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A Study on the Role of Remittances in Fiji's Economic Growth: An Augmented Solow Model Approach

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Abstract

In the context of the ongoing current global economic downturn, mobilization of foreign exchange earnings has assumed considerable importance. By adopting an augmented Solow model approach, this paper examines the long-run growth effects of Fiji's inward remittances during a three-decade period (1979-2008). The paper also discusses some important policy implications arising out of the study findings.

Keywords: Remittances, financial sector development, exports, economic growth, bounds test

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I. Introduction

In recent years, remittance inflows have become an important source of foreign exchange earnings for Fiji. Until 2003, remittances were a small proportion of its gross domestic output (GDP). In early years of independence since 1970, they formed less than one percent of GDP. From 1.3 percent of GDP in 2002, the ratio jumped to 5.3 percent in 2003[1] and continued to hover around a little more than 5 percent until 2006. This was also the period during which bank lending to private sector registered a high growth. The indications are that remittance receipts are now increasingly entering the system through banking channels, improving greater financial intermediation. The latter facilitates transfer of funds to investors in the private sector for investment in productive areas.

There are two recent studies, Browne and Leeves (2007) and Prakash (2009) on Fiji's inward remittances. Both of them investigate impact of remittances on household incomes and expenditures. Our study, unlike the aforementioned two studies, focuses on the growth nexus between remittances and growth in Fiji during a 30-year period (1979-2008), by adopting an augmented Cobb–Douglas production function approach along the lines of a Solow growth model employed by Luintel, Khan, Arestis and Theodoridis (2008) and Rao, Tamazian, Singh and Vadlamannati (2008). Our objective is to investigate whether there has been any long-run relationship between per capita real GDP, per capita physical capital stock and remittances through co-integration tests. The paper is organized into five sections. The second section provides a brief review of economic literature on the linkages between remittances and growth; the third section examines recent trends in inward remittances of Fiji. The fourth section outlines the methodology adopted to undertake the empirical study and discusses the results. The fifth and last section presents conclusions with some policy implications.

II. A brief literature survey

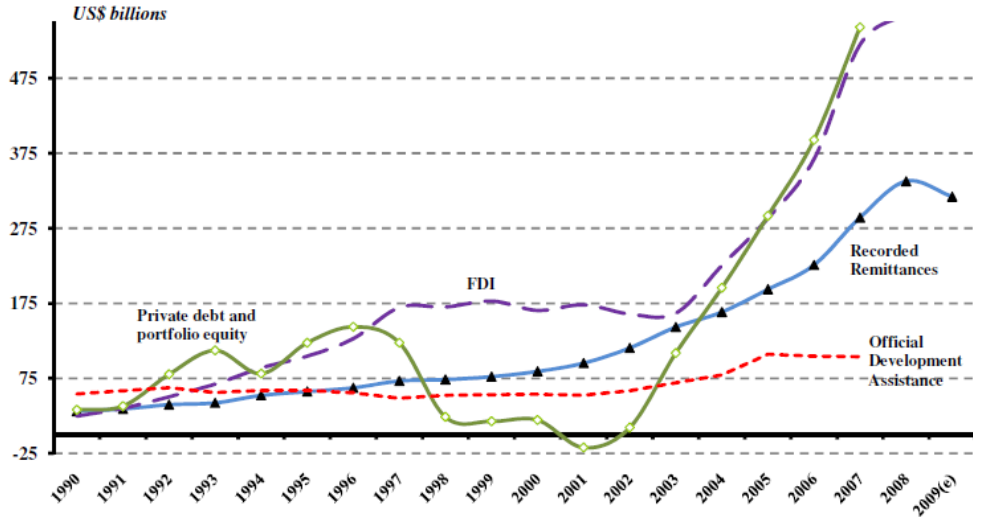
Remittances, which are defined as private income transfers from one or more family members living and working abroad back to the remaining family unit in the home country (Chami *et al.* 2006), have surpassed official development assistance of developing countries (Figure 1). Furthermore, remittances have been growing substantially (Table 1), increasing from US$22 billion in 1985-1989 to US$338 billion in 2008 (World Bank 2009b).

[1] The reasons behind this surge are not clear. It might be due to better reporting or other factors responsible for the surge in the inward remittances, including outmigration of skilled persons following the 2000 coup.

