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Nexus between Remittances and Growth in Pacific Islands: A Study of Tonga

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Abstract

Inward remittances have been a great support to Tongan economy. Aside from being a major source of foreign exchange earnings, they supplement domestic savings and real resources. This paper examines how remittance inflows in combination with increased financial development during a 28 year period (1981-2007), have helped greater flow of credit to productive activities and contributed to the growth of Tongan economy.

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

1. Introduction

Inward remittances are important for Pacific island countries (PICs)[1], notably for Samoa and Tonga (World Bank 2006). Although there are indications about likely a world-wide decline in remittance flows due to ongoing global recession, a report by Asian Development Bank (Asian Development Bank 2009) struck an optimistic note in regard PICs. The optimism is based on the fact that remittance inflows to PICs during the short spells of slowdowns in economic growth in Australia and New Zealand were on the rise in 2000 and 2001, and again in 2005 and 2006. Further, it is expected that implementation of a scheme of granting temporary work-permits for unskilled laborers from PICs to do fruit picking in the two advanced countries in the region, namely Australia and New Zealand would ensure a steady source of remittance inflows to PICs (Asian Development Bank 2009).

In the context of declining exports to industrialized countries owing to fall in worldwide demand for tropical commodities, PICs are conscious of conserving their international reserves. In the same vein, maintaining and even attracting greater inflows of remittances by offering additional incentives and persuading banks to lower charges on transfer of funds at both points of sending and receiving, have been given full attention. Remittance inflows have contributed to economic development of PICs in several ways. Aside from adding to the international reserves, domestic savings and real resources of the country, they reduce the inflationary pressures arising out of expansionary fiscal policies as well.

With increased financial development in terms of higher banking facilities, recipients of remittances are encouraged to keep their funds in interest earning deposits. Remittance receipts, thus entering the system through formal, banking channels promote financial intermediation. The latter facilitates transfer of funds to investors in the private sector for investment in productive areas. Further, as remittance inflows increase the liquidity in the domestic banking system, banking institutions tend to reduce interest rates and provide greater credit to private sector for productive purposes and growth.

Over the past 28 years (1981-2008), Tonga's annual inward remittance inflows have averaged about 35 percent of GDP and annual credit flows to private sector have been around 6 percent of GDP. The paper seeks to investigate the relationship between economic growth and remittances in Tonga, with particular reference to interaction of remittances and financial development following greater efforts towards mobilization of savings and provision of banking facilities. The paper is organized into six sections. The following section provides a brief review of economic literature on the linkages between remittances and growth; the third section examines recent trends in remittances to PICs, including Tonga. The fourth section outlines the methodology adopted to undertake the empirical study. The fifth section discusses the results of the empirical investigation. The last section presents some conclusions with policy implications.

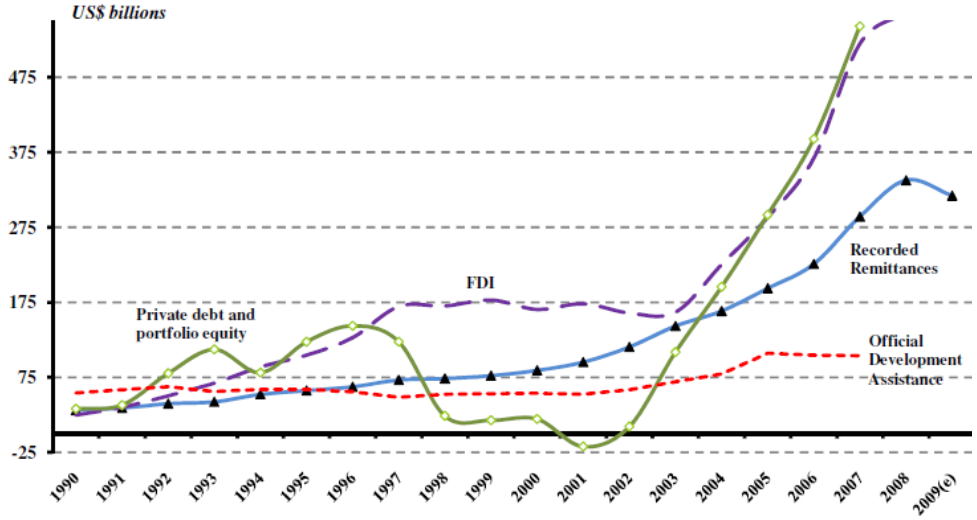
[1] The 14 independent Pacific island countries, which are the members of the formal inter-governmental organization, known as Pacific Islands Forum are: Cook Islands, Fiji, Kiribati, Federated States of Micronesia, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

