DO FISCAL DEFICITS CAUSE CURRENT ACCOUNT DEFICITS IN THE PACIFIC ISLAND COUNTRIES? A CASE STUDY OF FIJI

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Abstract

Pacific island countries have been experiencing budget deficits and deficits in their external accounts for some time in the past few years. Fiji is no exception. It has been experiencing current account deficits in its balance of payments since the late 1990s, despite the emergence of a boom in remittances. The deficits have become increasingly more pronounced since 2001 due to gradual decline in the country’s traditional exports of sugar and sharp fall in the exports of garments, due to expiry of the Multifibre Agreement, and decline in the exports of gold following operational problems. On the other hand, the surge in imports of capital goods and machinery for building and construction industry was mainly due to expansionary fiscal policies since 2001, which revived the economy as well. Additionally, a steep rise in private sector credit in the post-coup years of 2000 ensued, contributing to the further widening of current account deficit. This paper seeks to investigate whether the popular twin deficit hypothesis holds good in the case of Fiji.

Keywords: Budget deficit, current account deficit, bounds test, Granger causality test.
1. Introduction

Pacific island countries (PICs), ever since their independence in the mid 20th century have been receiving each year substantial official development assistance (ODA), known as foreign aid, which proved to be supportive in many ways. Aside from supplementing domestic savings, steady annual aid inflows financed a major proportion of expenditures in country’s annual budget. Since PICs are highly dependent on imports of all categories, including food, fuel and intermediate and capital goods with a narrow range of exports, annual trade gaps have remained large. Annual aid inflows, being in foreign exchange, amount to transfer in real resources. Thus, foreign aid in recent years, not only kept the domestic inflation low served but also served as cushion against pressures of current account deficits in the balance of payments on exchange rates (Jayaraman, 2006).

Following the end of the Cold War in the late 1980s, which led to changes in the donors’ priorities, there has been a marked decline in aid inflows specifically earmarked for budgetary support. The donors decided to link their assistance to implementation of structural reforms in PICs. With stagnant revenues and weak tax collection machinery, the fiscal position in PICs deteriorated further. Budget deficits are now an annual phenomenon. Being open economies, PICs began to experience external current account deficits in balance of payments as well, thus giving rise to the emergence of twin deficits.

It is still uncertain whether budget deficit causes current account deficit or vice-versa. Studies conducted in other regions, which examined the possible link between the two deficits in both developing and developed countries could not reach any consensus. Fiji, which is taken up as a case study, has been struggling with the twin deficits for quite some time. The objective of this paper is to examine the short-run temporal causality and long run relationship between external current account deficits and budget deficits in Fiji with a view to obtaining better appreciation of causal linkages for formulating appropriate macroeconomic policies.

The paper is organized as follows. The second section gives a brief descriptive account of Fiji’s economy, analyzing the recent trends in twin deficits experienced by Fiji during the last 25 years; the third section reviews in brief a vast amount of literature on the subject; the fourth section outlines the modeling strategy employed for the empirical study; the fifth section reports the results; and the sixth and final section presents the conclusions with policy implications.
2. Fiji’s Economy: Trends in Twin Deficits

Fiji ranks amongst PICs (Table 1) as the recipient of least amount of ODA expressed as percentage of gross domestic debt (GDP). Consequently, aid has not been a major component of government revenue unlike in the case of other PICs. A recent IMF study of Fiji’s fiscal performance observed that during most of the post-independence period, fiscal policy was appropriate with annual overall fiscal deficit, rarely exceeding 5 per cent of GDP (D’hoore, 2006: 72). Fiscal adjustments were introduced from time to time, applying brakes on government recurrent expenditure such as cuts on wages and salaries following the 1987 coups, which were restored, when situation improved.

Table 1: Fiji Among Pacific Island Countries: Selected Key Indicators

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The Pacific</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cook Islands</td>
<td>19</td>
<td>2,651</td>
<td>62</td>
<td>NA</td>
<td>490.0</td>
<td>NA</td>
<td>28.0</td>
</tr>
<tr>
<td>Fiji</td>
<td>840</td>
<td>2,195</td>
<td>90</td>
<td>9</td>
<td>61.0</td>
<td>3.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Fed. States of Micronesia</td>
<td>114</td>
<td>2,211</td>
<td>NA</td>
<td>NA</td>
<td>923.0</td>
<td>NA</td>
<td>37.4</td>
</tr>
<tr>
<td>Kiribati</td>
<td>90</td>
<td>751</td>
<td>129</td>
<td>NA</td>
<td>191.0</td>
<td>22.5</td>
<td>18.6</td>
</tr>
<tr>
<td>Palau</td>
<td>20</td>
<td>6,482</td>
<td>NA</td>
<td>NA</td>
<td>1295.0</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>5,600</td>
<td>714</td>
<td>139</td>
<td>31</td>
<td>40.0</td>
<td>12.8</td>
<td>7.2</td>
</tr>
<tr>
<td>Rep. Of Marshall Islands</td>
<td>58</td>
<td>2,559</td>
<td>NA</td>
<td>NA</td>
<td>991.0</td>
<td>NA</td>
<td>49.6</td>
</tr>
<tr>
<td>Samoa</td>
<td>181</td>
<td>1,672</td>
<td>75</td>
<td>20</td>
<td>186.0</td>
<td>42.6</td>
<td>14.5</td>
</tr>
<tr>
<td>Solomon Islands</td>
<td>471</td>
<td>550</td>
<td>129</td>
<td>11</td>
<td>132.0</td>
<td>21.7</td>
<td>11.0</td>
</tr>
<tr>
<td>Tonga</td>
<td>101</td>
<td>1,629</td>
<td>55</td>
<td>3</td>
<td>270.0</td>
<td>26.3</td>
<td>16.4</td>
</tr>
<tr>
<td>Tuvalu</td>
<td>11</td>
<td>345</td>
<td>118</td>
<td>NA</td>
<td>260.0</td>
<td>47.2</td>
<td>45.0</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>215</td>
<td>1,493</td>
<td>119</td>
<td>1</td>
<td>154.0</td>
<td>33.0</td>
<td>11.7</td>
</tr>
</tbody>
</table>


