（research note）

Remittance Effects on Financial Development: A Case Study by Income Level Groups

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Abstract

Remittance inflows have increased dramatically over the past few decades, awakening the interest of scholars to how these inflows can affect an economy. Mostly by observing the relationship between remittances and financial development, scholars have also started considering how financial sectors can generate a larger impact from remittance inflows. Until now, the results have remained diverse with both negative and positive coefficients.

In order to gain a proper understanding of remittance effects on financial development, this paper considers how the stage of economic development can change the sign of the coefficient. Using country income levels as proxies, a set of 147 countries is divided into four income level groups, from high income to low income countries, for the period 1980 to 2011. Financial development is measured by the ratio of bank deposit and bank credit to GDP, while controlling for economic factors such as the size of the economy, current openness, and capital openness, which are also expected to affect bank deposit and credit.

The results indicate that remittances are positive and significant for lower middle and low income countries. The model uses OLS estimations for an unbalanced panel data set, where country and time effects are included. In order to address endogeneity between remittances and financial development, the model is estimated once again using GMM, with lag first difference of variables.

Key words: Remittances, Financial Development, Income Level

1. Introduction

Remittances can be defined as household income from foreign economies comprising personal transfers and compensation to employees in cash or non-cash forms, which are registered in the current account of the balance of payments (IMF, 2009).

The role of remittances on financial development has caught the attention of economists and policy makers. In recent years, remittances have represented one of the largest sources of funds in many countries (IMF, 2009). As shown in Figure 1, total remittances amounted to 427 billion USD in 2011 and the share of low and middle income countries is the highest, valued around 317 billion USD and comprising about 74.18

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percent of total remittances received worldwide.

**Figure 1. Total Remittances Received Worldwide (1980-2011, in Billions USD)**
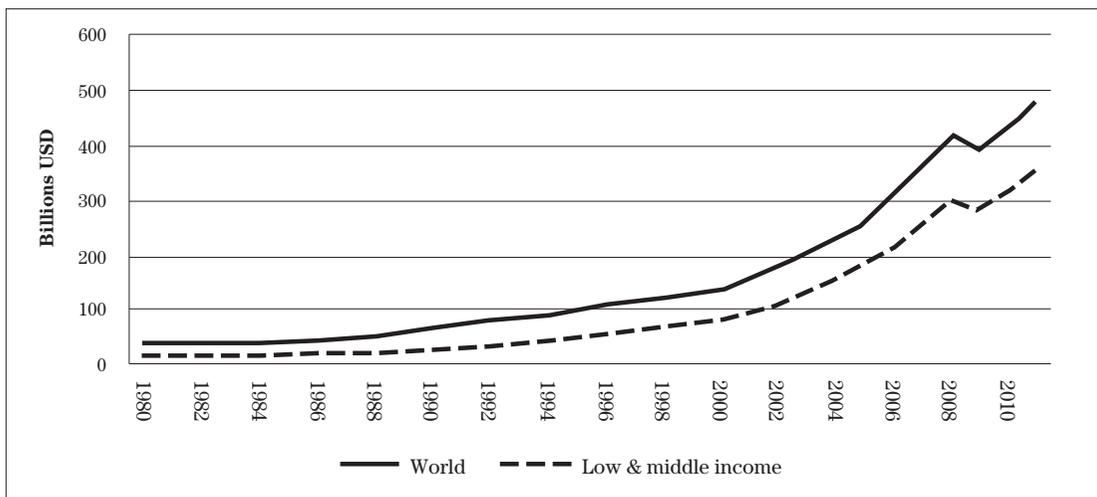
Figure 2 shows that remittances are the second largest source of funds in low and middle income countries, which seem to be stable over the long run and have overcome the shares of portfolio inflows and official development aid (ODA) inflows.

Figure 2. Inflows to Low and Middle Income Countries (in Current USD)
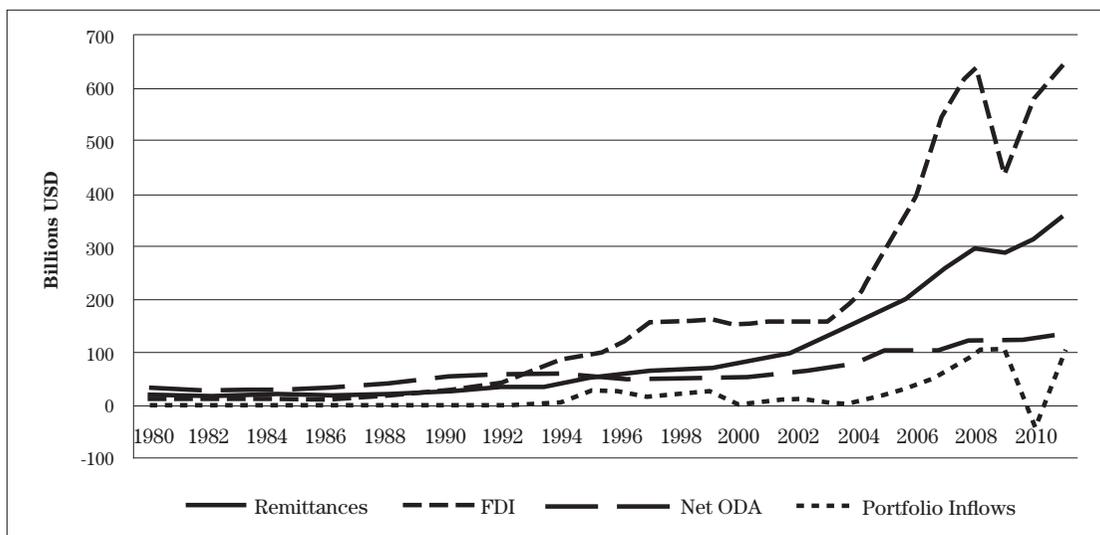
Maimbo and Ratha (2005) pointed out that remittances tend to be less volatile than other fund sources which appear to rise during favorable economic cycles and fall in bad times. They even considered the possibility that remittances might be countercyclical during periods when development slows down in the recipient country.

Using data comparing 250 countries, Table 1 shows the top 20 countries in terms of total remittance inflows in billions USD and as percentages of gross domestic products (GDP) in 2011. Low income countries tend to have higher remittances as a percentage of GDP.

Table 1. Top Remittance Receiving Countries in 2011 by Billions USD and Remittances as Percentage of GDP.

By Billion USD			By GDP percentage		
1	India	63.82	1	Tajikistan	46.91
2	China	40.48	2	Kyrgyz Republic	27.57
3	Mexico	23.59	3	Lesotho	26.11
4	Philippines	22.97	4	Liberia	23.41
5	Nigeria	20.62	5	Moldova	22.81
6	France	19.31	6	Bermuda	22.58
7	Egypt, Arab Rep.	14.32	7	Nepal	22.37
8	Germany	13.16	8	Samoa	22.02
9	Pakistan	12.26	9	Haiti	20.64
10	Bangladesh	12.07	10	Armenia	19.66
11	Belgium	10.91	11	Lebanon	17.25
12	Spain	9.91	12	West Bank and Gaza	17.04
13	Vietnam	8.60	13	Kosovo	16.92
14	Korea, Rep.	8.49	14	Tonga	16.51
15	Ukraine	7.82	15	Guyana	16.00
16	Poland	7.64	16	Honduras	15.87
17	Lebanon	7.32	17	El Salvador	15.84
18	Morocco	7.26	18	Jamaica	14.59
19	Italy	7.03	19	Gambia, The	12.01
20	Indonesia	6.92	20	Jordan	11.97

Source: World Bank, 2013a .
Note: data as of July 2013.

