A MACROECONOMETRIC MODEL FOR FIJI

By

Rup Singh
The University of the South Pacific
Suva, Fiji

No. 2006/14 May, 2006

This paper presents work in progress in the School of Economics at USP. Comments, criticisms and enquiries should be addressed to the author.

Copyright © 2006 by the author. All rights reserved.
A MACROECONOMETRIC MODEL FOR FIJI

Rup Singh
singh_r@usp.ac.fj
The University of the South Pacific

Paper Presented at the Fifth IIDS Conference
1st-4th December-2005, Suva(Fiji)

ABSTRACT

In this paper, we attempt to build a small scale structural macroeconometric model for Fiji using time series techniques.\footnote{This paper is based on my masters thesis titled: A Macroeconometric Model for Fiji. I wish to thank Professor B.B. Rao for continuous guidance and helpful suggestions and Associate Professor B.C. Prasad for encouragement and useful comments. However, errors in this paper are my responsibility.} The model is simulated over the historical period and standard simulation evaluation tests are performed. Based on the simulation results and evaluation tests, it can be said that time series methods such as GETS yield reasonably good results. The version presented in this paper is being developed for forecasting and a model for policy is under progress.
1 INTRODUCTION

There are three stages in economic research, viz, purpose, summary of facts and interpretation. From this perspective, econometric techniques have a limited role and only help to prepare summaries of facts. If alternative techniques yield similar summaries, our confidence in those summaries will increase. In this paper we have used a simpler time series technique known as the general to specific approach (GETS). It was developed by the econometricians at the London School of Economics such as Saragan, Mizon and Hendry. Hendry is currently its strongest proponent. We have used this technique because in a limited number of empirical studies we have found that it gives similar summaries of facts compared to some alternative techniques like the Phillip-Hansen FMOLS and the Johansen VECM.

However, GETS is relatively more flexible than these two techniques and especially useful for estimating small to medium sized models with a limited number of observations. In this respect, this paper is exploratory as it applies a single equation method to estimate the key structural equations for Fiji and develop a model for the entire economy with a view to examine how well it explains the macroeconomic variables. Where possible, we have also used VECM and FMOLS to check our estimates of GETS. However, we have not had substantial differences in the results obtained with these alternative techniques. At USP, we are extending our model to incorporate policy variables so that it can be used for policy analysis.

To date, only one conventional econometric model and a Computable General Equilibrium (CGE) model has been developed for Fiji. Murphy (1992) estimated a macroeconometric model using annual data from 1974 to 1986. While his work provides some useful insights in structural modeling, no further attempts have been made to refine or update this model. The Murphy model is aimed at analyzing shocks affecting the Fiji economy and a significant proportion (40 out of 58 equations) of the model are identities. The model is not suitable for forecasting. Details of the Murphy model and some important

---

1 Our approach is similar to the past practice of estimating models with the single equation methods. Some examples are: the Nevile model of Australia, the St.Louis model for the USA, the RBA model of Beechey et.al., the Shand and Tredgold model for the PNG and the Murphy model for Fiji. In all these models partial adjustment specifications have been used to capture the dynamics. In contrast GETS uses more general dynamic specifications.
estimated equations can be found in Singh (2005). However, Murphy failed to provide sound theoretical justifications for his equations and has used either OLS or partial adjustment models (PAM) to estimate the relevant parameters. It is well known that estimation using these standard methods with unit root variables give spurious summaries. Nonetheless, Murphy’s attempt is pioneering and important.

Levantis (1999) developed a CGE model for Fiji which he has revised in 2003. Nonetheless, both his works are important for policy institutions like the National Planning Office (NPO) and the Reserve Bank of Fiji (RBF). At its inception, the Levantis model was extensively used by the RBF to compare the validity of its own forecasts.\(^2\) While there are limitation in static CGE models, these models give a detailed breakdown of the effects of changes in exogenous variables. However, it would be even more valuable if a traditional time series dynamic econometric model and a CGE model are used together, often to check and re-affirm each other’s predictions. The advantage of conventional model is that they can generate the actual dynamic adjustment paths of variables which provides insightful information and room for assessment.

Currently there doesn’t seem to be a reliable and usable structural macroeconometric model for Fiji. Even at the RBF, only single equation framework is being used to generate inflation forecasts.\(^3\) Moreover, forecasts of national accounts and other key statistics are judgmental consensus between the major policy institutions on which, in many occasions, both academic and professional economists have had disagreements. Therefore, attempts to construct macroeconometric models for forecasting and policy are enormously supported and encouraged in empirical research in Fiji and perhaps in other PICs. Thus, in this respect, our work is a starting point for further works aimed at developing structural models for policy.