2. A brief literature linking remittances to development

Remittances are defined as private income transfers that take place between family members. In many cases, one or more family members live and work abroad while regularly transferring savings back to the remaining family unit in the home country (Chami *et al.* 2006). According to World Bank, remittances have surpassed official development assistance of developing countries (Figure 1) and have grown substantially, increasing from $22 billion in 1985-1989 to $338 billion in 2008 (Table 1).

Figure 1:

Remittances and capital flows to developing countries*



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

Remittance inflows have been playing an important role in developing countries by reducing 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). Remittances' contribution to growth is however dependent upon the scale and intensity of financial sector development. The latter is signified by the presence of deposit accepting banking institutions and financial deepening [2]. In underdeveloped economies remittances may alleviate credit constraints.

[2] Financial development is reflected in rise in the ratio of broad money (currency and demand deposits as savings and time deposits) to GDP, which is generally referred to as financial deepening.

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	NA	NA
2009(e)	317	NA	NA	NA

*Source: The World Bank - Briefing 3: Remittance Trends 2007 (updated July 10, 2008); * e = estimate of 2009, World Bank (2009c), and Global Financial Indicators from World Bank..*

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 would gradually evolve. 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). Shabaz *et al* (2007), using Pakistan's case concludes that appropriate financial sector reforms would have a positive impact on financial sector development.

Specifically in Pacific islands, 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.

Maclellan and Mares (2005) point out that migration has become an outlet for many PICs including many small islands states, such as Niue, Kiribati, Tuvalu, Wallis and Futuna. Overall, remittances spent on expenditures beyond daily consumption enhance productive capacities of the economy thereby contributing to economic growth. Brown and Ahlburg (1999) in their study on PICs, focusing on Samoa and Tonga report that compared with formal channels, remittances sent or contributed through informal channels are sizeable.

The transaction costs involved in sending remittances to PICs through legal, banking channels have been high. 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. The preferences are dependent on the availability and accessibility of existing remittance-transfer services. The selection of these services are largely based on the speed, the needs at the destination, and the sender's legal status; and (d) the extent to which consumers are aware of the various choices of services available to them (Ratha and Riedberg 2005).

Among the formal channels used by the remitters in the region, which include Western Union money transfers, bank drafts and automated teller machines (ATM), the ATM is the cheapest of all. Ratha and Riedberg (2005) note that transaction costs in remittance transfer can be reduced through reduction in labour costs, and ATM technology allows just that. A World Bank study (2006) reports that remitting NZ$100 (US$168) to Tonga through channels other than ATM costs 25 to 30 percent of the total amount remitted. However, ATM technology has yet to become popular in the PICs.

3. Trends in remittances in Pacific island countries (PICs)

Trends in PICs

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

Tonga, whose key indicators are given in Table 3, is one of the two PICs which figure in the list of top 10 remittances recipient countries in 2007 and 2008 (Table 4). In 2008, remittances accounted for 26 per cent of GDP of Samoa, while Tonga was the second top most country with remittances accounting for about 38 percent of GDP.