International organizations have also become aware of these new conditions and have started introducing various programs, most of them jointly with financial inclusion projects, in order to enhance the productive use of remittance inflows. Among the examples is the Global Remittances Working Group (GRWG), a subdivision of the World Bank Group that includes a thematic area focusing on access to finance (World Bank, 2009b). Activities that promote the productive use of remittance inflows directly affect the services of commercial banks. Directly aiming to improve access to finance, GRWG targets (i) greater reach of services for senders and recipients, (ii) housing loans, (iii) loans for investment, business and consumption, and (iv) savings and insurance products. Commercial banks can also benefit through innovations in the third thematic area that seeks to improve payment and market conditions.

At the Group of Eight summit in L'Aquila in June 2009, heads of State emphasized the importance of the impact of remittances on development and the objective of "a reduction of the global average costs of transferring remittances from the present 10% to 5% in 5 years through enhanced information, transparency, competition and cooperation with partners" (World Bank, 2009a).

These statements resulted in the launch of an online data base that provides remittance prices for 226 country corridors, with the objective of increasing transparency among institutions and enhancing

competition (World Bank, 2013c).

Considering the noticeable increase in remittance inflows and international organizations' attempts to enhance the productive use of remittances and boost their influence on financial market policies and infrastructure, remittance effects on financial development are expected to be positive.

The paper considers data for 147 countries, which are divided into four income level groups by using bank deposit and bank credit as indicators of financial development. The model uses ordinary least square (OLS) estimations for an unbalanced panel data set. In order to address endogeneity between remittances and financial development, the model is estimated again using the generalized method of moments (GMM), with lag first difference of variables.

The rest of the paper is structured as follows. Section 2 reviews the literature on measuring financial development. Section 3 outlines the data sample and methodology. Section 4 presents and interprets the main results. Section 5 concludes.

2. Literature Review

Some scholars understand that attaining a certain level of financial development enhances the effects of remittances on economic growth and poverty reduction. In a study of Latin America and the Caribbean, Mundaca (2009) found that remittances have a positive long-run effect on growth, and making financial services more generally available should lead to even better uses of remittances and thus boost growth in these countries. Other studies that considered such factors came to similar conclusions: as a country receives remittances through the financial system, the funds are directed to productive activities that can lead to economic growth (Ahamada & Coulibaly, 2011; Nyamongo, Misati, Kipyegon, & Ndirangu, 2012; Terry & Wilson, 2005).

These studies considered the growth focused approach, where financial development is a boosting factor that already exists. Other studies tried to measure the direct effect that remittances have on financial development, which was generally expected to be positive. Ratha (2003) stated that the economic effects of remittances are positive if either remittances are invested, which boosts economic growth, or consumed, which creates a multiplier effect within the economy.

However, financial development is a broad term that involves various types of participants, markets and products. In order to measure financial development, the World Bank (2013b) has classified four sets of proxy variables that include different aspects of financial development: financial depth, access, efficiency, and stability. These four proxy variables are measured both for financial institutions (banks, insurance companies, and so on) and financial markets (stock markets and bond markets).

At the macro level, financial development is commonly measured by (i) the ratio of the financial system's liquid liabilities (commonly referred to as M2 or M3) to the GDP, (ii) the ratio of bank deposit to GDP, (iii) the ratio of claims on the non-financial private sector to total domestic credit, and (iv) the ratio of claims on the non-financial private sector to GDP (King & Levine, 1993).

Aggarwal, Demirgüç-Kunt, and Pería (2011) constructed a macroeconomic model to measure financial development that uses financial depth as the main indicator. Using data from 109 developing countries for the period of 1975-2007, they used the ratio of bank deposit to GDP and bank credit to GDP as proxy variables of financial development. The result was a positive link between remittances and financial

development. This methodology inspired several scholars to conduct further studies that produced similar positive results for Latin American countries (Fajnzylber, Lopez, & World Bank, 2008), Sub-Saharan Africa (Gupta, Pattillo, & Wagh, 2009), and Bangladesh (Chowdhury, 2011).

Brown, Carmignani, and Fayad (2013) posited the induced financial literacy hypothesis that household recipients of remittances get informed and involved in more financial services by having to be in contact with banks to claim their remittances. Households that have not been involved with a bank before acquire more information on the banking system and gain additional interest in financial services.

The theoretical assumptions undergirding the study are based on the conditions of demand and supply channels. Brown, et al. (2013) considered the following possibilities. From the demand side, remitters and household recipients of remittances engage in formal transfer services that increase the latter group's financial literacy, which subsequently increases the likelihood of households holding bank accounts and further acquiring other financial services. From the supply side, banks that provide these accounts and hold deposit are able to lend more money in the form of loans or credit, either to household recipients of remittances or the general public, which widens the supply of funds in an economy.

Theories about how the recipients of remittances may react to the financial sector have been considered by other scholars. Using the microeconomic approach, these scholars tested the induced financial literacy hypothesis by measuring if household recipients of remittances are more likely to hold bank accounts and obtain a loan or credit.

The results turned out to be mixed, dependent on the conditions in each country. Using the municipal data, Demirguc-Kunt, Cordova, Peria, and Woodruff (2011) found that in the case of Mexico, remittances tended to increase the number of bank branches and accounts per capita as well as the ratio of bank deposit to GDP. Using households' data from El Salvador, Anzoategui, Demirguc-Kunt, & Peria (2014) found positive and significant results for deposit accounts, but the results for credit was not significant. They argued that remittances might behave as a credit substitute while reducing income constraints for the households. Brown et al. (2013) used household data for Azerbaijan and Kyrgyzstan to compare likelihoods of holding a bank account. There was a positive relationship in Kyrgyzstan, but the marginal effects were weak. The impact results were negative in Azerbaijan. Relationships might not be linear and remittances appear to contribute to financial development in countries that have already achieved a certain level of development, especially in the financial sector.

Overall, the results generated by both macro and microanalyses seem to vary. Brown et al. (2013) stated that the sign of the coefficient and magnitude of the relationship between remittances and financial development will vary across sub-groups within countries depending on variables such as the stage of economic development, the quality of institutions, and legislation relating to transfers of foreign exchange earnings.

3. Data and Methodology
3.1. Description of the data
The unbalanced panel data set used in this study includes annual data for 147 countries and is divided according to their income level groups (based on the World Bank's classification of countries by income levels, 2011) for the period 1980 to 2011.

The countries are divided into four groups: (i) high income countries, (ii) upper middle income countries, (iii) lower middle income countries, and (iv) low income countries. The variables included in the model are in accordance with the ones used by previous scholars (Aggarwal et al., 2011; Chowdhury, 2011; Gupta et al., 2009).

Financial development is measured by sector size using (a) the ratio of total bank deposit to GDP and (b) the ratio of domestic credit provided by the banking sector to GDP. For the independent variables, remittances are represented by (c) the ratio of personal remittances received to GDP. The control variables that are included are (d) GDP per capita to capture the stage of economic development of a country, (e) log of GDP in constant USD to control for country size, and (f) inflation represented by GDP deflator. To control for current and capital account openness, a set of variables are included; (g) the ratio of exports to GDP, and capital inflow ratios such as (h) foreign direct investment (FDI) to GDP, (i) portfolio inflows to GDP and (j) total ODA received to GDP.

