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PUBLIC DEBT AND ECONOMIC GROWTH IN THE SOUTH PACIFIC ISLANDS: A CASE STUDY OF FIJI

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Growing public debt of Fiji has been causing concerns all around. As part of countercyclical measures, the Government stepped up public expenditure from 2001 in response to the adverse consequences of the 2000 civilian coup, which witnessed a decline in investor confidence, resulting in a steep fall in private sector investment. Expansionary fiscal policy measures in the annual budgets of 2001 to 2004 as well as unforeseen natural disaster management expenditures have pushed the ratio of outstanding public debt to national output beyond the level of 50%. This paper seeks to examine the nexus between debt and growth in Fiji.

Keywords: Public Debt, Government Expenditure, Growth, Cointergration, Causality
JEL classification: H5, H6

1. INTRODUCTION

Focusing attention on public debt in industrial countries and in emerging market economies, the International Monetary Fund (IMF)'s *World Economic Outlook:2003*, (IMF 2003a) noted that debt levels in emerging economies, which were about 70% of their gross domestic product (GDP), were higher than those in industrial countries and observed that large public debt hampered economic activity. Higher taxes, which are required to finance the growing debt, exercise upward pressure on real interest rates crowding out private investment, thereby affecting long-term growth.

When a government finds itself unable to finance its annual fiscal deficits, it is forced to contract spending or raising revenues, often at a time when fiscal policy needed to be concentrated on stabilizing the economy. If the government could not take these actions, a debt crisis would ensue. According to IMF (2003), the prevailing levels of public debt in emerging economies were not currently sustainable-that is, continuation of past fiscal policies would not be sufficient to enable the debts to be repaid in the future. The sustainable level of debt for a typical emerging economy, based on past

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fiscal performance has been estimated by IMF at 25% of GDP, while estimates of fiscal policy reaction functions indicated that emerging market economies as a group have failed to respond in a manner consistent with ensuring fiscal solvency once the public debt exceeds 50 percent of GDP (IMF 2003).

With excess liquidity in the system in the economy due to poor investment climate, domestic borrowing by the Government of Fiji during the past five years for financing its annual fiscal deficits was not found difficult. For 2005, government debt was estimated at F$ 2,487 million or 53.4% of GDP. It is expected to be F$ 2,689 million or 54.2% of GDP in 2006. As for the debt portfolio in 2005, domestic debt was 93% of total debt while external debt was small at 9%. In recent months, there have been months increasing references to Fiji's growing public debt by official studies by international agencies (UNESCAP 2006, ADB 2006) as well as the country's central bank (Reserve Bank of Fiji 2006). Further, there have been concerns expressed by experts (Prasad (2006), Reddy (2005), Shah (2003), Chand (2003)) that the burden imposed by growing debt in terms of rising annual interest payments as well as distortions in the economy created by inflationary tendencies would ultimately hamper growth. There is only one study available so far on debt and growth in Fiji (Chandra and Jayaraman (2005)), which employed a bivariate model. The objective of this paper seeks to undertake more rigorous a quantitative analysis with a multivariate model, with a view to ascertaining whether past public debt has led to economic growth in Fiji. The study utilizes the annual data for a 34-year period from 1970 to 2003. The remainder of the paper is organized as follows. The second section presents trends in Fiji's public debt over the last three decades; the third section outlines the methodology adopted for the study; the fourth section presents the results; and the fifth and final section offers some conclusions with policy implications.

2. TRENDS IN PUBLIC DEBT IN FIJI

In Pacific island countries (PICs), external aid in terms of grants from bilateral sources in the past had been financing capital expenditures of governments to a substantial extent. In some PICs, external aid had also been financing their current budgets, by providing support for wages and salaries and other housekeeping expenses. Fiji (Table 1) annually receives external grants only to the extent of 2% of GDP, the least in the region, with the result its annual fiscal deficits in recent years have to be financed by increased public borrowing.