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

	Fiji	Kiribati	PNG	Samoa	Solomon Islands	Tonga	Vanuatu
1970-1974 (ave)	n.a.	n.a.	n.a.	n.a.	n.a.	2 (7.5)	n.a.
1975-1979 (ave)	4 (0.5)	2 (4.5)	10 (0.6)	10 (13.2)	n.n.	6 (16.4)	n.a.
1980-1984 (ave)	8 (0.7)	2 (6.9)	5 (0.2)	19 (19)	n.a.	10 (16.5)	8 (7.0)
1985-1989 (ave)	26 (2.2)	4 (15.8)	9 (0.3)	34 (33.8)	n.a.	19 (22.5)	8 (6.0)
1990-1994 (ave)	24 (1.6)	6 (19.3)	17 (0.4)	37 (28.1)	n.a.	21 (15.4)	12.2 (6.4)
1995-1999 (ave)	30 (1.5)	7 (15.2)	13 (0.3)	44 (19.6)	2 (0.6)	61 (37.7)	22 (8.3)
2000-2004(ave)	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.
Source: World Bank (2008, 2009a)

Table 3: Tonga: Selected key indicators

Land Area (Sq.km.'000)	0.72
Population (2006: '000)	104
Per Capita GDP (US$) Current Prices (2008)	2,548
Aid Per Capita in US$ (2007)	296
Aid as percentage of GDP (2007)	12.0
Annual Average Growth Rate in percent (2001-2008)	1.4
Annual Average Inflation in percent (2001-2008)	9.0
Overall Budget Balance as percent of GDP (2001-2007)	0.4
Current Account Balance as percent of GDP (2001-2007)	-6.6

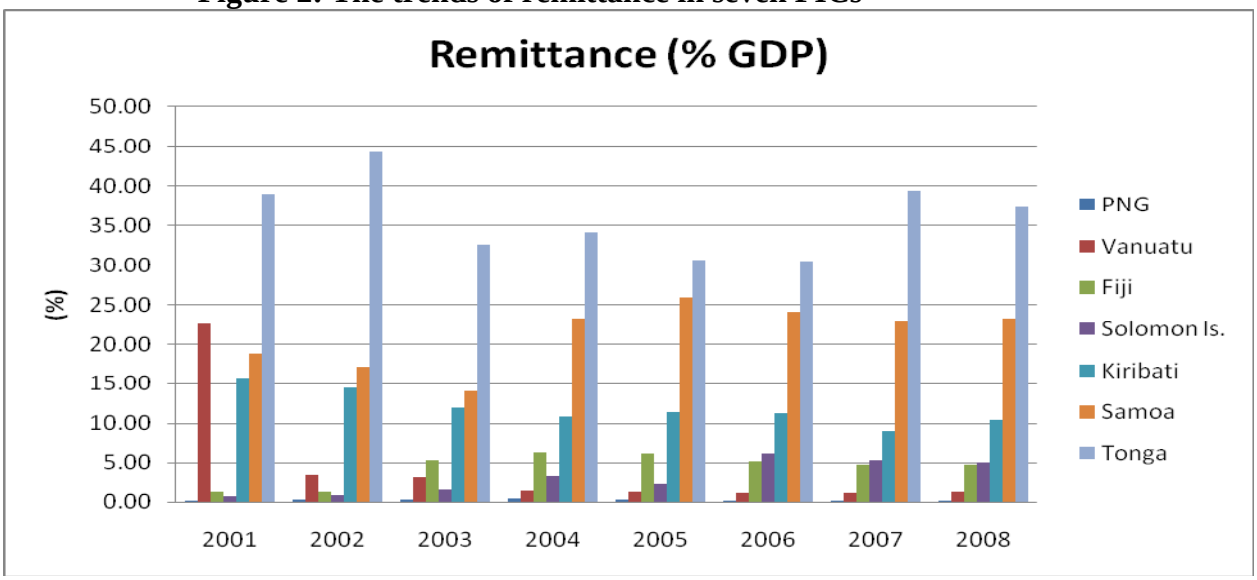
Source: World Bank (2009c), UNESCAP (2007)

Table 4: Top ten remittance recipients of 2008 (as percentage of GDP)