Table 2. Variables Included in the Regression by Income Level Groups.

Variable	Description
Bank deposit to GDP（%）	The ratio of bank deposit to GDP.
Bank credit to GDP（%）	The ratio of domestic credit provided by the banking sector to GDP.
Remittances to GDP（%）	The ratio of total remittance inflows to GDP.
GDP（constant USD 2005）	To control country size.
GDP per capita（in thousands US$）	To control the level of economic development.
Inflation（%）	Inflation is used as an indicator regarding financial investment and savings in real assets.
Exports to GDP（%）	Current and capital account openness have also been found to have a positive effect on financial development.
FDI inflows to GDP（%）	
ODA inflows to GDP（%）	
Portfolio inflows to GDP（%）	

Table 3. Descriptive Statistics for each Income Level Group.

High - Income Countries Descriptive Statistics				
Variables	Observations	Mean	Median	Standard Deviation
Deposit	1143	89.12	79.77	49.70
Credit	1252	96.37	86.04	58.68
Remittances	1316	0.93	0.43	1.50
GDP per capita	1316	18504.43	14058.01	15607.41
LOG GDP	1289	25.31	25.72	2.30
Inflation	1276	11.86	3.48	65.25
Exports	1295	46.09	39.39	28.85
FDI inflows	1316	3.60	1.52	9.30
ODA inflows	1316	0.33	0.00	1.01
Portfolio Inflows	1316	3.32	0.00	35.30

Upper Middle - Income Countries Descriptive Statistics				
Variables	Observations	Mean	Median	Standard Deviation
Deposit	1134	46.24	39.69	28.81
Credit	1252	55.33	50.27	37.25
Remittances	1309	3.20	0.91	5.63
GDP per capita	1309	3254.94	2545.82	2299.76
LOG GDP	1275	49.90	7.01	290.74
Inflation	1290	39.97	37.07	21.90
Exports	1309	3.43	2.26	5.55
FDI inflows	1309	3.07	0.91	5.55
ODA inflows	1262	23.48	23.66	2.31
Portfolio Inflows	1309	0.12	0.00	0.58

Lower Middle - Income Countries Descriptive Statistics				
Variables	Observations	Mean	Median	Standard Deviation
Deposit	1026	28.59	26.41	18.02
Credit	1079	36.07	31.34	24.57
Remittances	1148	6.45	2.82	11.77
GDP per capita	1148	1047.70	870.53	694.86
LOG GDP	1164	22.79	22.83	1.86
Inflation	1130	85.21	8.51	795.10
Exports	1103	33.88	30.49	18.23
FDI inflows	1148	3.10	1.50	4.87
ODA inflows	1148	7.85	4.88	9.06
Portfolio Inflows	1148	0.06	0.00	0.54

Low - Income Countries Descriptive Statistics				
Variables	Observations	Mean	Median	Standard Deviation
Deposit	505	16.62	14.27	10.40
Credit	568	22.86	17.86	16.10
Remittances	623	2.76	1.17	4.54
GDP per capita	623	325.64	291.87	146.94
LOG GDP	618	22.04	21.89	0.97
Inflation	616	17.23	8.08	50.45
Exports	612	20.11	17.40	11.32
FDI inflows	623	1.61	0.57	2.99
ODA inflows	623	14.28	11.66	10.97
Portfolio Inflows	623	0.03	0.00	0.12

Table 4. Correlation Matrix - High Income Countries.

Variables	Deposit	Credit	Remittances	GDP per capita	LOGGDP	Inflation	Exports	FDI inflows	ODA inflows	Portfolio Inflows
Deposit	1									
Credit	0.820917	1								
Remittances	−0.05723	−0.09796	1							
GDP per capita	0.588661	0.544302	−0.204647	1						
LOGGDP	0.281923	0.369133	−0.451308	0.38518	1					
Inflation	−0.19865	−0.10853	0.004249	−0.22076	−0.08921	1				
Exports	0.182991	0.028672	0.084122	0.240513	−0.35426	−0.08061	1			
FDI inflows	0.10175	0.069164	0.154581	0.122833	−0.16533	−0.06472	0.289628	1		
ODA inflows	−0.12545	−0.10029	0.403862	−0.28298	−0.44016	0.277706	0.047534	0.088854	1	
Portfolio Inflows	0.096147	0.069634	0.089705	0.342762	−0.02248	−0.01671	0.313892	0.22535	−0.029689	1

Table 5. Correlation Matrix - Upper Middle Income Countries.

Variables	Deposit	Credit	Remittances	GDP per capita	LOGGDP	Inflation	Exports	FDI inflows	ODA inflows	Portfolio Inflows
Deposit	1									
Credit	0.822824	1								
Remittances	0.097796	0.011299	1							
GDP per capita	0.211636	0.13486	−0.13893	1						
LOGGDP	−0.11084	−0.00047	−0.07561	−0.07761	1					
Inflation	0.363936	0.173148	−0.007888	0.097093	−0.1331	1				
Exports	0.17126	0.008586	0.119078	0.276889	−0.07248	0.215725	1			
FDI inflows	−0.04235	−0.08483	0.505338	−0.24239	−0.05032	0.010721	0.007081	1		
ODA inflows	0.045032	0.15699	−0.356943	0.102591	0.099383	−0.28051	−0.19831	−0.62296	1	
Portfolio Inflows	0.149127	0.251337	−0.083991	0.034586	0.010069	−0.05949	−0.06295	−0.11115	0.207361	1

Table 6. Correlation Matrix - Lower Middle Income Countries.

Variables	Deposit	Credit	Remittances	GDP per capita	LOGGDP	Inflation	Exports	FDI inflows	ODA inflows	Portfolio Inflows
Deposit	1									
Credit	0.795196	1								
Remittances	0.036744	−0.01961	1							
GDP per capita	0.289052	0.223687	0.000571	1						
LOGGDP	0.274073	0.372093	−0.273262	−0.03006	1					
Inflation	−0.08028	−0.05425	−0.032611	−0.03194	−0.02089	1				
Exports	0.045986	−0.18791	−0.015642	0.239831	−0.20367	−0.02309	1			
FDI inflows	0.037737	−0.14202	0.070203	0.237398	−0.28832	−0.03443	0.273717	1		
ODA inflows	−0.12162	−0.14752	0.305735	−0.15671	−0.728634	−0.00684	−0.06001	0.205227	1	
Portfolio Inflows	0.130104	0.090292	−0.008459	0.021514	0.113226	−0.00858	0.080236	0.135097	−0.06691	1

Table 7. Correlation Matrix - Low Income Countries.