This paper is organized as follows: The next section presents the basic structure of our model followed by the full exposition and a brief discussion of the dynamic model that is used for simulations. Section

\(^2\) While at the RBF, I had the first hand experience in generating macroeconomic forecasts and analyzing the effects of various shocks using the CGE. However, due to software licensing problems, the Bank restricted further use of this model. There are indications that it is hardly being used by the NPO as well.

\(^3\) While there are indications that RBF is developing a macroeconometric model for policy, we are privy to details.
4 Abstract

3 details the simulation results & evaluation tests and conclusions with limitations are stated in the final section.

1.2 THE BASIC STRUCTURE OF OUR MODEL

The hypothesized basic structure of our macroeconometric model, abstracted from its dynamics, is as follows:

\[ \ln C_t = \alpha_0 + \alpha_1 \ln Y D_t + \alpha_2 R_t + \epsilon_{1t} \]  
(1)

\[ \ln \left( \frac{I_t}{Y_t} \right) = \beta_0 + \beta_1 \ln Y_t + \beta_2 R L_t + \epsilon_{2t} \]  
(2)

\[ \ln \left( \frac{M_{1_t}}{P_t} \right) = \lambda_0 + \lambda_1 \ln Y_t + \lambda_2 R S_t + \epsilon_{3t} \]  
(3)

\[ \ln P_t = \pi_0 + \pi_1 \ln P M_t + \pi_2 T + \epsilon_{4t} \]  
(4)

\[ \ln X_t = \gamma_0 + \gamma_1 \ln Y T_t + \gamma_2 \ln \left( \frac{P_t}{E_t \times P_{Ft}} \right) + \epsilon_{5t} \]  
(5)

\[ \ln R M_t = \tau_0 + \tau_1 \ln Y_t + \tau_2 \ln \left( \frac{P_t}{E_t \times P_{Ft}} \right) + \epsilon_{6t} \]  
(6)

\[ \ln W_t = \omega_0 + \omega_1 \ln C P I_t + \epsilon_{7t} \]  
(7)

\[ \ln C P I_t = \phi_0 + \phi_1 \ln P_t + \epsilon_{8t} \]  
(8)

\[ Y_{d_t} = C_t + I_t + G_t + X_t - R M_t \]  
(9)

\[ \ln Y_{s_t} = \theta_0 T + \theta_1 \ln K_t + (1 - \theta_1) \ln L L_t + \epsilon_{10t} \]  
(10)

\[ Y_t = \eta_1 Y_{d_t} + \eta_2 Y_{s_t} \]  
(11)

There are 11 endogenous variables (C, I, X, RM, M1, P, CPI, W, Yd, Ys and Y) and therefore 11 equations. Given the estimated parameter values of these equations, if the actual values of the 13
exogenous variables (C, YD, R, RL, E, PM, PF, YT, K, L, POIL, PM and \(Y^*\)) and for the 9 dummy variables, (COUP, COUP1 SS, DEV, DEV2, VAT1, VAT2, DUM8991 and DUM8996) are provided, the models gives time paths for the endogenous variable.

The specification of the behavioral equations is based on economic theory and various empirical works on Fiji and other developing countries. However, controversies still persists over the structural specifications of macroeconometric models and macroeconomic relationships in general. In this respect, our work addresses some of these issues, but all the relevant issues can not be adequately addressed within the scope of this paper. Each equation is estimated with the two aforesaid time series methods, viz, GETS and JML. While it is hard to comment which method gave better results, we included the most preferred equations from both the estimators and selected the ones that produced better simulation results. In doing so, we noted that most of the equations included in the model are based on GETS; see the dynamic model below. The estimation details are not presented here to conserve space but a brief explanation is given after each dynamic equation.\(^5\) Data is derived from the RBF Quarterly Reviews and the Current Economic Statistics (various years) and the IMF-CD ROM (2003). Specific data construction and definition of variables are in appendix A and the standard unit root test results are given in Appendix B.

The aggregate demand \((Y^d)\) obtained by adding the levels of expenditures in (9) can be said to be only a proxy to \(Y^d\). Therefore, we assume that actual output adjusts to this proxy aggregate demand and aggregate supply (in 10), which is estimated with a production function. Unlike in many models where aggregate supply is ignored, we have used a Cobb-Douglas production function (unadjusted for capacity utilization) for Fiji estimated by Rao and Rao (2005) using GETS.\(^6\) The intersection of the two determine the equilibrium level of output \((Y_t)\) given in (11). This approach is based on Rao (2003) and Nevile and Rao (1996) who argue that such an exposition of the ADAS where AD is derived from the ISLM framework is inconsistent because

\(^5\) Detailed discussions can be found in Singh (2005). Also see, Rao and Singh (2004), (2005a), 2005b), and Singh (2005) for details of consumption, demand for money, exports & imports and investment equations, respectively.

