

EXPLORING THE NEXUS BETWEEN REMITTANCES, ODA, FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH: A STUDY OF INDIA

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***Abstract:** In this paper, we explore the relationship between remittances, net official development assistance, financial development and output per worker in India from 1975 to 2012. Using the augmented Solow framework with the autoregressive distributed lag bounds procedure; we examine the cointegration relationship as well as short-run and long-run effects. The results show that the remittances inflow, net official development assistance and financial development do not have statistically significant impact on growth both in the short run and long run. It is imperative for the policymakers to implement a holistic policy for realising the effect of selected variables on growth of the country.*

***Keywords:** Remittances, ARDL, ODA, Financial Development, Economic Growth*

***JEL Classification:** C22, F24, F43, O54*

INTRODUCTION

Remittances in India have been growing rapidly since 1991, making it one of the largest recipients of remittances. The Reserve Bank of India (RBI, 2003) reported that workers' remittances has been reached US\$ 46.4 billion in fiscal year 2008-09 from US\$ 2.1 billion in fiscal year 1990-91. With an estimated US\$ 70 billion in remittance inflows in 2013, India is the world's foremost remittance destination. With increasing international and internal migration, they are considered to be an 'important and stable source of external development finance' for households in source regions (Ratha, 2003). As noted in Fig. 1, although there was an increase in domestic credit between 1975- 2012, but it remained below 60 percent of GDP (Gross Domestic Product). Moreover, there has been some volatility in aid inflows (ODA as a percent of GDP) over the same period. On the other hand, the remittances inflow has increased significantly since early 1991. It is also noted that the

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remittances inflow has been relatively stable, indicating some resilience from economic shocks. According to Giuliano & Ruiz-Arranz (2009), remittances can significantly improve economic growth, if the financial sector development has been taken into consideration. A well-developed financial sector has the ability to remove credit constraints and enhance the economic growth. However, many researchers found that in countries with poorly developed financial markets remittances can be an important source of financing growth-enhancing activities. This study is an attempt to explore the nexus between remittances, financial deepening and official development assistance (ODA) vis-a`-vis growth.

The structure of our paper is as follows. Section 2 provides a brief review on selected variables. Section 3 discusses the empirical methodology. Section 4 deals with the results and discussion. We conclude the study in Section 5.

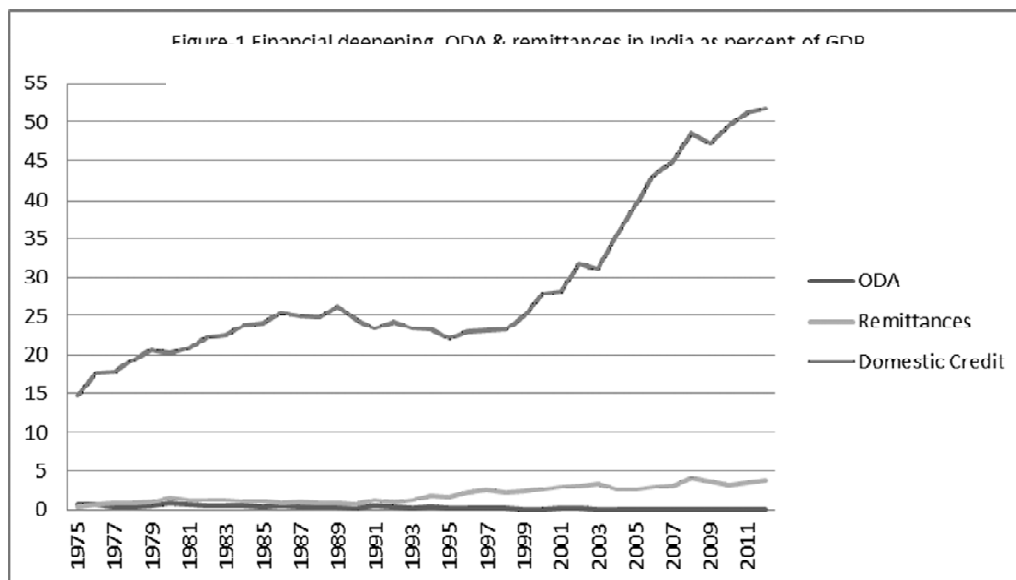


Figure 1: Financial deepening, ODA & remittances in India as percent of GDP

REVIEW ON REMITTANCES, AID AND FINANCIAL DEEPENING

Remittances have proved to be less volatile, less pro-cyclical and, therefore, a more reliable source of foreign currency than other capital flows to developing countries such as foreign direct investment and development aid. On the national level, there is substantial evidence that remittances are increasingly important and relatively stable source of external finance that often play a critical social insurance role in countries affected by economic and political crisis (Kapur, 2003). At a global level, remittances have surpassed the official development assistance (ODA) of developing countries. Moreover remittances flowing to developing countries have

