480*	-2.757***	-3.889*	-1.041***	-3.765*	-2.71***	-3.330*	-1.937***
	(1.84)	(5.35)	(1.77)	(5.55)	(1.74)	(2.77)	(1.86)	(4.36)	(1.73)	(2.80)
Number of country	54	54	54	54	54	54	54	54	54	54
Observation	332	327	332	327	331	326	342	337	332	327
R^2	0.36	-	0.32	-	0.31	-	0.41	-	0.32	-
P-value AR(2) test	-	0.26	-	0.29	-	0.33	-	0.34	-	0.31
P-value Sargan test	-	0.17	-	0.19	-	0.23	-	0.29	-	0.25

Note: t statistics is in parenthesis. ***, ** and * significant at 1%, 5% and 10% level.

We then apply stepwise regression where we estimate Model 1 (see Table 3) without introducing trade openness, financial liberalization and financial development indicators. This helps us to compare the estimated results before and after introducing these variables. Model 2 introduces trade openness, Model 3 financial liberalization and Model 4 financial development indicators. Model 5 includes the cross products of remittance and trade openness; remittance and financial liberalization; and remittance and financial development.

In a simple setup of economic growth model (see Table 3) we find that remittance plays a positive and significant role in economic growth. The study also finds that FDI, trade liberalization, financial liberalization and financial development positively affect the economic growth as well.

The magnitude of the coefficients of FDI and remittance show that trade openness and financial liberalization increases the influence of FDI and remittance to contribute more in economic growth. Interestingly, without financial development, FDI plays a greater role (0.21** to 0.33**) than remittance (0.08** to 0.25**) in economic growth. However, when financial development takes place, remittance becomes a stronger determinant (0.25** to 0.31**) than FDI (0.13** to 0.20**) in economic growth (compare Model 1-3 with Model 4-5 in Table 3). Particularly, by comparing Model 1 with Model 4 (in Table 3), we find that financial development catalyze the transmission channel from workers remittance to economic growth. If financial development variable is included into the empirical model (Model 4) the size and significance of Remittance/GDP increases. Moreover, the cross-product of remittance and financial development is found positive and significant, which indicate that if financial development is coupled with workers' remittance, it accelerate economic growth. We also find that the cross-product of workers' remittance and financial liberalization and the cross-product of workers remittance and trade openness positively affect economic growth.

One year lag of economic growth, technological improvement in export sector and government investment, unsurprisingly, have positive impact on economic growth. The diagnostic test statistics confirms the stability of our estimated model. The Arellano – Bond (1991) test for auto-regression, AR (2) indicates that there is no presence of serial

correlation in estimated model. Sargan (1988) test results suggest that employed instruments are valid.