The role of remittance inflows has been well recognized. They reduce poverty by enabling the recipient families to increase consumption and to some scale, contributing to capital investment (Buch and Kuckulenz 2004; Maclellan and Mares 2005; and Ratha 2007). Overall, remittances spent on expenditures beyond daily consumption enhance productive capacities of the economy thereby contributing to economic growth. Further, remittances have become an increasingly important source of development finance, supporting the balance of payments and contributing to investment. In regard to poor households, they help in developing human capital by contributing to education and healthcare needs and foster entrepreneurial development through investments in businesses, especially during economic crises and natural disasters (UN ESCAP 2010).

Figure 1:

Remittances and capital flows to developing countries*



Source: World Bank (2006, 2009a, 2009b), *Global Economic Prospects 2009* (World Bank), *IMF Balance of Payments Statistics Yearbook 2008,* and *Global Development Finance 2008*.

Table 1: Remittance, capital inflows to developing countries from 1990 – 2009*

Year	Remittances (in Billions)	FDI (in Billions)	Private Debt and Portfolio Equity (in Billions)	ODA (in Billions)
1990	31	25	33	54
1991	34	35	38	58
1992	40	50	80	62
1993	42	67	112	56
1994	52	89	81	59
1995	57	105	122	59
1996	62	128	144	56
1997	71	169	122	49
1998	73	170	23	52
1999	77	178	18	53
2000	84	166	19	54
2001	95	173	(17)	52
2002	116	161	9	58
2003	143	162	109	69
2004	163	226	196	79
2005	194	289	292	107
2006	226	368	393	104
2007	289	520	543	104
2008	338	562	n.a.	n.a.
2009*	317	n.a.	n.a.	n.a.

*Source: The World Bank - Briefing 3: Remittance Trends 2007 (updated July 10, 2008); *estimated by World Bank (2009a), and Global Financial Indicators from World Bank; n.a = not available.*

Maclellan and Mares (2005) point out that migration has become an outlet for many Pacific Island countries (PICs) including small islands states, such as Niue, Kiribati, Tuvalu, and Wallis and Futuna. Three phases of emigrants' motivations behind steady remittances evolving over their careers have been identified by an IMF study (Browne 2006). In the first phase, remittances are meant for meeting basic consumption needs of families living in home countries; and later the expenditures extend to cover telephones, sound systems, computers and outboard motors. The second phase is for human capital investment for the next generation, which includes support for schooling in the home country and later for support for higher education abroad. The next phase focuses on future retirement needs if migrants decide to return home, including long term needs such as real estate purchases and house building as well as for business investment purposes.

Common means of sending remittances in the Pacific region are through postal mails, and visiting migrant's or migrant's relatives or friends. Brown and Ahlburg (1999) in their study on PICs confirm that remittances sent or contributed are largely through informal channels than through formal channels. The formal channels used by the remitters in the region include Western Union money transfers, bank drafts and automated teller machines (ATM). The transaction costs involved in sending remittances to PICs through legal, banking channels have been high (Irving et al. 2010). Some of the market factors determining the transaction cost of

remittances are (a) the number of competitors (service providers) in the market, which depends on the size of that particular remittance corridor and legal regulations; (b) the cost of remittance providers, which depends on the method and technology available to them for use; (c) the needs and preferences of customers; and (d) the extent to which consumers are aware of the various choices of services available to them. Further, the preferences of customers are equally dependent on the availability and accessibility of existing remittance-transfer services, the selection of which are largely based on the speed, the needs at the destination, and the sender's legal status; (Ratha and Riedberg 2005; and Irving *et al*. 2010).

Sending through formal channels strengthen the process of financial sector development. The latter is signified by the presence of deposit accepting banking institutions and the process of financial deepening.[2] Implementation of financial sector reforms in PICs, including deregulation of interest rates and encouraging new entrants to the banking sector for allowing greater competition among the banking institutions, has facilitated a healthy shift in remittance flows from informal to formal banking arrangements (Browne 2006). As and when remittances are deposited with financial institutions, a cash economy begins to evolve; and, as the reserves in the banks go up, the latter tend to give more loans. Consequently, a large number of people would then be able to have access to increased credit facilities for education, home mortgages, and small business enterprise (Browne 2006).

In their study, Browne and Leeves (2007) conclude that remittances, aside from augmenting consumption, tend to support business activities by enabling reallocation of household resources from traditional subsistence to commercial activities. Prakash (2009) in his investigation finds that inward remittances, which are utilized for greater consumption, education, and housing, have a poverty reducing effect.

III. Recent trends in remittance inflows

In the Pacific region, Fiji, Samoa and Tonga have been receiving substantial remittance inflows in absolute terms as compared to other PICs. However, only in the case of Tonga, Samoa, and Kiribati, remittance inflows account for a large proportion of their respective gross domestic products (Table 2).

