Remittances, Economic Growth and Poverty: A Case of African OIC Member Countries

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This paper investigates the impact of remittance inflows on economic growth and poverty reduction for seven African countries using annual data from 1992-2010. By using the depth of hunger as a proxy for poverty in a Simultaneous Equation Model (SEM), we find that remittances have statistically significant growth enhancing and poverty reducing impact. Drawing on our estimates, we conclude that financial development level significantly increases the remittances inflows and strengthens poverty alleviating impact of remittances. Results of our study further show a signficant interactive imapct of remittances and finacial develpment on economic growth, suggesting the substitutability between remittance inflows and financial development. We further find that 3 percentage point increase in credit provision to the private sector (financial development) can help eliminate the severe depth of hunger in the region. Remittances, serving an alternative source of private credit, can be effective in this regard.

Keywords: Remittance Inflow, Poverty Alleviation, Financial Development, Simultaneous Equation Model

1. INTRODUCTION

Remittances are one of the major international capital flows for underdeveloped countries. The remittance inflows primarily help poor families to mitigate the adverse effects of income shock [Yang and Choi (2007)].[1] Direct income transfer also improves the economic status of the recipient family through a higher marginal propensity to save [Siddiqui and Kemal (2006); Adams (2002); Adams and Page (2005)]. Furthermore, the impact of remittance inflow is not limited to economic growth but also includes accumulation of physical and human capital, labour force participation and total factor productivity growth [Barajas, *et al.* (2009)]. Remittance inflows help in building the infrastructure and accumulation of human capital while at the same time reduce production process risk [Taylor (1999)], and increase access to better health care services and education [Orozco (2000)].

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[1]The direct and indirect effects of remittances including reduced output volatility, spurring development of financial sector, appreciation of real effective exchange rate (Dutch Disease), accumulation of human capital (increased spending on education and health), increased investment ratio to GDP for the recipient countries are well documented. See Barajas, *et al,* (2009); Acosta, *et al.* (2009); Bussolo (2007); Acosta and Mandelma (2007); Amuedo-Dorantes and Pozo (2004), named few.

In a broader perspective, remittance inflows through formal banking channels not only promote the financial sector development [Aggarwal, *et al.* (2011); Ruiz-Arranz, *et al.* (2005)] but also improve the foreign exchange reserves of the recipient country. Higher remittance inflows may enhance the development of domestic financial sector wherein a large number of beneficiaries/depositors may persuade the government to reform for better access to the banking and financial system.[2] Remittance inflows, in this context, are considered as a vital and stable source of funding for economic development.

On the contrary, higher remittance inflows may cause exchange rate appreciation that may adversely affect exports and thus hamper the economic growth of the recipient countries [Lartey, *et al.* (2012); Acosta, *et al.* (2009, 2008, 2007a)]. Remittance inflow may also increase households' dependence on remittances that may result in lower labour force participation[3] [Barajas, *et al.* (2008)].

In a pure economic setup, the level of foreign remittances depends on the migration rate of the home country and the economic growth rate of both the home and the host country. Countries with lower economic growth rate experience higher migration rate that may result in higher remittance inflows to the home country. However, a higher economic growth perspective in the home country as compared with the host country may also serve as motivation to remit higher amounts to the home country. This suggests that remittance inflows not only affect the economic growth (poverty reduction), but also the level of inflows can be affected by the level of economic growth, generating a bi-causal relationship. This study uses a simultaneous equation framework wherein the impact of remittances on economic growth and poverty alleviation are modelled simultaneously. The empirical estimations thus obtained are more efficient and reliable as compared to the studies, modelling the impact in a single equation framework.

We analyse the remittances-growth-poverty nexus for seven member countries of the Organisation of Islamic Cooperation (OIC) from Africa,[4] where about 50 to 80 percent of the population lives below the poverty line. One of the main reasons for the selection of OIC member countries is the structural differences among OIC member (Muslim) and non-member (non-Muslim) countries. These differences may exist due to following a social and cultural system based on religious values. For example, a Muslim may self-exclude the conventional financial system due to strict prohibition of interest in the religion of Islam.

African OIC member countries, as a group, have the lowest human capital index of 1.61 as compared to 1.92 for non-OIC member African countries[5] (see Appendix C for comparison). The difference can be attributed to the social attitude towards democracy and political set up, as well as the education system. For example gender parity in adult literacy rate in OIC member countries is 67.359 as compared to non-member countries where it is 86.289 [Malik and Qiong (2014)]. Furthermore, the Islamic social welfare system of *Zakat*[6] may also have a serious bearing on the nature and design of poverty

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[2]Refer to Karikari, *et al.* (2016) for details.

[3]Known as moral hazard problem.

[4]These countries includes Egypt, Mali, Morocco, Senegal, Sierra Leone, Sudan and Tunisia.

[5]Calculations are made using data from Penn World Table 8.0 (2013) for the African region. These average are for the period 1992-2010.

[6]Islamic tithe.

reduction programmes. In this background and context, this study provides new evidence on the following questions:

- What is the impact of increasing remittances inflows on economic growth of the selected countries?
- To what extent do remittance inflows help reduce poverty in OIC member countries of the African region?
- What is the role of financial sector development in the growth enhancing and poverty-reducing impact of remittances on the region?

The findings from the study suggest that remittance inflows enhance economic growth and reduce poverty in the selected countries. Most importantly the level of financial development determines growth enhancing and the poverty-reducing impact of remittances. The rest of the paper is structured as follows: the next section reviews the relevant literature followed by the development of an analytical framework in Section 3. Section 4 discusses the estimation methodology and describes data in detail. Empirical results are reported in Section 5. Finally, Section 6 presents conclusions of the study.

2. LITERATURE REVIEW

The strand of literature examining the impact of remittances generally reports a significant positive impact on poverty alleviation. Remittance inflows can alleviate poverty through increased income and higher consumption [Jongwanich (2007)].[7] Furthermore, remittance inflows can facilitate the building of physical and human capital through a higher number of children attending schools[8] [Imai, *et al.* (2014); Javid, *et al.* (2012); Banga and Sahu (2010); Gupta, *et al.* (2009); Adams, *et al.* (2008); Adams and Page (2005)].[9]

The academic literature also depicts mixed results on the remittances-growth nexus. There is significant evidence suggesting a positive impact of remittances on economic growth.[10] Remittance inflows may influence GDP growth positively through increasing consumption expenditures, domestic savings, building human capital [Adams and Page (2008)] and increased investments [Ojapinwa and Odekunle (2013)]. Remittance inflows can also contribute to economic growth positively through improving financial intermediation [Aggarwal, *et al.* (2011); Gupta, *et al.* (2009); Giuliano and Ruiz-Arranz (2009)]. On the contrary, Jahjah, *et al.* (2003) reports a growth dissuading impact of remittances resulting from reduced labor force participation and work efforts. Furthermore, volatility of remittances can also adversely affect the growth [Imai, *et al.* (2014)].