Table 1. Fiji: General Key Indicators

Surface Area (km^2)	18,270
Population (2005)	835,000
Total GDP at current prices (US $ million) 2002	1,750
Per capita GDP in current price (US $)	2,360
Human Development Index (Rank)	81
Aid per capita (US $) 2002	41
Aid per capita (% of GDP) 2002	1.8

Source: Commonwealth Secretariat (2005), ADB (2004), UNESCAP (2004)

Fiji's total debt, comprising domestic and external debt, during the past two decades has been low. In fact, the country made conscious efforts during the late 1980s and early 1990s to reduce external debt by early retirement of loans from international agencies, including Asian Development Bank. Fiji, being one of the countries belonging to lower middle-income group, was not allowed the facility of concessional loans at annual 1% rate, which were available to other PICs. Therefore, with the then prevailing comfortable international reserves equivalent to six-months imports of goods and no factor services, Fiji felt appropriate to retire the external debt in advance, rather than pay the loan installments and interest from future export earnings. With budget deficits also being close to yet another benchmark of 3% of GDP, it was possible to maintain low levels of domestic debt in the 1990s around 45% of GDP (Table 2).

Table 2. Fiji: Public Debt and Growth (1970-2000)

Year	Total Debt F$ Mill	Domestic Debt F$ Mill	External Debt F$ Mill	Total Debt % Of GDP	Domestic Debt % Of GDP	External Debt % Of GDP	GDP Growth Rate (%)
1970-1979 (Ave)	109.6	73.7	35.9	24.2	16.7	7.5	6.5
1980-1989 (Ave)	486.9	347.5	139.4	39.7	27.9	0.7	0.7
1990-1999 (Ave)	1222.7	1025.6	197.1	44.7	37.3	3.0	3.0
2000	1433.9	1232.3	201.6	41.2	35.4	5.8	-2.8
2001	1680.0	1480.6	199.4	45.5	40.1	5.4	2.7
2002	1893.9	1699.1	194.8	47.8	42.9	4.9	4.3
2003	2133.4	1963.5	169.9	50.3	46.3	4.0	3.0
2004	2280.3	2114.8	165.5	50.2	46.6	3.6	4.1
2005	2487.0	2312.0	174.0	53.4	49.2	4.2	1.7
2006 (est.)	2689.0	NA	NA	54.2	NA	NA	2.7

Source: Reserve Bank of Fiji (2006, 2005)

From 2000 onwards, Fiji stepped up its domestic borrowing to finance its annual fiscal deficits, the major lender being Fiji National Provident Fund (FNPF), which is the country's statutory body collecting contributions from employers and employees in the formal sector at a legally stipulated rate from the monthly salaries to be returned to employees with interest after their retirement. While these funds are readily available for investment by FNPF in income yielding projects in the economy, there has been another justification for government as well. Investor confidence was low soon after the 2000 coup and the expectations that the private sector would soon recover did not materialize. It was therefore considered appropriate by government to boost investment by incurring fiscal deficits for a while until private confidence was restored. Besides borrowing from the public for financing its own budgetary deficits, the government guaranteed the borrowing by state enterprises as well. In 2003, Fiji's public debt, including contingent liabilities, was a little above 60% of GDP (Narube (2004)).

A recent World Bank study (Gill and Pinto (2005)) identified three reasons why public debt might be better than taxation, which were categorized into three: (i) tilting; (ii) smoothing; and (iii) stability. Under the first, it would be more equitable if a country can finance projects of long gestation nature through debt, as such projects benefit future (richer) generations than through taxing the current (poorer) generation. The second reason is raising and lowering taxes frequently might entail efficiency losses and generate economic uncertainty and hence, debt allows a more efficient manner for conducting counter-cyclical polices and for meeting emergency spending needs. The third reason is debt ensures stability, since it avoids reliance on printing money. The latter involves high and volatile inflation, obscuring information content of relative prices and thereby hurting investment. However, as Gill and Pinto remind us, debt is nothing but postponed taxation, since it has to be re-paid; and returns from every infrastructure project funded by debt, regardless whether it is physical or social infrastructure, have to include not only the user fees but also higher future taxes.

An IMF study (2004) on *Fiscal Adjustment in IMF Supported Programs* acknowledged that misplaced optimism about private sector recovery would lead to "an understatement of the need for a more countercyclical fiscal stance that is too tight" (Selowsky (2004)). Taking the cue from the above, one would conclude that in retrospect, Fiji's fiscal deficits during 2001-2005 would appear to be part of countercyclical measures to compensate the loss of fall in private investment.

This raises an important question about the nature and composition of total public expenditure. Government prepares the budget under two parts: recurrent and capital expenditures. While the recurrent budget is nothing but housekeeping expenditure dominated by wages and salaries, the capital budget relates to asset creating investment activities. The ratio of current expenditure to capital expenditure in PICs, including Fiji has been around 80 to 20. Whether public expenditure was undertaken purely as countercyclical measure to meet the projected fall in demand or simply as a political commitment to step up growth through state sponsored schemes, the resultant rise in public debt due to fiscal expansion given the revenue position, is certainly a matter of

concern.