\(^6\) Rao used the GETS approach to tackle the unit roots in the variables of the production function.
the price flexibility implied in the ADAS model is inappropriate since the labor and goods markets are fixed price markets in the ISLM. This calls for an ADAS model based on the assumption that these are disequilibrium markets. A simpler alternative is to close the ISLM by augmenting with the Phillips curve type price adjustment equation or both price and quantity adjustment equations. Therefore, some Keynesian economists augment the ISLM model with the Phillips curve, but use the inverted Phillips curve as aggregate supply. Goods prices are determined as a mark-up on the wage costs augmented with a demand pressure variable. This is a pragmatic compromise and we follow this approach by developing wage and price equations in our model. Other equations in our model either explain the dis-aggregated components of \( Y^d \) and prices. The government expenditure which includes both current and capital spending of government is treated as exogenous. The estimated dynamic model is given below:

\[ \Delta \ln C_t = -0.105 \left[ \ln C_{t-1} - (0.811 \ln YD_{t-1} + 0.408 R_{t-1}) \right] \\
(-1.43) \quad (8.16)^* \quad (1.44) \\
- 0.699 \Delta \ln C_{t-1} - 0.451 \Delta \ln C_{t-2} - 0.258 \Delta \ln C_{t-3} \\
(-4.30)^* \quad (-4.10)^* \quad (-2.54)^* \\
- 0.285 \Delta \ln YD_{t-1} - 0.019 \Delta R_{t-1} \\
(-1.84)^{**} \quad (-3.38)^* \quad \text{ (1')} \]

\[ R^2 = 0.675, SER = 0.035 \quad \text{ Period: 1975 - 2002} \]

\[ \chi^2_{sc} = 0.047, \chi^2_{ff} = 2.855, \chi^2_n = 0.732, \chi^2_{hs} = 0.371 \]

Briefly, consumer expenditure depends on current and past values of disposable income \( (YD) \) and availability of consumer credit \( (R) \). Past values of consumption are also significant. The financial variables such as the real rate of interest has no implications for consumption in Fiji since low and volatile consumer incomes together with less developed bonds market offer limited opportunities for inter-temporal substitution. Rao (2005) and Rao and Singh (2004) have also made
these observations. Thus, targeting consumption with the rate of interest such as what the RBF is doing is inappropriate. None of the $\chi^2$ summary statistics for the first order serial correlation ($\chi^2_{sc_1}$), functional form mis-specification ($\chi^2_{ff}$), normality in residuals ($\chi^2_n$) and heteroscedasticity ($\chi^2_{hs}$) are significant at 5% level.

**Investment Equation**

$$\Delta \ln \left( \frac{I_t}{Y_t} \right) = -6.693 - 0.119(\Delta RL_t + COUP) - 13.374\Delta^2 \ln P_{t-1}$$

\[ (-7.81)^* \quad (-7.75)^* \quad (-6.40)^* \]

$$- 0.261[\Delta \ln (I/Y)_{t-2} + \Delta \ln (I/Y)_{t-4}] + 0.038T$$

\[ (-2.88)^* \quad (7.00)^* \]

$$- 7.898[\Delta^2 \ln P_t + \Delta^2 \ln P_{t-2}] - 2.589\Delta \ln Y_t$$

\[ (-5.00)^* \quad (-4.81)^* \]

$$+ 0.050\Delta RL_{t-4} - 0.688ECM_{t-1}$$

\[ (2.93)^* \quad (4.12)^* \]

$$R^2 = 0.761, SER = 0.127 \quad \text{Period: 1976 - 2002}$$

$\chi^2_{sc_1} = 2.590$, $\chi^2_{ff} = 0.202$, $\chi^2_n = 1.154$, $\chi^2_{hs} = 0.161$

