

DETERMINANTS OF DEMAND FOR FIJI'S EXPORTS: AN EMPIRICAL INVESTIGATION

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Fiji is no exception to the rule that exports are an important source of growth and development. In this light, it is important to know the determinants of exports. However, there is no empirical study on Fiji's export demand. This paper uses the modern econometric techniques—in particular, the autoregressive distributed lag approach to cointegration—to investigate whether the standard export demand variables, viz., trading partner income, export price, and competitor price, have a long-run cointegration relationship with Fiji's real exports for the period 1970 to 1999. In addition, the long-run results are also estimated by using the dynamic ordinary least squares and the fully modified ordinary least squares. The empirical results indicate the existence of a cointegration relationship among the variables. The long-run foreign income, own-price, and cross-price elasticities are found to be 0.7 to 0.8, -1.3 to -1.5 , and 2.1 to 2.2, respectively.

I. INTRODUCTION

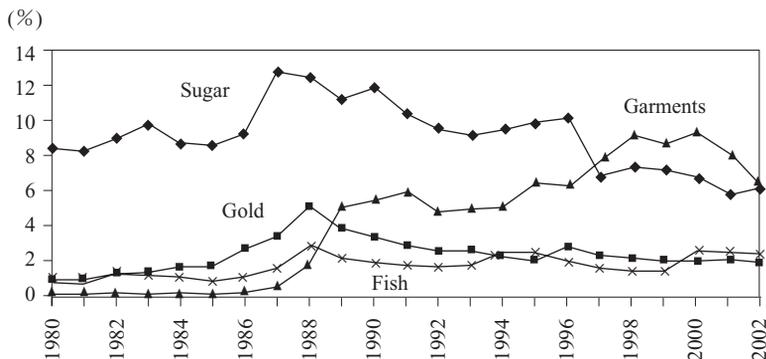
FIJI is a small island country with a population of 0.824 million in 2001 and population growth of 1.4 per cent between 1975 and 1999. It is classified by the World Bank as a lower-middle-income country with GDP per capita (PPPU.S.\$) in 2001 of U.S.\$2,130 (World Bank 2002). However, compared with other South Pacific island economies, Fiji's social development indicators are quite high. In 1999, life expectancy was 68.8 years and the overall literacy rate was 92.6 per cent (UNDP 2001). Among the Pacific Island countries, Fiji is the most developed, and dependent on exports—mainly sugar, garments, gold, and fish—for its growth and development. Primary commodities make up around 57 per cent of total export earnings. Sugar earnings alone contribute approximately 40 per cent to total exports.

In view of the importance of exports in the Fijian economy, the government in the late 1980s moved away from inward-oriented policies to outward-oriented policies, incorporating elements of export-oriented industrialization in their economic development policy. These policies have since seen significant growth in garment exports. Over the 1986 to 2001 period, garment exports grew from F\$4.8

million to over F\$300 million (Narayan 2001). In terms of their contribution to real GDP, garment exports increased from 0.3 per cent of real GDP in 1986 to 9.5 per cent of real GDP in 2000. However, with a coup in 2000, which led to trade bans, garment exports as a percentage of real GDP has since fallen, setting at around 6.4 per cent in 2002 (Figure 1). Other exports, however, have not shown any impressive increase since the shift in development policy. Sugar exports have been the most negatively affected. Sugar exports as a percentage of real GDP have fallen from around 12.5 per cent in 1988 to around 6.1 per cent in 2002 (Figure 1). The dismal performance of the sugar sector is attributed in large part to the expiry of sugar cane land leases, which has reduced sugar cane and sugar output (Narayan 2004a). Meanwhile, the export performance of Fiji's two other sectors—fish and gold—has been fairly stagnant in the post-1988 period.

On the macroeconomic front, Fiji's real GDP growth rate has been mediocre over the 1980–2002 period, mainly a result of a sustained period (1987–2002) of political instability. While Fiji's economy performed exceptionally in 1989, achieving a growth rate of 13.5 per cent, its growth performance has been dismal since with negative growth rates recorded in 1991 (–0.3 per cent), 1997 (–1.8 per cent), 1998 (–1.3 per cent), and 2000 (–8.0 per cent). Like economic growth, the performance of private investment has also been poor. Private investment was valued at 15 per cent of real GDP in 1980; however, in the post-1992 period it has failed to reach 5 per cent of real GDP, let alone achieving the government's aim of 25 per cent of real GDP. This is mainly due to two factors: political instability and expiry of agricultural land leases. Political instability, for instance, has not created an environment conducive for investment while expiring agricultural land leases have not created the security needed to attract meaningful investment.