The concern is about the way the growing annual interest burden would be borne by the government. Interest payments have to be effected out of the primary balance defined as surplus of current revenues over current expenditure, excluding interest payments. Sahay (2004) in her study on the island countries in the Caribbean region, with which PICs have been sharing many commonalities (Fairbairn and Worrell (1995)), has shown that during 1991-2002, all the highly indebted countries in the Caribbean, except Jamaica, were failing to generate primary surpluses. The result has been further deterioration in their overall fiscal balances, leading to further rise in debt levels, as interest payments have to be financed by recourse to additional public borrowing. If the public borrowing has been resorted to for financing economic growth through income generating investment projects as well as infrastructure projects supporting private sector investment, the country's revenue potential would also rise, as growth in tax revenues is positively related to economic growth (Jayaraman (2006)). Only then, rise in public debt could be defended on the ground that interest burden can be borne without any additional effort for raising tax revenues. The key point of our examination in this paper is, therefore, whether public debt has contributed to economic growth in Fiji.

3. DATA AND METHODOLOGY

For this study, we use annual real gross domestic product (RGDP) and stock of real public debt (DEBT) covering a 34-year period (1970-2003) to examine the debt-growth nexus in Fiji. Since a bivariate model is likely to suffer from deficiencies arising from the omission of other relevant explanatory variables, we propose to include two additional explanatory variables, which we consider essential for explaining the growth in debt. One is real Treasury bill rate (RTB) in percent, representing the cost of borrowing and the other is ratio of wages and salaries to total expenditure (WSTE), representing the allocational nature of total budget funds.

We expect that lower cost of borrowing as represented by a fall in RTB, which reflects monetary policy, should encourage governments to borrow more. Governments are generally reluctant to resorting to rise in tax rates and fees and user charges, as additional tax effort hurts re-election chances. Additionally, tax cuts and other discretionary tax exemption measures by ministers and bureaucrats lead to either reduction in or stagnation of revenues. On the other hand, rise in recurrent costs including wages and salaries and other consumption expenditures along with minimum critical capital expenditures often lead governments to explore avenues of financing fiscal deficits. Debt financing is the easy way out. It is, therefore, hypothesized that the higher the proportion of recurrent expenditures cost in the total budgeted expenditure, which is proxied here by WSTE, higher would be the debt. Several studies have shown that rise in consumption expenditures of government such as wages and salaries has negative impact on private investment, thereby adversely affecting economic growth

(Barram and Ward (1993), Alesina *et al.* (1999), and Giannaros *et al.* (1999)). In addition to these two explanatory variables, RTB and WSTE, a dummy variable representing political instability was also added. It takes the value of zero for years prior to and after 1987, one for 1987, the year of two coups and 2000, the year of civilian coup.

Accordingly, the equation to be estimated is:

$$RGDP_t = \beta_0 + \beta_1 DEBT_t + \beta_2 RTB + \beta_3 WSTE_t + \beta_4 DUM + \varepsilon_t , \quad (1)$$

where ε_t is the Gausian error term and all variables are expressed into the natural logarithm, and $DEBT_t$ represents real public debt.

For examining the long-term relationship between economic growth and public debt, we resort to the autoregressive distributed lag (ARDL) model proposed by Pesaran, *et al.* (2001). The ARDL procedure has become increasingly popular in recent years for several reasons: First, the technique is more appropriate to be used in testing the long run relationship between variables when the data are of a small sample size (Pesaran, *et al.* (2001)). Second, there is no restriction imposed on the order of integration of each variable under study. This implies that the test allows testing for the existence of a cointegrating relationship between variables in levels irrespective of whether the underlying regressors are I (0) or I (1). This is different from the general bivariate and multivariate cointegration frameworks, which require that time series in the system should be non-stationary in their levels and that all time series in the cointegrating equation should have the same order of integration.