The private investment ratio depends on two important variables, viz, real output and the real long-term interest rate taken as a proxy for the user cost of capital. Political coup seems to have a permanent negative impact on investment while accelerating inflation and inflation expectations seem to reduce investment. The implied long-run output elasticity is unity and the elasticity of the real rate on interest at its mean of 2.80 is around -0.40. This implies that an increase real interest rate by 1 percentage point (pp) will reduce investment ratio by around 0.20pp and therefore the recent RBF stance on interest rate is harmful to private investment. None of the $\chi^2$ summary statistics are significant and around 70% adjustments to long-run equilibrium are completed in one year.
Demand for Money

\[
\Delta \ln \left( \frac{M_t}{P_t} \right) = -3.047 - 1.114ECM_{t-1} - 0.039(\Delta RSt - \Delta RSt_{-1}) \\
(10.94)^* (11.05)^* (11.05)^*
\]

- 0.820(\Delta \ln Y_{t-2} - \Delta \ln Y_{t-4}) + 1.114\Delta^2 \ln Y_t \\
(-3.59)^* (6.43)^*
\]

+ 0.279COUP - 0.114DEV - 0.002T \\
(5.93)^* (1.93)^* (0.71)
\]

\( R^2 = 0.857, SEE = 0.055 \)  
Period: 1976 - 2002

\[ \chi^2_{sc} = 0.169, \chi^2_{ff} = 3.94, \chi^2_n = 1.053, \chi^2_{hs} = 0.642 \]

Real income and the nominal rate of interest determines the demand for narrow money. The income elasticity is unity and interest rate elasticity at its mean rate of 6.76 is around -0.35. The demand for money is stable (stability test results may be obtained upon request) and none of the \( \chi^2 \) statistics are significant. This implies the RBF to target the level of money supply rather than the rate of interest.

GDP Deflator Equation

\[
\Delta \ln P_t = 0.777 - 0.287[\ln P_{t-1} - (0.244 \ln PM_{t-1} + 0.028T)] \\
(6.70)^* (-4.27)^* (-2.08)^* (5.06)^*
\]

+ 0.362\Delta^2 \ln P_t + 0.188\Delta^2 \ln P_{t-1} + 0.025\Delta \ln POIL_{t-1} \\
(4.45)^* (2.55)^* (1.88)^*
\]

+ 0.054COUP1 \\
(3.60)^* (4')
\]

\( R^2 = 0.901, DW = 1.56, SEE = 0.020, Period: 1974 - 2002 \)

\[ \chi^2_{sc1} = 2.253(0.13), \chi^2_{ff} = 0.911, \chi^2_n = 1.126, \chi^2_{hs} = 0.139 \]

The import price and time trend are significant determinants of output price in Fiji. The dynamics are captured by current and lagged inflation and oil price growths. COUP1 indicates sudden upswings in prices due to precautionary demand during the political crisis and none of the \( \chi^2 \) summary statistics are significant at 5% level.
A Macroeconometric Model for Fiji

Exports Equation

\[ \Delta \ln X_t = 0.311 - 0.157(\Delta \ln X_{t-2} + ECM_{t-1}) + 0.0004SS_{t-2} \]

(6.50)\(^*\)  \(- (5.33)\)* \((3.78)\)*

\[ - 0.752\Delta \ln \left( \frac{P_{Dt}}{E_t \times P_{Ft}} \right) - 0.310(\Delta \ln YT_{t-2} + COUP) \]

(11.76)\)* \(- (13.79)\)*

\[ \bar{R}^2 = 0.817, \text{SER} = 0.061, \text{Period} : 1974 - 2002 \]

All the estimated coefficients are significant and have the expected signs. The implied long-run trading partner output elasticity is around unity and relative price elasticity is around -1.108. These results indicate that exports is an engine of growth for Fiji. The political coup seems to have a negative impact and the average sugar productivity (SS) seem to increase exports. The speed of adjustment is reasonable and none of the \( \chi^2 \) summary statistics are significant at 5% level.

Import Equation

\[ \Delta \ln RM_t = -1.425 + 0.416\Delta \ln \left( \frac{P_{Dt}}{E_t \times P_{Ft}} \right) + 0.416\Delta \ln YT_{t-4} \]

(-4.49)\)* \((4.26)\)* \((3.17)\)*

\[ + 0.785\Delta \ln YT_t - 0.716ECM_{t-1} + 0.021T \]

(2.52)\)* \(- (5.55)\)* \((2.21)\)*

\[ - 0.288COUP - 0.005SS_{t-2} \]

(-4.16)\)* \((3.92)\)*

\[ \bar{R}^2 = 0.80, DW = 2.00, \text{SER} = 0.05, \text{Period} : 1975 - 2002 \]

\[ \chi^2_{sc}(1) = 0.072, \chi^2_{ff}(1) = 1.668, \chi^2_{nn}(2) = 2.476, \chi^2_{hs}(1) = 0.179 \]