Structural Rigidities in Budget

However, due to structural rigidities on the revenue side, total government revenue, inclusive of tax and non-tax revenues and grants, has been hovering around 26 per cent of...
GDP, out of which tax revenue is about 20 per cent. Income tax revenue accounted for about 7 per cent of GDP, goods and services taxes around 9 per cent and taxes on international trade about 5 per cent.

Total government expenditures, which averaged 30 per cent of GDP in the early two decades of independence, after a decline for a brief period of two years in the current decade picked up to reach the historically highest proportion of 32 per cent of GDP in 2002. The level of expenditure was kept high in the next two years, signifying the expansionary fiscal stance of the government. Since private sector investment was dormant before the 1999 elections due to uncertainties and again in 2000 following a civilian coup in 2000, the elected government in 2001 decided to jumpstart the economy by adopting aggressive fiscal policies in the next three years. In a way, deficit financing was found easy. Excess liquidity in the economy due to poor investment environment and uncertainties that prevailed ever since the coups of 1987 helped the government to tap the idle domestic resources for financing the fiscal deficits of sizeable nature (Table 2) by domestic borrowing (Jayaraman and Choong, 2006a), without exercising any pressure on interest rates and crowding out private investment for a while until late 2005.

The composition of government expenditures has been heavily tilted in favour of operating expenditures, including administrative expenditures on value added taxes (VAT), which in recent years accounted for 75 per cent to 80 per cent of total expenditures. The wage and salary bill alone accounted for 50 per cent of the operating expenditures. Thus, government savings have been more directed each year towards consumption rather than investment expenditures in growth enhancing areas.

The fiscal deficit rose from 3.2 per cent of GDP in 2000 to 6.5 per cent in 2001, more than doubled. It further went up to 8.5 per cent in 2002, reaching an unprecedented figure of 8.7 per cent of GDP in 2003. In the next two years, the deficit came down to 6.5 per cent of GDP in 2004 and 3.3 per cent in 2005. Since Fiji financed it fiscal deficits by domestic borrowing, mostly from the state sponsored National Provident Fund, continuously for a six-year period (2001-2006), total government debt also rose from a

<table>
<thead>
<tr>
<th>Year</th>
<th>Government Revenue (% of GDP)</th>
<th>Government Expenditure (% of GDP)</th>
<th>Overall Balance (% of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988-2005 (Average)</td>
<td>26.4</td>
<td>30.5</td>
<td>-4.1</td>
</tr>
<tr>
<td>1988-1999 (Average)</td>
<td>26.8</td>
<td>30.4</td>
<td>-3.6</td>
</tr>
<tr>
<td>2000</td>
<td>24.2</td>
<td>27.4</td>
<td>-3.2</td>
</tr>
<tr>
<td>2001</td>
<td>22.1</td>
<td>28.6</td>
<td>-6.5</td>
</tr>
<tr>
<td>2002</td>
<td>25.8</td>
<td>34.3</td>
<td>-8.5</td>
</tr>
<tr>
<td>2003</td>
<td>24.4</td>
<td>32.1</td>
<td>-8.7</td>
</tr>
<tr>
<td>2004</td>
<td>24.8</td>
<td>31.3</td>
<td>-6.5</td>
</tr>
<tr>
<td>2005</td>
<td>24.1</td>
<td>27.4</td>
<td>-3.3</td>
</tr>
<tr>
<td>2006</td>
<td>25.9</td>
<td>28.8</td>
<td>-2.9</td>
</tr>
</tbody>
</table>

modest 44 per cent of GDP in 2001 to historically the highest level at 53 per cent of GDP in 2006. With contingent liabilities such as guaranteed public debt of state owned enterprises and other statutory bodies, the public sector debt ratio was expected to be around 60 per cent of GDP. Fiji’s fiscal vulnerability indicators are given in Table 3.