Table 3. Growth effect of workers' remittance through financial development

	Model 1		Model 2		Model 3		Model 4		Model 5	
	FE	**SGMM**	**FE**	**SGMM**	**FE**	**SGMM**	**FE**	**SGMM**	**FE**	**SGMM**
L1.GDP Growth	0.10**	0.04***	0.09*	0.08***	0.09**	0.07***	0.06	0.055***	0.05	0.018
Rate	(2.04)	(3.25)	(1.95)	(7.25)	(1.99)	(6.24)	(1.24)	(6.54)	(1.00)	(1.13)
Inv	3.02***	1.35***	2.25***	0.86***	2.76***	1.07***	4.32***	1.94***	4.61***	1.59***
	(3.82)	(4.98)	(2.53)	(3.55)	(2.94)	(3.95)	(3.93)	(5.81)	(4.20)	(5.80)
Gov	0.09	0.25***	0.83	0.215***	0.45	0.25***	0.54	0.75**	0.115	0.98***
	(0.13)	(5.78)	(0.98)	(3.43)	(1.58)	(4.17)	(0.45)	(12.25)	(0.10)	(8.50)
Tec	0.05***	0.03***	0.04***	0.01	0.06***	0.01	0.06***	0.07***	0.06***	0.035*
	(3.05)	(3.62)	(2.37)	(1.01)	(2.88)	(0.47)	(2.51)	(5.38)	(2.61)	(2.56)
FDI/GDP	0.33***	0.29**	0.25*	0.205***	0.20	0.28***	0.10	0.13***	0.14	0.20***
	(2.41)	(2.16)	(1.80)	(10.69)	(1.39)	(10.80)	(0.62)	(2.94)	(0.84)	(3.82)
Remittance/GDP	0.09	0.08***	0.06	0.18***	0.06	0.255***	0.08	0.31***	0.065	0.245***
	(1.12)	(4.18)	(0.69)	(2.98)	(0.77)	(3.09)	(0.70)	(6.95)	(0.50)	(3.45)
Openness (OPEN)	-	-	1.73*	1.15***	1.12	1.185***	0.09	1.04***	0.82	1.66**
			(1.84)	(4.48)	(1.12)	(4.40)	(0.08)	(4.23)	(0.67)	(2.57)
Financial	-	-	-	-	1.23*	0.53	1.93**	0.72***	2.01*	1.01***
Liberalization (FL)					(1.69)	(1.46)	(1.96)	(2.64)	(1.76)	(3.37)
Financial	-	-	-	-	-	-	0.001	0.05***	0.10	0.11***
Development (FD)[r]							(0.02)	(4.59)	(1.48)	(5.65)
Remit*FD	-	-	-	-	-	-	-	-	0.03**	0.04***
									(2.02)	(3.38)
Remit*FL	-	-	-	-	-	-	-	-	0.19	0.32***
									(0.55)	(3.10)
Remit*OPEN	-	-	-	-	-	-	-	-	0.18	0.584***
									(0.73)	(3.11)
Constant	-5.53	-3.74***	4.92	-4.26***	2.88	-6.98***	0.46	-2.73***	-9.43	-2.27***
	(0.93)	(7.72)	(0.25)	(6.50)	(0.98)	(6.14)	(0.02)	(13.16)	(0.32)	(5.99)
Number of country	56	56	56	56	56	56	54	54	54	54
Observation	422	422	422	422	422	422	342	342	342	342
R^2	0.22	-	0.23	-	0.23	-	0.24	-	0.36	-
AR(2) test (P-value)	-	(0.29)	-	(0.35)	-	(0.33)	-	(0.34)	-	(0.26)
Sargan test (P-value)	-	(0.18)	-	(0.23)	-	(0.26)	-	(0.27)	-	(0.31)

Note: t statistics is in parenthesis. ***, ** and * significant at 1%, 5% and 10% level. [r]CAGDP is used as FD. FE stands for the fixed effects.

Now, if we go back to our empirical equation (1), we confirm that EG/WR = β + η (FD) > β. This is because empirically both β and η are positive and significant. We also find evidence of EG/WR = β + δ (FL) > β and EG/WR = β + θ (OEPN) > β. These are because both β and δ; and both β and θ are found to be positive and significant in the regression (see Table 3). Thus our hypothesis that in the presence of financial development, workers' remittance significantly accelerates economic growth is supported by panel data.

5. Conclusion

The study examines whether financial development catalyses the transmission channel from workers' remittance to economic growth. We apply five different financial development indicators, which are suggested by existing literature. After examining all indicators in growth regression, we select the most significant financial development indicator to further examine the non-linear effect of workers' remittance on economic growth. The fixed effects and system GMM estimation techniques are used in unbalanced panel data. Our analysis indicates that methods matter in studying the effect of workers' remittance and financial development on growth. Estimates based on system GMM indicate that the current account balance to GDP ratio is the most significant financial development indicator for economic growth. Both foreign capitals, FDI and workers' remittance play significant role in economic growth; while the role of FDI is higher than that of workers remittance. However, in a financially developed economy, workers remittance play slightly higher role in economic growth than FDI does. Also, workers' remittance plays a greater role in economic growth, if the country is financially developed than if it is not. Although this result contrasts with the findings of Giuliano and Ruiz-Arranz (2009), it is in the line of the conclusion of Ahamada and Coulibaly (2011). Financial liberalization and trade openness also positively affect economic growth. In the presence of financial liberalization and trade openness, workers remittance plays a greater role in economic growth.