Fiji's remittance inflows

Fiji's key indicators are given in Table 3. There has been a stable growth in inward remittances as a percentage of GDP until 2002 (Figure 2). During 1984-2002 periods, the inward remittances in absolute terms capped to about $40 million. However, from 2002 onwards, the economy witnessed a surge in the numbers (Figure 3). On average, the economy received about US$165 million per year within the surge period. Interesting to note is that despite the 2007 financial crisis, remittances inflows to Fiji have remained relatively high in absolute terms, aside from being the largest among the PICs. This trend in remittances appears to be supported by the rising out-migration (Table 4).

[2]The term financial deepening here refers to rise in the ratio of broad money (currency and demand deposits plus savings and time deposits) to GDP.

Table 2: PICs: Remittances (US$ millions): 1970-2008[a]

	Fiji	Kiribati	PNG	Samoa	Solomon Islands	Tonga	Vanuatu
1970-1974	n.d.	n.a.	n.a.	n.a.	n.a.	2 (7.5)	n.a.
1975-1979	4 (0.5)	2 (4.5)	10 (0.6)	10 (13.2)	n.n.	6 (16.4)	n.a.
1980-1984	8 (0.7)	2 (6.9)	5 (0.2)	19 (19)	n.a.	10 (16.5)	8 (7.0)
1985-1989	26 (2.2)	4 (15.8)	9 (0.3)	34 (33.8)	n.a.	19 (22.5)	8 (6.0)
1990-1994	24 (1.6)	6 (19.3)	17 (0.4)	37 (28.1)	n.a.	21 (15.4)	12.2 (6.4)
1995-1999	30 (1.5)	7 (15.2)	13 (0.3)	44 (19.6)	2 (0.6)	61 (37.7)	22 (8.3)
2000-2004	73 (3.6)	7 (13.3)	11 (0.3)	54 (18.9)	4 (1.6)	61 (37.7)	22 (8.3)
2005	184 (6.2)	7 (11.4)	13 (0.3)	110 (25.9)	7 (2.4)	66 (30.6)	5.1 (1.4)
2006	165 (5.2)	7 (11.3)	13 (0.2)	108 (24.0)	20 (6)	72 (30.5)	5.0 (1.2)
2007	165 (4.8)	7 (9.0)	13 (0.2)	120 (22.9)	20 (5.1)	100 (39.6)	5.5 (1.1)
2008	175 (4.7)	9 (10.7)	13 (0.2)	135 (24.0)	20 (4.8)	100 (36.9)	7.0 (1.2)

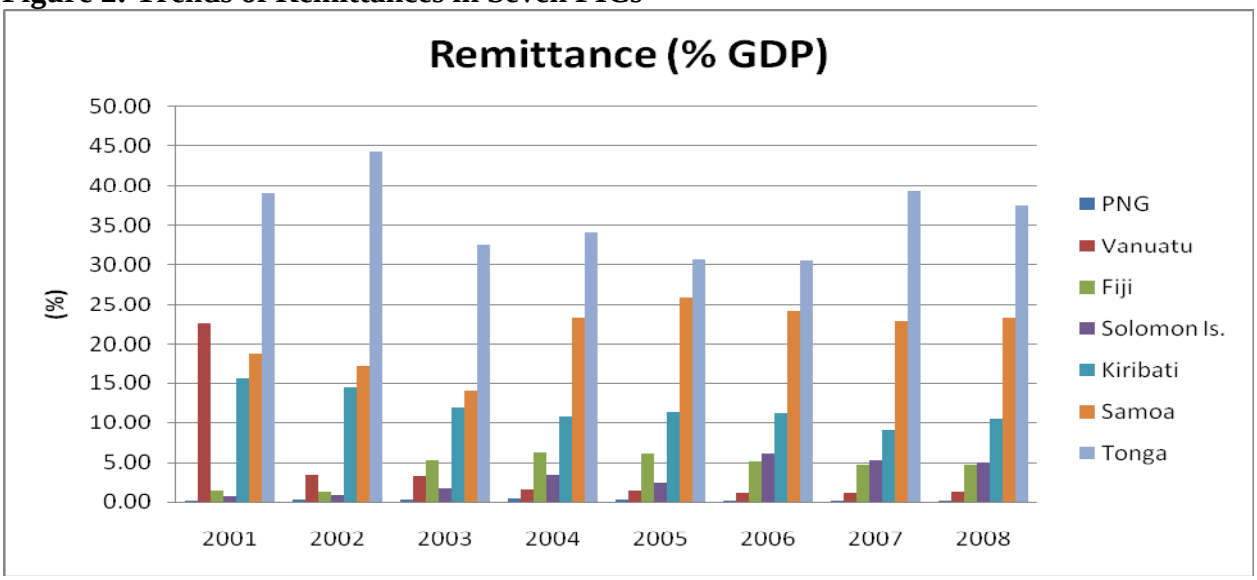
[a] Figures in parentheses denote percentages to GDP; the fiver-year interval periods are averaged.
Source: World Bank (2008, 2009a)