Country	as percentage of GDP	in US$ (millions)
Tajikistan	50	2,544
Tonga	38	100
Moldova	31	1,897
Kyrgyz Rep.	28	1,232
Lesotho	27	443
Samoa	26	135
Lebanon	25	7,180
Guyana	24	278
Nepal	22	2,727
Honduras	20	2,824

Source: World Bank (2008, 2009a & 2009b)

Figure 2: The trends of remittance in seven PICs



Source: World Bank (2008, 2009a)

Tongan economy has a narrow export base in agricultural commodities, which include squash to its niche market in Japan and bananas and vegetables to New Zealand and a slow but rising growth in kava and vanilla. Agricultural exports, including fish, make up two-thirds of total exports. Tongan agricultural sector contributes to about one-quarter of GDP.

Tourism sector is the second-largest source of foreign exchange earnings, next to remittances. However, the sector remains significantly underdeveloped. The government of Tonga is

considering developing tourism sector and regards it as a promising revenue stream in years to come.

The financial sector consists of five institutions: the National Reserve Bank of Tonga, three commercial banks, and one state-owned development bank (Table 5). Until 1993 only two banks operated in Tonga, including a state-owned development bank established to promote rural development by investing resources obtained mainly from external borrowing. Another of the commercial banks established in 1993 was a branch of a foreign bank; the other was a locally incorporated bank. A small insurance sector completes the financial sector.

Banking activities are largely confined to urban areas, where formal sector activities are concentrated. As Tonga has no vibrant bond and equity markets, there are no attractive financial assets other than saving and time deposits for savers to invest in. Following the liberalization of the economy in general and financial sector in particular, Tonga discontinued controls on lending and deposit rates from the late 1980s. 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 (Table 6).

Table 5: Tonga: Financial System Structure

	Assets (Millions of pa'anga)	**Percent in Total Assets**	**Percent of GDP**	**Number of Institutions**
Commercial banks	200.4	81.6	72.3	3
State-owned development bank	45.1	18.4	16.3	1
Insurance companies	n.a.	n.a.	n.a.	6
Total	245.5	100.0	88.6	10

Source: NRBT Authorities

4. Data, modeling and methodology

Our study on the investigation of nexus between remittances and Tongan economic growth seeks to focus on possible linkages between expenditures out of remittances facilitated by financial development and GDP. We assume aside from consumption expenditures, remittances contribute to investment expenditures, oriented towards exports of agricultural products including fruits and vegetables. In the context of paucity of disaggregated data relating to variables, namely remittances, indicators of financial sector development, and exports, our study employs the aggregated data relating to variables, which are reported on an annual basis by the World Bank (2009a, c).

Table 6: Tonga's Growth Rate of real GDP, Remittances and Financial Indicators

Variables	**real GDP**	**Remittances**	**Exports of goods and services**	**Money & quasi money**	**Private sector credit**
Year	RGDP (%)	REM (% of GDP)	XGS (% of GDP)	M2 (% of GDP)	PRCE (% of GDP)
1981-1985 (average)	3.4	36.3	3.3	n.d.	15.4
1986-1990 (average)	0.3	-6.2	5.0	0.4	5.5
1991-1995 (average)	3.7	0.9	-9.9	1.5	6.8
1996-2000 (average)	1.8	9.9	20.5	4.8	3.2
2001	3.1	23.2	-26.7	9.9	2.5
2002	1.7	13.5	63.6	-2.0	4.8
2003	3.1	-26.4	5.6	-0.5	0.6
2004	1.1	4.4	10.5	6.9	-9.3
2005	-3.3	-10.1	-4.8	10.6	n.d.
2006	4.4	-0.4	-20.0	-1.1	n.d.
2007	-0.3	29.1	3.5	3.6	n.d.
2008	1.2	-4.2	3.5	n.d.	n.d.