Reference

Ahamada, Ibrahim and Coulibaly, Dramane (2011), How does financial development influence the impact of remittances on growth volatility?, Economic Modelling Vol. 28, pp. 2748–2760.

Acosta, P.A., Baerg, N.R., and Mandelman, F.S. (2009), Financial Development, Remittances, and Real Exchange Rate Appreciation, Economic Review, Federal Reserve Bank of Atlanta, Vol. 94, No. 1.

Aggarwal, R., Demirgüç-Kunt, A. and Peria, M.S.M. (2006), Do Workers' Remittances Promote Financial Development?, The World Bank, World Bank Policy Research Working Paper 3957.

Amuedo-Dorantes, C. and Pozo, S. (2004), Workers' Remittances and the Real Exchange Rate: A Paradox of Gifts, *World Development,* Vol. 32, pp. 1407-1417.

Arellano, Manuel and Bond, Stephen (1991), Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *Review of Economic Studies*, Vol. 58, No. 2 pp. 277-297.

Barajas, A., Chami, R., Fullenkamp, C., Gapen, M., and Montiel, P. (2009), Do Workers' Remittances Promote Economic Growth?, IMF Working Paper, (WP/09/153).

Beck, Thorsten; Demirgüç-Kunt, Asli and Levine, Ross (2009), Financial Institutions and Markets across Countries and over Time – Data and Analysis, Policy Research Working Paper 4943, The World Bank.

Bekaert, Geert; Harvey, Campbell R., and Lundblad, Christian (2005) Does financial liberalization spur growth?, *Journal of Financial Economics* Vol. 77, pp. 3–55.

Catrinescu, N., Leon-Ledesma, M., Piracha, M., Quillin, B., (2006), Remittances, Institutions and Economic Growth, Institute for the study of labor (IZA Discussion Paper 2139).

Chami, R., Fullenkamp, C. and Jahjah, S., (2005), Are Immigrant Remittance Flows a Source of Capital for Development?, IMF Staff Papers; Vol. 52, Number 1.

Chowdhury, Mamta B. and Rabbi, Fazle (2014), Workers' remittances and Dutch Disease in Bangladesh, Journal of International Trade & Economic Development, Vol. 23 (4), pp. 455-475.

Giuliano, Paola and Ruiz-Arranz, Marta (2005), Remittances, Financial Development, and Growth, IMF Working Paper (WP/05/234).

Giuliano, Paola and Ruiz-Arranz, Marta (2009), Remittances, Financial Development, and Growth, Journal of Development Economics, Vol. 90, Issue 1, 144-152

Glytsos, N.P. (2002), The Role of Migrant Remittances in Developemnt: Evidence from Mediterranean Countries, International Migration, Vol. 40, No. 1, pp. 1-25.

Jackman, M., Craigwell, R., and Moore, W., (2009), Economic volatility and remittances: evidence from SIDS, *Journal of Economic Studies*, Vol 36, No. 2, pp. 135-146.

León-Ledesma, M., and Piracha, M., (2004), International Migration and the Role of Remittances in Eastern Europe, International *Migration.* Vol. 42, issue 4, pp. 65-82.

Lopez, H., Molina, L., and Bussolo, M. (2007), Remittances and the real exchange rate, World Bank Policy Research Working Paper 4213.

Lueth, E. and Ruiz-Arranz, M. (2008), Determinants of Bilateral Remittance Flows, The B.E. Journal of Macroeconomics, Volume 8, Issue 1, Article 26.

Prasad, E., R. G. Rajan and A. Subramanian, (2006), Patterns of international capital flows and their implications for economic development, Federal Reserve Bank of Kansas City Proceedings, 119-158.

Rao B. Bhaskara and Hassan G. Mainul (2011), A panel data analysis of the growth effects of remittances, Economic Modelling vol. 28 pp. 701-709.

Russell, S.S. (1986), Remittances from international migration: a review in Perspective, World Development, Vol 14, No. 6, pp. 677-696.

Sargan, J. D. (1988), "Testing for Misspecification after Estimating Using Instrumental Variables", in Maasoumi, E. (ed.), Contributions to Econometrics: John Denis Sargan, Vol. 1 (Cambridge: Cambridge University Press).