Fiji’s external debt was kept deliberately low at around 11 per cent of GDP until 2006. Since Fiji, unlike other PICs, is not eligible for concessional loans from international lending agencies including Asian Development Bank, past policies were aimed at keeping a low level of external borrowing (Jayaraman and Choong, 2007). Utilising the favourable credit rating\(^1\), Fiji carried out its first ever bond issue in international bond markets in September 2006, the issue size being at US$ 150 million with the stated objective that the loan proceeds would be for meeting the 2007 budget deficit requirements. The bond maturity period was for five years and the coupon payment amounted to 7 per cent of the face value.

<table>
<thead>
<tr>
<th>Table 3: Fiji: Fiscal Vulnerability Indicators</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue &amp; Grants</td>
<td>22.1</td>
<td>25.8</td>
<td>24.4</td>
<td>24.8</td>
<td>24.1</td>
<td>25.9</td>
</tr>
<tr>
<td>Expenditure &amp; Net Lending</td>
<td>28.6</td>
<td>34.3</td>
<td>32.1</td>
<td>31.3</td>
<td>27.4</td>
<td>28.8</td>
</tr>
<tr>
<td>Overall Balance</td>
<td>-6.5</td>
<td>-8.5</td>
<td>-8.7</td>
<td>-6.5</td>
<td>-3.3</td>
<td>-2.9</td>
</tr>
<tr>
<td>Government Debt</td>
<td>44.0</td>
<td>48.0</td>
<td>49.0</td>
<td>53.0</td>
<td>52.0</td>
<td>NA</td>
</tr>
<tr>
<td>External Debt</td>
<td>13.6</td>
<td>13.7</td>
<td>12.2</td>
<td>10.9</td>
<td>11.1</td>
<td>NA</td>
</tr>
<tr>
<td>Current Account Balance</td>
<td>-3.5</td>
<td>-0.1</td>
<td>-7.7</td>
<td>-16.4</td>
<td>-15.6</td>
<td>-24.4</td>
</tr>
<tr>
<td>Intl.Reserves (US$ Milion)</td>
<td>NA</td>
<td>359</td>
<td>423</td>
<td>636</td>
<td>471</td>
<td>495</td>
</tr>
<tr>
<td>Intl.Reserves (months of imports)</td>
<td>4.3</td>
<td>3.5</td>
<td>3.1</td>
<td>3.3</td>
<td>3.5</td>
<td>NA</td>
</tr>
<tr>
<td>Exch Rate (Dom.currency/US$)</td>
<td>2.3</td>
<td>2.2</td>
<td>1.9</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
</tr>
</tbody>
</table>


**Current Account in Balance of Payments**

The government’s expansionary fiscal stance during a five-year period (2001-2005) contributed towards reviving private sector confidence as well. Increases in domestic credit during 2001-2005 accordingly resulted in the quick bounce of the economy. Total credit as a proportion of GDP, which plunged from 44% of GDP in 2000 to 41% in 200 due to the civilian coup of 2000, rose steadily during the next four years and was about

\(^1\) Fiji’s credit rating had, however, fallen since January 2007, due to the military coup in December 2006 and the continuing international distrust in the interim government. The price of the bond fell from US 99.80 (face value of US$ 100) to US$ 86 soon after the coup. In late 2006, the Standard & Poors lowered Fiji’s foreign currency and local credit rating to B+ and BB- from BB+ and BB respectively. In March 2007, the ratings were further lowered to B and B+ respectively (RBF 2007).
59% of GDP in 2005. Credit to public sector registered increases, as banks and non-bank institutions stepped up investment in government bonds. Credit to private sector also went up, as it recorded increases from 33% of GDP in 2001 to 49% of GDP in 2005. The credit boom also reflected a catching up from the past-depressed levels of investment climate due to political instability.

Thus, both expansionary fiscal policies and revival of private sector credit resulted in increases in aggregate demand, which spilled over into demand for foreign goods and services. Consequently, trade deficits expanded. Despite a boom in remittances since 2003 and a rebound in the tourism sector, there were considerable pressures on balance of payments. The current account deficits in country’s balance of payments were on the rise, as there was a steep fall in garment exports as the US discontinued from January 2005 its annual quota of imports from Fiji. Added to the loss of export earnings, sugar exports fell as production reached low levels and gold exports declined due to mining operational problems.

Table 4 presents details on current account deficits in the balance of payments along with budget deficits. The current account deficits mounted rapidly from to 7.7 per cent of GDP in 2003 to record the highest figure of 24.4 per cent in 2006 (ADB, 2007). While the persistent fiscal deficits were financed from increased public borrowing, the current account deficits were financed under Fiji’s fixed exchange rate regime by a steady drawdown from the international reserves. Fiji’s reserves position weakened gradually from 2002 (6.3 months of import cover) to 2006 (3.2 months of imports cover).