Table 3: Fiji : Selected key indicators

Land Area (Sq.km.'000)	18.3
Population (2008: '000)	838.7
Per Capita GDP (US$) Current Prices (2007)	4016.3
Aid Per Capita in US$ (2007)	68.9
Aid as percentage of GNI (2001-2007)	2.0
Annual Average Growth Rate in percent (2004-2009)	0.6
Annual Average Inflation in percent (GDP deflator) (2001-2008)	4.1
Fiscal Balance of Central Government as percent of GDP (2004-2006)	-4.9
Current Account Balance as percent of GDP (2001-2008)	-13.5

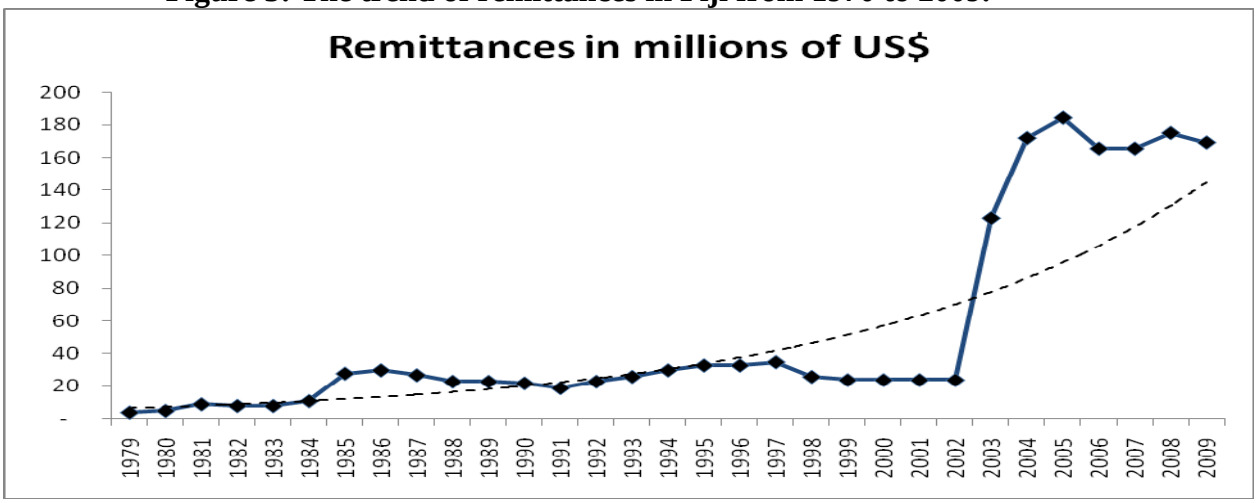
Source: World Bank (2009b), ADB (2009a), UNESCAP (2007)

Figure 2: Trends of Remittances in Seven PICs



Source: World Bank (2008, 2009a)

Figure 3: The trend of remittances in Fiji from 1970 to 2009.



Source: World Bank (2009a)

Table 4: Fiji's Demographic Profile

Year	Net migration (-)	Population growth rate (%)	population (5 year average)
1966-1970	(13273)	2.1	520304
1971-1975	(13760)	2.0	553683
1976-1980	(22677)	1.9	609236
1981-1985	(11911)	2.2	680956
1986-1990	(69692)	0.4	719123
1991-1995	(34785)	1.2	748793
1996-2000	(42000)	0.8	787451
2000-2005	(42000)	0.7	815254
2006-2008	n.a.	0.5	834286

Source: World Development Indicators (WDI), World Bank (2009b)

Fiji's financial sector

Fiji's financial sector comprises three major sectors: commercial banking system, insurance industry and non-bank financial institutions. In addition to five commercial banks, there are three non-bank licensed credit institutions (LCI), which cater to the credit needs of private sector in various areas, which include consumer credit, real estate, transport and storage and wholesale and retail trade. The insurance sector covers life insurance and general insurance. There are two life insurance companies, eight general insurance companies, and five insurance brokers with a large number of insurance agents. A major proportion of assets of insurance institutions are invested in government securities as well as in term deposits with commercial banks.

