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An Empirical Analysis of Sustainability of Fiji's Trade Deficits

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Abstract

This paper investigates the sustainability of Fiji's trade deficits in the context of recent, unprecedented fiscal expansion and private sector credit. Employing various tests for determining structural break in the time series and cointegration test, the study results support the existence of a long run equilibrium relationship between exports and imports in Fiji implying that trade deficits are only a short-term phenomena and hence, sustainable in the long run.

Keywords: Trade Deficit, Exports, Imports, Unit Root, Structural Breaks, Cointegration, Fiji
JEL Classifications: C12, C22, F14, F32

Imbalances of Fiji's trade in goods and services have become increasingly more pronounced since 2000. During 2001-2006, there has been a steady decline in the country's traditional exports of sugar, a sharp fall in the exports of garments following the expiry of the Multifibre Agreement from 2005, and a decrease in the exports of gold due to operational problems. Further, there has been a surge in imports of capital goods and machinery for the building and construction industry, due to expansionary fiscal and monetary policies adopted during 2001-2006 and consequent upsurge in private sector credit. As a result, there have been rising current account deficits in its balance of payments since 2001. Hence, the subject of sustainability of trade deficits has once again become an important policy area for

further investigation.

An earlier study by Narayan and Narayan (2004), which examined imports and exports during a 41-year period (1960-2001) by resorting to an ARDL bounds testing approach, concluded that Fiji's trade deficits were sustainable in the long run as there existed a long-term relationship between exports and imports. However, their study did not appear to have specifically dealt with the likely impact of changes due to financial and trade sector reforms that took place in the mid 1980s, and other structural changes since then. Revisiting the subject of sustainability of Fiji's trade deficits, in the context of recent, unprecedented fiscal and private sector credit expansion therefore seems appropriate. The present study is accordingly motivated. Specifically, our study employs Perron's (1997) unit root tests which endogenously determines a structural break in the time series; and Gregory and Hansen (1996) cointegration test which allows for an endogenously determined structural break to determine the long run relationship between exports and imports.

The paper is organized on the following lines: section 2 reviews recent trends in Fiji's trade; section 3 outlines the model adopted for the study and reports the empirical results; and the last section presents a summary and conclusions with policy implications.

2. Recent Trends in Fiji's Trade

Being a small, open island economy, Fiji's macroeconomic performance (Table 1) is closely linked to its export sector. Fiji is highly dependent on essential imports, which include rice, flour and cooking oil, besides intermediate and capital goods and manufactured goods of all kinds. Since imports have to be paid for in foreign exchange, steady earnings from country's limited range of exports become critically important for various reasons, including maintaining the stability of its currency, the Fiji dollar, which is pegged to a basket of currencies of its major trading partners. Nearly one third of Fiji's imports is mineral fuels, followed by machinery and transport equipment and other capital goods and manufactured goods. Food and beverages have been hovering around 15 percent to 17 percent of total imports. However, mineral fuel imports, as a proportion of total imports have risen from 11 percent in 1993 to 33 percent in 2006 (Table 2).

Table 1: Fiji: Key Macroeconomic Indicators

Year	Annual Growth Rate (%)	Total Domestic Credit (% of GDP)	Private Sector Credit (% of GDP)	Budget Balance (% of GDP)	Broad Money (M2) (% of GDP)
1975-1979 (Ave)	2.2	23.3	18.8	-5.6	33.9
1980-1984 (Ave)	-0.6	32.1	24.9	-5.9	35.2
1985-1989 (Ave)	0.4	38.3	47.2	-5.5	42.1
1990-1994 (Ave)	2.9	52.5	44.0	-4.6	53.4
1995-1999 (Ave)	2.8	47.4	41.4	-5.5	45.6
2000	-1.7	44.2	37.3	-6.6	41.8
2001	2.0	40.8	33.3	-9.4	38.4
2002	3.2	41.2	33.6	-8.7	38.9
2003	1.1	43.1	34.9	-9.0	44.7
2004	5.4	45.4	38.5	6.6	45.7
2005	0.7	54.1	45.2	-7.7	49.1
2006	3.6	60.2	50.4	-6.8	57.1

Source: IMF (2007), RBF (2007) and authors' calculations.