increased from US\$22 billion (1985– 1990) to US\$325 billion (2010) (Mohapatra et al., 2011). The magnitude of remittances to India increased steadily during the 1970s; remained more or less flat in the 1980s and grew rapidly in the 1990s (the sharpest increase took place during 1991-97). In terms of percentages of GDP at market price, remittances were around 0.02 percent in 1971, 0.78 percent in 1991 and 3percent in 2012(World Bank,2016). Remittances have a welfare enhancing effect, particularly when supporting consumption, capital investment, education and human capital development, entrepreneurship, and poverty reduction efforts (Buch and Kuckulenz, 2010; Rao and Hassan, 2012a).

Remittances increase household incomes and are therefore a powerful anti-poverty tool in developing countries like India. One cross country study of 71 developing countries found that a 10 percent increase in the official remittances causes a 3.5 percent decline in poverty (Adams, 1991). Similarly IMF (2007) study finds that on average, a 10% increase in the share of remittances in a country's GDP is associated with about a 1.5 % fall in headcount poverty and 1.1 % fall in poverty gap. Evidence from Latin America, Africa, South Asia and other regions suggests that remittances reduce the depth and severity of poverty, as well as indirectly stimulate economic activity (Adams 1991, Fajnzylber & Lopez 2007).

Like remittances, impact of official development assistance would be greater if the economic system of the country is very poor (Guillaumont and Chauvet, 2001). However, Burnside and Dollar (2000) find that aid can have beneficial impact on the economic growth of the recipient country given that it has a good set of trade, monetary and fiscal policies in place. It fails to promote economic growth in case of inefficient policies for economic assistance programme. According to the Martínez-Zarzoso et al. (2008) due to raise in the exchange rate, the effect of aid on the exports of the recipient country tends to be detrimental. He concludes that the net effect of ODA on the country receiving the aid is not significant.

Financial Development of a country has the ability to enhance economic growth. Remittance enforces growth in countries with less developed financial system. In addition to this the inflow of remittance influences the growth of financial development in developing countries (Aggarwal et al., 2011). Many studies have been done on the relationship between financial development and economic growth. In case of developing countries Hassan et al. (2011) find a positive association between finance and economic growth. Similarly several other studies find a positive correlation between financial development and economic growth despite mixed views on the direction of causality between the two (Khan and Senhadji, 2003; Odhiambo, 2010; Savvides, 1995). According to many researchers, the dynamics of financial systems are characterized by their ability to produce information about possible investments ex ante, to mobilize and pool savings and allocate capital, to monitor investments and exert corporate governance after providing finance, to facilitate the trading, diversification and management of risk,

and to ease the exchange of goods and services (Beck et al., 2000; Greenwood and Jovanovic, 1990; McKinnon, 1973; Levine, 1997). Three indicators are often used to assess financial deepening. These include bank credit to private sectors as a percent of GDP, turnover rate of stock market or ratio of shares traded to GDP, and the extent of shareholder and creditor protection as part of the legal or regulatory characteristics of the financial system (Kumar, 2013). Against this backdrop, this paper is an attempt to investigate the relationship between remittances, net official development assistance, financial development and economic growth in India.

We hypothesize that the remittances inflow, aid and financial deepening measured by domestic credit to private sectors have plausible positive effect on growth in India given their trend and magnitude.

EMPIRICAL METHODOLOGY

Method

We have followed the similar approach laid down by Rao & Takirua (2010), Rao & Hassan (2012) and Kumar (2013). The methodologies introduced by them are related to augmented Solow framework (Solow, 1956).

The per worker output (y_t) equation is defined as

$$y_t = Ak_t^\alpha, \alpha \in (0, 1) \quad (1)$$

Where A = Stock of technology and K = Capital per worker, and α is the profit share.

The Solow model assumed that the evolution of technology is given by,

$$y_t = A_0 e^{gt} \quad (2)$$

Where, A_0 is the initial stock of knowledge and T is time.