In addition to these institutions, there is a state-sponsored pension institution, known as Fiji National Provident Fund (FNPF), which collects a stipulated percentage of the salaries of employees in the formal sector matched by a similar contribution from the employers. The FNPF's investments are concentrated in fixed income securities, the bulk of which is in long-term government and government guaranteed bonds. Its short-term funds are kept with commercial banks as deposits of varying duration or invested in government short-term treasury bills.

Banking activities are largely confined to urban areas, where formal sector activities are concentrated. As the country's capital market is at an infant stage of development, Fiji has no vibrant bond and equity markets and there are no attractive financial assets other than saving and time deposits for savers to invest in. Further, as more rural bank branches are opened and mobile van banking facilities are introduced, the ratio of broad money, comprising narrow money and quasi money (savings and time deposits) to GDP has been on the rise.

IV. Modeling, Methodology, Data and Results

Our study on the investigation of nexus between remittances and Fiji's economic activities covers a 30-year period (1979-2008). Table 5 presents the data employed by the study. The study focuses on possible linkages between expenditures out of remittances facilitated by financial sector development and GDP during this period. There is substantial body of literature on the subject on how the financial sector development plays a critical role in reallocating resources to the most productive investments, which in turn lead to higher economic growth (King and Levine 1993; Beck, Levine and Loyaza 2000; and Levine, Loayza and Beck 2000). For an updated survey, the reader is referred to Rao *et.al* (2008).

For our study, we therefore make an assumption that as remittances received by rural and urban households increase over time, surplus funds after satisfying consumption needs are mobilized by financial sector institutions and are invested in activities, which are oriented towards production of agricultural output as well as processed primary consumer goods for domestic consumers and foreign markets. These include production of tropical fruits and vegetables and processed food products for the overseas residents of Fiji origin.

Table 5: Fiji: GDP, Remittances and Financial Indicators[a]

Year/Variables	**Real GDP**	**Remittances**	**Exports of goods and services**	**Money & quasi money**	**Private sector credit**
	Growth Rate (percent)	REM (as percent of GDP)	XGS (as percent of GDP)	M2 (as percent of GDP)	PRCE (as percent of GDP)
1981-1985	-0.1	1.1	43.4	34.5	24.1
1986-1990	2.9	2.1	53.3	40.9	28.6
1991-1995	2.5	1.6	55.5	52.0	39.5
1996-2000	2.1	1.5	62.2	43.3	33.4
2001	2.0	1.5	60.7	39.1	28.6
2002	3.1	1.3	61.5	37.5	28.2
2003	1.0	5.3	59.9	40.1	30.2
2004	5.2	6.3	53.8	43.6	33.1
2005	0.7	6.2	55.7	46.4	38.9
2006	3.5	5.2	48.5	50.0	44.0
2007	-6.8	4.9	51.7	57.9	45.6
2008	0.2	5.0	49.2	55.8	48.2

Source: data from World Development Indicators, World Bank (2009b) and Statistical Database System Online, ADB (2009b). [a.] the fiver-year interval figures are averaged.

We hypothesize that: (i) remittances, expressed as percent of GDP positively affect economic activities; and (ii) financial sector development proxied by broad money (narrow money plus quasi money) and expressed as percent of GDP and economic activities are directly

related. We start from the Cobb-Douglas production function, with the constant returns and Hicks–neutral technical progress:

$$y_t = A_t\, k_t^{\alpha}, \qquad 0 < \alpha < 1 \qquad (1)$$

where y = per worker output, A = stock of technology and k = capital per worker.

The Solow model assumes that the evolution of technology is given by

$$A_t = A_o e^{gT} \qquad (2)$$

where A_0 is the initial stock of knowledge and T is time.

It is also plausible to assume for our purpose that

$$A_t = f(T, REM, FD) \qquad (3)$$

where *REM*= remittances as percent of GDP and *FD* = M2 as percent of GDP.