Fiji's exports (Table 3) were once dominated by sugar, which accounted for 33 percent of total exports in 1993. Over time, following deregulation of the economy, and due to diversification efforts in the 1990s, export promotion measures, such as incentives to overseas investors attracting to set up export oriented, labour intensive industries including garments and resource based industries, paid dividends. Garments became the dominant exports after 1997, pushing sugar to the second rank. In 1997, sugar accounted only for 24 percent of total exports, while garment exports were about 27 percent of total exports. The dominance of garments began to decrease since 2000, due to growing, intense competition from Asian exporters. With the expiry of the US quota of garment imports from Fiji effective January 1, 2005, garment exports as percentage of total exports plunged from 19 percent in 2004 to 10 percent in 2005 and 8 percent in 2006.

Table 2: Fiji: Major Imports: 1993-2007 (percentages to total)

Year	Food	Beverages and Tobacco	Crude Materials	Mineral Fuels	Oils and Fats	Chemicals	Manfd Goods	Machinery Transport Equipment	Misc. Manfd Goods	Misc Transactions	Total
1993	14.3	0.8	0.5	11.4	1.1	7.0	21.6	31.1	10.9	1.2	100.0
1994	13.5	0.9	0.6	11.2	1.0	7.3	22.7	32.3	9.6	1.0	100.0
1995	14.5	1.1	0.7	11.0	1.3	7.4	26.9	24.9	11.1	1.1	100.0
1996	14.1	1.0	0.6	13.4	1.1	7.4	25.9	23.9	11.7	1.0	100.0
1997	14.0	0.8	0.8	14.1	1.0	7.8	27.6	20.6	12.3	0.9	100.0
1998	14.4	0.7	0.6	11.1	0.9	6.3	27.3	26.3	11.7	0.8	100.0
1999	10.6	0.8	0.5	15.3	0.9	6.2	24.3	27.2	13.2	0.9	100.0
2000	12.4	0.6	0.9	18.2	0.8	6.5	27.0	19.9	13.4	0.4	100.0
2001	15.5	0.7	0.7	22.0	0.8	7.2	21.0	20.8	10.8	0.5	100.0
2002	16.0	0.8	0.7	22.1	0.8	7.5	19.5	21.8	10.5	0.3	100.0
2003	14.7	0.8	0.7	20.3	0.9	7.1	19.5	25.4	10.4	0.3	100.0
2004	14.1	0.8	0.8	23.5	0.6	7.9	19.4	22.4	10.1	0.5	100.0
2005	13.1	0.8	0.8	28.8	0.7	7.6	16.6	21.7	9.7	0.3	100.0
2006	12.4	0.7	1.0	32.7	0.6	7.2	14.9	22.0	8.3	0.3	100.0
2007	13.6	0.7	0.8	33.2	0.9	7.6	14.6	19.7	8.5	0.4	100.0

Source: Reserve Bank of Fiji (2007) and authors' calculations.

Traditional exports dominated by sugar and copra, which are subject to weather factors such as cyclones and other natural disasters, have now become more dependent on other conditions. Various reports and studies of Fiji's economic growth with focus its on export performance (UNESCAP 2007, Chand 2007, Narayan and Prasad 2004) have identified other reasons as well. These studies refer to political impasse, which has developed since 1996 over the renewal of the 30-year agricultural leases. As a result sugar production declined from a peak of 462,000 tons in 1996 to about 289,000 tons in 2005 and 343,000 tons in 2006. Uncertainties about renewal of leases also led to productivity decreases as farmers were reluctant to invest and non-renewal of land leases for sugar cultivation has led to fall in production in recent years. When combined with operational inefficiencies at factory levels, lower cane production has been resulting in less sugar export earnings. Sugar exports in 2005 accounted 18 percent of total exports as compared to 33 percent in 1993. Added to these problems, another development affecting sugar export earnings was the decision by European Union to phase out its preferential price system for the African, Caribbean and Pacific sugar exporters.