Variables	Deposit	Credit	Remittances	GDP per capita	LOGGDP	Inflation	Exports	FDI inflows	ODA inflows	Portfolio Inflows
Deposit	1									
Credit	0.758193	1								
Remittances	0.3358	0.250171	1							
GDP per capita	0.435581	0.170683	0.387667	1						
LOGGDP	0.641602	0.509532	0.151716	0.390834	1					
Inflation	−0.2247	0.033793	−0.115169	−0.20225	−0.158	1				
Exports	0.024187	−0.03677	−0.031198	0.288304	−0.03352	−0.07642	1			
FDI inflows	−0.116844	−0.20323	−0.066409	0.19505	0.069925	−0.03798	0.322437	1		
ODA inflows	−0.439522	−0.36118	−0.165308	−0.36039	−0.46534	0.306676	−0.12941	0.005343	1	
Portfolio Inflows	0.013304	0.02061	0.056306	0.014292	−0.12093	−0.10305	0.179741	0.055408	−0.08894	1

Tables 3 to 7 include descriptive statistics and correlation matrices for each income level group. The correlation coefficient for the independent variables indicates that there is no serious multi-collinearity in the data set, considering percentages lower than 1.

3.2. Estimation of the model

The model takes the following form:

$$FD_{i,t} = \beta_1 REM_{i,t-1} + \beta'_2 X_{i,t-1} + \alpha_i + u_{i,t} \qquad (1)$$

FD denotes financial development, *REM* represents remittances, *X* is a matrix of controlled variables, α captures country specific effects, u is unobserved variables, i is country, and t is time period.

Using OLS estimations for the unbalanced panel data set and considering cross section and fixed period specifications, all independent variables include a time lag of one period in order to account for the problem of reverse causality between the dependent and independent variables.

To address endogeneity due to reverse causality, the model is regressed again using GMM as suggested by Aggarwal et al. (2011). The equation takes the following form, using lagged regressors as instruments for two periods to estimate the equation in levels.

$$FD_{i,t} = \gamma\, FD_{i,t-1} + \beta_1 REM_{i,t} + \beta'_2 X_{i,t} + \alpha_i + u_{i,t} \qquad (2)$$

$$FD_{i,t} - FD_{i,t-1} = \gamma\, (FD_{i,t-1} - FD_{i,t-2}) + \beta_1 (REM_{i,t} - REM_{i,t-1}) + \beta'_2\, (X_{i,t} - X_{i,t-1}) + u_{i,t} - u_{i,t-1} \qquad (3)$$

Even though the GMM estimation can avoid the problem of reverse causality between variables, the model may still suffer from endogeneity biases. The data for remittances in the balance of payments only reflect official transfers and do not consider funds that enter through informal channels. Other factors that affect endogeneity include omitted variables that the model is unable to account for, such as policies and legislation relating to international transfers.

In dividing countries according to income level groups, an additional limitation had to be considered. The period from 1980 to 2011 involved changes in countries' income levels as countries transitioned from being low income to middle income economies. However, the data do not allow the model to consider this transition factor, so the data were classified based on each country's stage of economic development in 2011.

4. Results

Table 8 and Table 9 present the regression results for equation 1 for each income level group. The dependent variable for Table 8 is bank deposit to GDP, while that for Table 9 is bank credit to GDP. Columns 2, 4, 6, and 8 present estimations without considering portfolio inflows as the data for this variable are not available for several countries. The rest of the columns include this variable.

Table 10 and Table 11 show the estimation results for GMM for bank deposit and bank credit, respectively, as dependent variables.

Table 8. Regression Results for Equation 1 by Income Level Group - Bank Deposit to GDP as Dependent Variable.

Regression results for equation 1　by income level groups　- Deposit to GDP

Variables	High Income		Upper Middle Income		Lower Middle Income		Low Income	
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Remittances to GDP	−4.05***	−3.95***	−0.20	−0.19	0.34***	0.33***	0.85***	0.85***
	[−5.31]	[−5.19]	[−1.42]	[−1.36]	[5.58]	[5.45]	[11.18]	[11.25]
GDP per capita	0.00***	0.00***	0.00***	0.00***	0.01***	0.01***	0.02***	0.02***
	[8.43]	[8.70]	[8.34]	[8.56]	[7.83]	[7.87]	[5.62]	[5.59]
log GDP constant USD (2005)	28.27***	29.47***	23.16***	23.06***	25.86***	25.54***	15.05***	15.08***
	[4.16]	[4.33]	[9.12]	[9.14]	[10.10]	[9.99]	[7.86]	[7.88]
Inflation (GDP deflator)	0.03	0.03	0.00	0.00	0.00***	0.00***	−0.01	−0.01
	[1.58]	[1.51]	[−0.14]	[−0.12]	[−3.44]	[−3.44]	[−0.50]	[−0.52]
Exports to GDP	−0.53***	−0.50***	−0.03	−0.03	0.13***	0.12***	0.03	0.02
	[−5.76]	[−5.26]	[−0.78]	[−0.78]	[2.77]	[2.66]	[0.63]	[0.56]
FDI to GDP	0.10	0.13	0.18**	0.21**	0.08	0.04	−0.16	−0.14
	[1.23]	[1.60]	[1.97]	[2.26]	[0.82]	[0.44]	[−1.35]	[−1.23]
ODA to GDP	2.09	2.00*	−0.45***	−0.47***	0.07	0.07	0.03	0.03
	[1.87]	[1.79]	[−3.07]	[−3.24]	[0.84]	[0.87]	[0.93]	[0.82]
Portfolio Inflows to GDP		−0.05**		2.51***		1.44***		−2.29
		[−2.23]		[3.77]		[2.67]		[−1.35]
Constant	−622.79***	−657.21***	−503.84***	−502.02***	−580.68***	−573.08***	−327.04***	−327.54***
	[−3.62]	[−3.81]	[−8.55]	[−8.58]	[−9.96]	[−9.85]	[−7.84]	[−7.86]
R-squared	0.81	0.82	0.85	0.85	0.77	0.77	0.87	0.87
Countries included	44	44	42	42	39	39	21	21
Total panel (unbalanced) observations	1096	1068	1057	1057	937	937	463	463

Note: Fixed Effects estimations. Columns 2, 4, 6, and 8, refers to the regress model without Portfolio Inflows. T-statistics are shown in brackets, *, **, and *** denotes significance at the 10, 5, and 1% level.

Table 9. Regression Results for Equation 1 by Income Level Group - Bank Credit to GDP as Dependent Variable.