The long-run output elasticity is 0.81 and relative price elasticity is 0.60. The impact of coup and supply shock seem to be negative. To improve the current account balance, Fiji needs to improve international competitiveness since the absolute value of the sum of the two relative price elasticities exceeds unity. Note, the speed of adjustment is reasonable and none of the \( \chi^2 \) summary statistics are significant at 5% level.
Wage Rate Equation
\[
\Delta \ln W_t = -0.175[\ln W_{t-1} - 0.147 \ln CPI_{t-1}] + 0.283\Delta^2 \ln W_{t-1}
\]
\[\text{(9.46)*} \quad \text{(9.54)*} \quad \text{(4.65)*}\]
\[+ 0.424\Delta^2 \ln W_t + 0.130[\Delta \ln (Y/LL)_{t-1} + \Delta \ln (Y/LL)_{t-2}]
\]
\[\text{(6.36)*} \quad \text{(1.78)**}\]
\[+ 0.047VAT2 - 0.043DUM8991
\]
\[\text{(3.07)*} \quad \text{(-1.96)*}\]
\[
\overline{R}^2 = 0.875, DW = 1.59, SEE = 0.026, Period : 1974 - 2002
\]
\[\chi^2_{sc1} = 1.154, \chi^2_{ff} = 0.008, \chi^2_n = 0.386, \chi^2_{hs} = 2.003\]

The implied long run elasticity of wages with respect to CPI is significant at around 0.15. The dynamic factors are the lagged changes in GAP, wage rates, average productivity of labor and a temporary VAT dummy lead to higher wage rate in Fiji. The dummy variable (DUM8991) which marks government’s massive tax free programs for producers seems to have lead to higher demand for labor. Note, none of the \(\chi^2\) summary statistics are significant at 5% level.

CPI Equation
\[
\Delta \ln CPI_t = -0.264[\ln CPI_{t-1} - (1.015 \ln P_{t-1})] + 0.036DEV
\]
\[\text{(-3.49)*} \quad \text{(145.70)*} \quad \text{(3.04)*}\]
\[+ 0.100[\Delta \ln PM_{t-1} + \Delta \ln PM_{t-2} + \Delta (\ln Y - \ln Y^*)_{t-2}]
\]
\[\text{(4.08)*}\]
\[+ 0.220\Delta \ln CPI_{t-2} + 0.317\Delta \ln P_t
\]
\[\text{(2.66)*} \quad \text{(3.98)*}\]
\[
\overline{R}^2 = 0.828, DW = 1.61, SEE = 0.015, Period : 1974 - 2002
\]
\[\chi^2_{sc1} = 1.255, \chi^2_{ff} = 0.007, \chi^2_n = 1.135, \chi^2_{hs} = 0.074\]

The GDP deflator has a strong positive effect on CPI and has an implied long-run unit elasticity. All other variables are correctly signed and the change in GAP seems to have positive impact on CPI. The lagged growth of import prices are significant and the devaluations seem to have increased consumer prices. The VAT dummy, both temporary and permanent were insignificant at conventional levels.
The production function has two inputs: labor and capital and a time trend has been added to capture the impact of the Hicks neutral technical progress. In spite of the preliminary nature of his estimates, his production function gave good results. These have been improved further in the growth accounting equations; see Rao and Rao (2005). Note, the $\bar{R}^2$ which is impressive and that none of the $\chi^2$ summary statistics are significant at 5% level.

Aggregate Output

$$Y_t = 3.261 + 0.298Y^*_t + 0.280Y^d_t$$

$$(9.17)^* (2.74)^* (1.99)^* (11')$$

$\bar{R}^2 = 0.911, DW = 1.598, SER = 0.040, Period: 1977 − 2002$

$\chi^2_{sc}(1) = 0.87, \chi^2_{ff}(1) = 1.46, \chi^2_{nn}(2) = 0.47, \chi^2_{hs}(1) = 0.79$

The aggregate output adjusts to both demand and supply conditions with similar impacts. Note that none of the $\chi^2$ summary statistics are significant at 5% level.
3 A NOTE ON SIMULATIONS