It is also important to note that economic growth may also affect the remittance inflows. Bad economic conditions (low economic growth) in the home country encourage economic migration that may result in higher remittances to recipient families for

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[7]See Bracking, and Sachikonye (2006) for an excellent survey .

[8]Kemal (2001), Gyimah-Brempong and Asiedu (2009), Ratha (2013), Enebeli-Uzor, *et al.* (2012), Shroff (2009) and Siddiqui and Kemal (2006) reports the similar findings.

[9]See Anyanwu and Erhijakpor (2010) for detail on macro, miso and micro channels of transmission of the poverty reducing effect of foreign remittances.

[10]See for example, Ratha (2005), Goldberg, *et al.* (2008), Cooray (2012), Fajnzylber and Lopez (2006). Similar results are reported by Shera and Meyer (2013), Fayissa and Nisah (2010), Imai, *et al.* (2014), Javid, *et al.* (2012), Obiechina and Emeka (2013).

altruistic purposes [Ratha (2013)]. Also, a good economic condition in the domestic economy may motivate migrants to invest more in the home country causing the remittance inflows to increase [Lucas and Stark (1985)]. This highlights the bi-causal relationship of the remittance and growth.

The literature examining the growth enhancing impact of remittances for the African countries primarily employs primary data at the household level [Adams (2006); Adams (1991)]. However, analysing the impact of remittance inflows on the economic growth, by using the data at macroeconomic scale is scant except for Fayissa and Nsiah (2010) and Nyamongo, *et al.* (2012). Both of the studies report a significant positive impact of remittances on economic growth in the region. Furthermore, the impact of remittances on poverty is widely studied in the African context.[11] Anyanwu and Erhijakpor (2010), using the data from poverty surveys for 33 African countries report a significant poverty-reducing impact of remittances, and the impact is robust to alternative measures of poverty. A look into the available literature clearly suggests that there is no study investigating the issue for OIC member countries in Africa. This study attempts to fill the void and provide evidence in this regard. We argue that the structural difference in OIC member and non-member countries of the African origin needs a careful examination as these differences may significantly affect the outcomes.

3. THE ANALYTICAL FRAMEWORK

Following Cooray (2012) and Rao and Hassan (2011), we derive growth equation by using the neo-classical production function[12] and further extended by the inclusion of remittance inflows as specified below:

$$Y_{it} = A_{i0} \, e^{\delta t} \, Z_{it}^{\emptyset i} \, K_{it}^{\alpha} \, H_{it}^{\beta} L_{it}^{1-\alpha-\beta} \, e^{\varepsilon_{it}} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (1)$$
$$0 < \alpha < 1 \text{ and } 0 < \beta < 1$$

In Equation 1 above, i represent the country while t denotes time. Y_{it} is output *(GDP)*, A_{i0} is the given level of technology, and K_{it}, H_{it} and L_{it} denote physical and human capital and the labour force stock respectively in country i at time t, while Z_{it} is a vector of control variables carrying conventional determinants of growth.[13]

Dividing both sides by stock of labour force *(L_{it})*, above equation gives

$$y_{it} = A_{i0} \, e^{\delta t} \, Z_{it}^{\emptyset i} \, k_{it}^{\alpha} \, h_{it}^{\beta} \, e^{\varepsilon_{it}} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (2)$$

Where y_{it} is per capita *GDP*, k_{it} and h_{it} are physical and human capital per worker. This equation allows us to decompose the differences capital intensity and education attainment and return on education across different countries.[14] The above function, using a log linear specification, can be written as:

$$ln y_{it} = ln A_{i0} + \delta t + \varphi i ln Z_{it} + \alpha ln k_{it} + \beta ln h_{it} + \varepsilon_{it} \qquad \dots \qquad \dots \qquad (3)$$

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[11]The available literature primarily deals the case studies [see Adam (1991) for Egypt, Bracking and Sachikonye (2006) for Zimbabwe, Anyanwu (2005) for Nigeria, Bhasin, and Obeng (2005) for Ghana etc.].

[12]For more details on the validity see Jones (1995) and Solow (2000).

[13]This set of conventional determinants is guided by the theory and empirical literature available on the issue.

[14]This may also explain the differences in productivity across the sample countries through contributing to output per worker.

Incorporating the variable included in Z_{it}, above equation can be written as:

$$lny_{it} = \alpha_0 + \alpha_1 lny_{it-1} + \alpha_2 PC_{it} + \alpha_3 REM_{it} + \alpha_4 HC_{it} + \alpha_5 FD_{it} + \alpha_6 GEXP_{it} + \alpha_7 OP_{it} + \alpha_8 FDI_{it} + \alpha_9 DI_{it} + \alpha_{10} RFD_{it} + \varepsilon_{it} \quad \ldots \qquad \ldots \quad (4)$$

Where *lny* is the log per capita GDP growth rate; *PC* is physical capital/infrastructure; *REM* is remittance inflows;[15] *HC* is human capital; *FD* is financial development; *GEXP* is government expenditure; *OP* is openness; *FDI* and *DI* are foreign direct investment and domestic investment respectively; *RFD* is term capturing interactive impact of remittances and financial development and ε_{it} is error term. In Equation 4, y_{t_1} is included to understand dynamic relationship of the variables and to check the convergence hypothesis [Barro (1990a, 1996b); Barro and Sala-i-Martin (1995)].

The notable point in Equation 4, however, is the remittances-growth nexus. Economic growth, both in home and host countries, has emerged as an important factor in determining remittance inflows. The lower economic growth rate in the home country may cause higher migrations from the country and thus higher remittance inflow in the future. This is more pronounced when the country is passing through economic contraction phase (altruistic motive). One of the reasons for higher home remittances is to fight the negative consequence of the economic downturn.

On the contrary, higher economic growth in the home country may serve as motivation to remit higher amounts for investment purpose. This implies a bi-causal relationship between remittances and economic growth that may be counter-cyclical or pro-cyclical. Most importantly, remittance inflows could have a positive as well as negative impact on growth depending upon the transmission channel employed.[16] This simultaneous relationship is captured by incorporating simultaneity in the model.[17]

$$REM_{it} = \beta_0 + \beta_1 REM_{it-1} + \beta_2 lny_{it} + \beta_3 RER_{it} + \beta_4 Migr_{it} + \beta_5 FD_{it} + \beta_6 POV_{it} + \varepsilon_{it} \quad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \quad (5)$$

Where, *RER* is real effective exchange rate[18] and *Migr* stands for number of migrants from the home country. REM_{it-1} is the lagged value of remittances used to capture the signaling impact, as the higher inflows to the host economies in the previous year may be an indication of suitable environment, encouraging remitters for higher home remittances. The rest of the variables are as explained above.