Table 3: Fiji: Major Exports: 1993-2007 (percentages of total)

Year	Sugar	Gold	Garments	Fish	Timber	Molasses	Coconut oil	Others	Total	Re-Exports	Total
1993	33.1	9.6	18.5	6.9	5.2	1.4	0.5	9.9	85.1	14.9	100.0
1994	25.2	6.2	14.1	6.4	3.8	1.4	0.4	25.8	83.2	16.8	100.0
1995	31.5	6.7	21.1	8.0	6.1	2.4	0.4	11.7	88.0	12.0	100.0
1996	28.7	7.8	18.3	5.7	4.3	2.1	0.5	10.9	78.3	21.7	100.0
1997	23.8	8.2	27.2	5.6	3.8	1.4	0.6	13.8	84.5	15.5	100.0
1998	24.0	6.9	29.8	4.9	5.4	1.0	0.9	16.1	89.1	10.9	100.0
1999	21.9	6.4	26.8	4.8	3.0	1.0	0.8	14.2	78.9	21.1	100.0
2000	20.5	6.0	27.9	6.1	3.8	0.8	0.3	20.8	86.2	13.8	100.0
2001	18.4	7.0	25.0	7.5	3.2	1.0	0.2	18.8	81.1	18.9	100.0
2002	20.7	6.0	19.7	6.9	3.4	1.1	0.5	18.8	77.2	22.8	100.0
2003	17.8	6.0	19.2	6.3	2.4	0.5	0.4	22.9	75.5	24.5	100.0
2004	17.4	7.3	18.8	6.8	3.5	0.8	0.3	24.1	78.9	21.1	100.0
2005	18.8	5.0	10.1	7.0	3.8	0.8	0.3	25.4	71.1	28.9	100.0
2006	17.9	3.6	7.9	8.2	3.1	1.6	0.2	27.0	69.4	30.6	100.0

Source: Reserve Bank of Fiji (2007) and authors' calculations.

Table 4 provides data on exports and imports as well as trade balance as percentages of gross domestic product. In the initial five years of Fiji as an independent nation, trade balance was positive. But in subsequent years, as imports exceeded exports, the country has been experiencing trade deficits. With expansionary fiscal policies and unprecedented growth in private sector credit during last six years (2001-2006), strong growth in demand for imports, as against subdued growth in export earnings until 2003 and steady fall in export earnings since 2004 have worsened the situation. Trade deficit was 16 percent of GDP in 2004 and 2005 and reached the historically highest figure at 22.1 percent of GDP in 2006.

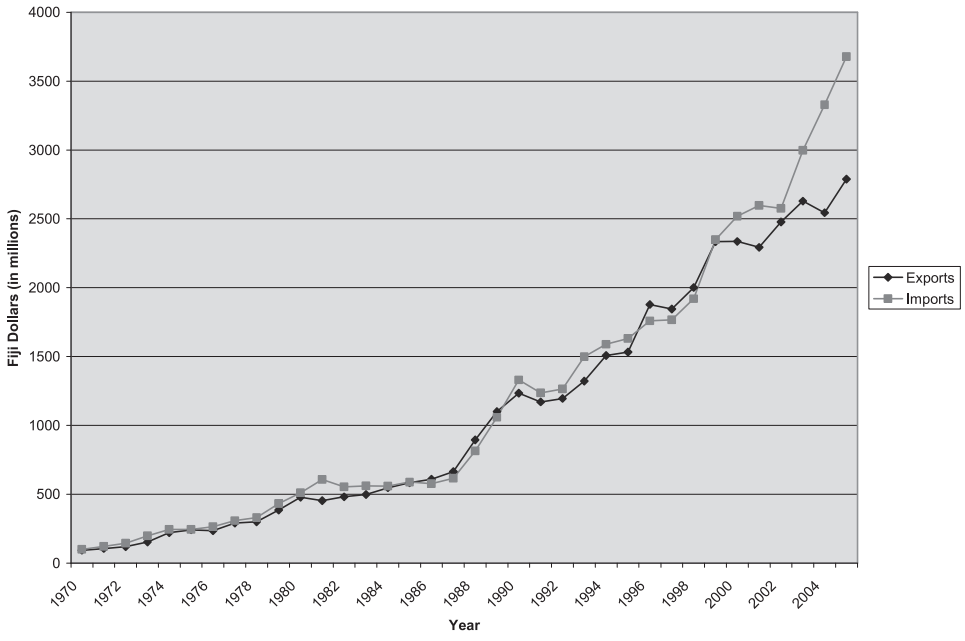
The tightening of monetary stance by Reserve Bank of Fiji during 2005 and 2006 in terms of raising the official policy indicator interest rate and the reserve ratio requirements of commercial banks as well as through imposition of stricter exchange controls on certain transactions in current and capital accounts, proved effective in controlling growth in current account deficits. However, the disturbing, downward trend in export earnings (Figure 1) has been causing concerns, raising the legitimate question about the sustainability of trade deficits in the long run.