It is also plausible to assume for our purpose that:

$$A_t = f(T, REM, ODA, FIN) \quad (3)$$

Where,

y = Output per worker in US dollars deflated at 2010 prices;

k = Capital per worker in US dollars deflated at 2005 prices;

REM = Workers' remittances as a percent of GDP;

ODA = Net official development aid as a percent of GDP;

FIN = Domestic credit to private sectors as a percent of GDP that is a proxy variable for financial deepening.

The effects of REM, ODA and FIN on total factor productivity (TFP) have been captured with REM, ODA and FIN entered as shift variables in the production function (Rao, 2010). Subsequently,

$$A_t = A_0 e^{gt} REM_t^\beta ODA_t^\lambda FIN_t^\gamma \quad (4)$$

And

$$y_t = \left(A_0 e^{gt} REM_t^\beta ODA_t^\lambda FIN_t^\gamma \right) k_t^\alpha \quad (5)$$

The above equations can also be formulated as:

$$\Delta \ln y_t^* = g + \beta \Delta \ln REM_t + \lambda \Delta \ln ODA_t + \gamma \Delta \ln FIN_t \quad (6)$$

Where, the term Δ denotes the partial differential of logs of respective variables and the intercept term, g , is the TFP, which was compactly defined.

Data

We applied the perpetual inventory method to build the data for capital stock. We assumed depreciation rate (δ) of 0.08 and an initial capital stock (k_0) as 1.2 times of the real GDP of 1974 in constant USD (US dollars at 2010 prices). The gross fixed capital formation in constant 2010 USD term has been used as a suitable proxy for aggregate investment (I_t).

Hence, $K_t = (1 - \delta) K_{t-1} + I_t$. The data on working population has been applied as proxy for labour stock. The data on remittances, net official development assistance and financial development have been used as a percent of GDP. Moreover, The Domestic credit to private sector has been used as a proxy for financial development. The total of 38 years of annual data over the period 1975–2012 have been considered for the analysis that are duly transformed into natural log form. The data on key variables were obtained from World Development Indicators 2016 (World Bank 2016).

ARDL Approach

Pesaran & Pesaran (1997); Pesaran & Smith (1998); Pesaran & Shin (1999) and Pesaran et al. (2001) generalize the ARDL technique. This model does not involve the pre-testing of variables. The test on existences of relationship between variables in all level can be applicable irrespective of whether the underlying regressors are purely I(0), purely I(1) or fractionally co-integrated (Pesaran & Pesaran, 1997).

The autoregressive distributed lag (ARDL) approach has been used because it has relatively simple and recommended for small sample size (Ghatak & Siddiki 2001; Pesaran et al., 2001). To examine the co-integration based on the computed F-statistics, it has recommended to use the critical bounds from Narayan (2005)

that are specifically constructed for a small sample size. Moreover, the critical bounds of Pesaran et al. (2001) are suitable when sample size exceeded 80.

The ARDL equation is specified as follows¹:

$$\begin{aligned} \Delta Ly_t = & \beta_{10} + \beta_{11} Ly_{t-1} + \beta_{12} Lk_{t-1} + \beta_{13} LREM_{t-1} + \beta_{14} LODA_{t-1} + \beta_{15} LFIN_{t-1} \\ & + \beta_{16} TREND + \sum_{i=1}^p \alpha_{11i} \Delta Ly_{t-i} + \sum_{i=1}^p \alpha_{12i} \Delta Lk_{t-i} + \sum_{i=1}^p \alpha_{13i} \Delta LREM_{t-i} \\ & + \sum_{i=1}^p \alpha_{14i} \Delta LODA_{t-i} + \sum_{i=1}^p \alpha_{15i} LFIN_{t-i} + \varepsilon_{1t} \end{aligned} \quad (7)$$

RESULTS AND DISCUSSION

Unit Root Test

According to Granger (1988), we cannot do any regression, unless all variables are stationary. Hence, to check the variables are stationary or not, we applied Unit Root test.

We carried out the unit root test in order to determine the variables are used in the study are at most integrated in one order (I(1)), i.e. the variables are at most stationary in their first differences mode. Moreover, performing the unit root test helps us to conduct a robust causality assessment. Subsequently, we applied the ADF and Phillips–Perron test to examine the time series properties of the variables and computed the unit root statistics. The test statistics has shown that all the variables have stationary properties at most in their first differences (see the Table 1).

Table 1
Results of unit root tests.