Equation (5) not only captures the simultaneity involved in growth-remittances nexus but also include the implicit poverty alleviation effect of growth through increased remittances. Remittances, unlike other international financial capital inflows, are

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[15]Remittances inflows are defined as "Workers' remittances and compensation of employees comprise current transfers by migrant workers and wages and salaries earned by nonresident workers" [World Bank Group (2013)].

[16]Refer to Barajas, *et al.* (2009) for detail on transmission channels.

[17]This equation is adopted based on the literature available on the issue.

[18]Real Effective Exchange Rate= [(CPI USA/ (CPI local]* official exchange rate [Alfaro, *et al.* (2004)]. Studies focusing on motive to remit (and not only simple drivers of remitting) use Real Exchange Rate as movements in real exchange rate as it capture "economic conditions". For example "Real appreciation" may be an outcome of "lower inflation" or "higher interest rate" etc. which is not possible to capture using nominal exchange rate. Only through movements in "Real Exchange Rate" we can capture state of economy (boom or bust) which have implication for remittance inflows. For example, Olubiyi and Kubrat (2015) also use REER to explain movements in remittances inflows.

distributed primarily at the household level and affect the household poverty level through increased consumption of non-durables, food items and agriculture (irrigation) in African region [Nagarajan (2009)]. Poverty, as measured in this study, serves as an indicator of low economic condition at home country and may motivate migrants to remit higher amounts to meet the basic needs- the altruism. The theory of altruism proposes that increased welfare of the left-behinds (family) adds positively to the utility of migrants [Becker (1974); Stark (1991)]. Measured overall, poverty may reflect the poor economic conditions which may motivate the people to migrate and send remittances. Poverty can also serve as constraint to remittances inflows if people cannot afford the cost of migration.

Importantly, poverty derives remittances, but at the same time remittances affect poverty also. Babatunde and Martinetti (2010) report that remittances increased food security in Nigeria. Further, Nagarajan (2009), using a panel data, reports that remittance-recipient households consume a large share of the income on food and health. This implies that higher inflows of home remittances may affect poverty, through direct (increased income at the household community level, etc.) and indirect channels (resulting from increased economic growth; trickle down). Remittance inflows, therefore, improve the income of the households and help to reduce poverty. To capture the impact of remittance inflows on poverty, we extended the model and included poverty into it, as:

$$POV_{it} = \gamma_0 + \gamma_1 REM_{it} + \gamma_2 GG_{it} + \gamma_3 PCY_{it} + \gamma_4 FD_{it} + \varepsilon_{it} \quad \ldots \qquad \ldots \quad (6)$$

Where *POV* is the level of poverty and is measured by food deficit kilocalories per person per day, *GG* is the GDP growth, *PCY* is initial per capita income[19] and *FD* is financial development. Equation 6, when employing a simultaneous equation model, accounts for all the direct and indirect effects of remittances on poverty. The point worth mentioning is that in Equation 6, GDP growth (GG) is used instead of per capita GDP growth. The specification is adopted purposefully to capture the trajectory of economic growth given the initial level of income per capita. In a panel setting, it captures the poverty-eliminating trajectory of respective countries by controlling the relative poverty levels of the countries at the initial stage, which have a subsequent impact on poverty reduction efforts.

4. DATA AND ESTIMATION METHODOLOGY

4.1. Data

The sample consists of eight African OIC member countries namely Egypt, Mali, Morocco, Senegal, Sierra Leone, Sudan and Tunisia for the period from 1992 to 2010. The final selection of the countries and the time period is guided by the availability of data on major variables. All the variables are extracted from the 2013 online version of the World Development Indicators (WDI), International Financial Statistics (2012) and Penn World Table (2013). All the data are in constant US dollars ($) 2005. The variables are converted into a percentage of GDP except the indices.

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[19]Average per person income in 1992 in our case.

Given the non-availability, data on the real effective exchange rate for Egypt, Mali, Senegal, and Sudan were constructed, using Alfaro, *et al.* (2004) wherein REER real effective exchange rate= [(CPI) USA/ (CPI)]* local official exchange rate. Credit provided to the private sector (% of GDP) is used as a proxy for financial development (FD). Human Capital Index calculation, based on years of schooling [Barro and Lee (2013)] and the returns on education [Psacharopoulos (1994)], serves as the proxy for human capital [PWT (2013)], while telephones per 100 persons are used as physical capital/infrastructure/infrastructure (PC). Trade openness (OP) is the sum of exports and imports of goods and services as a ratio to GDP. To avoid the double counting bias, domestic investment (DI) is calculated by subtracting FDI from the gross fixed capital formation. Since the migration data were available at four years' interval so we interpolated the migration data to convert it yearly.

The definition of poverty has a special relevance for the region under consideration. Hunger persists widely in the majority of the population residing in African countries, while Sub-Saharan Africa ranks highest in hunger/malnourishment [FAO (2013)].[20] The measure of poverty used in this study essentially captures the food (in)security element.[21] The measure of poverty becomes highly relevant, given the estimates that 239 million people were hungry or undernourished in sub-Saharan Africa in 2010.[22] To capture the impact of poverty, this paper, uses the depth of hunger as a proxy for poverty and is measured in the food deficit kilocalories per person per day.[23] A higher number shows a deeper level of hunger.

The descriptive statistics highlight some differences in variables across the sample countries as reflected by the range and standard deviations (see Appendix A). Per capita GDP growth rate represents an average growth rate of 2 percent, indicating a low growth environment during the sample period. Remittances represent a major capital inflow at 4.57 percent of the GDP as compared with FDI of 2.43 percent of GDP. This suggests that remittances constitute major capital inflow during the sample period for these countries and could have a major impact on poverty levels and economic growth. It is also evident that sample countries use the domestic investment for financing their economic growth. In terms of poverty, the sample countries are found food deficient on average (119.83) ranging from severely food deficit Sierra Leone (333.00) to almost non-deficit Tunisia (3.00); similarly very lower level of openness is evident in the region. In summary, the descriptive statistics provide the motivation for further investigation.

4.2. Estimation Methodology

In the presence of simultaneous feedback of the dependent variables, estimating a single equation model would have been erroneous [Carkovic and Levine (2005a)]. A

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[20]http://www.fao.org/docrep/018/i3434e/i3434e.pdf

[21]Also the data on poverty head count ratio based on $ 1.25 and 2 per day and poverty gap were either not available for the panel of countries or a good number of values were missing.