The effect of *REM* and *FD* on total factor productivity (*TFP)* can be captured with *REM* and FD as a shift variable into the production function[3]

$$A_t = A_o e^{gT} REM_t^{\beta} FD^{\lambda} \qquad (4)$$

$$y_t = (A_o e^{gT} REM^{\beta}{}_t\, FD_t^{\lambda})\, k_t^{\alpha} \qquad (5)$$

The capital stock utilized for the study has been built up by a perpetual inventory method. As regards labour, we use population as a proxy, since we do not have a consistent time series on employment. Data on remittances are sourced from *World Development Indicators* issued by World Bank (2009b), whereas data on financial indicators are taken from International Financial Statistics of International Monetary Fund (2009). Appendix 1 provides information on data sources.

Bounds testing approach

Since the number of observations is small, that is from 1979 to 2008 (30 observations), we prefer the bounds testing approach under autoregressive distributed lag (ARDL) procedure developed by Pesaran *et al.* (2001). Excellent expositions of ARDL bounds testing approach are available in Narayan (2005) and Narayan and Smyth (2006). While observing that bounds testing approach is a variant of general to specific approach (GETS), Rao (2007) notes that both GETS

[3] In the estimation procedure in order to accommodate the likely contribution of other variables, which are not included and hence ignored, to total factor productivity one can include time trend to the production function.

and ARDL bounds testing procedures do not require pre-testing of unit roots and that unlike in GETS, however, it is possible using bounds testing approach for investigating cointegration of the levels of the variables, irrespective of their order. With a view to meeting the criticism that it is difficult to accept that variables are of different orders are cointegrated, we conduct unit root tests first and ensure they are of the same order before entering them into analysis. This would also enable us to conduct further analysis in terms of error-correction model (ECM) in first differences if the variables are of I(1).

We use two unit root tests to examine the time series properties of the variables, namely ADF and Ng-Perron (Ng and Perron 2001) test statistics. We find that all variables are nonstationary in their levels. However, they are found to be stationary after first differencing (Table 6).

Table 6: Results of Unit Root Tests

Variable	ADF		Ng and Perron	
	Level	First Difference	Level	First Difference
Y	-3.013	-4.098**	-8.166	-13.825**
K	-2.500	-3.509**	-14.221	-8.439**
REM	-2.621	-3.915**	-13.322	-13.268**
FD	-3.393	-4.078**	-10.483	-13.315**
Critical Value				
1 per cent	-4.324	-3.689	-23.8	-13.8
5 per cent	-3.581	-2.972	-17.3	-8.1
10 per cent	-3.225	-2.625	-14.2	-5.7

Notes: The ADF critical values are based on Mckinnon. The optimal lag is chosen on the basis of Akaike Information Criterion (AIC). The null hypothesis for both ADF and Ng-Perron tests is a series has a unit root (non-stationary) while the null hypothesis of the KPSS test is does not contain unit root (stationary). The asterisk ** denotes the rejection of the null hypothesis at the 5% level of significance.

The next step is to examine the existence of a long run relationship between per worker output, capital per worker, remittances and financial development measure (M2) by using bounds test. For econometric analysis, all variables are duly transformed into their natural logs. In the estimation procedure, we add trend variable (*TREND*).

The ARDL equations are given as follows:

$$\Delta Ly_t = \beta_{10} + \beta_{11}Ly_{t-1} + \beta_{12}Lk_{t-1} + \beta_{13}LREM_{t-1} + \beta_{14}LFD_{t-1} + \beta_{15}TREND + \sum_{i=1}^{p}\alpha_{11i}\Delta Ly_{t-i} + \sum_{i=0}^{p}\alpha_{12i}\Delta Lk_{t-i} + \sum_{i=0}^{p}\alpha_{13i}\Delta LREM_{t-i} + \sum_{i=0}^{p}\alpha_{14i}\Delta LFD_{t-i} + \varepsilon_{1t} \quad (7)$$

$$\Delta Lk_t = \beta_{20} + \beta_{21}Ly_{t-1} + \beta_{22}Lk_{t-1} + \beta_{23}LREM_{t-1} + \beta_{24}LFD_{t-1} + \beta_{25}TREND + \sum_{i=0}^{p}\alpha_{21i}\Delta Ly_{t-i} + \sum_{i=1}^{p}\alpha_{22i}\Delta Lk_{t-i} + \sum_{i=0}^{p}\alpha_{23i}\Delta LREM_{t-i} + \sum_{i=0}^{p}\alpha_{24i}\Delta LFD_{t-i} + \varepsilon_{2t} \quad (8)$$