Variables in log form	ADF		Phillips – Perron test	
	Level	First difference	Level	First difference
Ly_t	2.9126	-5.4789***	5.1985	-5.4818***
Lk_t	-0.3132	-22.4946***	3.6395	-5.8334***
$LREM_t$	-1.7507	-7.8615***	-1.7527	-7.6612***
$LODA_t$	-0.3932	-7.4954***	-1.4083	-9.7796***
$LFIN_t$	-0.3209	-6.5157***	-0.5363	-6.4052***

The ADF critical values are based on McKinnon. The optimal lag was chosen based on the Akaike Information Criterion (AIC).

The null hypothesis for both ADF and Phillips–Perron tests in a series has a unit root (non-stationary).

**The rejection of the null hypothesis of unit root at 5% level of significance.

***The rejection of the null hypothesis of unit root at 1% level of significance.

Bound Test

To examine the existence of long run relationship, we applied bound test- an estimation model developed by Pesaran, Shin & Smith (2001). This is an approach to test the existence of a level relationship among variables based on F statistics.

The bounds F-statistics evidence a long-run co-integration when per worker output (Ly_t) has been taken as the dependent variable. Here, the F-statistics of 10.425 exceed the upper critical bound of 7.063 at the 1 per cent level of significance (see the Table 2). Like output per worker has computed F statistics of capital per worker (k_t) is also exceeded the upper critical bound.

Notably, when we set all the other variables ($LREM_t, LODA_t, LFIN_t$) as dependent variable, the F-statistics do not satisfy the critical bounds, thus confirming a two co-integrating vector. The existence of a long-run relationship has been traced by imposing a restriction on all the estimated coefficients of lagged level variables equating to zero. Hence, in essence, the bounds test that based on the F-statistics (or Wald statistics) with the null hypothesis of no co-integration ($H_0 = \beta_{i1} = \beta_{i2} = \beta_{i3} = \beta_{i4} = \beta_{i5} = 0$) against the alternative hypothesis of the existence of long-run co-integration ($H_{01} \neq \beta_{i1} \neq \beta_{i2} \neq \beta_{i3} \neq \beta_{i4} \neq \beta_{i5} \neq 0$). The results of the bounds tests (Table 2) confirm the presence of a long-run relationship when only real output per worker (Ly_t) is set as the dependent variable.

Diagnostic and stability test

To check the model is strong or not, it is necessary to evaluate diagnostic and stability test. The diagnostic tests have been evaluated based on the initial ARDL model. These include: (a) the Lagrange multiplier test of residual serial correlation, (b) a normality test based on a test of skewness and kurtosis of residuals and (c) a

Table 2
Results of Bound Test

<i>Dependent variable</i>	<i>Computed F-statistic</i>	
Ly_t	10.40525	
Lk_t	8.4325	
$LREM_t$	1.6732	
$LODA_t$	4.4551	
$LFIN_t$	4.327	
<i>Critical Value</i>	<i>Lower bound value</i>	<i>Upper bound value</i>
1%	5.33	7.063
5%	3.710	5.018
10%	3.008	4.150

Notes: Critical values are from Narayan (2005, pp. 1988)

heteroscedasticity test based on the regression of squared residuals on squared fitted values (See the Table 3).

Based on the chi-square results, the diagnostic tests confirmed that the equation performed well. This is because of the disturbance terms are normally distributed and serially uncorrelated with homoscedasticity of residuals, thus the model has correct functional form. Moreover, the cumulative sum control chart (CUSUM) and CUSUM-of-squares plot that measured the stability of the parameters in the model is indeed stable (see the Figures 2 and 3).