[22]http://www.worldhunger.org/articles/Learn/africa_hunger_facts.htm

[23]"Depth of hunger or the intensity of food deprivation indicates how much food-deprived people fall short of minimum food needs in terms of dietary energy. The food deficit, in kilocalories per person per day, is measured by comparing the average amount of dietary energy that undernourished people get from the foods they eat with the minimum amount of dietary energy they need to maintain body weight and undertake light activity. The depth of hunger is low when it is less than 200 kilocalories per person per day, and high when it is higher than 300 kilocalories per person per day" (World Bank).

simultaneous equation model consisting of three equations with per capita GDP growth, remittance inflows (% GDP) and depth of poverty as dependent variables is estimated. Given the fact, that lagged values of the dependent variable may correlate with the combined error terms, leaves OLS redundant amid violation of orthogonality assumption. Generalised Method of Moments (GMM) is used to estimate a dynamic panel model to account for the endogeneity problem. We used "internal" instruments, as strictly exogenous instruments are hard to come by particularly in the context of sample countries. Sargent J stat [Sargan (1958); Sargan and Desai (1988)] tests the validity of instruments with null hypothesis that "instruments are valid".

5. RESULTS AND DISCUSSION

Since the basic hypothesis of the study is that higher the remittance inflow lower will be the poverty, and that strong and well established financial capital strengthens the impact. Also, we argue that financial development persuades remittance inflows. These hypotheses are tested in two ways (1) descriptive analysis (including correlation and graphical presentation of data) and (2) regression analysis.

5.1. Descriptive Analysis

The linear association between major variables is given in Table 1 below. The correlation coefficient between financial development and remittances is positive (0.27), suggesting that an increase in financial development increases remittances. Similarly, the data exhibits that financial development reduces poverty. The correlation coefficient between financial development and poverty is very high (–0.87) and negative, showing a very strong interrelation. Most importantly however, remittances are strongly (coefficient of association is –0.50) and negatively correlated with poverty, which support our very basic hypothesis that an increased inflow of remittances has strong poverty reduction effect.

Table 1

Correlation Matrix Panel Data [1992-2010, N=133]

Correlation	REM	FD	LNY	POV
REM	1.00			
FD	0.27	1.00		
LNY	0.37	0.90	1.00	
POV	–0.50	–0.87	–0.82	1.00

For the ease of the reader, we also present a country level graphical analysis of relationship/association between major variables of study. The relationship between financial development and poverty is inverse for the entire set of countries except Senegal [see part (i) Appendix B]. Part (ii) of Appendix B portrays the relationship between financial development and remittances. Remittances are supposed to be positively associated with strong and well established financial system. The data did not support this relationship in case of Egypt, Morocco and Tunisia while in the remaining countries the association holds. Lastly, in part (iii) inflow of remittances play significant role in reduction of poverty in all countries except Egypt and Senegal. Overall, the descriptive analysis provides evidence for major hypothesis of study.

5.2. Regression Analysis

All the three Equations (4, 5 and 6 above) are estimated simultaneously, and the results are reported in Tables 2, 3 and 4. 1st column of Tables 2, 3 and 4 reports the results of specification (1) while the second column of all three tables carry the results of specification (2) and so on. The sensitivity of the direction and magnitude of the impact of the respective variables is gauged by introducing an alternative set of alternative control variables (M1-M5). Last Column of all the three tables (M5) report the results of final specification and forms the bases of analysis and conclusions. To set the baseline comparison, we begin our discussions on results with M1 and then the impact of set of control variables is discussed in the light of findings from final model (M5).

Table 2

GMM Estimates for Determinant of Economic Growth [1992-2010]
[Dependent Variable= GDP Per Capita Growth (y)]

IND VAR.	M 1	M 2	M 3	M 4	M 5
y_1	–0.44***	–0.42***	–0.43***	–0.24***	–0.13***
	(0.08)	(0.08)	(0.08)	(0.07)	(0.04)
PC	0.12***	0.18***	0.22***	0.24***	0.30***
	(0.03)	(0.06)	(0.05)	(0.04)	(0.07)
REM	0.69*	1.09***	1.22***	0.83***	1.26***
	(0.48)	(0.38)	(0.39)	(0.34)	(0.45)
HC		–2.12*	–2.58***	–2.33***	–2.85*
		(1.29)	(1.21)	(0.91)	(1.65)
FD			–0.29	–0.77***	–0.54**
			(0.25)	(0.19)	(0.27)
GEXP			0.17	0.59	1.26*
			(0.59)	(0.49)	(0.80)
OP				–0.39	–0.91**
				(0.31)	(0.41)
FDI				0.39***	0.37***
				(0.06)	(0.08)
DI				1.40***	1.42***
				(0.17)	(0.19)
RFD					–0.01*
					(0.00)
Constant	2.50***	2.84***	3.13***	–0.91	–3.76*
	(0.57)	(0.72)	(1.32)	(1.36)	(2.55)
J-Stat	0.19	0.20	0.19	0.20	0.20
P-Value (J-stat)	0.91	0.90	0.98	0.99	0.99
No. of Obs.	**105**	**105**	**105**	**105**	**105**

In parentheses are Heteroskedasticity-Autocorrelation (HAC) corrected Newey-West standard errors.
*, **, ***indicate 10 percent, 5 percent and 1 percent level of significance respectively.

Table 3

GMM Estimates for Determinants of Remittance Inflows [1992-2010]
[Dependent Variable= Remittance as % of GDP (REM)]

IND VAR.	M 1	M 2	M 3	M 4	M 5
REM_1	0.93***	0.89***	0.84***	0.79***	1.05***
	(0.04)	(0.04)	(0.05)	(0.04)	(0.03)
Y	0.13***	0.12***	0.11***	0.09***	1.10***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
RER	0.03***	0.03***	0.03**	0.03***	0.09***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Migr			0.04	0.01	0.13*
			(0.03)	(0.03)	(0.08)
FD			0.08**	0.06**	0.17*
			(0.04)	(0.03)	(0.11)
POV					-0.24***
					(0.08)
Constant	−0.36***	−0.29***	−0.41***	−0.25**	0.75*
	(0.10)	(0.10)	(0.09)	(0.10)	(0.46)
J-Stat	0.19	0.20	0.19	0.20	0.20
P-Value (J-Stat)	0.91	0.90	0.98	0.99	0.99
No. of Obs.	105	105	105	105	105

In parentheses are Heteroskedasticity-Autocorrelation (HAC) corrected Newey-West standard errors.
*, **, *indicate 10 percent, 5 percent and 1 percent level of significance respectively.