Following Pesaran, *et al.* (2001), we constructed the vector autoregression (VAR) of order *p* (VAR(*p*)) for debt-growth model:

$$Z_t = \mu + \sum_{i=1}^{p} \beta_i Z_{t-i} + \varepsilon_t , \quad (2)$$

where Z_t is the vector of both X_t and Y_t, where Y_t is the dependent variable (*RGDP*) and X_t is the vector matrix represents a set of explanatory variables (*DEBT*, *RTB*, *WSTE* and *DUM*). $\mu = \left[\mu_Y, \mu_X\right]'$, t is a time or trend variable, and β_i is a matrix of VAR parameters for lag i. According to Pesaran, *et al.* (2001), the dependent variable must be I (1) variable, but the regressors, or explanatory variables can be either I (0) or I (1).

We can further develop a Vector Error Correction Model (VECM) as follows:

$$\Delta Z_t = \mu + \alpha t + \lambda Z_{t-1} + \sum_{i=1}^{p-1} \gamma_i Y_{t-i} + \sum_{i=0}^{p-1} \gamma_i X_{t-i} + \varepsilon_t , \quad (3)$$

where $\Delta = 1 - L$ and $\alpha = [\alpha_Y, \alpha_X]$. We partition the long-run multiplier matrix as

follows:

$$\lambda = \begin{bmatrix} \lambda_{YY} & \lambda_{YX} \\ \lambda_{XY} & \lambda_{XX} \end{bmatrix}.$$

The diagonal elements of the matrix are unrestricted, so the selected series can be either I(0) or I(1). If $\lambda_{YY} = 0$, then *Y* is I(1). In contrast, if $\lambda_{YY} < 0$, then *Y* is I(0).

The VECM procedures described above are important in testing of at most, one cointegrating vector between dependent variable (Y_t) and a set of regressors (X_t). Further, following the assumptions made (unrestricted intercepts and no trends) and restrictions imposed ($\lambda_{XY} = 0, \mu \neq 0$ and $\alpha = 0$) by Pesaran, *et al.* (2001) in Case III, therefore, we re-formulate Equation (3) to derive the following Unrestricted Error Correction Model (UECM) to examine the long run relationship between real GDP and debt.

$$\begin{aligned} \Delta RGDP_t = {} & \beta_0 + \beta_1 RGDP_{t-1} + \beta_2 DEBT_{t-1} + \beta_3 RTB_{t-1} + \beta_4 WSTE_{t-1} + \beta_5 DUM \\ & + \sum_{i=1}^{p} \beta_6 \Delta RGDP_{t-i} + \sum_{i=0}^{p} \beta_7 \Delta DEBT_{t-i} + \sum_{i=0}^{p} \beta_8 \Delta RTB_{t-i} \\ & + \sum_{i=0}^{p} \beta_9 \Delta WSTE_{t-i} + u_t, \end{aligned} \tag{4}$$

where u_t is the white noise error term; Δ is the first difference operator; and *p* is lag structure, which determined by Akaike's information criterion.

There are two steps in testing the cointegration relationship between economic growth and its explanatory variables. First, we estimate Equation (4) by ordinary least square (OLS) technique. Second, we examine the long run relationship by imposing the restriction that all estimated coefficients of lagged one level variables equal to zero. That is, the null hypothesis is $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ against its alternative hypothesis. In order to test the above hypotheses, following Pesaran, *et al.* (2001), we will apply either standard Wald test or *F*-statistic, which has a non-standard distribution that depends on few factors such as sample size, the inclusion of intercept and trend variable in the estimation, and number of regressors. If the *F*-statistic obtained from the restriction is less than lower bound critical value, we do not reject the null hypothesis of no long run relationship. In contrast, if the computed *F*-statistic is greater than upper bound critical value, then we reject the null hypothesis and conclude that there appears steady state long run equilibrium between the variables under study. However, if the *F*-statistic falls within lower and upper bound critical values, then the results are inconclusive and the stationarity of the series must be examined and investigated.

Narayan (2005) argues that the use of Pesaran, *et al.*'s (2001) critical values for small sample study may produce misleading results because the critical values calculated are

generally lower than those generated by Narayan who used similar GAUSS code used by Pesaran, *et al*. (2001). Narayan (2005) has generated a new set of critical values ranging from 30 to 80 observations. Since the sample size in our study is small (that is, 34 observations) and as the critical values provided by Pesaran, *et al.* (2001) are calculated on the basis of large sample sizes of 500 and 1000 observations and 2000 and 40000 replications respectively, we propose to use the critical values provided by Narayan (2005).