$$\Delta LREM_t = \beta_{30} + \beta_{31}Ly_{t-1} + \beta_{32}Lk_{t-1} + \beta_{33}LREM_{t-1} + \beta_{34}LFD_{t-1} + \beta_{35}TREND + \sum_{i=0}^{p}\alpha_{31i}\Delta Ly_{t-i} + \sum_{i=0}^{p}\alpha_{32i}\Delta Lk_{t-i} + \sum_{i=1}^{p}\alpha_{33i}\Delta LREM_{t-i} + \sum_{i=0}^{p}\alpha_{34i}\Delta LFD_{t-i} + \varepsilon_{3t} \quad (9)$$

$$\Delta LFD_t = \beta_{40} + \beta_{41}Ly_{t-1} + \beta_{42}Lk_{t-1} + \beta_{43}LREM_{t-1} + \beta_{44}LFD_{t-1} + \beta_{45}TREND + \sum_{i=0}^{p}\alpha_{41i}\Delta Ly_{t-i} + \sum_{i=0}^{p}\alpha_{42i}\Delta Lk_{t-i} + \sum_{i=0}^{p}\alpha_{43i}\Delta LREM_{t-i} + \sum_{i=1}^{p}\alpha_{44i}\Delta LFD_{t-i} + \varepsilon_{4t} \quad (10)$$

There are two steps in examining the relationship between *Ly, Lk, LREM and LFD*. First, we estimate Equations (7) to (10) by ordinary least squares techniques. Second, the existence of a long-run relationship can be traced by imposing a restriction on all estimated coefficients of lagged level variables equating to zero. Hence, bounds test is based on the F-statistics (or Wald statistics) with the null hypothesis of no cointegration ($H_0 : \beta_{i1} = \beta_{i2} = \beta_{i3} = \beta_{i4} = 0$) against its alternative hypothesis of a long-run cointegration relationship ($H_1 : \beta_{i1} \neq \beta_{i2} \neq \beta_{i3} \neq \beta_{i4} \neq 0$).

The results of the bounds test are reported in Table 7. The results confirm the presence of a long run relationship amongst the variables when real output (RGDP) is set as the dependent variable. The computed F-statistic is 14.359, which is greater than the upper critical values provided by Pesaran, et al (2001) and Narayan (2005) at 1% significance level. Hence, the null hypothesis of no cointegration is rejected for this equation. However, the respective computed F-statistics in the equations with other variables as dependent variables are found not statistically significant even at 10% significance level.

Having confirmed the existence of a long-run relationship between per capita output and per capita capital stock, remittances and M2, we now proceed to estimate the long run equation by using the autoregressive distributed lag model (ARDL). As it was found that the trend variable was not significantly different from zero, it was dropped from the estimation procedure. The long-run equation is:

$$\begin{array}{lccccc} Ly = & -1.415 & + & 0.310Lk & + & 0.120LREM & + & 0.449LFD \\ t = & (-4.660)*** & & (3.162)** & & (4.710)*** & & (4.270)*** \end{array} \quad (11)$$

. *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.

Table 7: Results of Bound Tests

Dependent Variable			Computed F-statistic	
$L\,y$			14.359***	
$L\,k$			2.475	
$L\,REM$			2.181	
$L\,FD$			1.552	
	Pesaran, et al. (2001)[a]		**Narayan (2005)[b]**	
Critical Value	Lower bound value	Upper bound value	Lower bound value	Upper bound value
1 per cent	3.74	5.06	4.768	6.670
5 per cent	2.86	4.01	3.354	4.774
10 per cent	2.45	3.52	2.752	3.994

[a] Critical values are obtained from Pesaran et al. (2001), Table CI(iii) Case III: Unrestricted intercept and no trend, p. 300.
[b] Critical values are obtained from Narayan (2005), Table case III: unrestricted intercept and no trend, p. 10. *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.

The estimated coefficients of all the explanatory variables influencing the dependent variable log of per capita output have positive signs and are found to be statistically significant. The coefficient of per capita capital stock is positive and is also statistically significant at 5 percent level. The magnitude of the coefficient, denoting denotes the profits share, is 0.31 which is consistent with the stylized value of one third.