Variables	High Income		Upper Middle Income		Lower Middle Income		Low Income	
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Remittances to GDP	−2.57***	−2.50***	−0.13	−0.11	0.45***	0.44***	1.10***	1.11***
	[−3.16]	[−3.06]	[−0.63]	[−0.56]	[4.71]	[4.57]	[5.96]	[5.99]
GDP per capita	0.00***	0.00***	0.00***	0.00***	0.01***	0.01***	−0.01*	−0.01*
	[10.34]	[10.19]	[3.2]	[3.45]	[6.89]	[6.92]	[−1.65]	[−1.67]
log GDP constant USD (2005)	9.33	10.4	39.28***	39.07***	22.61***	22.14***	25.74***	25.79***
	[1.41]	[1.57]	[10.99]	[11.04]	[6.53]	[6.40]	[6.09]	[6.09]
Inflation (GDP deflator)	0.04***	0.04***	0.00*	0.00*	0.00	0.00	0.04	0.04
	[2.90]	[2.83]	[1.66]	[1.70]	[−1.19]	[−1.18]	[1.42]	[1.41]
Exports to GDP	−0.59***	−0.57***	−0.12**	−0.12**	0.13*	0.12*	−0.22**	−0.23**
	[−6.35]	[−6.03]	[−1.96]	[−1.98]	[1.95]	[1.8]	[−2.38]	[−2.41]
FDI to GDP	0.06	0.08	−0.17	−0.14	−0.24*	−0.29**	−0.47**	−0.46**
	[0.67]	[0.89]	[−1.24]	[−0.99]	[−1.76]	[−2.07]	[−2.14]	[−2.09]
ODA to GDP	3.62***	3.57***	−0.48**	−0.51**	0.68***	0.69***	0.08	0.07
	[3.15]	[3.11]	[−2.21]	[−2.37]	[6.03]	[6.06]	[0.97]	[0.92]
Portfolio Inflows to GDP		−0.03		4.87***		2.12**		−2.70
		[−1.37]		[4.69]		[2.41]		[−0.64]
Constant	−138.01	−167.36	−865.97	−862.25	−506.21	−495.14	−539.79	−540.70
	[−0.83]	[−0.99]	[−10.37]	[−10.43]	[−6.43]	[−6.29]	[−5.88]	[−5.88]
R-squared	0.84	0.84	0.76	0.77	0.67	0.68	0.65	0.65
Countries included	44	44	42	42	38	38	21	21
Total panel (unbalanced) observations	1164	1164	1140	1140	995	995	531	531

Note: Fixed Effects estimations. Columns 2, 4, 6, and 8, refers to the regress model without Portfolio Inflows. T-statistics are shown in brackets, *, **, and *** denote significance at 10, 5, and 1% level.

Table 10. GMM Results by Income Level Group - Bank deposit to GDP as the Dependent Variable.

GMM Regression Results by income level groups – Deposit to GDP

Variables	High Income		Upper Middle Income		Lower Middle Income	
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Deposit (−1)	1.59***	1.59***	1.27***	1.27***	0.22***	0.23***
	[100.21]	[111.32]	[0.05]	[23.97]	[14.98]	[14.47]
Deposit (−2)	−0.96***	−0.96***	−0.46***	−0.46***	0.25***	0.25***
	[−64.21]	[−70.59]	[0.08]	[−5.85]	[19.68]	[19.39]
Deposit (−3)	0.32***	0.32***	0.08	0.07	−0.09***	−0.09***
	[37.98]	[58.49]	[0.07]	[1.14]	[−10.12]	[−10.16]
Remittances to GDP	0.33***	0.3***	0.11	0.11	0.05***	0.05***
	[4.81]	[4.07]	[0.14]	[0.77]	[3.92]	[4.32]
GDP per capita	0.00***	0.00***	0.00	0.00	0.00***	0.00***
	[19.99]	[19.21]	[0.00]	[−0.04]	[−14.32]	[−15.39]
log GDP constant USD (2005)	−60.1***	−58.04***	−29.04***	−29.12***	−15.53***	−15.74***
	[−22.12]	[−21.81]	[9.16]	[−3.13]	[−12.83]	[−12.29]
Inflation (GDP deflator)	−0.08***	−0.07***	0.00	0.00	−0.00	−0.00
	[−10.59]	[−10.35]	[0.00]	[0.62]	[−1.25]	[−1.17]
Exports to GDP	−0.14***	−0.14***	−0.07	−0.07	−0.02***	−0.02***
	[−6.99]	[−6.95]	[0.05]	[−1.46]	[−2.81]	[−2.37]
FDI to GDP	0.02***	0.01*	0.03	0.04	−0.01	−0.01
	[3.53]	[1.72]	[0.08]	[0.47]	[−0.57]	[−0.66]
ODA to GDP	0.28***	0.29***	−0.05***	−0.04***	−0.05***	−0.04***
	[2.64]	[2.67]	[0.09]	[−0.4]	[−6.57]	[−5.77]
Portfolio Inflows to GDP		−0.01***		0.27		−0.06
		[−25.36]		[0.89]		[−1.41]
J-statistic	41.59	39.60	691.18	687.95	462.50	464.68
Probability (J-statistic)	0.21	0.27	0.00	0.00	0.32	0.28
Countries included	43	43	41	41	39	39
Total panel (unbalanced) observations	913	913	904	904	799	799

Noe: Dynamic system GMM estimates. Columns 2, 4, and 6,, refers to the regress model without Portfolio Inflows. T-statistics are shown in brackets, *, **, and *** denotes significance at the 10, 5, and 1% level.

Table 11. GMM Results by Income Level Group - Bank Credit to GDP as the Dependent Variable.

GMM Regression Results by income level groups　－Credits to GDP

Variables	High Income		Upper Middle Income		Lower Middle Income		Low Income	
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Credit (−1)	1.09***	1.10***	0.82***	0.82***	0.57***	0.57***	0.75***	0.75***
	[115.9]	[74.31]	[7.21]	[7.17]	[4.29]	[4.30]	[15.84]	[9.12]
Credit (−2)	−0.2***	−0.2***	−0.02	−0.02	0.19***	0.19***	0.05	0.05
	[−29.06]	[−14.89]	[−0.17]	[−0.17]	[14.31]	[14.35]	[1.06]	[0.96]
Credit (−3)	0.01**	0.01	−0.03	−0.03	−0.05	−0.05	n/a	n/a
	[2.13]	[1.39]	[−0.55]	[−0.56]	[−1.31]	[−1.31]	n/a	n/a
Remittances to GDP	0.5***	0.53***	0.27	0.27	0.21*	0.21*	0.19	0.18
	[9.11]	[4.79]	[1.30]	[1.29]	[1.71]	[1.74]	[0.63]	[0.54]
GDP per capita	0.00***	0.00***	0.00	0.00	0.00	0.00	0.01*	0.01**
	[14.72]	[7.86]	[−0.46]	[−0.42]	[−0.99]	[−0.98]	[1.67]	[2.02]
log GDP constant USD (2005)	−51.81***	−49.91***	−34.10	−34.02*	−11.77	−12.04	−17.72***	−17.74***
	[−14.99]	[−8.99]	[−1.84]	[−1.83]	[−0.84]	[−0.87]	[−2.88]	[−5.6]
Inflation (GDP deflator)	0.09***	0.09***	0.00	0.00	0.00*	0.00*	−0.09***	−0.09***
	[34.72]	[12.43]	[−0.07]	[−0.08]	[−1.66]	[−1.65]	[−4.33]	[−2.18]
Exports to GDP	−0.13***	−0.15***	−0.06	−0.06	−0.07	−0.07	0.21***	0.21*
	[−7.25]	[−4.17]	[−0.89]	[−0.88]	[−1.22]	[−1.25]	[2.43]	[1.89]
FDI to GDP	0.03***	0.03**	−0.06	−0.05	−0.13**	−0.13**	0.12	−0.12*
	[5.95]	[1.86]	[−0.49]	[−0.43]	[−1.91]	[−2.00]	[−1.09]	[−1.65]
ODA to GDP	−0.5***	−0.38	0.11	0.11	−0.61	−0.61	0.02	0.02
	[−3.61]	[−1.3]	[0.57]	[0.59]	[−1.24]	[−1.24]	[0.36]	[0.84]
Portfolio Inflows to GDP		0.01		0.22		−0.18		0.57
		[0.81]		[0.43]		[−0.41]		[1.22]
J-statistic	30.87	48.16	538.83	537.90	787.35	786.99	452.80	452.80
Probability (J-statistic)	0.71	0.04	0.00	0.00	0.00	0.00	0.01	0.01
Countries included	44	44	42	42	38	38	21	21
Total panel (unbalanced) observations	924	924	930	930	881	881	483	483

Note: Dynamic system GMM estimates. Columns 2, 4, and 6,, refers to the regress model without Portfolio Inflows. T-statistics are shown in brackets, *, **, and *** denotes significance at the 10, 5, and 1% level.