Table 4

GMM Estimates for Determinants of Poverty [1992-2010]
[Dependent Variable= Depth of Hunger (Deficit Kilocalories per Day per Person]

IND VAR.	M 1	M 2	M 3	M 4	M 5
REM	6.03	4.64	−3.86	−9.36***	−8.33***
	(6.59)	(6.23)	(5.89)	(3.82)	(3.36)
GG	1.68*	0.58	0.63	−0.48	−1.17*
	(0.88)	(0.82)	(0.82)	(0.67)	(0.75)
PCY	−25.09***	−24.46***	−25.29***	−24.54***	−22.86***
	(9.08)	(9.18)	(6.65)	(4.19)	(4.88)
FD	−72.14***	−72.48***	−69.60***	−67.34***	−68.06***
	(7.57)	(7.65)	(5.82)	(3.59)	(3.34)
Constant	484.08***	484.55***	495.63***	493.99***	484.76***
	(45.18)	(45.30)	(33.91)	(21.37)	(25.03)
J-Stat	0.19	0.20	0.19	0.20	0.20
P-Value (J-Stat)	0.91	0.90	0.98	0.99	0.99
No. of Obs.	105	105	105	105	105

In parentheses are Heteroskedasticity Autocorrelation (HAC) corrected Newey-West standard errors.
*, **, ***indicate 10 percent, 5 percent and 1 percent level of significance respectively.

The estimation results of growth equation are presented in Table 2. The coefficient of the remittance inflows (REM) is positive and statistically significant, implying that higher inward remittances boost the economic growth in the home country. These results are in concurrence with Cooray (2012), Ratha (2013). Also, Fajnzylber and Lopez (2006); Fayissa and Nisah (2010); Imai, *et al.* (2014) and Javid, *et al.* (2012); reported a positive association between the inward remittances and growth. The significant and negative lagged dependent variable confirms the convergence hypothesis of Solow. The idea behind convergence hypothesis, also known as catch-up effect, is that poor countries grow faster as compared to rich countries and, in the long run, growth rate of rich and poor countries will converge to each other.[24] Physical capital/infrastructure (PC) enters with a statistically significant positive sign, implying that infrastructure development boosts economic growth [World Bank Staff (1994)].

Among other control variables, Column 1 of Table 3 reports the estimation results for Equation (5) [determinants of remittances]. The coefficient of per capita GDP growth is positive and statistically significant, suggesting that better economic conditions at home country lead to higher remittances back to home.[25] The lag of the dependent variable is positive and statistically significant suggesting the persistence. There may be two alternative explanations for this persistence. The first one, which is more plausible, is that due to inflation, a higher level of income is required to maintain the current standard of living and thus results in higher home remittance. Alternatively, higher remittances can be attributed to better investment opportunities in the home country. Real effective exchange rate (RER) (Table 3) shows a significant and positive impact on remittance inflows, suggesting that appreciation of home country's currency will lead to more inflow of remittances [Dakila and Claveria (2007)].[26]

Returning to the impact of remittances on poverty alleviation, remittances *(REM)* register a positive sign but is statistically insignificant, implying that higher remittances are not effective in mitigating poverty, as measured by food deficit (1st column of Table 4), even though they have been found significantly affecting growth positively. Also, it may be due to the uneven distribution of remittances themselves. Initial per capita income (PCY) has a significant and negative impact on poverty, confirming the argument that relative economic position of the countries measured in terms of per capita income is a significant determinant of poverty reduction.

Similarly, GDP growth (GG) enters with a statistically significant positive sign, suggesting plausibly, that initially with increased level of growth, in the presence of inequality, will increase the poverty.[27] It is stated that poverty is more sensitive to income inequality than to income level, and the country-specific threshold level of income inequality determine the extent to which the growth can reduce poverty [Fosu (2009)]. Financial development (FD) enters significantly with negative sign designating that financial development may be helpful in alleviating poverty. Remittances, serving as an alternative source of finance in the presence of credit constraints, provide more

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[24]Barro R. and X. Sala-i-Martin (1995) provides excellent discussion on the issue.

[25]It is assumed here that a part of inflows is used for investment.

[26]It is however asserted that appreciation in the currency is not necessarily guaranteed to be positive for the overall growth of the economy and that the argument drawn here must be evaluated only in the context of remittance-exchange rate nexus.

[27]Similar argument was forwarded by Ravallion (2007).

opportunities for investment to small entrepreneurs. Thus, more economic activity occurs which, in turn, through expanding employment opportunities, may reduce poverty [Ordóñez (2012); Jeanneney and Kpodar (2008)].

Interestingly, human capital enters into growth equation with negative sign. Initially, it may sound counter intuitive but it is not the case here. Human capital can carry negative sign in developing countries [Nyatepe-Coo (1998)]. Poor quality of education, higher costs involved in education, coupling with lower return and less job opportunities, a common case for the region understudy, can be probable candidates underlying this outcome [Pritchett (2001)]. Also, the gains from human capital depend on its interaction with other forms of capital available in country, say physical capital. These gains may not be realised if any of the two is below threshold level, a case in countries understudy.[28]

It is reiterated that even though we undertake a sensitivity analysis to observe the changes in the basic set of variable (specification 1), by including a set of control variables alternatively. But, for brevity, and to avoid any omitting variable bias, the results of the final model (model 5) are discussed in detail. Model-1 was discussed to set the base scenario in order to draw a meaningful comparison and implication of the introduction of the alternative set of variables. The discussion that follows is based on final specification (M-5 in respective Tables 2, 3 and 4).

In growth equation (Table 2), lagged growth (y_{t_1}) confirms the significant convergence across the sample countries and the relation is robust, but the rate of convergence is the lowest when the full set of control variables is introduced (M-5). Remittances inflows (REM), the variable of interest in the study at hand, contribute to the growth positively and the impact is robust across the alternative specification and retains statistical significance. Importantly however the impact magnitude is highest when the full set of controls is included in the model. Interestingly, however, irrespective of the set of controls, human capital (HC) retains the negative sign. The plausible reason for negative sign of HC might be the poor quality of education, higher cost of education with lower returns, especially at initial levels of human capital development and fewer job opportunities [Pritchett (2001)]. The point of caution, however, is interpreting this negative sign. It does not imply that human capital accumulation is bad for growth per say, rather it reflects the environment failing to exploit the human capital to maximise the gains.

Financial development (FD), measured as credit provided to the private sector, carries a statistically significant robust negative sign in growth equation (M-5, Table 2).[29] Financial liberalisation may generate uncertainty in the financial sector at the initial stages and hampering the growth consequently. Uncertainty in financial markets also means poor information which, through reduced investments, may cause financial underdevelopment harms growth. Further to add, a nonlinear monotonic relationship between financial sector development and economic growth may render negative impact in countries with lower levels of per capita income [Méon and Weill (2010); Rioja and

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[28]Studies reporting negative signs on human capital in growth equation include, but not limited to, Benhabib and Spiegel (1994); Kyriacou (1991); Lau, *et al.* (1991); Bashir (1999); and Pritchett (2001).

[29]The results are in concurrence with Loayza and Ranciere (2005) and De Gregorio and Guidotti (1995).

Valev (2004); Deidda and Fattouh (2002); Lee (1996)]. The estimates are not surprising, given the lower level of financial market development in sample countries, coupled with lower per capita income.