Source: authors' calculation from World Bank (2009a and 2009c)

We can use two proxies of financial development. One is the indicator of financial deepening[3], namely the ratio of M2 (broad money, namely currency and demand and time and savings deposits) to GDP. The other one is the ratio of credit by banking system to private sector to GDP. In regard to M2/GDP ratio, our hypothesis is that, if remittance inflows are duly deposited by the recipients in the country's banking system, either as additions to banking systems as, liabilities, demand deposits or savings, or long term deposits or both, bank's reserves would increase; and rise in ratio of financial deepening would promote economic growth; and hence M2/GDP and GDP would be positively associated. In regard to the other proxy, we argue that rise in liquidity due to increase in bank liabilities in terms of savings and time deposits consequent to rise in remittance inflow, would induce banks to transform them into interest yielding assets by way of greater provision of bank loans to private sector.

Among the two indicators of financial development, we choose ratio of credit to private sector to GDP, which has been increasingly recognized as superior to the other. No doubt an increase in private financial savings (quasi money, namely time and savings deposits) results in higher M2.

[3] Financial deepening is generally reflected in ratio of broad money (currency and demand deposits plus time and saving deposits) to gross domestic product (GDP). Time and savings deposits, which are referred to quasi money, are also known as financial savings. In the absence of financial assets such as shares and bonds, savers invest in bank deposits.

However, in the event of a rise in statutory reserve ratio, banks are required to keep higher reserves with central bank. One is not sure mere rise in M2/GDP by itself would be a sufficient indicator. Following this reasoning, credit to private sector is a more appropriate measure and proxy for financial sector development as it is directly related to the quantity of investment and hence to economic growth (King and Levine 1993; Demetriades and Hussein 1996; Beck, Levine, and Loayza 2000).

We, therefore, hypothesize that credit to private sector is positively associated with growth in output as rise in private sector investment, facilitated by increases in credit, would lead to a rise in production of goods and services. As the domestic market is small, rise in production of goods and services would result in rise in exports, leading to higher economic growth. We also hypothesize that interaction between remittances and the indicator of financial development would positively influence growth.

The model is written as follows:

$$LRGDP = f(LREM, LCRE, LXGS, LREMCRE) \quad (1)$$

Where:
LRGDP = GDP in millions of local currency (paanga) in constant prices;
LREM = remittances as percent of GDP;
LCRE = private credit as percent of GDP;
LXGS = exports of goods and services as percent of GDP;
LREMCRE = the interaction term between financial development and remittance

Bounds testing approach

Since the number of observations is not large enough, we resort to bounds testing approach under the autoregressive distributed lag (ARDL) procedure developed by Pesaran *et al.* (2001). The ARDL bounds testing model is a general dynamic specification, which applies lags of the dependent variable and the lagged and contemporaneous values of the explanatory variables, through which short-run impacts can be directly assessed and long-run relationship indirectly estimated[4]. For econometric analysis, all variables are duly transformed into their natural logs.

An ARDL model of Equation 1 is constructed as follows:

$$\begin{aligned}\Delta LRGDP_t = {} & \beta_0 + \beta_1 LRGDP_{t-1} + \beta_2 LREM_{t-1} + \beta_3 LCRE_{t-1} + \beta_4 LXGS_{t-1} + \beta_5 LREMCRE_{t-1} \\ & + \sum_{i=1}^{p} \alpha_{1i} \Delta LRGDP_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta LREM_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \Delta LCRE_{t-i} + \sum_{i=0}^{p} \alpha_{4i} \Delta LXGS_{t-i} \\ & + \sum_{i=0}^{p} \alpha_{5i} \Delta LREMCRE_{t-i} + \varepsilon_t\end{aligned} \quad (2)$$

[4] The use of this technique is also based on its advantages over the conventional cointegration procedure. See, for example, Pesaran et al. (2001), Chang et al. (2001), Narayan and Smyth (2006), Akinlo (2006), among others for the advantages and applications of ARDL.

In the estimation procedure we add trend variable, which captures the influences of other relevant variables which are omitted for the reason that relevant time series are not available on a consistent basis.