Table 4: Fiji's Exports, Imports and Trade Balance: 1970-2006 (percent of GDP)

Year	Exports	Imports	Trade Balance
1970-1974 (Average)	47.7	55.5	7.8
1975-1979(Average)	42.5	46.1	-3.6
1980-1984 (Average)	34.5	40.0	-5.5
1985-1989 (Average)	50.1	47.6	2.5
1990-1994 (Average)	56.1	60.3	-4.2
1995-1999 (Average)	60.3	59.3	1.0
2000	60.2	64.5	-4.3
2001	60.6	68.6	-9.8
2002	61.5	63.9	-5.5
2003	60.0	68.4	-7.2
2004	58.1	73.9	-15.8
2005	54.2	70.4	-16.2
2006	53.1	75.1	-22.1

Source: World Bank (2006), Reserve Bank of Fiji (2007) and authors' calculations

Figure 1: Exports and Imports in Fiji: 1970-2005 (current prices)



3. Methodology and Empirical Analysis

Structural change occurs in many time series due to economic crises, policy changes, changes in institutional arrangements, wars and regime shifts. Since the seminal work of Perron (1989), it is well known that in the presence of a structural break, the traditional ADF and Philips Perron tests[1] are biased towards the non-rejection of the null hypothesis. In Perron's (1989) procedure, dating of the potential break is assumed to be known *a priori* in accordance with the underlying asymptotic distribution theory. Perron (1989) extends the standard Dickey-Fuller procedure whereby test statistics are constructed by adding dummy variables representing different intercepts and slopes.

However, Perron's known assumption of the break date was criticized by many but most notably by Christiano (1992) as "data mining". Christiano argued that the data based procedures are typically used to determine the most likely location of the break and this approach invalidates the distribution theory underlying conventional testing (Glynn *et al*., 2007). Since then, several studies have been developed using different methodologies for endogenising the break date.[2] These studies showed that the bias in the conventional unit root tests can be reduced by endogenously determining the time of the structural break.

Unit Root Test with a Structural Break

Perron (1997) proposed a class of test statistics which allow for two different forms of structural break. One is the Innovational Outlier (IO) model and the other is the Additive Outlier (AO) model. In the IO model, changes are assumed to take place gradually while the AO model allows for the structural change to take place instantaneously.

The IO model allows for a gradual change in the intercept (IO1) and gradual changes in both the intercept and the slope of the trend function (IO2) such that:

$$\text{IO1}: x_t = \mu + \theta DU_t + \beta t + \delta D(T_b)_t + \alpha x_{t\text{-}1} + \sum_{i=1}^{K} c_i \Delta x_{t\text{-}i} + e_t \quad (1)$$

$$\text{IO2}: x_t = \mu + \theta DU_t + \beta t + \gamma DT_t + \delta D(T_b)_t + \alpha x_{t-1} + \sum_{i=1}^{K} c_i \Delta x_{t-i} + e_t \quad (2)$$

where T_b denotes the time of break ($1 < T_b < T$) which is unknown, DU_t=1 if $t > T_b$ and zero otherwise, $DT_t = T_t$ if $t > T_b$ and zero elsewhere, $D(T_b) = 1$ if $t = T_b+1$ and zero otherwise, x_t is any general ARMA process and e_t is the residual term assumed

[1] Augmented Dickey Fuller (ADF) (1979, 1981) tests and the Philip-Perron (1988) unit root tests.