Government expenditures (GEXP) enter statistically significant and positive in growth equation (M-5, Table 2). Openness is found hampering the economic growth for the region while FDI and Domestic Investment (DI) persuade the growth in the region. A negative sign for openness implies that trade hurts the economies under investigation. This may partly be a reflection of the fact that the countries with specialisation in traditional goods, exporting raw material or primary goods and face lower levels of human capital. Consequently, a trade deficit may experience negative impacts of trade openness.

FDI inflows to the poor countries generate externalities through increasing business competence and easing technology transfers [Alfaro (2003) and Carkovic and Levine (2002b)]. FDI is also associated with the transfer of new knowledge in the form of acquisition of new skills, introducing modern management practices, etc. FDI can also accelerate growth in line with the development of domestic financial sector [Alfaro, *et al.* (2004); Hermes and Lensink (2003); Levine (1991)]. Additionally, this growth enhancing the impact of FDI has strengthened a crowd in domestic investment. We find the evidence of the complementary relationship as a domestic investment (DI), carries coefficient larger than that of FDI [Agosin and Mayer (2000)].

Lastly, we turn to the interactive impact remittance and financial development (RFD) on economic growth (model of Table 2). The argument is that effectiveness of remittance inflows, in promoting economic growth is conditional on financial sector conditions in the home country. Remittance inflows serve an alternative source and increase the supply of funds to domestic banking system facing resource constraints. Also, remittance inflows stimulate financial development by reducing intermediation costs. A negative sign on interaction term means that remittance inflows act as a substitute when there are credit constraints (i.e. low level of financial development). Looking at column 5 (M-5) of Table 2, we find a statistically significant negative sign of interaction term RFD confirming the substitutability between remittance inflows and financial development [Ruiz-Arranz and Giuliano (2005)]. Lastly, but most importantly, the constant term in the growth equation (Table 1) shows a significant decline in the growth over the time, registering negative growth rates on average for the region.

In the remittance inflows equation (Table 3, M-5), financial development (FD) enters with statistically significant positive, suggesting that a well-functioning financial market attracts more remittances as it provides an easy and efficient way for remitting. The findings are suggestive that for the countries under investigation, financial development increased the inflows of remittances over the period under study. Economic growth in the recipient country and real effective exchange rate appreciation attract a significant amount of remittances, and the relation is robust to the alternative set of control variables.[30]

Finally, we turn to the central concern of this study: the poverty-reducing impact of remittances. As is evident from the last column of Table 4, remittance inflows (REM)

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[30]A very detailed discussion of determinants of remittances is avoided intentionally as it does not fall in the primary scope of this study.

reduce poverty (consequently reducing hunger depth). Remittance inflows increase the income of households, resulting in higher levels of consumption of both durable and non-durable goods and increased saving ratios of families back home. Thus through an increase in consumption, this money flow result in increased demand for local products; and hence, stimulate the production of local goods and build small scale entrepreneurship [Woodruff and Zenteno (2001)]. The increased flows of remittances also act as a private welfare system that enhance the purchasing power of poor, smooth out consumption patterns, build infrastructure, human capital and reduce poverty [Adams, *et al.* (2008); Hildebrandt, *et al.* (2005); Fajnzylber and Lopez (2006)]. The findings are also suggesting that the positive impact of remittances is conditional on the level of financial development of recipient economies.

The study provides striking evidence on the severe depth of hunger irrespective of the control variables, as the deficit per day is greater than 485 kilocalories on average which is more than double of the target set for lower hunger i.e. 200 kilocalories per person per day. Looking at Table 3, it is evident that, along with per capita income (PCY), the contribution financial development (FD) is highest and a one percent increase in the provision of credit to private sector results in a drop in the mean depth of hunger by, as high as, 72 kilocalories per person per day. Intuitively, given the food deficit, hovering around 485 kilocalories per person per day, *citrus paribus*, credit provision to the private sector increased by 3 percent can eliminate/diminish the severe depth of hunger. Remittances, serving an alternative source of private credit as is evident from the above discussion, can be hugely effective in this context. Finally, Sargan J statistic of over-identifying restrictions is applied and the results, validating the instruments being exogenous, are reported in a 2nd bottom row of Tables 2, 3 and 4 respectively.

6. CONCLUSION

This study, using simultaneous equation model, assessed the impact of remittance inflows on economic growth and poverty for seven OIC member countries of African origin. Measured as the depth of hunger, we find that severe poverty prevails in the region. Importantly, however, remittance inflows appear productive for economic growth and help households get out of poverty. Some important findings emerge from the assessment. First and the foremost, international remittances exert a statistically significant poverty reducing impact through direct and indirect channels. Second, remittances contribute to the economic growth of the region significantly. Third, the contributions of remittances to growth are conditional on level of financial development. Fourth, financial market development and the initial level of per capita income exert a strong impact on alleviation of poverty. Increased provision of credit to private sector can help eliminate sever hunger. Fifth, private investors face credit constraints, and remittances may serve as an alternative source. Finally, the evidence submits that FDI,[31] physical capital/infrastructure, trade openness and government expenditures are significant determinants of economic growth.

These findings highlight some key policy implications. First, the countries need to design policies to promote export of labour in order to generate remittances. Second, financial market development is the key to growth enhancing and poverty reducing

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[31]Most importantly FDI crowd-in domestic investment in the region.

impact of remittances. The introduction of advanced technology in the banking sector may encourage the remitters to remit more through formal financial institutions at lower transaction cost which, in turn, could be better channelised to growth enhancing sectors of the economy to combat poverty. Also, there is an urgent need to bring serious financial reforms which could provide easy access to credit, while reducing credit constraints to reap gains from investing into small and medium enterprise projects. Government expenditures are found to be counterproductive for economic growth and thus need to be utilised so as to contribute positively to economic growth and to provide benefits to the poor. Finally, the governments of the respective countries should pay special attention to increasing the quality of the workforce through vocational and technical education, in line with the demands of national and international labour markets. This will not only generate more remittances through exporting skilled labour force to work in high paid sectors of foreign countries but will also enable the countries to reap benefits of other transnational investments and financial capital inflows.