Once the variables are found to be cointegrated, then the next step is to use the error-correction model to estimate the short-run dynamic causality relationship. Equation (3) can now be constructed into a vector error-correction model (VECM) in order to capture both short- and long -run impact of the vector. Defining Z_t as the vector of the potentially endogenous variables, we can model Z_t as an unrestricted vector autoregression (VAR) model with lag-length up to 3:[1]

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + A_3 Z_{t-3} + U_t \quad \textit{where } U_t \sim IN(0, \sigma^2), \tag{5}$$

where Z_t is (4 x 1) vector consists of *RGDP, DEBT, WSTE* and *RTB*. Each of the A_i is (4 x 4) matrix of parameters. The 4-VAR model as stated in Equation (5) will be used if there is no long run relationship to be found in the bound testing approach. However, if there is a cointegration relationship, then the following vector error correction will be applied to examine the long- and short -run causality between variables.

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \Pi Z_{t-3} + U_t, \tag{6}$$

where ΔZ_t = [*RGDP, DEBT, WSTE* and *RTB*]', $\Gamma_1 = -(I - A_1)$, $\Gamma_2 = -(I - A_1 - A_2)$ and $\Pi = -(I - A_1 - A_2 - A_3)$. Γ_i measures the short-run effect of the changes in Z_t. The (4 x 4) matrix of Π $(= \alpha\beta')$ contains both speed of adjustment to disequilibrium (α) and the long-run information (β) such that the term $\beta' Z_{t-3}$ embedded in Equation (6) represents the (n-1) cointegrating vector in the model.

Accordingly, we can re-state the Equation (6) as follows:

[1] The maximum lag length up to 3 is suggested as the frequency of the data is annual and there are 34 observations in the study.

$$\begin{bmatrix}\Delta RGDP_t\\ \Delta DEBT_t\\ \Delta WSTE_t\\ \Delta RTB_t\end{bmatrix} = \Gamma_1\begin{bmatrix}\Delta RGDP_{t-1}\\ \Delta DEBT_{t-1}\\ \Delta WSTE_{t-1}\\ \Delta RTB_{t-1}\end{bmatrix} + \Gamma_2\begin{bmatrix}\Delta RGDP_{t-2}\\ \Delta DEBT_{t-2}\\ \Delta WSTE_{t-2}\\ \Delta RTB_{t-2}\end{bmatrix} + \begin{bmatrix}\alpha_{11}\ \alpha_{12}\ \alpha_{13}\\ \alpha_{21}\ \alpha_{22}\ \alpha_{23}\\ \alpha_{31}\ \alpha_{32}\ \alpha_{33}\\ \alpha_{41}\ \alpha_{42}\ \alpha_{43}\end{bmatrix} \times \begin{bmatrix}\beta_{11}\ \beta_{21}\ \beta_{31}\ \beta_{41}\\ \beta_{12}\ \beta_{22}\ \beta_{32}\ \beta_{42}\\ \beta_{13}\ \beta_{23}\ \beta_{33}\ \beta_{43}\end{bmatrix} \times \begin{bmatrix}RGDP_{t-3}\\ DEBT_{t-3}\\ WSTE_{t-3}\\ RTB_{t-3}\end{bmatrix}. \quad (7)$$

There are two steps involved in the estimation of error-correction model (ECM). First, we identify the unique long-run relationship based on theory that represents the economic relationship underlying the long run model among real GDP, real debt, the ratio of wages and salaries to total expenditure and real Treasury bill rate. Secondly, we estimate the short-run model within the VECM to find out the short run causal relationship. The short run model is of interest since we can study the behaviour of each variable in the estimated system in response to the residual from the cointegrating equation (error-correction term - ECT). The ECT measures the speed of adjustment of each variable in response to a deviation from the steady state equilibrium relationship. Since the objective of the study is to examine the causality relationship between economic growth and debt, the two equations are derived from Equation (7) as follows:

$$\Delta RGDP_t = \beta_1 ECT_{t-1} + \sum_{j=1}^{k} \pi_j \Delta RGDP_{t-j} + \sum_{j=1}^{k} \tau_j \Delta DEBT_{t-j} + \sum_{j=1}^{k} \lambda_j \Delta Y_{t-j} + u_{1t}, \quad (8)$$

$$\Delta DEBT_t = \beta_2 ECT_{t-1} + \sum_{j=1}^{k} \phi_j \Delta RGDP_{t-j} + \sum_{j=1}^{k} \delta_j \Delta DEBT_{t-j} + \sum_{j=1}^{k} \eta_j \Delta Y_{t-j} + u_{2t}, \quad (9)$$