Model simulations are performed for a variety of reasons. However, given our objectives, we only perform historical simulation and evaluate the results based on standard model evaluation criteria, viz, the root mean squared errors ($RMSE$), root-mean-squared percentage errors ($RMSPE$), Theil’s inequality measure ($U$) and its decompositions. Generally, the RMSE should be compared with the actual size of the variables, say proxied by its sample mean. In practice, the RMSEs are often high, since they penalize large individual errors more heavily. Low RMSPE is only one of the desirable measure of simulation fit. A statistic related to RMSE is the Theil’s inequality coefficient ($U$). The values of $U$ close to zero means a perfect fit. This inequality can then be defined in proportions of $Um$, $Us$ and $Uc$, which are called the bias, variance and covariance proportions, respectively, which are useful breakdowns of simulation errors into its characteristics sources. Large values of $Um$ signal systematic bias and implies the need for revision of the model. The variance proportion, $Us$ indicates the model’s ability to replicate the degree of variability in the variables i.e, either the actual or the simulated series have more fluctuations than the other. This would also signal model revision. Finally, the $Uc$ measures unsystematic errors which is less worrisome.

Sometimes, a model may perform well in some of these criteria, but may fail in others. Thus one has to apply judgment and understand the trade-off between alternative criteria. Unfortunately as yet, econometric does not offer a unified statistic which gives model’s performance consistent with all these desirable attributes. Further, one should check if the model tracks turning points well in data. This indicates if there are specification bias. Moreover, evaluation should depend on the purpose for which the model is built. Since our main objective is to develop a macroeconometric model using recent developments in time series methods, it is important to check if the equations are well specified, with the correctness of the signs and the magnitudes of estimates, which are shown to be appropriate and consistent with economic theory and our expectations. Note each equation fits historical data reasonably well with low SERs, high $R^2$ and satisfy other important summary statistics. However, when combined as a system, we hope that the complete model will accurately replicate the actual data series. The simulation results and evaluation tests of the complete model are given below.
4 SIMULATION RESULTS

We now turn to simulation results and conduct standard simulation evaluation tests. We compute various summary statistics to examine how well the model captures the dynamics of output, its disaggregated components, inflation and wages during the sample period. However, before we analyze the simulation results, it is important to highlight some of the major problems that we faced in simulating the model. First, all equations were specified in logarithms and their re-conversion to levels, at best, is an approximation. We found it difficult to balance the national accounting identity. This was further aggravated by the lack of consistent data for the full sample on capital consumption and other important components of the national accounts. Therefore, instead of linking the national income and disposable income with identities, we have assumed that the disposable income is a proportion of GDP, determined by the tax rate. This approach was also taken by Murphy (1992). Further the aggregate demand \( (Y^d) \), obtained by adding the levels of expenditures, is only a proxy of \( Y^d \). Therefore, we assumed that actual output adjusts to this proxy aggregate demand and aggregate supply. In our simulations, output in the short-run is assumed to adjust to both demand and supply conditions. In a way, this adjustment process captures the missing quantity adjustment equation in the disequilibrium models. While some model builders make slope and intercept adjustments in their simulations, we found that small adjustments to the intercepts of our consumption function, which did not fit the data well, adversely effected the simulation results for other variables. Therefore, we had to experiment with alternative estimates of the consumption equation which is given in (1’). Nonetheless, in spite of some weaknesses, our simulation results satisfy various criteria used to judge the quality of simulation results.

The in-sample simulations plots of actual and simulated values of the endogenous variables are given are in Figures 1-8. These are based on dynamic simulation and all quantity variables are in real terms and given in their logarithms. The predicted series are indexed with \( z \).

Figure-1 shows the dynamic time path of consumption. Although the simulation results were not impressive of our estimates of consumption equation given in (1’), it is noted that the model replicates turning points reasonably well. Therefore, we had to fit an OLS equation between the actual and predicted values of consumption and the
Abstract

FIGURE 1
ACTUAL AND SIMULATED VALUES OF CONSUMPTION

Results are given in Figure-2. It may be noted that there is a remarkable improvement in predictions and a near to perfect fit between the two is noteworthy.

FIGURE 2
ACTUAL AND SIMULATED VALUES OF CONSUMPTION

In Figure-3, we have plotted private investment against its sim-
FIGURE 3
ACTUAL AND SIMULATED VALUES OF PRIVATE INVESTMENT

Simulated values. Except for the mid 1980’s, the model gives a good prediction for changes in investment given the volatility of investment in general. However, based on the evaluation criteria of Theil’s’s, see next section, our predictions are quiet reasonable. None of the decomposed Theil’s indices are high and the RMSE is low at 0.016.

FIGURE 4
ACTUAL AND SIMULATED VALUES OF MONEY DEMAND
Abstract

The money demand is shown in Figure-4. Apart from the slight unexplained deviations in 1986, which may be due to political problems, the predictions are impressive. All simulation tests statistics are well determined.