As Fiji’s international reserves were seen declining from 2002 onwards for the next four years, pressures were mounting on the exchange rate during the second half of 2006 resulting in speculative attacks, as rumours were rife about imminent devaluation. It was then clear that fiscal deficits and the build up of public debt of record size would eventually take a toll on the country’s currency (Jayaraman and Choong, 2006b). Fiji’s monetary authority, the Reserve Bank of Fiji (RBF) imposed in December 2006, exchange controls on transactions under capital account and introduced credit ceilings along with increases in interest rates on RBF lending facilities to commercial banks (RBF, 2006b).

<table>
<thead>
<tr>
<th>Year</th>
<th>Current Account Deficit (% of GDP)</th>
<th>Budget Deficit (% of GDP)</th>
<th>Broad Money (M2) (% of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979-89 (Average)</td>
<td>2.1</td>
<td>5.9</td>
<td>41.2</td>
</tr>
<tr>
<td>1990-94 (Average)</td>
<td>2.1</td>
<td>4.6</td>
<td>55.2</td>
</tr>
<tr>
<td>1995-99 (Average)</td>
<td>1.6</td>
<td>4.7</td>
<td>55.9</td>
</tr>
<tr>
<td>2000</td>
<td>2.9</td>
<td>3.2</td>
<td>43.2</td>
</tr>
<tr>
<td>2001</td>
<td>3.5</td>
<td>6.5</td>
<td>39.1</td>
</tr>
<tr>
<td>2002</td>
<td>0.1</td>
<td>8.5</td>
<td>39.8</td>
</tr>
<tr>
<td>2003</td>
<td>7.7</td>
<td>8.7</td>
<td>45.7</td>
</tr>
<tr>
<td>2004</td>
<td>16.4</td>
<td>6.5</td>
<td>46.6</td>
</tr>
<tr>
<td>2005</td>
<td>15.6</td>
<td>3.3</td>
<td>54.0</td>
</tr>
<tr>
<td>2006</td>
<td>24.4</td>
<td>2.9</td>
<td>56.2</td>
</tr>
</tbody>
</table>
3. A Brief Literature Survey

A survey of studies on the linkages between current account deficits in the balance of payments and budget deficits begins with standard treatment of external current account deficits, which is based on the national accounting identity (Daniel, et al., 2006).

\[ CA = (S_{priv} - I_{priv}) + (S_{pub} - I_{pub}) \]

where \( CA \) = external current account balance;

\( S_{priv} \) = private sector savings

\( I_{priv} \) = private sector investment,

\( S_{pub} \) = public sector saving

\( I_{pub} \) = public sector investment

While \( (S_{pub} - I_{pub}) \) represents the overall fiscal balance, \( (S_{priv} - I_{priv}) \) is the private savings and investment balance.

Assuming private savings/investment remained stable overtime, external current account balance would be equal to overall fiscal balance. Alternately, external current account deficit would be equal to budget deficit. This identity provides a basis for modelling the hypothesised long run relationship between current account deficits and budget deficits. However, we do not have any indication of the direction of linkages, both behavioural and temporal.

Under fixed exchange regime, in the Johnson’s (1972) monetary approach to balance of payments model with or without capital mobility, any excess domestic absorption and in our case, with private and savings gap being stable, excess government expenditure over its revenues would spill into excess demand for overseas goods and services, resulting in trade/current account deficit. Under freely floating regimes, with either partial or free capital mobility in the Mundell-Fleming open economy model, there is interaction between budget deficit and trade/current account deficit directly through domestic absorption and indirectly through monetary channels. As budget deficit rises, aggregate demand would increase and domestic interest rate would also rise; and if the domestic rate is higher than world interest rate there will be a capital inflow, resulting in the rise of real exchange rate; exports would fall; and trade balance/current account balance would deteriorate. Thus, our modelling strategy has to incorporate both real and monetary variables.

A review of past empirical studies on both developed and developing countries shows conflicting results. These studies used either trade deficits or current account deficits (taking into account net earnings from services including tourism and transfers, official and private including remittances) depending upon the country circumstances. Studies by Chen and Haug (1993), Evans (1988, 1993), and Evan and Hasan (1994) on the US and Canadian economies concluded that there was an absence of linkage between budget and
external deficits. Their conclusion indicated the possibility of existence of Ricardian Equivalence proposition that economic agents anticipate budget deficits would be financed by increase in future tax rates; accordingly, they would adjust consumption towards maximising the inter-temporal welfare by increasing current savings rather than current consumption; and thus there would be no effect on domestic interest rates, total savings, investment, price level and income. An earlier study by Normandin (1994), however, showed that Ricardian equivalence proposition could be rejected for the Canadian economy but not for the US economy. Darrat (1988) in his study on the US economy noted the existence of bi-directional causality between two deficits. On the other hand, Khalid and Guan (1999) noted the existence of a long run-cointegrating relationship between fiscal and trade deficits in selected developing countries while recognizing the absence of such relationship in developed countries.

Thus, the evidence collected by past empirical studies, which employed models with variables representing domestic absorption, such as industrial production index, and variables representing monetary influences, such as interest rate and real exchange rate, is inconclusive. The results differed across countries and they varied more significantly when the researchers employed different econometric techniques with different model specification for the same country data (Onafowara and Owoye, 2006).

