

# The relationship between Fiji's exchange rate and trade balance: some policy implications

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In 1987 Fiji's economy went through a major internal shock as a result of two military coups in April and September. This shock was compounded by a severe drought. The government confronted this disruption to the economy with an economic reform program focused on restoring stability by implementing a combination of fiscal, monetary and exchange rate policies. Exchange rate policy was the hallmark of these reform policies including the depreciation of the dollar by 18 per cent in June 1987 and a further 15 per cent in October 1987. Theoretically, such an adjustment affects economic growth through its impact on the current account and is considered to be expenditure-switching, resulting in an increased production of tradables, higher exports and improvement in the external position of the adjusting country (Dornbusch 1988). This expected effect will be realised only if the Marshall-Lerner conditions are satisfied, that is, the absolute sum of imports and export demand elasticities exceeds one. Empirical evidence from studies on developing economies shows that devaluation can be an effective tool for rectifying current account deficits and is growth enhancing (see, for example, Nunnenkamp and

Schweikert 1990; Gylfason and Radestzki 1991; and Doroodian 1993).

After almost 10 years, the response of Fiji's trade balance to the dollar depreciation has not been the subject of any empirical inquiry. Recent advancements in econometrics, for example, the cointegration approach, now make it possible to investigate the dynamic relationship in variables of interest. This study investigates the long-run dynamic relationship between Fiji's real exchange rate and real trade balance using quarterly time-series data for the period 1988-95. A study of this nature may identify potential policy options surrounding Fiji's exchange rate management.

## Analytical framework

The definition for real exchange rate most commonly used in the empirical economic literature in recent times is the relative price of tradables with respect to non-tradables, given the assumption that the law of one price holds in foreign trade. Hence the real exchange rate (*RER*) for Fiji takes the following general form

$$RER_{FJ} = \frac{E^{FJ} P_T^F}{P_N^{FJ}} \quad (1)$$

where  $E^{FJ}$  is Fiji's nominal exchange rate,  $P_T^F$  is the foreign price (measured by the US producer price index) and  $P_N^{FJ}$  is Fiji's price of non-tradables (measured by Fiji's consumer price index). Adjusting for trade shares (hence a trade-weighted exchange rate), the following cointegration equation is formulated

$$Y_t = \alpha_0 + \beta_1 RER_t + \varepsilon_t \quad (2)$$

where,  $Y$  is Fiji's real trade balance,  $\varepsilon_t$  is the associated error term assumed to be normally distributed with a mean value of zero and  $t$  is the time subscript. All variables are in their natural logs.

The applied econometrics literature has advanced, with cointegration and error correction modelling, a potential solution to the spurious regression problem involving time series data. The estimation procedure begins by testing the order of integration [ $I(n)$ ] of each variable. In regard to models utilising time-series data, Nelson and Plosser (1982) suggest that these have a unit root (a stochastic trend), that is, the movements in these variables result from the accumulation of shocks, each of which has large permanent effects. Therefore, the concept of stationarity and cointegration is potentially important in assessing the statistical validity of Equation 2. Recent developments in time series econometrics have shown that most time series variables appear to be non-stationary,  $X_t \sim I(1)$ . Granger (1986) and Engle and Granger (1987) define a non-stationary time series to be integrated of order  $d$  if it achieves stationarity after

being differenced  $d$  times,  $X_t \sim I(d)$ . If variables in question are non-stationary, then the estimated model may yield misleading values and hence the inference will be invalid. Statistically, a time-series is said to be stationary if its mean, variance and covariances are all invariant with respect to time, thus  $X_t \sim I(0)$ . If two variables, for example,  $X_t$  and  $Y_t$  are  $\sim I(1)$ , Engle and Granger (1987) have shown that if a linear combination  $Z_t = X_t - \Delta Y_t$  exists such that it yields an outcome where  $Z_t \sim I(d-b)$  and  $b > 0$ , then  $X_t$  and  $Y_t$  are said to be cointegrated. On the other hand, if the variables are  $\sim I(1)$ , but not cointegrated, OLS will give spurious and misleading results.

Therefore, it is important to test first for unit roots and second, directly test for cointegration before a relationship is estimated. In this spirit, stationarity tests of the augmented Dickey-Fuller (ADF) type (see Dickey and Fuller 1981) are performed on all the variables using Equation 3.

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 t + \sum_{j=1}^p \gamma_j \Delta Y_{t-j} + \varepsilon_t \quad (3)$$

where  $Y$  is the variable under consideration,  $p$  is the number of lags in the dependent variable, which is set to a maximum lag order of  $\sqrt{N}$  so as to induce a white noise term, and  $\varepsilon$  is the error term.