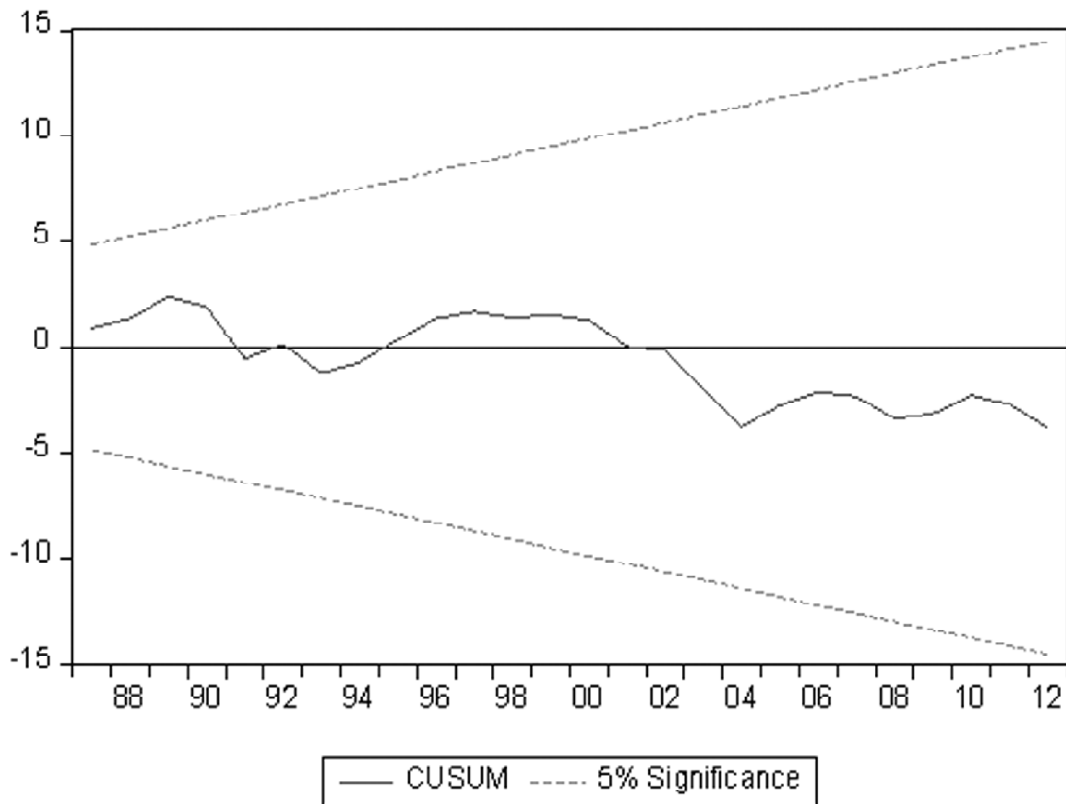


Figure 2: Plot of cumulative sum of recursive residuals.

Table 3
Diagnostic tests - from the ARDL approach

Test types	LM version	p-Value	F version	p-Value
Serial correlation	0.1626	0.9219	0.0544	0.9471
Normality	0.9510	0.6215	Not applicable	
Heteroscedasticity	3.8439	0.9214	1.4050	0.2367