4.1 Macro Analysis Results

The macro analysis considers both bank deposit to GDP and bank credit to GDP as the dependent variables used to measure the depth of financial institutions in countries with different income levels in order to compare variations in the signs of coefficients and significance.

As expected, the results indicate that as a country's income level and financial development increase, the effect of remittances on financial development tends to decrease until the effect is no longer positive. However, this relationship is not linear and further considerations according to the country's stage of economic development should be taken.

4.1.1 High Income Countries

As evident in the results for bank deposit to GDP in Table 8, the coefficient for remittances in high income countries is negative and significant. Surprisingly, this coefficient is the highest among income level groups. Similar conclusions can be drawn for bank credit to GDP in Table 9, where the coefficients for remittances are negative and significant for high income and upper middle income countries.

The results for equation 3 are shown in Tables 10 and 11. The coefficients for remittances become positive and significant for both bank deposit and credit.

Even though the coefficient is negative in Table 8, this result does not mean that a percentage increase in remittances would decrease bank deposit or credit.

Figure 3 shows remittance inflows to high income countries as a percentage of GDP. Remittance inflows to high income countries tend to fluctuate more in comparison to those to lower middle and low income countries.

Figure 3. Remittance Inflows to High Income Countries (as percentage of GDP).
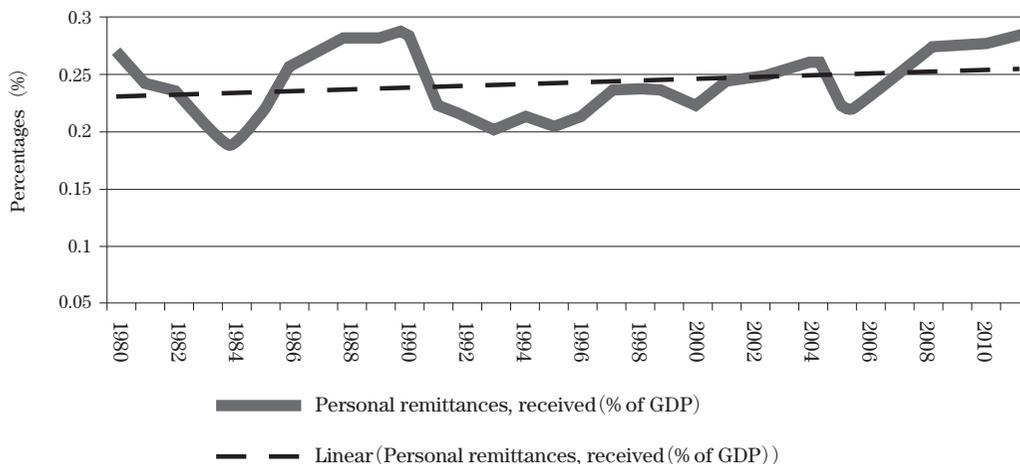
Source: World Bank, 2013a.
Note: data as of July 2013.

Figure 4 illustrates the comparison between remittance inflow percentages and bank deposit and credit percentages of GDP. This illustration demonstrates the scale of remittance inflows relative to financial activities over time.

Figure 4. Comparison between Remittances, Bank Deposit and Credit for High Income Countries (as Percentage of GDP).
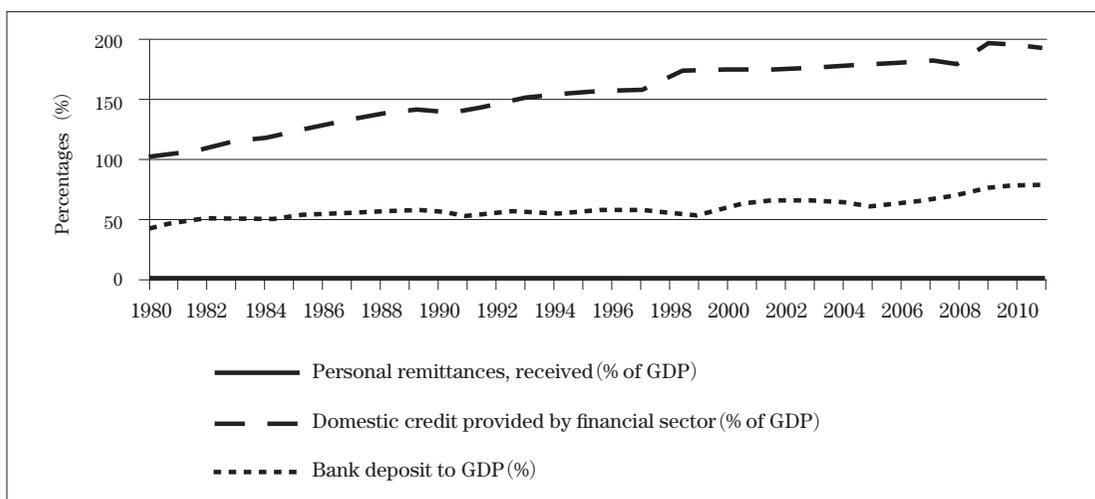
Source: World Bank, 2013a; World Bank, 2013d.
Note: data as of July 2013.

4.1.2 Upper Middle Income Countries

Even though the results for all countries seem to change according to income level, as shown in Table 8 and Table 9, the results of both regressions for upper middle income countries are not significant.

Figure 5 shows the change in remittance inflows as a percentage of GDP from 1980 to 2011. Though remittance inflows show an increase over time, their impact on financial market is not significant when compared with bank deposit and credit as percentage of GDP, shown in Figure 6.

Figure 5. Remittance Inflows to Upper Middle Income Countries (as Percentage of GDP).
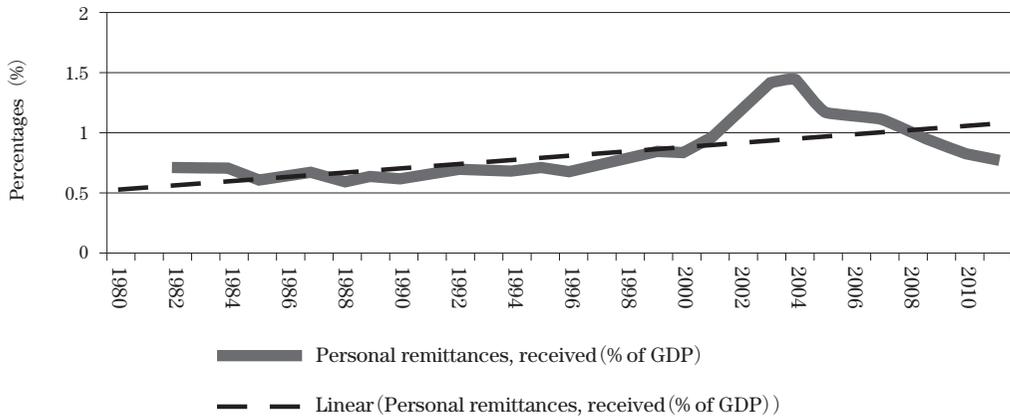
Source: World Bank, 2013a.
Note: data as of July 2013.