There are two steps in examining the relationship between real output, remittances, private credit and exports. First, we estimate Equation (2) 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 ($H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$) against its alternative hypothesis of a long-run cointegration relationship ($H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$).

Since the F-statistics used for this test has a non-standard asymptotic distribution, Pesaran *et al.* (2001) have generated two different sets of critical values for given significance levels. The first set assumes that all variable are integrated of order zero, I(0) and the second set assumes all variables are integrated of order one, I(1). If the computed F-statistic is greater than the upper critical bounds value, then the null hypothesis is rejected. In contrast, if the computed F-statistic is smaller than lower critical bounds value, it indicates no long-run relationship between variables. If the computed F-statistic lies between lower and upper bounds values, then the test becomes inconclusive.

Granger causality test

We conduct the Granger causality test in the parsimonious vector error correction model (PVECM) framework to investigate the short-run causality relationship between real output, remittances, private credit and exports. In PVECM framework, we regress the change in variables (both endogenous and exogenous) on lagged deviations and it can be written as follows[5]:

$$\Delta Z_t = \Pi Z_{t-1} + \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + ... + \Gamma_{p-1} \Delta Z_{t-p+1} + u_t \quad (3)$$

where $\Delta Z_t = [\Delta LRGDP, \Delta LREM, \Delta LCRE, \Delta LXGS, \Delta LREMCRE]'$, and $\Gamma_i = -\left(1 - \sum_{j=1}^{i} A_j\right)$. For $i = 1,..., p-1$.

Γ reflects the short run effect of the changes in Z_t.

Meanwhile, the (5×5) matrix of $\Pi = (\alpha\beta)'$ contains the speed of adjustment to long-run equilibrium (α) and the long-run information (β) such that the term $\beta' Z_{t-p}$ represents the $(n-1)$ cointegrating vector on the model.

[5] Engle and Granger (1987) and Irandoust and Ericsson (2004) provide a comprehensive discussion of this technique.

The Granger causality test is conducted by computing the F-statistics (or Wald test) based on the null hypothesis that the set of coefficients (Γ_i) on the lagged values of explanatory variables are not significantly different from zero. If the null hypothesis is rejected, then it is concluded that the explanatory variables cause the dependent variables. If Π is found not significant based on the t-statistics, then both the explanatory and dependent variables do not have a stable relationship in the long run.

5. Results

Before conducting the bounds testing, we resort to unit root tests. All variables are transformed into logs and then entered into analysis. Although bounds testing procedure does not require that all variables should be integrated of the same order, we want to make sure whether we can conduct Granger causality tests in the event of obtaining a cointegrating relationship between variables. We use two unit root tests, the augmented Dickey and Fuller (ADF) (1979) and Ng and Perron (2001) to examine the order of integration of each variable under study. The results of both unit root tests (Table 7) indicate that all variables are integrated of order one.

Table 7: Results of unit root tests

Variable	ADF		Ng and Perron	
	Level	First Difference	Level	First Difference
LRGDP	-2.487	-7.056**	-11.056	-12.247**
LREM	-2.924	-6.182**	-8.551	-12.400**
LCRE	-2.721	-3.001**	-7.743	-12.817**
LXGS	-2.531	-6.209**	-13.123	-9.666**
LREMCRE	-3.009	-5.592**	-7.419	-12.720**

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). The asterisk ** denotes the rejection of the null hypothesis at the 5% level of significance.

Bounds testing results

The results of bound tests are reported in Table 8. The test results reject the null hypothesis of no long-run relationship between real output, remittances, private credit, exports and the interaction term between remittances and private credit at 1% significance level. This is evident by the computed F-statistics, which is greater than the upper bound value in the equation with LRGDP as the dependent variable. However, the respective F-statistics in the equations with other variables as dependent variables are found not significant.