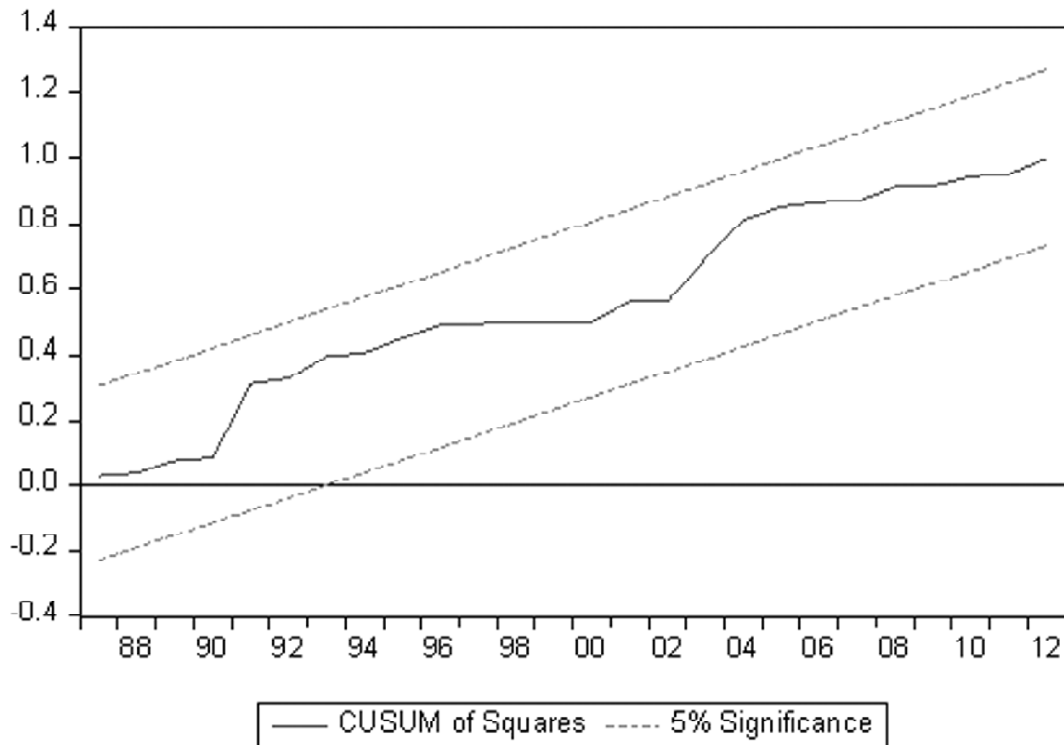


Figure 3: Plot of cumulative sum of squares of recursive residuals

Long run and short run results

The long-run results show that capital per worker (statistically significant at 1 per cent level) is a dominant driver of growth ($Lk_t = 0.55$). In short run also the coefficient of ΔLk_t is statistically significant. On the other hand, we found that remittances, financial development and net official development assistance are not statistically significant, both in the long and short run.

CONCLUSION

In this paper, we explored the relationship among remittances, net official development assistance, financial development and economic growth. We used the augmented Solow framework (Rao, 2010; Rao & Hassan, 2012; Kumar, 2013), ARDL Bounds Procedure to explore the relationship between remittances, net official development assistance, financial deepening vis-a' -vis growth in India, from 1975 to 2016. We find a long run relationship among the selected variables. However, short run and long run coefficient analysis results show that the remittances inflow, net official development assistance and financial development are not statistically significant in both the short run and the long run.

Table 4
Estimated long-run and short run coefficient

Long-run: dependent variable Lyt			Short-run: dependent variable $DLyt$				
Regressor	Coefficient	t-Ratio		Regressor	Coefficient	t-Ratio	
Lk_t	0.5506	6.2142	***	ΔLk_t	8.3988	7.1054	***
$LREM_t$	-0.0058	-0.4387	N.S	ΔLk_{t-1}	-3.0050	-5.3788	***
$LODA_t$	-0.0117	-1.1626	N.S	$\Delta LREM_t$	-0.0173	-1.0800	N.S
$LFIN_t$	-0.0283	-0.8586	N.S	$\Delta LODA_t$	-0.0113	1.2893	N.S
TREND	0.0987	2.0192	*	$\Delta LFIN_t$	-0.0176	-0.2720	N.S
				Constant _t	2.2391	8.2166	***

N.S. = Not significant within 1–10 percent level of significance.

* Significant at 10% level

** Significant at 5% level

*** Significant at 1% level

On the policy front, the use of remittances needs to be reviewed as the impact of remittances on growth is not significant in our results. In-depth research on utilisation of the remittances will provide greater insight into the role of remittances on various socio-economy aspects in India. Moreover, in order to realize the effects of remittances; financial products and formal channels through which remittances may be mobilized, must be made more cost effective and efficient (Kumar & Thu Vu, 2014).

The effect of net official development assistance (ODA) on growth is not significant both in the long-run and the short run. Hence, it is the need of the hour to have a more vigilant look into the aid deployment and management aspects. The effect of financial deepening is also not significant in our results. This is because of the low share of domestic credit (as a percent of GDP) over the sample period, which is indicative of weak financial intermediation (Diego, 2009). Thus, for optimising the benefit from remittances and net development assistance; development of financial sector, technology, financial literacy and supporting institution is very much essential.

Note

1. Other cointegration specifications were tested by setting Lk_t , $LREM_t$, $LODA_t$, $LFIN_t$ as the dependent variable, respectively. To conserve space, their respective regression specifications are not shown.

References

- Acosta, P *et al.* (2007). The impact of remittances on poverty and human capital: Evidence from Latin American household surveys. *Policy Research Working Paper Series 4247*. Washington, DC: The World Bank. (<http://econ.worldbank.org>)
- Adams, J.R. (1991). The Effects of International Remittances on Poverty, Inequality and Development in Rural Egypt. *Research Report 86*, International Food Policy Research Institute, Washington, DC.