Fig. 1. Fiji's Main Exports as a Percentage of Real GDP, 1980–2002

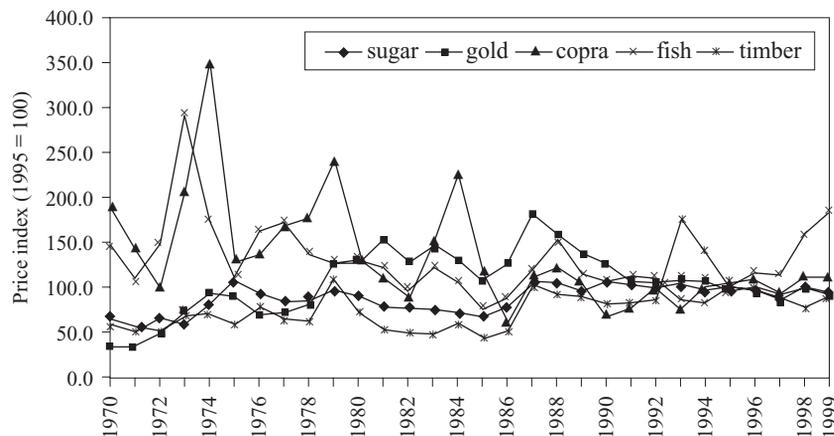


Source: Data extracted from the Reserve Bank of Fiji, *Quarterly Review*, various issues.

Over the last couple of decades the government's revenue situation has deteriorated in the face of falling investment and economic growth while government expenditure on consumption has increased sharply, mainly due to the political instability which requires increased budgets for the military and police to restore law and order. Expanding expenditures and falling revenues have seen Fiji's budget deficits increase. In 1980, for instance, Fiji's budget deficit was valued at -3.5 per cent of real GDP, it increased to -4.7 per cent of real GDP in 1993 and reached over -10 per cent of real GDP in 2001. Increasing budget deficits have led to an increase in debts. For most of the years between 1992 and 2002 total debt as a percentage of real GDP has been over 55 per cent of real GDP. Meanwhile domestic savings, in an economy filled with political instability, have fallen from a high of 26.9 per cent of real GDP in 1980 to 19.2 per cent of real GDP in 2000 (Table I).

On the performance of exports and imports, in most years imports have exceeded exports, leading to a balance-of-trade deficit. A number of reasons have been given for the subdued growth in exports. The continuous decline in world market prices for primary commodities, adverse weather conditions, and low productivity in the agricultural sector have been some of the factors curbing export growth. The world market prices of primary commodities are plotted in Figure 2. It can be seen that all prices have fluctuated over the 1970–99 period, with copra and fish prices undergoing the most fluctuations. One important observation is that in the post-1988 period all prices have fallen. However, total exports account for around 60 per cent of GDP each year.¹ The economy relies heavily on export

Fig. 2. Commodity Prices, 1970–99



¹ The export sector has dominated Fiji's economic activity, accounting for an average of around 70 per cent of GDP in the 1990s. This was higher than the average of the 1970s and the 1980s which was around 54 and 58 per cent, respectively.

TABLE I
SELECTED ECONOMIC INDICATORS FOR FIJI, 1980–2002

Year	GDP Growth (%)	Private Investment (% GDP)	External Debt (% GDP)	Budget Deficits (% GDP)	Total Debt (% GDP)	Inflation	Domestic Savings (% GDP)	Real Reserves (F\$ Million)	Exports (F\$ Million)	Imports (F\$ Million)
1980	-1.6	14.9	22.6	-3.5		14.5	26.9	289.5	984.6	1,086.4
1981	6.3	13.7	30.9	-3.5		11.2	19.9	254.6	942.7	1,258.5
1982	-6.0	11.1	34.2	-6.2		7.0	19.2	232.2	890.7	1,022.6
1983	-4.3	10.9	40.1	-4.0		6.7	15.7	217.6	859.8	966.8
1984	8.5	11.4	37.1	-3.7		5.3	17.9	232.5	916.1	938.9
1985	-4.0	13.6	37.8	-3.2		4.4	18.7	235.9	911.2	919.0
1986	7.7	11.0	34.6	-3.6		1.8	20.4	305.3	922.3	873.8
1987	-6.6	10.9	46.1	-5.0		5.7	19.2	268.3	929.6	862.4
1988	1.0	7.5	41.8	-1.9		11.8	18.0	432.8	1,132.3	1,066.6
1989	13.5	6.5	33.3	-1.6		6.2	19.1	404.3	1,476.4	1,349.1
1990	2.6	5.6	29.4	0.4		8.2	15.1	454.3	1,546.0	1,604.3
1991	-0.3	5.4	24.4	-3.6		6.5	14.0	447.1	1,414.1	1,404.1
1992	4.9	3.6	22.4	-3.1	60.1	4.9	14.0	543.0	1,405.3	1,385.8
1993	2.2	4.7	19.9	-4.7	60.1	5.2	12.7	426.6	1,457.3	1,519.6
1994	3.9	4.1	14.6	-3.6	59.6	0.6	14.3	391.4	1,585.3	1,574.1
1995	1.4	4.1	14.9	-3.3	57.7	2.2	11.4	499.3	1,541.1	1,620.4
1996	3.4	4.2	11.8	-4.9	57.1	3.1	11.4	564.5	1,722.7	1,711.1
1997	-1.8	3.4	13.0	-9.2	62.5	3.4	10.7	513.5	1,624.9	1,673.2
1998	-1.3	4.0	22.7	-3.3	51.7	5.7	13.3	1,118.1	1,829.3	1,793.5
1999	8.0	4.2	16.7	-6.3	45.9	2.0	18.0	1,194.9	2,012.1	1,858.7
2000	-8.0	3.1	21.2	-7.2	50.3	1.1	19.2	1,134.1	1,930.9	1,765.9
2001	4.4	3.4	15.6	-10.1	52.2	4.3				
2002	5.1	-	14.2	-	57.5	1.6				