where ECT_{t-1} is the one-period lagged error correction term, Y_t is the vector comprising *WSTE* and *RTB*, and u_{1t} and u_{2t} are white noise error terms. In these two equations, the series real GDP and debt are cointegrated when at least one of the coefficients β_1 or β_2 is not zero. In that case, two series will display long-run relationship. If $\beta_1 \neq 0$ and $\beta_2 = 0$, we conclude that debt Granger causes RGDP in the long run. On the other hand, if $\beta_2 \neq 0$ and $\beta_1 = 0$, RGDP will Granger cause debt. If both β_1 and β_2 are nonzero, the conclusion then is that there exists a feedback relationship between economic growth and debt.

The short-run relationships between growth and debt are signified by the coefficients τ_j's and ϕ's. If τ_j's are not all zero, movements in debt will cause growth in the short-run. If ϕ_i's are not all zero, movements in growth will cause debt in the short-run. The short-run as well as long-run dynamic causality relationships between growth and

debt can be assessed by forming hypotheses and testing them on the estimated coefficients in the Equations (8) and (9). In general, six possible testable hypotheses concerning the short-run and long-run influence of debt on growth ($DEBT_t \rightarrow RGDP_t$) and growth on debt ($RGDP_t \rightarrow DEBT_t$) can be formulated. These can be described and summarized in Table 3.

Table 3. Six Possible Testable Hypotheses between Debt on Growth

Granger Causality Test	Testable Hypotheses	Description
$H^{ST}_{DEBT \rightarrow RGDP}$ *(No ST linkage)*	$\tau_j = 0$ $(j = 1,...,k)$	DEBT does not Granger Cause DCGDP in the short-term
$H^{LT}_{DEBT \rightarrow RGDP}$ *(No LT linkage)*	$\beta_1 = 0$	DEBT does not Granger Cause DCGDP in the long-term
$H^{NO}_{DEBT \rightarrow RGDP}$ *(No ST or LT linkages)*	$\beta_1 = 0$ *and* $\tau_j = 0$ $(j = 1,...,k)$	DEBT does not Granger Cause DCGDP in the short-term and long –term
$H^{ST}_{RGDP \rightarrow DEBT}$ *(No ST linkage)*	$\phi_i = 0$ $(i = 1,...,k)$	DCGDP does not Granger Cause DEBT in the short-term
$H^{LT}_{RGDP \rightarrow DEBT}$ *(No LT linkage)*	$\beta_2 = 0$	DCGDP does not Granger Cause DEBT in the long-term
$H^{NO}_{RGDP \rightarrow DEBT}$ *(No ST or LT linkages)*	$\beta_2 = 0$ *and* $\phi_i = 0$ $(i = 1,...,k)$	DCGDP does not Granger Cause DEBT in the short-term and long -term

These individual hypotheses can be tested using standard *F*-tests on the estimated coefficients of the error-correction model. The six hypotheses are used to examine the lead-lag and feedback relationships between debt and economic growth as well as other variables.

4. EMPIRICAL RESULTS

We start by testing the long run relationship among real GDP (RGDP), real total debt (RTD), real treasury bill rate (RTB) and wages and salaries to total expenditure ratio (WSTE) by estimating Equation (4) by ordinary least squares (OLS) method. Four equations, each with four different variables, namely RGDP, RTD, RTB and WSTE as dependent variable along with other variables as explanatory variables are thus estimated and the calculated *F*-statistics are reported in Table 4. The level of significance chosen for our study is 1%. Among four equations, only in regard to the equation with RGDP as dependent variable, we find the null hypothesis of no long-run relationship stands

rejected as the computed *F*-statistic (8.25) is greater than the upper bound value either from Pesaran, *et al.* (2001) [5.06] or Narayan (2005) [6.37]. In the other three cases, we find the null hypothesis cannot be rejected.

Table 4. Bound Test for Cointegration Analysis Based on Equation (4)

Dependent Variable			Computed F-statistic	
RGDP			8.25***	
RTD			3.62	
RTB			1.67	
WSTE			2.35	
Critical Value	Pesaran *et al.* (2001)[a]		Narayan (2005)[b]	
	Lower bound value	Upper bound value	Lower bound value	Upper bound value
1 percent	3.74	5.06	4.59	6.37
5 percent	2.86	4.01	3.28	4.63
10 percent	2.45	3.52	2.70	3.90

Sources: [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. 1988. *** indicates significance at 1% level.