- Aggarwal, R. et al. (2011). Do remittances promote financial development? *Journal of Development Economics*, 96, 255–264.
- Beck, T. et al. (2000). Finance and the sources of growth. *Journal of Financial Economics*, 58, 261–300.
- Buch, M.C., Kuckulenz, A., 2010. Worker remittances and capital flows to developing countries. *International Migration* 48, 89–117.
Food Policy Research Institute, Washington, DC.
- Aggarwal, R. et al. (2011). Do remittances promote financial development? *Journal of Development Economics*, 96, 255–264.
- Beck, T. et al. (2000). Finance and the sources of growth. *Journal of Financial Economics*, 58, 261–300.
- Buch, M.C., Kuckulenz, A., 2010. Worker remittances and capital flows to developing countries. *International Migration* 48, 89–117.
- Burnside, C. & Dollar D. (2000). Aid, policies, and growth. *American economic review*, 847–868.
- Dickey, D. A. & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, 74, 427–431.
- Diego, H. (2009). Remittances and Financial Development in Latin America. School of Business and Economics – Institute of Public Economics. Humboldt-Universitat, Berlin, Germany (MA Thesis).
- Ghatak, S. & Siddiki J. (2001). The use of ARDL approach in estimating virtual exchange rates in India. *Journal of Applied Statistics*, 28 (5), 573–83.
- Giuliano, P. & Ruiz-Arranz M. (2009). Remittances, financial development, and growth. *Journal of Development Economics*, 90 (1), 144–152.
- Granger, C.W.J. (1988). Some recent developments in a concept of causality. *Journal of Econometrics*, 39 (1/2), 199–211.
- Greenwood, J. & Jovanovic, B. (1990). Financial development, growth, and the distribution of income. *Journal of Political Economy*, 98, 1076–1107.
- Guillaumont, P. & Chauvet L. (2001). Aid and performance: a reassessment. *Journal of Development Studies*, 37(6), 66–92.
- Hassan, M.K. et al. (2011). Financial development and economic growth: new evidence from panel data. *The Quarterly Review of Economics and Finance*, 51, 88–104.
- IMF (2008), 'Macroeconomic Consequences of Remittances', International Monetary Fund, Washington: DC. Occasional Paper No. 259.
- Kapur, D. (2004). Remittances: The New Development Mantra? New York and Geneva, UN Conference on Trade and Development, G-24 Discussion Paper Series No. 29.
- Khan, M. & Senhadji, A. (2003). Financial development and economic growth: a review and new evidence. *Journal of African Economies*, 12, 89–110.
- Kumar, R.R & Thu V. (2014). Exploring the Nexus between ICT, Remittances and Economic Growth: A Study of Vietnam. *Journal of Southeast Asian Economies*, 31(1), 104–120.
- Kumar, R.R (2012). Remittances and economic growth: A study of Guyana. *Economic Systems* 37, 462–467.

- Levine, R. (1997). Financial development and economic growth: views and agenda. *Journal of Economic Literature* 35, 688–726.
- Martínez-Zarzoso, I et al. (2009). Does German development aid promote German exports. *German Economic Review*, 10(3), 317–338.
- McKinnon, R.I.(1973). Money and Capital in Economic Development. *Brookings Institution, Washington, DC*.
- Mohapatra, S. et al. (2011). Migration and Development Brief 17. *World Bank, Washington, DC*.
- Narayan, P.K. (2005). The saving and investment nexus for China: Evidence from cointegration tests. *Applied Economics* 37, 17, 1979–90.
- Odhiambo, N.M. (2010). Finance-investment-growth nexus in South Africa: an ARDL-bounds testing procedure. *Economic Change and Restructuring*, 43, 205–219.
- Rao, B.B. & Hassan, G.H. (2012). An analysis of the determinants of the long-run growth rate of Bangladesh. *Applied Economics*, 44, 565–580.
- Rao, B.B. & Hassan, G.H. (2012). Are the direct and indirect growth effects of remittances significant? *World Economy*, 35, 351–372.
- Rao, B.B. & Takirua, T. (2010). The effects of exports, aid and remittances on output: the case of Kiribati. *Applied Economics*, 42, 1387–1396.
- Rao, B.B. (2010). Estimates of the steady state growth rates for selected Asian countries with an extended Solow Model. *Economic Modelling*, 27, 46–53.
- Ratha, D. (2003). Workers' Remittances: An Important and Stable Source of External Development Finance. *Global Development Finance*, 7.
- Reserve Bank of India (2009). Handbook of Statistics on the Indian Economy 2008-09. RBI Bulletin, Mumbai.
- Savvides, A. (1995). Economic growth in Africa. *World Development*, 23, 449–458.
- Solow, R.M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70, 65–94.
- World Bank (2016). World Development Indicators. World Bank, Washington, DC.