Source: Calculated from the Reserve Bank of Fiji, *Quarterly Review*, various issues.

receipts to finance imports of almost all investment goods used in capital formation. Exports are not only the major source of foreign exchange but also an important source of employment.²

The monetary authorities, meanwhile, have kept inflation under control. Inflation which was 14.5 per cent in 1980 fell sharply to 5.2 per cent in 1993, and in 2002 it stood at 1.6 per cent. Fiji's international reserves have been fairly healthy as well, sufficient to cover five to six months of imports.

Existing empirical studies on export demand have mainly concentrated on developing countries in the South and East Asian, African, and South American regions (e.g., Arize 1990; Senhadji and Montenegro 1998, 1999). Not much emphasis has been given to small island countries such as Fiji. Given the importance of exports in Fiji's economic development and the lack of empirical studies on export demand behavior for such island economies, this paper attempts to estimate an export demand model for Fiji. The model is estimated within the context of recent developments in econometric methodologies, particularly with respect to cointegration analysis and error correction models that allow estimation of both the short-run and long-run export demand elasticities. In this regard we use three different methodologies—the autoregressive distributed lag (ARDL) approach to cointegration (Pesaran and Shin 1995), dynamic ordinary least squares (DOLS) approach of Stock and Watson (1993), and the fully modified ordinary least squares (FMOLS) of Phillips and Hansen (1990)—to derive the long-run elasticities. These methodologies, while proven to produce reliable estimates in small sample sizes, provide a check for the robustness of results.

The paper is organized as follows. The next section reviews the empirical literature on export demand followed by the model specifications. The penultimate section elucidates the empirical results, while the final section provides some conclusions and policy recommendations.

II. A BRIEF REVIEW OF THE EMPIRICAL LITERATURE

The literature deals with relative prices and an activity variable as the key determinants of export demand. This approach follows from the "imperfect substitute" model which assumes that exports are imperfect substitutes for domestic goods (see Goldstein and Khan 1978; Khan and Knight 1988).

The earlier literature that modeled trade in developing countries, for instance, Houthakker and Magee (1969), Khan (1974), and Bond (1987), found evidence that relative prices play a significant role in determining exports. More recent literature, including Reinhart (1995) and Senhadji and Montenegro (1998, 1999),

² The sugar industry alone employs more than 25 per cent of Fiji's total workforce (Narayan 2004a).

show support for a significant relationship between the two variables. Reinhart's (1995) results show that relative prices are a significant determinant of demand for exports in developing countries; however, the elasticity tends to be low, suggesting that large relative price swings are required to have an appreciable impact on trade patterns. Senhadji and Montenegro (1998, 1999) obtained results on relative price elasticities of exports demand similar to those of Reinhart (1995).³

Since the above studies used relative prices, they assumed exports to be homogeneous of degree zero in prices. This specification of the price variable is restrictive because the effect of the change in the two price variables (own price and competitor price) on the export volumes is considered to be equal in size but opposite in sign (Arize 1990). Arize (1990) and others have argued that this empirical specification of relative prices does not work for export demand functions for some countries. Therefore, in modeling export demand, he replaced the logarithmic relative price with a "split format" of the logarithmic relative price. An advantage of this specification is that it enables separate estimations of the effect of own export price, and competitor export price on export demand (Arize 1990).⁴

A foreign activity variable is also incorporated in the export demand model to obtain the income elasticity of demand. The foreign activity variable is defined as the weighted average of trading partner income, gross national product (GNP), or gross domestic product (GDP). Since high foreign activity induces increased demand for exports, the income elasticity of demand is expected to be positive; hence exports may be seen as an engine of growth.

A. *Fiji's Export Demand Model*

Following Arize (1990), we posit that the export demand model for Fiji takes the following form:

$$\ln X_t^d = \alpha + \beta_1 \ln TPinc_t + \beta_2 \ln xp_t + \beta_3 \ln wxp_t + \varepsilon_t, \quad (1)$$

where $\ln X_t^d$ is the logarithm of real exports; $\ln TPinc_t$ is the logarithm of the weighted average of trading partners' real income which captures the trading partners' demand conditions; $\ln xp_t$ is the logarithm of the export price index; and $\ln wxp_t$ is the logarithm of the competitor export price index. Equation (1) represents a "split format" of the logarithm of the relative price variable, allowing us to examine separately the effect of Fiji's own price and the price of competitors

³ The short-run relative price elasticities for developing countries range from 0.0 (Peru) to -0.96 (Paraguay) while the long-run relative price elasticities vary from -0.02 (Peru) to -4.72 (Turkey). The short-run income elasticities vary from 0.02 (Ecuador) to 1.15 (Finland) while the long-run income elasticities vary from 0.17 (Ecuador) to 4.43 (the Republic of Korea) (Senhadji and Montenegro 1999).