Having found the existence of a long-run relationship between real GDP, real debt, real treasury bill rate and the ratio of recurrent expenditures to total expenditure when real GDP is the dependent variable, we estimate the long run elasticities. The estimated Equation (10), with figures in parentheses representing calculated "*t*" values is as follows:

$$\underset{\quad}{RGDP} = \underset{(4.57)}{3.36} + \underset{(5.26)}{0.87}RTD - \underset{(-4.73)}{0.11}RTB + \underset{(5.05)}{1.22}WSTE + \underset{(0.84)}{0.02}DUM. \qquad (10)$$

Thus, we find that coefficients of the explanatory variables namely RTD, RTB and WSTE not only have the expected signs in accordance with theoretical expectations but are also found statistically significant. While estimated coefficients of total debt and WSTE are positive, the coefficient of real Treasury bill rate is negative. Debt positively influences economic growth. So too WSTE: higher recurrent expenditure, which contributes to consumption, positively affects GDP. The lower the interest rate, which is represented by RTB, higher is the economic growth. Dummy variable (DUM) for political instability appears to have had no effect on economic growth, as the coefficient was not statistically significant.

Equation (10) is adequate as indicated in the diagnostic checking output, i.e., the

model has the desired properties of OLS method such as serially uncorrelated, constant variance or homoscedasticity of residuals and has a correct functional form. Moreover, the CUSUM and CUSUM of Squares plot[2] show that the parameters of the model are stable over time.[3]

Since we found the existence of a cointegrating relationship among RGDP, RTD, RTB and WSTE, there should be Granger causality at least in one direction. For testing the direction of temporal causality between the variables, we resort to testing Granger causality within a vector error correction model (VECM). The test results are reported in Table 5.

Table 5. Granger Causality Tests Based on Vector Error Correction Model

Dependent Variable	F-statistic				ECT_{t-1} (t statistic)
	ΔRGDP	ΔRTD	ΔRTB	ΔWSTE	
ΔRGDP	-	130.6291***	0.6361	2.7466	-0.9177***
ΔRTD	4.5861	-	3.1505	2.9088	-0.6596
ΔRTB	1.1732	1.1027	-	2.5401	-0.0011
ΔWSTE	0.6981	0.9527	0.2701	-	-0.3508

Note: *** significance at 1% level.

The results show that ECT in all the four equations has the correct negative sign. However, only the ECT in the RGDP equation is found statistically significant at 1 per cent level, which confirms the results we obtained from the bounds test of cointegration. This implies that in the long run the causality runs from debt, Treasury bill rate and the ratio of recurrent expenditures to total expenditures, to GDP and that change in GDP are a function of disequilibrium in the cointegrating relationship. The ECT coefficient of 0.92 indicates that adjustment towards the long run equilibrium is about 92% per annum, suggesting any deviation from the long run equilibrium is corrected substantially in the following year.

Turning to short-run causal effects, we find that short-run causality runs only from debt to growth. Thus, there is only unidirectional relationship, running from debt to

[2] The use of both CUSUM and CUSUM squares tests are aims to show the stability of the estimations. Nevertheless, it is well known that in the estimation of lagged dependent variables, both tests are less accurate as a guide. In addition, given the large number of parameters being estimated and the small sample size, these tests are more likely to have low power. Therefore, these tests are used as complementary diagnostic checking to our estimated models. The validity of both models (Tables 4 and 5), nonetheless, is reliable as demonstrated by other diagnostic tests such as serial correlation, heteroscedasticity and mis-specification tests.

[3] The diagnostic checking results are available upon request.

growth, both in the long run and short run.

5. SUMMARY AND CONCLUSIONS

The paper employed the bounds testing approach to examine the relationship between Fiji's economic growth, public debt, real interest rate and ratio of government recurrent expenditure to its total expenditure during a 34-year period (1970-2003). Empirical analysis revealed that economic growth had a long-run relationship with public debt, real interest rate and ratio of government recurrent expenditures to total expenditure. Second, vector error correction modeling procedure established that in the long run term causality was only unidirectional and that it was from debt, interest rate and ratio of government recurrent expenditures to total expenditures, to GDP. In the short run, the causality ran from debt to GDP. The other two variables, interest rate and ratio of government recurrent expenditure to its total expenditure in the short run had no effect on real GDP. Thus, we have the result that debt influenced economic growth, both in the long and short runs.

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