Figure 6. Comparison between Remittances, Bank Deposit and Credit for Upper Middle Income Countries (as Percentage of GDP).
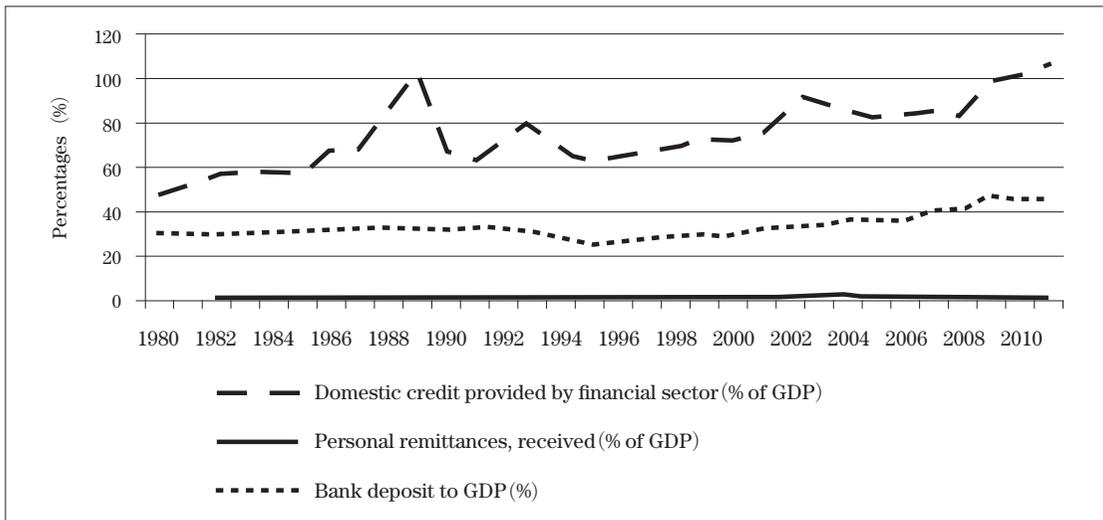
Source: World Bank, 2013a; World Bank, 2013d.
Note: data as of July 2013.

However, the results for GDP per capita, log of GDP, FDI, ODA and portfolio inflows are significant.

GDP per capita is positively related to both bank deposit and credit, even though the coefficient is almost zero, and it reflects the stage of economic development in the country. The log of GDP, which controls for country size, is positive and significant, which simply indicates that as the GDP of the country increases, bank deposit and credit also increase. The coefficients are also positive and significant for both FDI and portfolio inflows. Most countries classified as upper middle income countries are the so called 'emerging economies'. Given the promising stage of economic development that these countries are currently facing, foreign investors are more likely to participate in their markets. In the case of ODA, the coefficient is negative and significant, which reflects the past aid agreements of these countries; transitioning from recipients to providers of aid.

Using the GMM maintains the same results, while using lag regressors up to three, which seek to control endogeneity caused by reverse causality in the model. In most cases, the effect of remittances is not significant. However, the results for credit, which include portfolio inflows as shown in Table 10, are positive and significant. Some of the countries included in this income level group, such as Mexico and China, receive high amounts of remittances. In the case of Mexico, studies have already demonstrated that remittances can positively affect the performance of banks (Demirguc-Kunt et al., 2011).

4.1.3 Lower Middle Income Countries

As expected with regard to remittance inflows in middle income countries shown in Tables 8 and 9, the coefficients are positive and significant for both bank deposit and credit. A one percent increase in remittances appear to increase bank deposit by approximately 0.34 percent and bank credit by approximately 0.45 percent.

Figure 7 illustrates remittance inflows as a percentage of GDP in lower middle income countries, which appears to increase at a relatively stable rate over time. Remittances play much more prominent role in financial activities when compared to bank deposit and credit in high income and upper middle income countries, as shown in Figure 8.

Figure 7. Remittance Inflows to Lower Middle Income Countries (as Percentage of GDP).
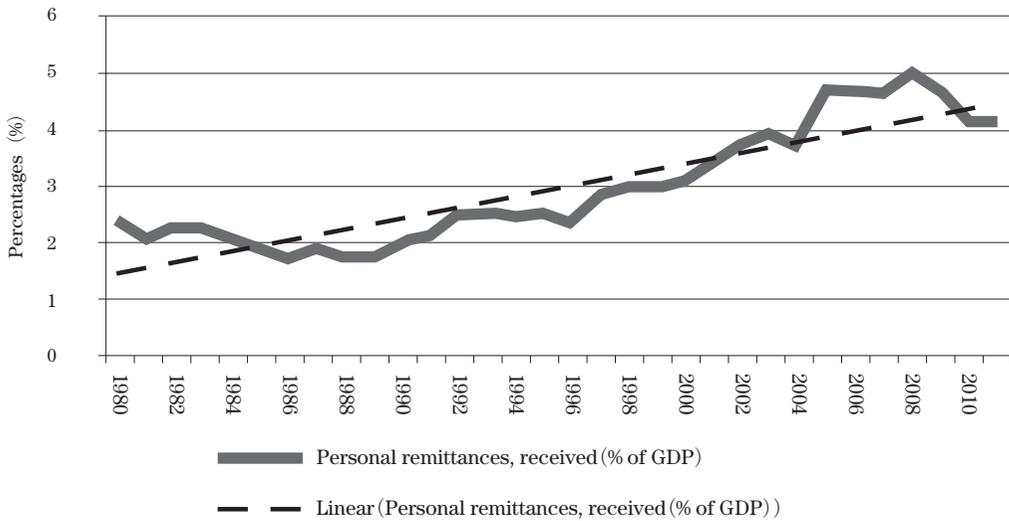
Source: World Bank, 2013a.
Note: data as of July 2013.

Figure 8. Comparison between Remittances, Bank Deposit and Credit for Lower Middle Income Countries (as Percentage of GDP).
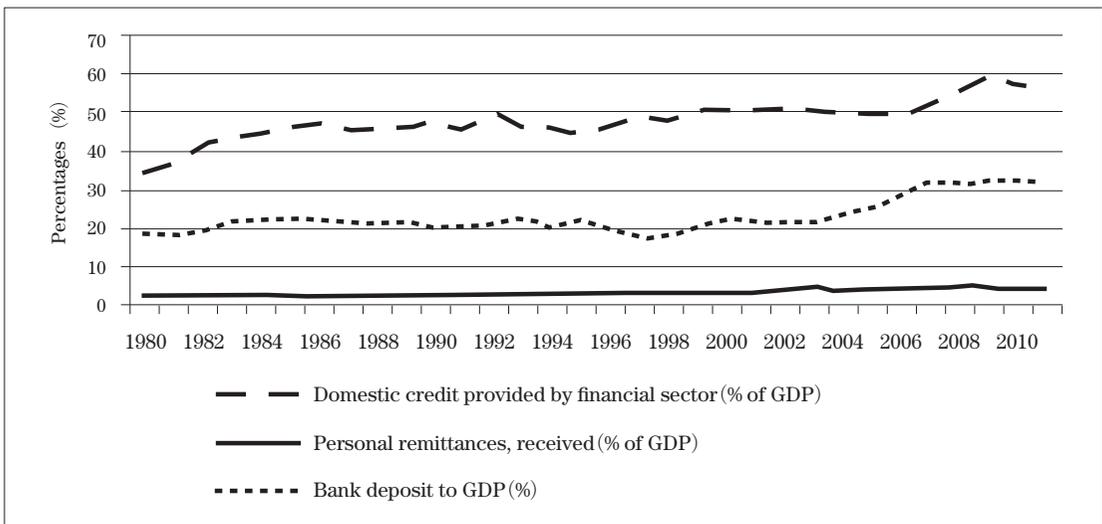
Source: World Bank, 2013a; World Bank, 2013d.
Note: data as of July 2013.