⁴ This paper also uses the split format of the relative prices; refer to model specification section for more detail on this.

on export demand (see Arize 1990)⁵; α is a constant; ε_t is an error term; and β_1 , β_2 , and β_3 are elasticities to be estimated, representing income, own-price, and cross-price elasticities of Fiji's exports, respectively. A priori, higher economic activity in the trading partner countries is likely to cause an increase in the demand for Fiji's exports; hence, β_1 is expected to have a positive sign ($\beta_1 > 0$). With respect to prices, an increase in export prices (own prices) leads to a fall in the demand for Fiji's exports while an increase in competitor price leads to an increase in demand for Fiji's exports; hence, $\beta_2 < 0$ and $\beta_3 > 0$.

B. *Data and Methodology*

The time-series data adopted for this study are annual and cover the period 1970 to 1999. The data series are sourced from the IMF, *International Financial Statistics*, *Current Economic Statistics* published by the Fiji Bureau of Statistics, and the Reserve Bank of Fiji, *Quarterly Review* (see Appendix Table I).

Tests for cointegration. To estimate the cointegration relationship between Fiji's exports, trading partner income, competitor price, and export price, we apply the ARDL approach advocated by Pesaran and Shin (1995) (see also Pesaran and Pesaran 1997; Pesaran, Shin, and Smith 2001); this is also known as the bounds testing procedure. The notion of cointegration was first introduced by Granger (1981) and Granger and Weiss (1983). It was further extended and formalized by Engle and Granger (1987). Cointegration describes the existence of an equilibrium or stationary relationship among two or more time series, each of which is individually nonstationary. The advantage of the cointegration approach is that it allows one to integrate the long-run and short-run relationships between variables within a unified framework. Since the seminal work of Engle and Granger (1987), research on cointegration techniques has multiplied with a focus on determining the number of linearly independent cointegration vectors, or the cointegrating rank, in a general vector autoregressive process.

We employ the bounds testing procedure recently developed by Pesaran, Shin, and Smith (1996) (see Pesaran and Pesaran 1997; Pesaran and Shin 1998; Pesaran, Shin, and Smith 2001). The statistic underlying the procedure is the Wald or F -statistic in a generalized Dickey-Fuller type regression, which is used to test the significance of lagged levels of the variables under consideration in a conditional unrestricted equilibrium correction model (UECM). This procedure has several advantages over alternatives such as the Engle and Granger (1987) two-step residual-based procedure for testing the null of no cointegration or the system-based reduced-rank regression approach pioneered by Johansen (1988, 1995) and Johansen and Juselius (1990).

The first main advantage is that the bounds test approach is applicable irrespec-

⁵ Logarithms of the variables are used so that the estimated coefficients can be interpreted as percentages or elasticities.

tive of whether the underlying regressors are purely $I(0)$, purely $I(1)$, or mutually cointegrated. Thus, because the bounds test does not depend on pretesting the order of integration of the variables, it eliminates the uncertainty associated with pretesting the order of integration. Pretesting is particularly problematic in the unit-root-cointegration literature where the power of unit root tests is typically low, and there is a switch in the distribution function of the test statistics as one or more roots of the x_t process approach unity (Pesaran and Pesaran 1997, p. 184). Second, the UECM is likely to have better statistical properties than the two-step Engle-Granger method because, unlike the Engle-Granger method, the UECM does not push the short-run dynamics into the residual terms (Pattichis 1999; Banerjee et al. 1993; Banerjee, Dolado, and Mestre 1998).

The other major advantage of the bounds test approach is that it can be applied to studies that have a small sample size. It is well known that the Engle and Granger (1987) and Johansen (1988, 1995) methods of cointegration are not reliable for small sample sizes, such as that in the present study. Several previous studies, however, have applied the bounds test to relatively small sample sizes. Pattichis (1999) uses the bounds test approach to estimate a disaggregated import demand function for Cyprus employing annual data for 1975–94 (twenty observations). Narayan (2004b) uses the bounds approach to model tourism demand for Fiji for 1970–2000 (thirty-one observations). Narayan and Smyth (2004) employ the bounds test to estimate the relationship between trade liberalization and economic growth for Fiji using annual data for 1970–2000 (thirty-one observations). Narayan and Smyth (2003) use the bounds test to estimate the relationship between attendance at the Melbourne Cup and prices for 1960–2002, while Tang and Nair (2002) use the bounds test approach to estimate an import demand function for Malaysia using annual data for 1970–98 (twenty-nine observations).

Estimation of long-run equilibria. In this paper we use three different methods to estimate the long-run elasticities of Fiji's export demand. These methods are the ARDL approach (Pesaran and Shin 1995), the DOLS of Stock and Watson (1993), and the FMOLS of Phillips and Hansen (1990). The reason for doing this is twofold: first, these methods provide more efficient results in small samples; second, they provide a good basis for the comparison of the robustness of results. In what follows we briefly explain these three methodologies.