FIGURE 5
ACTUAL AND SIMULATED VALUES OF EXPORTS

Real exports and imports are given in Figures-5 & 6, respectively. The predictions are not perfect only in 1986-87 and in late 2000. These may be due to the two political coups during these periods. However, the overall simulation results for both, exports and imports together with the RMSPE are noteworthy. The Theil’s statistics and its decompositions are low. The graph shows good fit of data.

Figures 7-9 show simulation results of price equations. All the variables, viz, the GDP deflator, CPI and the nominal wage rate have perfect fit implying that their dynamics are well captured by the model.
Figure 10 shows predictions of real GDP which is derived using the output equation. Note there is a close association between the actual and predicted values, although the fit is not perfect. However, the results are reasonable given the size and limitations of our model and data. However, there are no serious problems according to the simulation evaluation tests.
The simulation evaluation statistics are given in Table-1. All the summary statistics are impressive except for the original consumption equation which has been improved upon in $C_t'$, see the third row. Both RMSPE and Theil’s U are low for all variables. The highest RMSPE is 0.118 for the wage variable and is lowest for the alternative con-
sumption and GDP deflator equations at 0.003. The U is 0.010 for the wages but this is still low. The Um and Us decompositions are small which indicate that there are no serious errors in specification and that the variations in dependent variables are adequately captured in all equations. While Um is around 0.15 for investment and exports equations, but they are respectful, given our sample size, data limitations and single equation approach to estimation. Further, Pindyck and Rubinfeld (1991) suggest that Um above 0.2 may be troublesome, which is not the case in ours. The last three columns in Table-1 give the basic statistics based on OLS fit of the actual and the simulated values of respective variables. It may be said that there exists close to perfect fit between the actual and simulated values for all the endogenous variables. The $R^2$s are high, slope coefficients are close to unity and the intercepts are around zero. Thus, our dynamic simulation results indicate that our methodology is useful for developing other models for policy and forecasting. However, there are no alternative models for comparing our results and building another model for this single purpose is beyond the scope of this paper.
Table-1

EX-post Simulations: Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>RMSE</th>
<th>RMSPE</th>
<th>U</th>
<th>Um</th>
<th>Us</th>
<th>Uc</th>
<th>α</th>
<th>β</th>
<th>$\bar{R}^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$lnC_t$</td>
<td>0.085</td>
<td>0.012</td>
<td>0.006</td>
<td>0.921</td>
<td>0.026</td>
<td>0.053</td>
<td>0.990</td>
<td>0.583</td>
<td>0.930</td>
</tr>
<tr>
<td>$lnC'_t$</td>
<td>0.019</td>
<td>0.003</td>
<td>0.001</td>
<td>0.001</td>
<td>0.999</td>
<td>0.033</td>
<td>0.996</td>
<td>0.990</td>
<td></td>
</tr>
<tr>
<td>$lnI_t$</td>
<td>0.092</td>
<td>0.016</td>
<td>0.008</td>
<td>0.135</td>
<td>0.002</td>
<td>0.863</td>
<td>0.121</td>
<td>0.918</td>
<td>0.974</td>
</tr>
<tr>
<td>$lnM1_t$</td>
<td>0.042</td>
<td>0.008</td>
<td>0.004</td>
<td>0.061</td>
<td>0.052</td>
<td>0.888</td>
<td>0.238</td>
<td>0.961</td>
<td>0.983</td>
</tr>
<tr>
<td>$lnX_t$</td>
<td>0.059</td>
<td>0.008</td>
<td>0.004</td>
<td>0.161</td>
<td>0.008</td>
<td>0.831</td>
<td>-0.008</td>
<td>1.004</td>
<td>0.984</td>
</tr>
<tr>
<td>$lnRM_t$</td>
<td>0.058</td>
<td>0.008</td>
<td>0.004</td>
<td>0.107</td>
<td>0.000</td>
<td>0.893</td>
<td>0.099</td>
<td>0.989</td>
<td>0.970</td>
</tr>
<tr>
<td>$lnP_t$</td>
<td>0.014</td>
<td>0.004</td>
<td>0.002</td>
<td>0.009</td>
<td>0.025</td>
<td>0.966</td>
<td>-0.021</td>
<td>1.005</td>
<td>0.999</td>
</tr>
<tr>
<td>$lnCPI_t$</td>
<td>0.015</td>
<td>0.003</td>
<td>0.002</td>
<td>0.025</td>
<td>0.000</td>
<td>0.975</td>
<td>0.003</td>
<td>0.999</td>
<td>0.975</td>
</tr>
<tr>
<td>$lnW_t$</td>
<td>0.042</td>
<td>0.118</td>
<td>0.010</td>
<td>0.043</td>
<td>0.067</td>
<td>0.890</td>
<td>-0.008</td>
<td>1.010</td>
<td>0.998</td>
</tr>
<tr>
<td>$lnY_t$</td>
<td>0.037</td>
<td>0.005</td>
<td>0.002</td>
<td>0.000</td>
<td>0.021</td>
<td>0.979</td>
<td>0.000</td>
<td>1.000</td>
<td>0.918</td>
</tr>
</tbody>
</table>