## Empirical results

The stationarity of the variables  $Y$  and  $RER$  is investigated using the ADF unit root test in levels and first differences using Equation 3 (Table 1).

The null hypothesis of non-stationarity is rejected at 5 per cent of

Note

significance for both variables if expressed in first differences, thus supporting the alternative hypothesis of stationarity for the first difference format  $[-I(1)]$ . Using the OLS method to estimate Equation 1, a cointegration test is performed. The simplest procedure to test the null hypothesis of no cointegration is to see if a cointegrating regression Durbin-Watson (CRDW) statistic is not significantly different from zero (Engle and Granger 1987). The results of the long-run cointegration tests show that the CRDW is 2.58, providing evidence of cointegration at the 5 per cent level since the critical value of the CRDW statistic in the vicinity of 40 observations is 0.78 at the 5 per cent level and 0.69 at the 10 per cent level (see Engle and Yoo 1987). This clearly implies that a long-run equilibrium relationship exists between Fiji's trade weighted real exchange rate and real trade balance.

Having established cointegration, the next step in the Engle-Granger procedure is the formulation of an error correction model (ECM). An overparameterised model with lags on both the dependent

and independent variables was estimated. Given the small sample size, the lag on all variables is set to two. This general model is then tested down, eliminating statistically insignificant terms until a parsimonious representation of the data generating process was achieved. The chosen specification is represented by Equation 4.

$$\Delta Y_t = \alpha_0 + \beta_1 \Delta RER_t + \beta_2 EC_{t-1} + v_t \quad (4)$$

where,  $\Delta$  is the first difference operator,  $EC_{t-1}$  is the residuals from the cointegrating regression equation used to form an error-correction term and  $v$  is the associated error term. The  $\alpha$  and  $\beta$  are the estimated coefficients whose signs are predicted by theory:  $\beta_1 > 0$  and  $\beta_2 < 0$ . The results of the error-correction model are as follows.

$$Y = 0.011 + 2.03 RER - 0.24 EC_{t-1} \quad (0.11) \quad (1.79)** \quad (-2.26)*$$

(Adjusted  $R^2 = 0.16$ ,  $DW = 0.25$ ,  $JB = 3.48$ ,  $B-G = 2.19$ ,  $ARCH = 1.68$ ,  $RESET (2) = 0.30$  and  $N=33$ .)

\* indicates significant at the 1 per cent level.

\*\* indicates significant at the 5 per cent level.)

The coefficient of the error-correction term,  $EC_{t-1}$ , is significant at the 1 per cent level and with the expected sign which provides support of a long-run relationship between the real trade balance and the real exchange rate. The model is adequate according to the several diagnostic tests. A low adjusted  $R^2$  is common with error correction models utilising first differences. The estimated parameter of  $RER$  confirms the theory's *a priori* predictions; the coefficient has the theoretically correct sign and is statistically

Table 1 Stationarity tests

	Test statistic	Lags
Levels		
Y	-2.27	2.0
RER	-1.90	0.0
First difference		
Y	-9.23	0.0
RER	-58.12	0.0

**Note:** The critical value of the ADF statistic in the vicinity of 40 observations is 2.96 at the 5 per cent level of significance. The comparable value at the 10 per cent level is 2.63.

**Source:** Charemza, W. W. and Deadman, D. F., 1992. *New Directions in Econometric Practice*, Edward Elgar, London: Table 4.

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significant at the 5 per cent level. This suggests that the trade-weighted real exchange rate has exerted a significant impact on the trade balance during the period 1988 to 1995. These results are consistent with Fiji's competitive position. For example, soon after the depreciation in exchange rate in 1987, Fiji's competitive position strengthened. The positive real GDP growth rate of 2.1 per cent in 1988 and 12.9 per cent in 1989 compared to -6.4 per cent in 1987 reflected export-led growth where the dollar depreciation showed the expected favourable effect. However, in recent times, both the real and nominal effective exchange rates have been appreciating. For example, during 1993, the nominal and real effective rates appreciated by 6 and 3 per cent respectively (World Bank 1996), acting against export-led growth. On balance, it is revealed that there is a positive and a significant long-run dynamic relationship between Fiji's real exchange rate and real trade balance.

### Summary and conclusion

Using cointegration and error correction methodology, this paper investigates the long-run dynamic relationship between Fiji's real exchange rate and real trade balance. On the basis of quarterly time-series data for the period 1988-95, empirical results show a positive and significant long-run relationship between the two variables. The major policy implication for Fiji is that the government should avoid policies which lead to further rises in the real exchange-rate which can undermine current and future prospects for export-led growth essential for Fiji's economic growth and developmental needs.

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