To implement the bounds test let us define a vector of two variables, z_t , where $z_t = (y_t, x_t)'$, y_t is the dependent variable and x_t is a vector of regressors. The data generating process of z_t is a p -order vector autoregression. For cointegration analysis it is essential that Δy_t be modeled as a conditional error correction model (ECM):

$$\Delta y_t = \beta_0 + \pi_{yy}y_{t-1} + \pi_{yx}x_{t-1} + \sum_{i=1}^p \vartheta_i \Delta y_{t-i} + \sum_{j=0}^q \phi_j' \Delta x_{t-j} + \theta w_t + \mu_t. \quad (2)$$

Here, π_{yy} and π_{yx} are long-run multipliers. β_0 is the drift and w_t is a vector of ex-

ogenous components, e.g., dummy variables. Lagged values of Δy_t and current and lagged values of Δx_t are used to model the short-run dynamic structure. The bounds testing procedure for the absence of any level relationship between y_t and x_t is through exclusion of the lagged-level variables y_{t-1} and x_{t-1} in equation (2). It follows, then, that our test for the absence of a conditional level relationship between y_t and x_t entails the following null and alternative hypotheses:

$$H_0: \pi_{yy} = 0, \pi_{yx.x} = 0', \quad (3)$$

$$H_1: \pi_{yy} \neq 0, \pi_{yx.x} \neq 0' \text{ or } \pi_{yy} \neq 0, \pi_{yx.x} = 0' \text{ or } \pi_{yy} = 0, \pi_{yx.x} \neq 0'. \quad (4)$$

The F test has a non-standard distribution which depends upon (i) whether variables included in the ARDL model are $I(0)$ or $I(1)$, (ii) the number of regressors, and (iii) whether the ARDL model contains an intercept and/or a trend. Two sets of critical values are reported in Pesaran and Pesaran (1997) (see also Pesaran, Shin, and Smith 2001). The two sets of critical values provide critical value bounds for all classification of the regressors into purely $I(1)$, purely $I(0)$, or mutually cointegrated.

If the computed F -statistic falls outside the critical bounds, a conclusive decision can be made regarding cointegration without knowing the order of integration of the regressors. For instance, if the empirical analysis shows that the estimated $F_x(\cdot)$ is higher than the upper bound of the critical values, then the null hypothesis of no cointegration is rejected. Once a long-run relationship has been established, in the second stage, a further two-step procedure to estimate the model is carried out. First the orders of the lags in the ARDL model are selected using an appropriate lag selection criterion such as the Schwartz Bayesian Criterion (SBC), and in the second step, the selected model is estimated by the ordinary least squares technique. The mathematical derivation of the long-run model can be found in Pesaran and Pesaran (1997) and Pesaran, Shin, and Smith (2001). A condensed version of the methodologies can also be found in Narayan (2004b) and Narayan and Smyth (2003, 2004).

Dynamic OLS (DOLS). This procedure advocated by Stock and Watson (1993) involves estimation of long-run equilibria via DOLS which corrects for potential simultaneity bias among regressors. It resembles the ideas inherent in Phillips and Loretan (1991), Phillips and Hansen (1990), Saikkonen (1991), and Park (1992). The DOLS entails regressing one of the $I(1)$ variables on other $I(1)$ variables, the $I(0)$ variables, and lags and leads of the first difference of the $I(1)$ variables. The essence of incorporating the first difference variables and the associated lags and leads is to obviate simultaneity bias and small sample bias inherent among regressors. The choice of DOLS relates to the fact that the endogeneity of any of the regressors has no effect, asymptotically, on the robustness of the estimates. It is asymptotically equivalent to the maximum likelihood estimator of Johansen (1988); also, Stock and Watson (1993) have shown its superior performance in

finite samples. The mathematical derivation of the model can be found in Stock and Watson (1993). We do not repeat the methodology here to conserve space.

Fully modified OLS (FMOLS). This procedure, developed by Phillips and Hansen (1990), has two distinct advantages. Apart from correcting for endogeneity and serial correlation effects, it also asymptotically eliminates the sample bias. There are two conditions considered essential for the appropriateness of the FMOLS. First, there needs to be only one cointegrating vector. Second, the explanatory variables should not be cointegrated among themselves. The mathematical derivation of the model can be found in Phillips and Hansen (1990). We do not repeat the methodology here to conserve space.

The test for unit roots, while not essential for the purpose of investigating the cointegration relationship, is important for the purpose of estimating the long-run estimates from the DOLS and FMOLS, for reasons explained earlier. We use two different tests for unit roots: the Dickey-Fuller (DF) (1979, 1981) test and the Phillips-Perron (PP) (1988) test. The augmented Dickey-Fuller (ADF) test is based on the following regression equation:

$$\Delta x_t = \alpha_0 + \lambda T + \phi x_{t-1} + \sum_{i=1}^{p-1} \gamma_i \Delta x_{t-i} + e_t, \quad (5)$$

where x_t is the variable tested for unit root; Δ is the first difference operator; α is the constant; T is the time trend variable; and p is the number of lags included to avoid the problem of autocorrelation in the residuals. The lag length in the ADF regression is selected based on the minimum SBC. The null hypothesis in the ADF tests is that the series (which should be in level form) is nonstationary, i.e., it contains unit roots. To reject the null, the calculated test value has to be greater than the critical value. The critical values are calculated from MacKinnon (1991).