4. Modelling Strategy
While focusing our attention on Fiji, we note the time span of data series of Fiji, although the country gained independence in 1970, is not available for a full period from 1970. The IMF data series on balance of payments begins only from 1979. Hence, our study uses the available data series covering a 27-year period (1979-2005). Since Fiji depends heavily upon tourism earnings besides earnings from traditional sugar export earnings, we use current account deficits, rather than trade deficits. Our model, incorporating the real and monetary variables, therefore remains simple and is written as:

\[
CAD = f(RGDP, BD, M2)
\]

where

- \(CAD\) = Current account deficit (per cent of GDP);
- \(RGDP\) = real GDP (index number); and
- \(BD\) = budget deficit (per cent of GDP);
- \(M2\) = broad money supply (per cent of GDP).

\(RGDP\) represents domestic absorption and \(M2\) monetary influences. The latter include changes in interest rate, inflation and real interest affecting trade volume. The data series are drawn from a single source, namely Asian Development Bank (2006). We employ the bounds testing approach developed by Pesaran, et al. (2001) to examine the existence of relationship between current account deficit and budget deficit. This approach has assumed importance in recent years since the stationarity properties of the series along with the finite sample performance of this testing approach have increasingly been proven to be superior to that of cointegration procedure by Johansen (1988, 1991), Johansen and Juselius (1990). Since the traditional F-test for Granger non-causality is not
valid when the variables are cointegrated and the test statistic does not follow its own
distribution, error correction models (ECMs) are used instead (Granger, 1988). However,
if the variables are not integrated of the same order or are not cointegrated, ECM cannot
be applied. In addition, possibly severe pre-test biases in ECM may exist, especially for
finite samples. To overcome these problems, an autoregressive distributed lag (ARDL)
model proposed by Pesaran, et al. (2001) has been recommended.

Following Pesaran, et al. (2001), we form the vector autoregression (VAR) of order \( p \)
(VAR(\( p \))) for the twin deficit model:

\[
Z_t = \mu + \sum_{i=1}^{p} \beta_i Z_{t-i} + \epsilon_t \tag{2}
\]

where \( Z_t \) is the vector of both \( X_t \) and \( Y_t \), where \( Y_t \) is the dependent variable (CAD) and
\( X_t \) is the vector matrix represents a set of explanatory variables (RGDP, BD and M2).
\( \mu = [\mu_Y, \mu_X]' \), \( t \) is a time or trend variable, and \( \beta_i \) 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:

\[
\Delta Z_t = \mu + \alpha t + \lambda \Delta Z_{t-1} + \sum_{i=1}^{p-1} \gamma_i Y_{t-i} + \sum_{i=0}^{p-1} \gamma_i X_{t-i} + \epsilon_t \tag{3}
\]

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 budget deficit
and current account deficit.

\[
\Delta CAD_t = \beta_0 + \beta_1 CAD_{t-1} + \beta_2 RGDP_{t-1} + \beta_3 BD_{t-1} + \beta_4 M2_{t-1} + \sum_{i=1}^{p} \beta_i \Delta CAD_{t-i} + \sum_{i=0}^{p} \beta_i \Delta RGDP_{t-i} + \sum_{i=0}^{p} \beta_i \Delta BD_{t-i} + \sum_{i=0}^{p} \beta_i \Delta M2_{t-i} + u_t \tag{4}
\]

where \( u_t \) is the white noise error term; \( \Delta \) is the first difference operator; and \( p \) is lag
structure, which is determined by Akaike’s information criterion.
There are two steps in testing the cointegration relationship between CAD 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 $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$. In order to test the null hypothesis, following Pesaran, et al. (2001), we 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 properties 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, 27 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 cointegrated, the next step is to use a parsimonious vector 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 $3^2$:

$$Z_t = A_1Z_{t-1} + A_2Z_{t-2} + A_3Z_{t-3} + U_t, \quad \text{where } U_t \sim IN(0, \sigma)$$  \hspace{1cm} (5)

where $Z_t$ is $(4 \times 1)$ vector consists of $CAD, RGDP, BD$ and $M2$. Each of the $A_i$ is $(4 \times 4)$ 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.

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

where $\Delta Z = [CAD, RGDP, BD$ and $M2]'$, $\Gamma_1 = -(I - A_1)$, $\Gamma_2 = -(I - A_1 - A_2)$ and $\Pi = -(I - A_1 - A_2 - A_3)$. $\Gamma_i$ measures the short-run effect of the changes in $Z_t$. The $(4 \times 4)$ matrix of $\Pi (=\alpha\beta')$ contains both speed of adjustment to disequilibrium ($\alpha$) and the long-run information ($\beta$) 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:

\[
\begin{bmatrix}
\Delta CAD_t \\
\Delta RGDP_t \\
\Delta BD_t \\
\Delta M2_t
\end{bmatrix} = \Gamma_1 \begin{bmatrix}
\Delta CAD_{t-1} \\
\Delta RGDP_{t-1} \\
\Delta BD_{t-1} \\
\Delta M2_{t-1}
\end{bmatrix} + \Gamma_2 \begin{bmatrix}
\Delta CAD_{t-2} \\
\Delta RGDP_{t-2} \\
\Delta BD_{t-2} \\
\Delta M2_{t-2}
\end{bmatrix} + \begin{bmatrix}
\alpha_{11} & \alpha_{12} & \alpha_{13} \\
\alpha_{21} & \alpha_{22} & \alpha_{23} \\
\alpha_{31} & \alpha_{32} & \alpha_{33} \\
\alpha_{41} & \alpha_{42} & \alpha_{43}
\end{bmatrix} \times
\begin{bmatrix}
\beta_{11} & \beta_{21} & \beta_{31} & \beta_{41} \\
\beta_{12} & \beta_{22} & \beta_{32} & \beta_{42} \\
\beta_{13} & \beta_{23} & \beta_{33} & \beta_{43}
\end{bmatrix}^t
\begin{bmatrix}
CAD_{t-3} \\
RGDP_{t-3} \\
BD_{t-3} \\
M2_{t-3}
\end{bmatrix}
\]

(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 \(CAD, RGDP, BD\) and \(M2\). 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 budget deficit and current account deficit, the two equations are derived from Equation (7) as follows:

\[
\Delta CAD_t = \beta_1 ECT_{t-1} + \sum_{j=1}^{k} \pi_j \Delta CAD_{t-j} + \sum_{j=1}^{k} \tau_j \Delta BD_{t-j} + \sum_{j=1}^{k} \lambda_j \Delta Y_{t-j} + u_{1t}
\]

(8)

\[
\Delta BD_t = \beta_2 ECT_{t-1} + \sum_{j=1}^{k} \phi_j \Delta CAD_{t-j} + \sum_{j=1}^{k} \delta_j \Delta BD_{t-j} + \sum_{j=1}^{k} \eta_j \Delta Y_{t-j} + u_{2t}
\]

(9)

where ECT\(_{t-1}\) is the one-period lagged error correction term. \(Y_t\) is the vector comprising \(RGDP\) and \(M2\), and \(u_{1t}\) and \(u_{2t}\) are white noise error terms. In these two equations, budget deficit and current account deficit are cointegrated when at least one of the coefficients \(\beta_1\) or \(\beta_2\) 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 budget deficit Granger causes current account deficit in the long run. On the other hand, if \(\beta_2 \neq 0\) and \(\beta_1 = 0\), current account deficit will Granger cause budget deficit. If both \(\beta_1\) and \(\beta_2\) are nonzero, the conclusion then is that there exists a feedback relationship between budget deficit and current account deficit in the long-run.

The short-run relationships between budget deficit and current account deficit are signified by the coefficients \(\tau_j\)'s and \(\phi_j\)'s. If \(\tau_j\)'s are not all zero, movements in budget deficit will cause current account deficit in the short-run. If \(\phi_j\)'s are not all zero, movements in current account deficit will cause budget deficit in the short-run. The short-run as well as long-run dynamic causality relationships between budget deficit and current account deficit 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 influences of budget deficit on current account deficit \((BD_t \rightarrow CAD_t)\) and those of current account deficit on budget deficit \((CAD_t \rightarrow BD_t)\) can be formulated. These are summarized in Table 5.

**Table 5: Six Possible Testable Hypotheses between Budget Deficit (BD) and Current Account Deficit (CAD)**

<table>
<thead>
<tr>
<th>Granger Causality Test</th>
<th>Testable Hypotheses</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(H^{ST}_{BD \rightarrow CAD}) (No ST linkage)</td>
<td>(\tau_j = 0) ((j = 1, \ldots, k))</td>
<td>BD does not Granger Cause CAD in the short-term</td>
</tr>
<tr>
<td>(H^{LT}_{BD \rightarrow CAD}) (No LT linkage)</td>
<td>(\beta_i = 0)</td>
<td>BD does not Granger Cause CAD in the long-term</td>
</tr>
<tr>
<td>(H^{NO}_{BD \rightarrow CAD}) (No ST or LT linkages)</td>
<td>(\beta_i = 0) and (\tau_j = 0) ((j = 1, \ldots, k))</td>
<td>BD does not Granger Cause CAD in the short- and long-term</td>
</tr>
<tr>
<td>(H^{ST}_{CAD \rightarrow BD}) (No ST linkage)</td>
<td>(\phi_i = 0) ((i = 1, \ldots, k))</td>
<td>CAD does not Granger Cause BD in the short-term</td>
</tr>
<tr>
<td>(H^{LT}_{CAD \rightarrow BD}) (No LT linkage)</td>
<td>(\beta_2 = 0)</td>
<td>CAD does not Granger Cause BD in the long-term</td>
</tr>
<tr>
<td>(H^{NO}_{CAD \rightarrow BD}) (No ST or LT linkages)</td>
<td>(\beta_2 = 0) and (\phi_i = 0) ((i = 1, \ldots, k))</td>
<td>CAD does not Granger Cause BD in the short- and long-term</td>
</tr>
</tbody>
</table>

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 budget deficit and current account deficit as well as other variables.