[2] Some of these include Banerjee *et al*., (1992), Zivot and Andrews (1992), Perron (1997) and Lumsdaine and Papell (1998).

white noise. The unit root null is rejected if the absolute value of the t-statistic for testing $\alpha = 1$ is greater than the corresponding critical value. The time of structural break (T_b) is chosen from among all other possible break point values to minimize the t-ratio on the estimated slope coefficient (γ).

Data-dependent method proposed by Perron (1997) is used to determine the truncation lag parameter (k). The optimum k (or k*) is selected such that the coefficient on the last lag in an autoregression of order k* is significant and that the last coefficient in an autoregression of order greater than k* is insignificant, up to a maximum order k (Perron, 1997).

The third model, the AO model assumes structural changes take place instantaneously; that is it allows for a sudden and rapid change in the trend function. When considering the AO model for testing a unit root, a two-step procedure is used. First the series is detrended using the following regression:

$$y_t = \mu + \beta_t + \gamma DT_t^* + \tilde{y}_t \tag{3}$$

where $\tilde{y}_t$ is the detrended series and $DT_t^* = 1(t - T_b)$ if $t > T_b$ and zero otherwise. This assumes that a structural break only impacts on the slope coefficient. Thus, the test is then performed using the t-statistic for $\alpha = 1$ in the regression:

$$\tilde{y}_t = \alpha \tilde{y}_{t-1} + \sum_{i=1}^{K} c_i \Delta y_{t-i} + e_t \tag{4}$$

The unit root null hypothesis is rejected in favour of the alternative if the t-statistic for α is significant and greater than the critical values tabulated by Perron (1997).

For empirical analysis in this paper, we use annual data for the period from 1970 to 2005. The exports and imports data, which are in current prices are obtained from the *International Financial Statistics*, published by International Monetary Fund (2008), the *Reserve Bank of Fiji Quarterly Review*, published by Reserve Bank of Fiji (2008), the World Development Indicators, published by World Bank (2008) and the *Key Indicators of Developing Asian and Pacific Countries*, published by Asian Development Bank (2008).

The results shown in Table 5 indicate that both the exports and imports are non-stationary under structural change at a five percent significance level for both the IO2 and the AO cases. The break dates of the early 1980s correspond to the period of damages inflicted on farmlands by cyclone Wally in 1981 and its continued adverse impact for the next three years, on all agricultural production activities including sugar cane. The negative effects included resultant decline in sugar exports, followed by rise in imports of rice and other food items. The break dates of 1990 and 1992 correspond to the changes that took place in the late 80s. These include the two

military coups of 1987, which marked an important watershed in the political history of Fiji. Aside from the traumatic effects in the next few years affecting business climate, the currency devaluations of 1988 in two steps totaling about 33 percent and the introduction of reforms towards deregulating the economy, completely altered its course in the following years.

Table 5: Perron's (1997) Unit Root Tests: Additive Outlier Model (AO) and the Innovational Model (IO2): Series in current prices from 1970-2005

Series	Model	Break Point	Lag $\hat{k}$	Test Statistic $t\hat{\alpha}$	Critical Values at 5%	Result
Exports (X_t)	AO	1985	0	-4.669	-4.83	Unit Root
Imports (M_t)	AO	1990	6	-3.830	-4.83	Unit Root
Exports (X_t)	IO2	1983	0	-4.554	-5.59	Unit Root
Imports (M_t)	IO2	1992	1	-2.595	-5.59	Unit Root

In the AO model, changes are assumed to take place rapidly, allowing for a break in the slope. While the IO2 model changes are assumed to take place gradually, allowing for a break in both the intercept and slope. The max k =8.