The Phillips and Perron (1988) is an alternative to the ADF test. It controls for serial correlation when testing for unit root and is based on the non-augmented DF-test equation. The key focus of this method is on modifying the t -ratio so that serial correlation does not affect the asymptotic distribution of the test statistic (*EViews 4.1* 2002).

III. EMPIRICAL RESULTS: UNIT ROOTS, COINTEGRATION, AND LONG-RUN AND SHORT-RUN RESULTS

A. Tests of the Unit Root Hypothesis

Table II reports the unit root tests. Since the ADF and PP statistics for real exports, trading partner income, export price, and competitor price do not exceed the critical values (in absolute terms), we therefore could not find any significant evidence that $[X_t, TPIn_t, wxp_t, xp_t]$ were not integrated of order one or $I(1)$.

However, when all these variables are differenced once and subjected to the

TABLE II
UNIT ROOT TEST RESULTS

Variables	ADF Statistics	1% Critical Value	5% Critical Value	PP Statistics	1% Critical Value	5% Critical Value
$\ln X_t$	-3.3875	-3.4339	-3.5875	-2.7825	-4.3098	-3.5742
$\Delta \ln X_t$	-5.3388	-3.6892	-2.9719	-6.7999	-3.6892	-2.9719
$\ln TPin_t$	-2.2579	-4.3098	-3.5742	-2.2572	-4.3098	-3.5742
$\Delta \ln TPin_t$	-5.2887	-5.2887	-2.9719	-5.2887	-3.6892	-2.9719
$\ln wxp_t$	-2.3272	-4.3393	-3.5875	-0.8896	-4.3098	-3.5742
$\Delta \ln wxp_t$	-4.5108	-3.6892	-2.9719	-4.5108	-3.6892	-2.9719
$\ln xp_t$	-1.9763	-4.3098	-3.5742	-1.9652	-4.3098	-3.5742
$\Delta \ln xp_t$	-4.5068	-3.6892	-2.9719	-4.5190	-3.6892	-2.9719

TABLE III
F-STATISTICS FOR COINTEGRATION RELATIONSHIP

k	Critical Value Bounds of the F -Statistic					
	90% Level		95% Level		97.5% Level	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
3	2.022	3.112	2.459	3.625	2.901	4.161

Calculated F -statistics:
 $F_X(X | TPin, wxp, xp) = 4.1506$, $F_{TPin}(TPin | X, wxp, xp) = 1.5863$,
 $F_{wxp}(wxp | TPin, X, xp) = 3.1306$, $F_{xp}(xp | TPin, wxp, X) = 2.0816$.

Source: The critical value bounds are from Table F in Pesaran and Pesaran (1997, p. 484).

Note: k is the number of regressors.

ADF and PP tests, we find that the test statistics exceed the critical values. This leads us to the conclusion that all variables [X_t , $TPin_t$, wxp_t , xp_t] are stationary in their first differences.

B. Cointegration Analysis

We start by testing for the presence of long-run relationships. The bounds test for cointegration involves the comparison of the F -statistics against the critical values which are extracted from Pesaran and Pesaran (1997). The calculated F -statistic when export volume is the dependent variable $F_X(X | TPin, wxp, xp) = 4.1506$ is higher than the upper bound critical value of 3.625 at the 5 per cent level of significance. The F -statistics for the remaining equations (when other variables in the model are taken as dependent variables) are below the upper bound critical value at the 5 per cent significance level (Table III). This suggests that the null hypothesis of no cointegration cannot be accepted and that there exists a unique

TABLE IV
LONG-RUN RESULTS FOR FIJI'S EXPORT DEMAND, 1970–2000

	Regressors	Coefficient	Standard Error	<i>t</i> -statistics
A. ARDL estimates	$\beta_1(\ln TPi_{t_i})$	0.6998	0.22047	3.1743
	$\beta_2(\ln xp_t)$	-1.2977	0.52611	2.4666
	$\beta_3(\ln wxp_t)$	2.1481	0.6075	3.5354
B. Phillips-Hansen, FMOLS estimates	α	-9.2218	0.9660	-9.5444
	$\beta_1(\ln TPi_{t_i})$	0.7057	0.1192	5.9232
	$\beta_2(\ln xp_t)$	-1.2506	-0.2874	-4.3511
	$\beta_3(\ln wxp_t)$	2.0850	0.3584	5.8165
C. Stock-Watson, DOLS estimates	α	-9.5365	1.5832	6.0234
	$\beta_1(\ln TPi_{t_i})$	0.8063	0.2074	3.8872
	$\beta_2(\ln xp_t)$	-1.4932	0.5345	2.7930
	$\beta_3(\ln wxp_t)$	2.2339	0.5879	3.7996

Notes: 1. The DOLS was estimated by including up to two lags and leads and up to two lags of the equilibrium error. The results presented here do not include the lags and leads.

2. All variables are significant at the 1 per cent level.

cointegration relationship between Fiji's exports and its determinants.