**5. Empirical Results**

Before proceeding with the cointegration analysis, we conducted unit root tests in regard to time series of the variables employed in the study, although the bounds testing procedure does not require the same order of integration. In Table 6, we report the results of three types of unit root tests: (i) the Augmented Dickey-Fuller (ADF), (ii) the modified non-parametric Phillips-Perron unit root test by Ng and Perron (2001), known as MZa test; and (iii) the KPSS test, which relies on the null hypothesis that the series under study is an I(0) stationary process. Based on the results reported in Table 6, we found that BD and M2 are integrated at different order, either I(0) or I(1) process, depending on the use of the unit root tests. For other series such as CAD and RGDP, the findings are consistent, that is, integrated at I(1), regardless the use of ADF, Ng-Perron and KPSS unit root tests. Obviously, under such conditions of mixed integrated order conditions of
variables, the use of cointegration procedures such as Johansen (1988, 1991) and Johansen and Juselius (1990) are not appropriate

Table 6: Results of Unit Root Tests (Sample Period: 1979-2005)

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF Test</th>
<th>Ng and Perron Test, M Za</th>
<th>KPSS Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level (Constant with Trend)</td>
<td>First Difference (Constant without Trend)</td>
<td>Level (Constant with Trend)</td>
</tr>
<tr>
<td>CAD</td>
<td>-2.114 (0)</td>
<td>-6.545* (0)</td>
<td>-7.756 (0)</td>
</tr>
<tr>
<td>BD</td>
<td>-3.751* (1)</td>
<td>-6.025* (0)</td>
<td>-12.395 (0)</td>
</tr>
<tr>
<td>RGDP</td>
<td>-2.704 (0)</td>
<td>-4.788* (1)</td>
<td>-6.927 (0)</td>
</tr>
<tr>
<td>M2</td>
<td>-1.389 (0)</td>
<td>-3.462* (0)</td>
<td>-3.902 (0)</td>
</tr>
</tbody>
</table>

Note: The ADF critical value at 5% level is $-2.9640$ and $-3.5629$ for constant without trend and constant with trend regressions, respectively. These critical values are based on Mckinnon. The optimal lag is selected on the basis of Akaike Information Criterion (AIC). The Ng and Perron critical value is based on Ng and Perron (2001) critical value and the optimal lag is selected based on Spectral GLS-detrended AR based on SIC. The null hypothesis of the test is: a series has a unit root. The KPSS critical value is based on KPSS (1992, Table 1) and the optimal lag is selected based on Newey-West using Bartlett kernel. The null hypothesis of the KPSS test is: a series is stationary. The asterisk * denotes the rejection of the null hypothesis at the 5% level of significance. The figures in brackets denote number of lags. CAD = current account deficit; BD = budget deficit; RGDP = real GDP; M2 = broad money supply.

Table 7: Bound Test for Cointegration Analysis

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Computed F-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD</td>
<td>7.76***</td>
</tr>
<tr>
<td>BD</td>
<td>2.47</td>
</tr>
<tr>
<td>RGDP</td>
<td>1.99</td>
</tr>
<tr>
<td>M2</td>
<td>2.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower bound value</td>
<td>Upper bound value</td>
</tr>
<tr>
<td>1 %</td>
<td>3.41</td>
<td>4.68</td>
</tr>
<tr>
<td>5 %</td>
<td>2.62</td>
<td>3.79</td>
</tr>
<tr>
<td>10 %</td>
<td>2.26</td>
<td>3.35</td>
</tr>
</tbody>
</table>

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.

The results of the unrestricted error correction model (UECM) adopted under bounds testing procedure are shown in Table 7. The empirical finding in Table 7 provides strong evidence in favour of cointegration between $BD$ and $CAD$. The calculated $F$-statistic of
CAD equation (7.76) is statistically significant at 1% level. Hence, the null hypothesis of no cointegration relationship is rejected. On the other hand, the calculated $F$-statistic in the equations of $BD$, $RGDP$ and $M2$ is respectively smaller than the respective lower bound value (either using both Pesaran, et al.’s (2001) or Narayan’s (2005) critical values), thus leading us to conclude that there is only one cointegration equation. Our finding is in line with the findings of Enders and Lee (1990), Alse and Bahmani-Oskooee (1992), Biswas, et al. (1992), Tanner and Liu (1994), Khalid (1996), Khalid and Guan (1999) and Kouassi, et al. (2004).

The estimated equation for current account deficit as dependent variable is shown as follows:

$$CAD = -50.99 + 3.23BD*** + 0.08RGDP*** + 0.36M2**$$

(10)

Note: ** and *** indicate significance at 5% and 1% levels. Figures in parentheses are calculated “$t$” values.

It is found that in the long run, budget deficit, real GDP and money supply have a direct and significant impact on the current account deficit. In terms of the magnitudes of the coefficients, budget deficit has far greater impact on current account deficit with coefficient of 3.23. In line with existing studies, it is concluded that domestic absorption, budget deficit and money supply are positively associated with CAD in the long-run.