Appendices

Appendix A

Descriptive Statistics [1992-2010]

Variable Name (Notation)	Mean	Max	Min	Std. Dev.
Financial Development (FD)	27.97	69.11	1.62	21.70
GDP per Capita Growth (y)	2.15	20.72	−18.58	4.01
Foreign Direct Investment (FDI)	2.43	9.42	−0.97	2.25
Government Expenditure (GEXP)	13.10	19.35	4.84	3.50
Human Capital (HC)	1.69	2.38	1.14	0.32
Domestic Investment (I)	17.21	30.25	−5.04	6.60
Number of Migrants (MIGR)	1.44	4.45	0.16	1.15
Openness (OP)	0.59	1.03	0.15	0.21
Remittances (REM)	4.57	14.58	0.01	2.60
Physical Capital/Infrastructure /Infrastructure (PC)	4.03	15.70	0.15	4.45
Initial per Capita Income (1992) (PCY) [US$]	1126.23	3861.51	304.25	899.02
Poverty (POV)	119.83	333.00	3.00	105.36

Appendix B (i)
Relationship between Financial Development and Poverty

Egypt

Mali

Morrocco

Senegal

Sierra Leone

Sudan
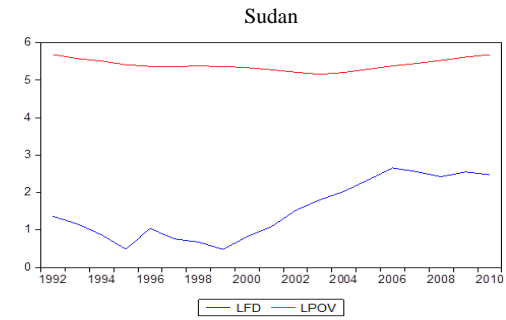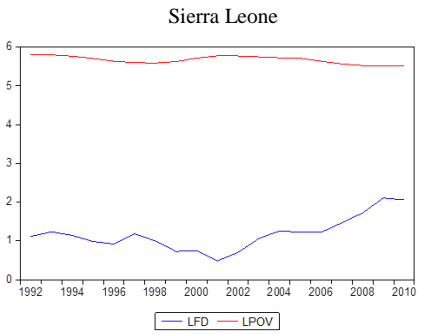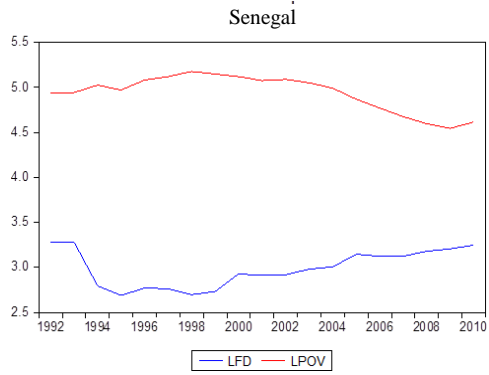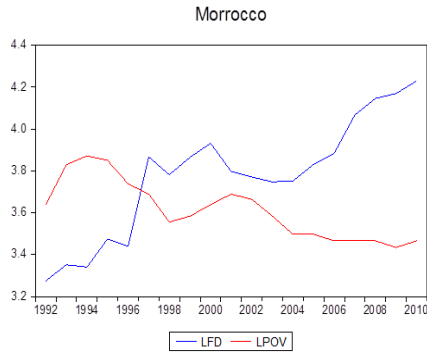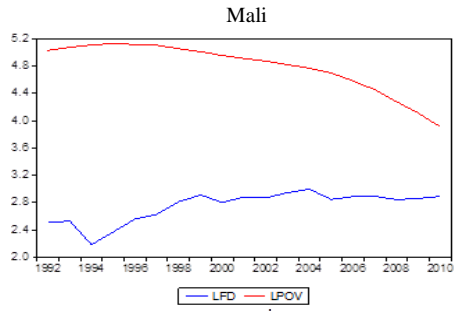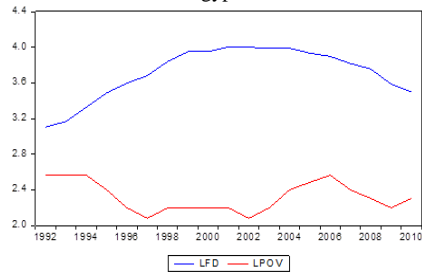
Tunisia

(ii) Relationship between Financial Development and Remittances

Egypt

Mali

Morocco

Senegal

Sierra Leone

Sudan

Tunisia
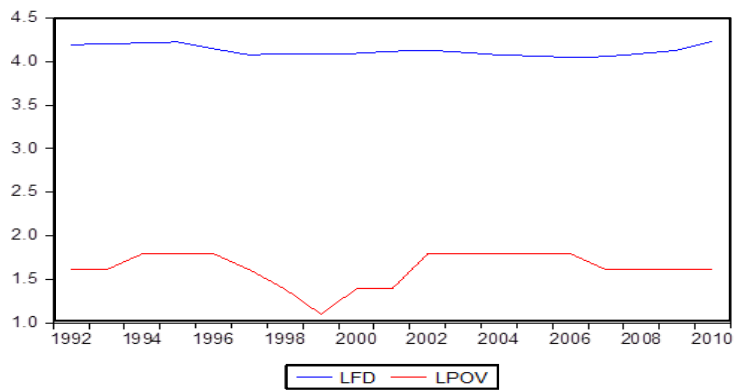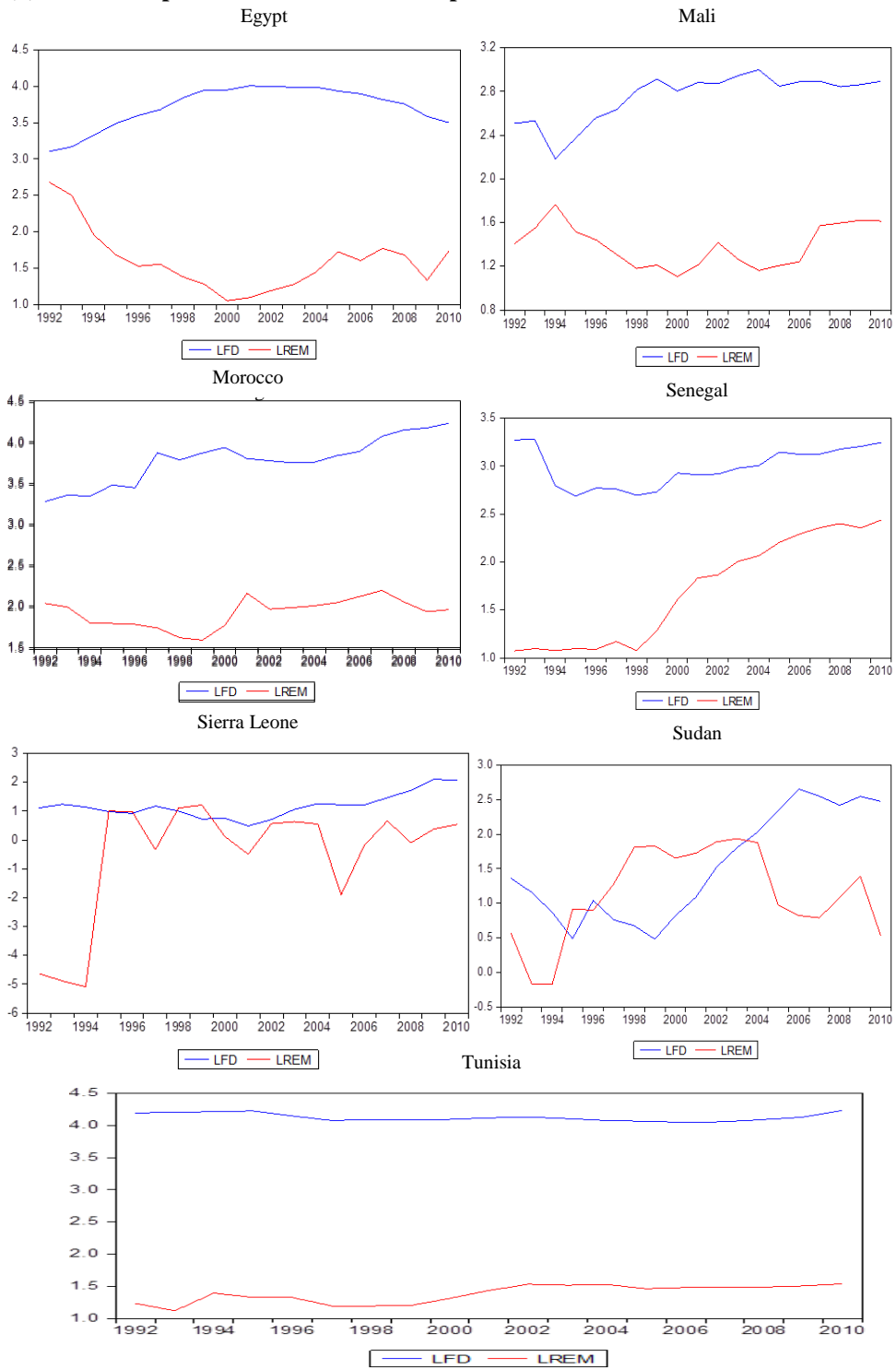
(iii) Relationship between Poverty and Remittances