APPENDICES

ANNEX 1: Data sources

Data/variable	Data Source	Data Period
Remittance/GDP	World Development Indicators Database	1980-2009
FDI/GDP	World Development Indicators Database	1980-2009
GDP growth rate	World Development Indicators Database	1980-2009
Tec	World Development Indicators Database	1980-2009
Gov	World Development Indicators Database	1980-2009
Openness	Penn World Table(PWT)	1980-2008
Gov	Penn World Table(PWT)	1980-2008
Financial Development Indicators	Beck, Démirguc-Kunt and Levine (2009)	1989-2008
Financial Liberalization	Bekaert *et al.* (2005) and authors own arrangement	1980-2009

ANNEX 2: Code and list of variables

Variable	Code
LIQUID LIABILITIES / GDP	LLGDP
PRIVATE CREDIT BY DEPOSIT MONEY BANKS / GDP	PCRDBGDP
BANK DEPOSITS / GDP	BDGDP
CURRENT ACCOUNT BALANCE/ GDP	CAGDP
FINANCIAL SYSTEM DEPOSITS / GDP	FDGDP
High-tech exports / Manufactured goods exports	Tec
Openness at 2005 constant prices (%)	Openness
Sum of government collective and government individual consumption expenditure	Gov

ANNEX 3: List of countries in overall sample

Algeria	Fiji	Jordan	Philippines
Argentina	Finland	Kenya	Portugal
Australia	France	Madagascar	Republic of Korea
Austria	Gambia	Malawi	Sierra Leone
Bangladesh	Germany	Malaysia	Singapore
Barbados	Ghana	Mali	South Africa
Brazil	Greece	Mauritius	Spain
Cameroon	Guatemala	Mexico	Sri Lanka
Canada	Haiti	Morocco	Sweden
Chile	Honduras	Nepal	Switzerland
Colombia	India	Netherlands	Thailand
Costa Rica	Indonesia	New Zealand	Trinidad and Tobago
Cote d'Ivoire	Iran	Nicaragua	Tunisia
Denmark	Ireland	Niger	Turkey
Dominican Republic	Israel	Nigeria	United Kingdom
Ecuador	Italy	Norway	United States
Egypt	Jamaica	Pakistan	Venezuela
El Salvador	Japan	Paraguay	Zambia

Note: Number of countries is not common in each model (Table 3) due to the unavailability of data for the variables in each empirical model. However, ANNEX 3 includes the list of all countries that are used in our sample.

ANNEX 4: Financial Liberalization

Country	Year of Liberalization	Country	Year of Liberalization
Algeria	2000	Jordan	1995
Argentina	1989	Kenya	1995
Australia	1900	Madagascar	2000
Austria	1900	Malawi	2000
Bangladesh	1991	Malaysia	1988
Barbados	1900	Mali	2000
Brazil	1991	Mauritius	1994
Cameroon	2000	Mexico	1989
Canada	1900	Morocco	1988
Chile	1992	Nepal	2000
Colombia	1991	Netherlands	1900
Costa Rica	2000	New Zealand	1987
Cote d'Ivoire	1995	Nicaragua	2000
Denmark	1900	Niger	2000
Dominican Republic	2000	Nigeria	1995
Ecuador	1994	Norway	1900
Egypt	1992	Pakistan	1991
El Salvador	2000	Paraguay	2000
Fiji	2000	Philippines	1991
Finland	1900	Portugal	1986
France	1900	Republic of Korea	1992
Gambia	2000	Sierra Leone	2000
Germany	1900	Singapore	1900
Ghana	1993	South Africa	1996
Greece	1987	Spain	1985
Guatemala	2000	Sri Lanka	1991
Haiti	2000	Sweden	1900
Honduras	2000	Switzerland	1900
India	1992	Thailand	1987
Indonesia	1989	Trinidad and Tobago	1997
Iran	2000	Tunisia	1995
Ireland	1900	Turkey	1989
Israel	1993	United Kingdom	1900
Italy	1900	United States	1900
Jamaica	1991	Venezuela	1990
Japan	1983	Zambia	2000