Various diagnostic tests – tests of normality, autocorrelation, heteroskedasticity in the error term and misspecification error – were conducted to examine the validity and reliability of the long-run regression models. The results of the tests are summarized in Table 8. We do not reject the null hypotheses of no autocorrelation, the error terms being normally distributed and homoskedasticity. The RESET test indicates that the model is correctly specified. In addition, Figures 1 and 2 plot the CUSUM and CUSUMSQ statistics when CAD is the dependent variable. The results indicate absence of instability in the coefficients as the plot of the CUSUM and CUSUMSQ statistics are confined within the 5% critical bounds of parameter stability. This indicates that the structure of the parameters have not diverged abnormally over the period of the analysis.

### Table 8: Diagnostic Tests for Equation (10)

<table>
<thead>
<tr>
<th>Diagnostic Test</th>
<th>Null Hypothesis</th>
<th>Equation (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jarque-Bera test</td>
<td>$H_0$: Normality of error term</td>
<td>$\chi^2 = 1.2606 [0.5324]$</td>
</tr>
<tr>
<td>Breusch-Godfrey Serial Correlation LM Test</td>
<td>$H_0$: No autocorrelation</td>
<td>$F(2) = 0.1292 [0.8803]$</td>
</tr>
<tr>
<td>ARCH Test</td>
<td>$H_0$: Homoskedasticity</td>
<td>$F(1) = 0.4694 [0.5015]$</td>
</tr>
<tr>
<td>Ramsey RESET Test</td>
<td>$H_0$: The model is correctly specified</td>
<td>$F(2) = 1.7500 [0.2280]$</td>
</tr>
</tbody>
</table>

Note: Figures in square brackets are probability values of the test statistics. Figures in parentheses are the lag lengths used for the appropriate diagnostic tests.
After examining the long-run relationship between current account deficit and its determinants, we proceed to apply the Granger-causality tests within a parsimonious vector error correction model (PVECM) to examine the short-run causality among the variables. The Granger causality results are reported in Table 9. For the equation with CAD as dependent variable, the coefficient on the error correction term is negative and significant at 1% level. A significant error correction term (ECT) is indicative of long-run causality running from BD, RGDP and M2 to CAD. However, none of the error correction terms in the remaining equations is found significant, indicating absence of evidence of any long-run causality running respectively from the relevant variables to RGDP, BD or M2. Thus, we have only one long run causality link running from real GDP, budget deficit and money supply to current account deficit, which confirms the result of only one cointegration equation obtained from the bound testing approach.

In the short-run, we observe the existence of a bi-directional causality between (i) CAD and BD; (ii) CAD and RGDP; (iii) BD and RGDP. Further, we observe there is a causality running from M2 to CAD and BD. Based on these causality relationships, it appears that there are two channels in which budget deficit influences current account deficit in Fiji. The first is the direct causal relationship from budget deficit to current account deficit, and the second is the indirect channel through real GDP, that is, higher budget deficit leads to higher real GDP; higher real GDP further worsens the current account deficit.

**Figure 1: Plot of CUSUM Test**
Figure 2: Plot of CUSUM of Squares Test

Table 9: Summary of Temporal Causality Results based on Parsimonious Vector Error-correction Model (PVECM)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>F-statistic</th>
<th>ECT (t-statistics)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΔCAD</td>
<td>ΔBD</td>
</tr>
<tr>
<td>ΔCAD</td>
<td>-</td>
<td>3.64**</td>
</tr>
<tr>
<td>ΔBD</td>
<td>4.34**</td>
<td>-</td>
</tr>
<tr>
<td>ΔRGDP</td>
<td>3.64*</td>
<td>2.97*</td>
</tr>
<tr>
<td>ΔM2</td>
<td>1.34</td>
<td>1.57</td>
</tr>
</tbody>
</table>

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

6. Summary and Conclusions

This paper undertook a study on the relationship between Fiji’s budget deficit and current account deficit in the country’s balance of payments. Utilising the time series covering a 27-year period (1979-2005), the study employed the bounds testing approach for examining the long run relationship and short-run temporal causality between the two deficits. The study results confirmed the existence of a long run relationship between budget deficit and current account deficit, with causality link running from domestic absorption, budget deficit and money supply to current account deficit. These findings are also consistent with the results in Khalid and Guan (1999) and Kouassi, et al. (2004)
regarding the positive relationship between budget deficit and current account deficit in other developing countries.

Further, the study findings established the existence in the short run of a bi-directional causality between two deficits, and bi-directional causality between budget deficit and domestic absorption and as well as current account deficit and domestic absorption. Furthermore, it is found that causality ran from money supply to current account and budget deficits. From the policy perspectives, the existence of feedback causality between budget deficit and current account deficit suggests that the Fiji’s policy makers cannot rely on curtailing the budget deficit alone to manage the current account deficit. In fact, it is critical to monitor and control both rise in money supply and fiscal deficits for achieving current account sustainability in the long run.
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