C. Long-Run and Short-Run Elasticities

Once we established that a long-run cointegration relationship existed, equation (1) was estimated using the following ARDL (m, n, p, q, r, s) specification:

$$\ln X_t = \alpha_0 + \sum_{i=1}^m \alpha_1 \ln X_{t-i} + \sum_{i=0}^n \alpha_2 \ln TPi_{t-i} + \sum_{i=0}^p \alpha_3 \ln wxp_{t-i} + \sum_{i=0}^q \alpha_4 \ln xp_{t-i} + \mu_t \quad (6)$$

For each model a maximum of two lags was used, such that $i_{max} = 2$. The estimated model presented here is based on the SBC. Results of the long-run model estimated by using the ARDL, FMOLS, and DOLS are presented in Table IV. The three methods provide similar results, confirming the robustness of the long-run results. In addition, all the parameters are statistically significant and have the expected signs.

Of the three regressors used in the export model, competitor price has the most influence on exports. The price elasticity ranges from 2.09 to 2.23. A 1 per cent increase in competitor export price is likely to increase export demand for Fiji's goods by over 2 per cent. Trading partner income also has a positive but an inelastic relationship with export demand; the income elasticity ranges from 0.70 to 0.81. Other things being equal, a 1 per cent increase in Fiji's trading partner eco-

conomic activity leads to a 0.7–0.8 per cent increase in Fiji's exports in the long run—a result consistent with previous studies on export demand (see Senhadji and Montenegro 1998, 1999; Richards 2001; Arize 1990, 1999, 2001).

Fiji's own-price elasticity is between -1.30 and -1.49 , implying that a 1 per cent increase in export price induces a 1.3 to 1.5 per cent fall in exports. As compared to Arize's (1999) result of Singapore's own-price elasticity of export demand, Fiji's own-price elasticity is larger, indicating that Fiji's exports are more sensitive to own-price change than Singapore's exports. Arize (1999) supports his result on the grounds that Singapore is able to distinguish its products from those of its competitors—the same cannot be said for Fiji's exports. Fiji's exports, as explained earlier, while being narrow, comprise goods that are commonly traded by many other countries.

Next we look at the short-run model. Tests for normality of residuals, serial correlation, heteroskedasticity, and misspecification of functional form were applied to the ECM. Since none of these tests disclosed any significant evidence of departure from standard assumptions, the empirical validity of the model was confirmed by the various diagnostic tests.

The parameter (η) for the lagged error term is negative and significant, indicating the existence of a long-run relationship between the variables. η measures the speed at which equilibrium is restored in the model. The result indicates that some 63 per cent of the change in Fiji's export demand per year is attributed to disequilibrium. In other words, it takes one and a half years for export demand to return to its long-run equilibrium position (Table V).

TABLE V
SHORT-RUN RESULTS FOR FIJI'S EXPORT DEMAND

Dependent Variable: Real Exports			
Variables	Coefficient	Standard Error	<i>t</i> -statistics
α	-5.8350^{***}	1.6242	3.5926
$\beta_1(\Delta \ln TPi_{t-1})$	0.4424^{**}	0.1868	2.3682
$\beta_2(\Delta \ln xp_t)$	-0.8203^{***}	0.3691	2.2221
$\beta_3(\Delta \ln wxp_t)$	1.3579^{***}	0.4369	3.1083
$\eta(\epsilon_{t-1})$	-0.6321^{***}	0.1591	3.9746

Diagnostic tests:

$$R^2 = 0.4648, \text{ adjusted } R^2 = 0.3717, \sigma = 0.1102,$$

$$\chi^2_{\text{Auto}}(2) = 0.1502, \chi^2_{\text{Norm}}(2) = 0.0215, \chi^2_{\text{RESET}}(2) = 0.0229, \chi^2_{\text{White}}(2) = 0.7012$$

Notes: 1. ** and *** indicate statistical significance at the 5 per cent and 1 per cent level respectively.

2. σ is the standard error of the regression; $\chi^2_{\text{Auto}}(2)$ is the Breusch-Godfrey LM test for autocorrelation; $\chi^2_{\text{Norm}}(2)$ is the Jarque-Bera normality test; $\chi^2_{\text{RESET}}(2)$ is the Ramsey test for omitted variables/functional form; $\chi^2_{\text{White}}(2)$ is the White test for heteroskedasticity; Critical value for $\chi^2(2) = 9.21$.

Regarding all other regressors, they exert a statistically significant effect on export demand and have the expected signs (Table IV). Unlike the long-run results, all short-run elasticities are smaller in magnitude, a result analogous to studies such as those by Senhadji and Montenegro (1998, 1999) and Reinhart (1995). The own-price elasticity for instance is -0.8 per cent, implying that, *ceteris paribus*, a 1 per cent fall in Fiji's export prices leads to a 0.8 per cent increase in Fiji's export demand. On the other hand, a 1 per cent increase in trading partner income and competitor price have a positive impact of around 0.4 per cent and 1.4 per cent on Fiji's export demand, respectively.