Among the shift variables, which are the main focus of attention in the study, we find that the impact of remittances on per worker output is positive and significant. As the estimated long run equation has all the estimated variables in logs, the magnitudes of coefficients estimate respective elasticities of output with respective variables. For example, a 1 percent increase in REM would increase per capita output by 0.12 percent and while a 1 percent rise in M2 would increase in per capita output by 0.45 percent. The findings of positive impact of remittances on output are consistent with the findings of empirical studies undertaken in other regions (Giuliano and Ruiz-Arranz 2009). It also emerges that growth is directly associated with financial sector development in Fiji, which is in line with standard studies (King and Levine 1993; Levine *et al*. 2000; Beck and Levine 2004)

A number of diagnostic tests such as Jacque-Bera normality test, serial correlation LM test, heteroskedasticity ARCH test, and Ramsey RESET mis-specification test were applied to Equation (4). This equation performs reasonably well as the disturbance terms are normally distributed and serially uncorrelated with homoscedasticity of residuals, confirming the model has a correct functional form. Besides, the CUSUM and CUSUM of Squares plot show that the parameters of the model are stable over time.[4]

[4] The CUSUM and CUSUM of Squares plots are not reported in order to conserve space. However, the results are available upon request.

Since there is cointegration between the variables, we proceed to conduct VECM tests in their first differences. Results are shown in Table 8. The results have confirmed the existence of a unidirectional relationship and that in the long run, the linkage runs only from per capita capital stock, remittances and M2 to per capita output, as error-correction term (ECT) has a correct sign and is statistically significant at 1% level in the equation with per capita output as dependent variable. In contrast, ECT in other equations is not significant even at 10% significance level. This duly establishes confirms the existence of only one cointegration vector, as was shown by bounds test approach.

To sum up, empirical results confirm the hypothesis that remittances contribute to GDP. Further, that domestic financial sector is crucial in channeling remittance inflows into the banking system to finance the productive investment projects, and promoting real output.

Table 8: Tests for Weak Exogeneity

Dependent Variable	F-statistics				ECT (t-statistics)
	Δ Ly	***ΔLk***	***ΔLREM***	***ΔLM2***	
ΔLy	-	3.335*	4.428**	5.326**	-0.2938*** (-3.421)
ΔLk	18.365***	-	2.341	3.693**	-0.0291 (-1.349)
ΔLREM	2.646*	2.831*	-	3.752*	-0.6172 (-1.523)
ΔLM2	0.009	0.304	0.088	-	-0.1829 (-1.636)

Note: *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.
Figures in parentheses are t-statistics.

V. Conclusions and policy implications

Inward remittance inflows have been a great support to all PICs, as they supplement their real resources and augment foreign exchange reserves. Viewed against the background of falling foreign exchange earnings from traditional commodity exports with the dimming prospects of tourism consequent to the depressed global economic conditions, annual remittance inflows have assumed far greater importance than ever before.

The objective of this paper was to study the long run growth effects of remittances received by Fiji, by employing an augmented Solow growth model which assumes a constant returns to scale production function. The model was duly extended by including two shift variables, namely remittances as percentage of GDP, and a variable representing financial sector development, namely broad money as a percentage of GDP for an empirical study of the relationship between remittances and economic growth in Fiji during a 30-year period (1979-2008). The study findings for Fiji study shows that remittances have had a positive and significant effect on economic activities. The policy implications are clear:

- the financial sector development is one of the decisive factors to Fiji's economic growth, since it channels remittance inflows into the banking system;

- decision makers should devise appropriate incentive measures to encourage the remittance recipient families to deposit them in financial institutions, which would contribute to accumulation of higher domestic savings and greater resource mobilization;
- incentive measures can include offering higher interest rates for remittances than available for domestic currency deposits, on the lines offered by the South Asian countries, including India for attracting deposits from their non-resident nationals;
- government in consultation with financial institutions should review the current structure of fees and other charges levied on inward remittances at both ends with a view to removing the hurdles that come in the way of remitting the funds through formal, financial channels for promoting greater flows of resources to developing countries; and
- the Reserve Bank of Fiji announced on 9 June 2010, the launch of a most innovative scheme to date, with a view to promoting greater financial inclusion by bringing savers in the rural areas into the banking system (Reserve Bank of Fiji 2010). Known as E- Money Project, the scheme when made fully effective in the next six months of 2010 would bring about revolutionary changes in the financial landscape. The Project is also expected to cover inward remittances from overseas. In that case, inward remittances would play a far greater role than ever before in Fiji's economy.

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Appendix 1

Definitions and Data Sources

Y = Real GDP in Fiji dollar (million)
K = Capital stock estimated with the perpetual inventory method with 4% rate of depreciation
L = Labour force (total population)
XGS = Total exports of goods and services as a percent of GDP
REM = Workers remittances received (% of GDP)
M2 = Broad money

Sources:
Data on real GDP are from the UN database at
http://unstats.un.org/unsd/snaama/selectionbasicFast.asp.
Other variable data are extracted from World Development Indicators and IMF (2009) CD ROM.

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