Control variables such as GDP per capita and log of GDP are also significant and positive as expected. However, in the case of bank deposit as the dependent variable, inflation is positive and significant. This result contradicts the assumption that households are less likely to save money as inflation increases, even though the coefficient is almost zero.

In the case of credit, both portfolio inflows and ODA are positive and significant. The FDI coefficient is negative and significant as expected, since it represents market investment conditions and the competitiveness with other countries.

4.1.4 Low Income Countries

In the case of low income countries, the coefficients for remittances are also positive and significant for both bank deposit and credit, as shown in Table 8 and 9. The coefficients are higher than those for lower middle income countries. A one percent increase in remittances appears to increase bank deposit by approximately 0.85 percent and credit by approximately 1.11 percent.

Figure 9 shows remittance inflows as a percentage to GDP to low income countries for the period 1980 to 2011. In comparison with the other income level groups, low income countries have the largest increase in remittances during this period. The ratio of Remittances to GDP indicates that remittances play an increasingly important role in economies, as shown in Figure 9. In comparing bank deposit to GDP and bank credit to GDP, domestic credit in economies has not managed to pass the 40 percent level. High income countries have reached percentages above that level.

Figure 9. Remittance Inflows to Low Income Countries (as Percentage of GDP).
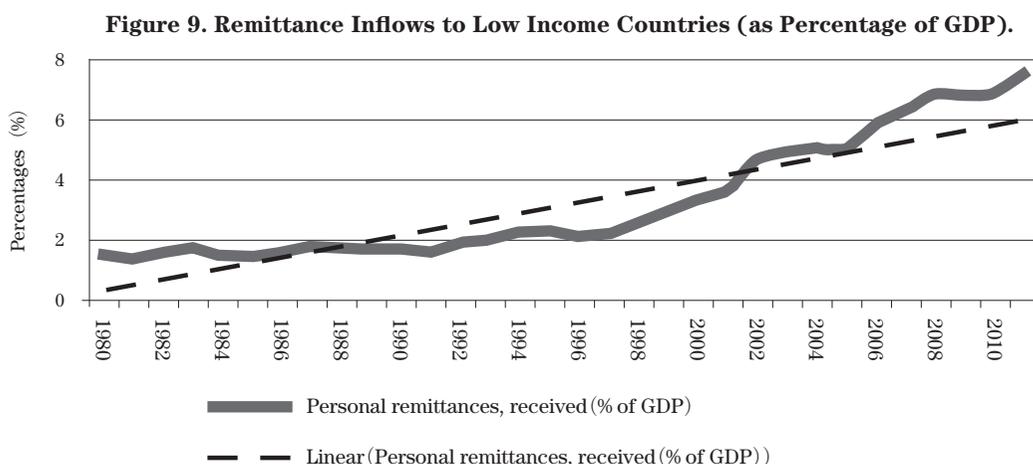
Source: World Bank, 2013a.
Note: data as of July 2013.

Figure 10. Comparison between Remittances, Bank Deposit and Credit for Low Income Countries (as Percentage of GDP).
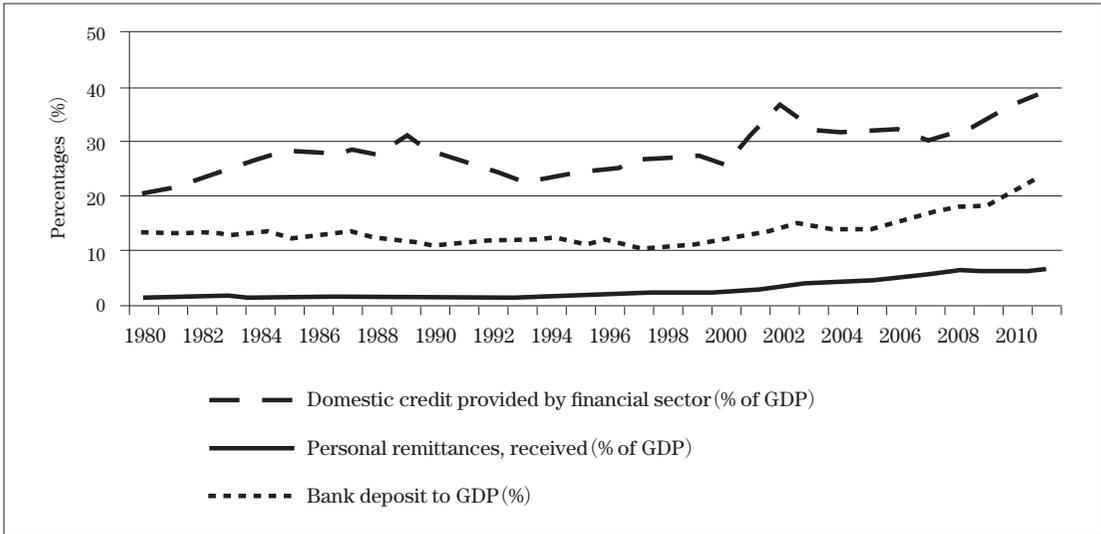
Source: World Bank, 2013a; World Bank, 2013d.
Note: data as of July 2013.

Coefficients for GDP per capita and log of GDP are also positive and significant, except in the case of credit, where GDP per capita becomes negative and significant. In the case of exports, the coefficient for credit is also negative and significant. Generally, exports are expected to generate cash inflows to a country, but the share of exports in most low income countries tends to be small.

The FDI coefficient for credit is also negative and significant in low income countries, which reflects that this income level group has similar conditions to lower middle countries, yet the coefficient for low income countries is higher than that for middle income countries.

5. Conclusions

In this paper, the macro analysis used an unbalanced panel data set for 147 countries and financial development was measured by bank deposit to GDP and bank credit to GDP. The countries were classified into four different income level groups, as proxies for stages of economic development and the associated quality of institutions and general market conditions in the financial sector.

Using OLS estimations for the data set, including time and country dummies, the results indicate that as a country's income level increases, the effects of remittances on bank deposit and credit are less and less positive. As financial sectors naturally evolve, they can direct inflows from other activities into their respective domestic economies.

The financial sectors in high income countries are the most highly developed, as shown in Table 3, with a mean deposit rate of 89.12 percent and mean credit rate of 96.37 percent. At the same time, remittances have the lowest ratio to GDP.

In lower middle income and low income countries, remittances have positive and significant effects on

bank deposit and credit, which means that remittances contribute to financial development. The ratio and thus effect is higher in low income countries.

This analysis confirms that judging by a country's stage of economic development, the national government and international organizations can implement policies and legislation that enhance the effect of remittances on the country's financial development.

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