IV. CONCLUSION AND POLICY IMPLICATIONS

In this paper an export demand function is employed to investigate the determinants of Fiji's export demand. The paper uses the Pesaran, Shin, and Smith (2001) technique to determine whether a long-run relationship exists between real exports, foreign economic activity, export prices, and competitor prices. Upon finding the existence of a long-run relationship, we employ three different methods (ARDL, DOLS, and the FMOLS) to determine the long-run estimates. These methodologies have shown to provide reliable and robust estimates in small sample sizes, such as for the present study. The empirical results derived from the three different estimators indicate no divergence of elasticities, pointing to a robust long-run result. The short-run model—derived using the error correction mechanism—is also reliable, based on the diagnostic tests, and indicates that all variables are significant determinants of Fiji's export demand. It should be noted that the ARDL approach has not been previously used in the export demand literature to test for cointegration and estimate elasticities.

The long-run income elasticity from the three different estimators ranges from 0.70 to 0.81 while the short-run income elasticity is 0.4. Foreign income has a positive impact on export demand, suggesting that exports can be regarded as an engine of growth in Fiji. The results, however, point to a relatively low income elasticity of export demand in the long run, as compared with results from other developing countries (see Senhadji and Montenegro 1998). Regarding the cross-price elasticity, it is highly elastic in both the long run (between 2.08 and 2.23) and the short run (1.36), implying that Fiji's exports may be relatively good substitutes for competitor exports.

The long-run own-price elasticity for export demand lies between -1.25 and -1.49 . In this light, empirical evidence suggests devaluation or price competition as an effective policy for improving export performance in the long run. In the short run, results show that export demand is price inelastic (-0.8 per cent), suggesting that an increase in Fiji's export prices are likely to induce a less than proportionate fall in demand for exports. Hence, while devaluation, if used, is likely to

increase export demand within a year, a relatively large devaluation is needed to improve export performance.

With the robustness of our long-run results confirmed and our derived elasticities being both consistent with theoretical expectations and economically plausible, we can confidently conclude that Fiji's export-led growth strategy is contingent on export prices, competitor prices, and income of trading partner countries. From a policy perspective, it is clear that Fijian policymakers need to focus on improving price competitiveness. Export sectors in Fiji, particularly sugar and garments have been regarded as low productive sectors. The sugar industry, for instance, is operating under persistent mill breakdowns, relatively old transportation systems which lack investment, and high rates of sugarcane burning which is affecting the quality of sugar in cane. Government investment in the sugar industry is imperative. Similarly, the garment industry is facing a skilled-labor shortage. The government needs to work closely with the private sector in ensuring that appropriate training, in line with industry demands, can be provided to the potential labor force. This, it is envisaged, will increase productivity levels in the industry and will ultimately assist in Fiji's endeavors towards price competitiveness.

Moreover, our empirical results indicate that Fiji's export price is elastic with respect to exports. We attribute this result to the fact that Fiji's exports consist of only a few commodities—sugar, garments, fish, and gold—goods commonly traded by other countries. From these results it is important to recognize that for Fiji to increase the volume of its exports, it needs to diversify its export base and hence reduce its reliance on only a few sectors for its growth and development. For instance, one export sector that Fiji can target is the information, communications, and technology (ICT) sector. Fiji can draw on the experience of Mauritius, which has diversified its export base by successfully attracting investment in the ICT sector. For Fiji, however, attracting private investment has been an arduous task. Over the last decade, Fiji's private investment has been mediocre—averaging a mere 3.5 per cent of real GDP per annum. This has become a cause for alarm for Fijian policymakers given the prognosis of the government that, for Fiji to achieve its targeted growth rate of 5 per cent per annum, it needs to generate private investments of 25 per cent of GDP per annum (Kubuabola 2002, p. 18). Subdued investment levels have obviously not stimulated growth in exports as envisaged. Political instability has been one of the biggest hurdles for investment and export growth in Fiji. The period since 1987 has been a volatile one in terms of the political and economic climate. In this period, Fiji has not only experienced coups, but has undergone fourteen changes in government (Narayan and Smyth 2004). The ensuing economic policies have, as a result, become a function of the rapid turnover in government. This has been unpalatable for investment in Fiji. Hence, we believe that for a successful growth in exports it is important for Fiji to

create both a stable economic and political climate, where the economic climate is a function of the political climate and both are conducive for investment.

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APPENDIX TABLE I
DATA SOURCES AND CONSTRUCTION

Series	Construction and Sources
Real exports	Total merchandise exports deflated by the export price index: IMF, <i>International Financial Statistics Yearbook 1999</i> (1999) Fiji Bureau of Statistics, <i>Current Economic Statistics</i> (various issues) Reserve Bank of Fiji, <i>Quarterly Review</i> (1999 issues)
Trading partner income (real)	Calculated as the trade-weighted average constant price GNP of Fiji's five major trading partners (excluding real exports): Australia, New Zealand, the United Kingdom, the United States, and Japan (importing up to 70 per cent of Fiji's exports) IMF, <i>International Financial Statistics Yearbook 1999</i> (1999) IMF, <i>International Financial Statistics</i> (various issues) IMF, <i>Direction of Trade Statistics</i> (various issues)
World price index	Index of world prices: IMF, <i>International Financial Statistics Yearbook 1999</i> (1999) IMF, <i>International Financial Statistics</i> (various issues)
Export price index	Index of Fiji's export prices from 1970 to 1999: Fiji Bureau of Statistics, <i>Current Economic Statistics</i> (various issues)