Egypt

Mali

Morocco

Senegal

Sierra Leone

Sudan

Tunisia
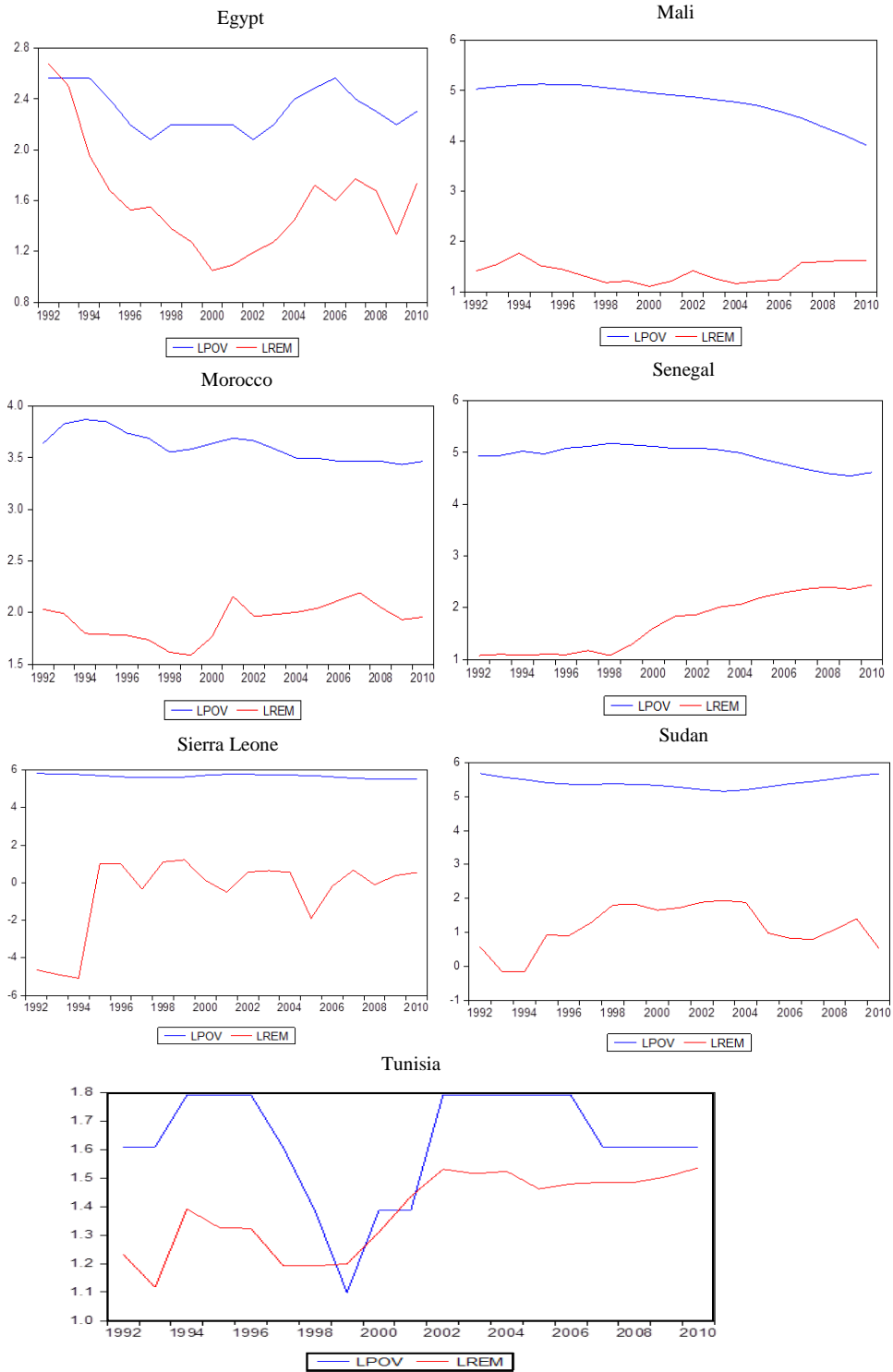
Appendix C

Average Human Capital Index by Region [1992-2010]

Classifications (Region)	Human Capital Index (Average)	Classifications (Region)	Human Capital Index (Average)
Africa	1.83	East Africa	1.71
African Muslim Countries	1.61	West Africa	1.74
African Non-Muslim Countries	1.92	North Africa	1.79
Central Africa	1.99	Southern Africa	2.11

Note: Calculations are made using data from Penn World Table 8.0 (2013) for the African region. The data on Human capital index for the countries (Algeria, Comoros, Djibouti, Eritrea, Ethiopia, Guinea-Bissau, Libya, Nigeria, Somalia, Angola, Burkina, Chad, Madagascar, Malawi, Sao Tome and Principe, Seychelles and Togo are not available so, these countries are not included in the calculation.

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