Table 8: Results of Bound Tests

Dependent Variable	Computed F-statistic
LRGDP	19.603***

LREM			2.551	
LCRE			2.140	
LXGS			1.444	
LREMCRE			0.710	
	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	3.41	4.68	4.134	5.761
5 per cent	2.62	3.79	2.910	4.193
10 per cent	2.26	3.35	2.407	3.517

[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 long-run estimated coefficient obtained by bounds testing procedure is shown as follows:

$$LRGDP_t = 2.710 + 0.356LREM^{*} + 0.974LCRE^{**} + 0.130LXGS^{**} + 0.447LREMCRE^{*} + 0.001TREND$$

$$t = \quad (2.334) \quad (2.544) \quad (4.380) \quad (5.349) \quad (2.862) \quad (0.256) \qquad (4)$$

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

As reported in Equation (4), all coefficients of the explanatory variables have the theoretically expected positive signs. Further, they are statistically significant at 10% level or better. The results confirm that remittances, private credit and exports stimulate economic growth. As for the magnitudes of coefficients, we observe that private credit has the greatest effect on output as compared to other explanatory variables. Equally important to emphasize is the significance of the interaction term (LREMCRE) which explains that remittances can act as a buffer for additional credit operation or in mobilizing funds to other banking functions. This plausible causation not only ensures a high liquidity in the banking system, but also simultaneously feeds into in to higher rate of economic growth through investment and consumption channels.

A number of diagnostic tests show that the model chosen performs well insofar as the disturbance terms are normally distributed and serially uncorrelated with homoscedasticity of residuals. The test results confirm 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 time6.

Table 9: Granger causality test for Tonga

Dependent Variable	**F-statistics[a]**					**ECT (t-statistics)**
	ΔLRGDP	**ΔLREM**	**ΔLCRE**	**ΔLXGS**	**ΔLREMCRE**	
ΔLRGDP	-	3.1059*	3.2278*	12.8742***	4.6045**	-0.1508* (-1.9301)
ΔLREM	1.6939	-	3.3508*	3.6522*	0.1041	-0.2221

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

						(-0.5940)
ΔLCRE	3.3706	6.6953**	-	16.5397***	7.7779**	-0.0255 (-0.1287)
ΔLXGS	6.9915**	4.4551*	6.2026**	-	2.6930	-0.7271 (-1.6223)
ΔLREMCRE	0.6271	0.5451	1.0947	1.7033	-	-0.7030 (-0.8825)

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

Given the results of bounds tests, we proceed to undertake Granger causality tests. Table 9 reports the results of long-run and short-run Granger causality tests. Among the four equations, error correction term (ECT) is statistically significant with the expected negative sign only in the equation with LRGDP, as dependent variable. The results, obtained by the bound tests, thus confirm that there is only one cointegrating equation, namely the equation with LRGDP as dependent variable. Further, in the short-run we find that there is a bi-directional causality between remittances and exports, real output and exports, remittances and credit to private sector, and credit to private sector and exports, while a unidirectional causality running from remittances, private credit and the interaction term to real output. The results establish the hypothesis that remittances play an important role in Tonga.

6. Conclusions and policy implications

Amongst the PICs, Tonga depends on inward remittances from citizens and residents of their national origin overseas for maintaining adequate international reserves to cover at least three months equivalent of imports. Its ratio of remittances to GDP is also highest amongst PICs Thus, remittance inflows have also been a great support to Tonga by adding to country's real resources. As foreign exchange earnings from traditional commodity exports are falling and the prospects of tourism are dim due to continuing global economic downturn, remittances have assumed greater importance in recent months..

This paper undertook an empirical investigation of the nexus between remittance and economic growth in Tonga during the past 28–year period (1981-2008). The study findings are remittance inflows by adding to the liquidity in the banking system, led to increases in credit to private sector, which in turn resulted in greater economic activities and resultant rise in exports, thereby leading to growth in GDP.

The policy implications are clear:

- the financial sector development is the key to 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 would include offering higher interest rates for remittances than available for domestic currency deposits, on the lines offered by the South Asian countries attracting deposits from their non-resident nationals; and
- the 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.

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