Gregory and Hansen (1996) Cointegration Test

To establish whether there is a long run equilibrium relationship between exports and imports in Fiji, we employ the concept of cointegration. Ignoring the issue of a potential structural break can render invalid statistical results not only for unit roots tests but also in terms of cointegration tests. Kunitomo (1996) argued that in the presence of structural change, traditional cointegration tests, which do not allow for a structural break, may produce 'spurious cointegration results'. Further to this, the Monte Carlo analysis of Gregory *et al*., (1996) showed that the power of the traditional Engle-Granger (1987) test of the null of no cointegration is substantially reduced when there is a break in the cointegrating relationship. In response to this, Gregory and Hansen (1996) extended the Engle-Granger test to explicitly allow for breaks in either the intercept or the intercept and trend of the cointegrating relationship at an unknown time. The following equation is the Engle-Granger cointegrating regression between two series $\{Y_t, X_t\}$ as:

$$y_t = u_o + \alpha x_t + \varepsilon_t \tag{5}$$

Gregory and Hansen procedure is revised to provide three models allowing for a structural change in the cointegrating relationship. The procedure is to test the null hypothesis of no cointegration against the alternative of cointegration with a

structural break. The first model is known as a level shift model (Model C). This model contains an intercept and a level shift dummy as follows:

$$y_t = u_0 + u_1\varphi_1 + \alpha x_t + \varepsilon_t \tag{6}$$

The second model (C/T) contains an intercept and a trend with a level shift dummy:

$$y_t = u_0 + u_1\varphi_t + \beta t + \alpha x_t + \varepsilon_t \tag{7}$$

The third model is the full break model called a regime shift (C/S), allowing for change in both intercept and slope as follows:

$$y_t = u_0 + u_1\varphi_t + \alpha_1 x_t + \alpha_2 \varphi_t x_t + \varepsilon_t \tag{8}$$

Model C/S includes two dummy variables, one for the intercept and one for the slope. In the context of our analysis, y_t and x_t are the exports and imports. The above models permit a structural change via the dummy variable ϕ_t which is defined as:

ϕ_t = 1 if t > τ and 0 otherwise

with τ denoting the break point in the sample. The residuals obtained from the above cointegrating regressions are then employed in the following Dickey-Fuller test to provide a modified Engle-Granger test which allows for structural change in the cointegrating relationship:

$$\Delta \hat{\varepsilon}_t = (\rho - 1)\hat{\varepsilon}_{t-1} + v_t \tag{9}$$

To determine the point at which to impose a break, Gregory and Hansen (1996) suggest the use of a grid search procedure, with all values in the central 70 percent of the sample being considered for τ. For each of the above three models (C, C/T, C/S), the Dickey-Fuller test of (9) is estimated, with the value employed as the resulting test statistic being the minimum value obtained for the *t*-ratio for ($\hat{\rho}$–1) . The full break model (expressions 8) is estimated to test for the existence of cointegration between exports and imports with an endogenously determined structural break.

The empirical results based on the Gregory-Hansen cointegration procedure for the full break model (case C/S) indicates that the test statistic of -5.48 is smaller than its five percent critical value of -4.95. The result implies that the null hypothesis of no cointegration is rejected in favor of the alternative hypothesis of cointegration with a structural break. That is, there exists a long run equilibrium relationship

between exports and imports in Fiji, suggesting that the current account of Fiji is sustainable in the long run.

The break date of 1997 detected by the Gregory-Hansen procedure corresponds with significant changes that took place in that year. Enactment of a new Constitution in 1997, acceptable to all sections of the society, marked the culmination of decade-long efforts of political parties as well as international cooperation towards reconciling the interests of two major racial groups. The 1997 Constitution, which also provided the possibility for a multi-party government, was yet another watershed in the nation's troubled economic history, inspiring the revival of investor confidence.

4. Conclusion

The objective of this study is to investigate the long run relationship between Fiji's exports and imports during the period 1970 to 2005 by employing unit root tests and cointegration techniques that allow for an endogenously determined structural break. We apply the Gregory and Hansen procedure with recursively estimated breakpoint and find that the exports and imports are cointegrated with a structural break occurring in 1997.

The results of empirical investigation support the existence of a long run equilibrium relationship between exports and imports in Fiji implying that trade deficits are only a short-term phenomena and hence, sustainable in the long run. As the contractionary macroeconomic policies in terms of discouraging credit and consumer demand by a tight monetary stance, as evidenced during 2005 and 2006, were indeed instrumental in bringing exports and imports into a long run equilibrium, it can be said that Fiji is not in violation of its international budget constraint. The policy implications are clear: when external disequilibrium situations arise, appropriate and timely macroeconomic policy measures are needed, as the past corrective measures have proved effective.

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