$lnC'_t$ represents the alternative consumption function used in simulations. The $\alpha$ and $\beta$ are, respectively, the intercept and slope of the fit between the actual and simulated values. The $\bar{R}^2$ measures the goodness of fit.

5 CONCLUSIONS & LIMITATIONS

In this paper, we have used alternative time series techniques to estimate a small macroeconometric model for Fiji. A brief survey of literature suggests that an up-to-date macroeconometric model useful for forecasting or policy does not exist in Fiji. Our single equation approach for estimation is not new because systems methods are not pragmatic given the quality and frequency of data in developing countries compared to the number of coefficients of the model. Further, it
is not yet known how these time series methods can be modified to estimate models consisting of more than two or three equations. The complete model is then simulated over the historical period and standard model evaluation tests are performed. The simulation predictions are noteworthy with small RMSPE and impressive Theils inequality coefficients. The decomposed Theils indices indicate that there are no serious systematic or specification errors. Based on these results, we claim that our methodology which is a mixture of the Cowles Foundation tradition to specification and time series approach to estimation seems to have produced good results and therefore is useful for developing large scale forecasting or policy models.

However, a few limitations should be noted. First, we are unable to extend our work in lines of forecasting and policy analysis. However these require further revision of our model which we are currently pursuing at USP. Second, we have ignored structural breaks and their implications on unit root tests as implied by Perron (1989) whose work stimulated several interesting developments because a major limitation in it is that the date of the break should be known a priori; for a comprehensive survey see Maddala and Kim (1998). However, we argue that there are practical problems in utilizing these tests when there are only a limited number of annual observations i.e., suppose the tests show that there is a single or double break in the series, it would be necessary then to partition the data into sub-samples and estimate the cointegrating vectors for each. Such a partition is not practical for a small sample such as ours. Nonetheless, we do not argue that structural change methodology is not useful, but in our view, has only limited use for developing countries. However, we have conducted the usual TIMVAR stability tests which suggest that all the estimated equations are stable. The stability test results are not reported in this paper but are available upon request.

Given these limitations and the exploratory nature of our work, we do not claim to have estimated a model satisfactory for policy or forecasting at this stage but suggest that our approach based on simple techniques such as GETS gives promising and more reliable estimates for building better models for policy and forecasting. With these controversial methodological debates, our findings should be treated as preliminary until they are refuted by other works. Nonetheless, we are hopeful that it will be a useful starting point for further works and may encourage other researchers to develop large scale forecasting or policy models for Fiji and for the other PICs.
APPENDIX A: DATA AND DEFINITIONS

\( C_t = \) Nominal private consumption expenditure including durables and non-durables deflated by GDP deflator. Source: Current Economic Statistics, Bureau of Statistics (various years).


\( YD_t = \) Real private sector disposable income computed as \( YD_t = Y_t \ast (1 - Tx) + RGNT_t \), where \( Tx \) is the average (direct) tax rate and \( RGNT_t \) is the sum of grants and current transfers received by the private sector, deflated by GDP deflator. The tax rate is computed as a ratio of direct tax levied on wages and profits as a proportion of gross disposable income accrued to labor and capital. Source: Current Economic Statistics, Bureau of Statistics (various years).

\( Y_t = \) Nominal GDP at factor cost deflated by GDP deflator. Sources: Reserve Bank of Fiji, Quarterly Reviews (various years) and International Financial Statistics CD-ROM, (December 2003).

\( R_t = \) Credit availability proxy computed as the spread between the nominal short term (RBF 91-day bond or treasury bill rate, which ever is available) and the long term interest rates (5yr government bond yields). Sources: International Financial Statistics CD-ROM, (December 2003) and Reserve Bank of Fiji, Quarterly Reviews (various years).

\( I_t = \) Nominal private sector investment deflated by GDP deflator. It also includes investment expenditure of statutory bodies. Source: Reserve Bank of Fiji, Quarterly Review, (December 2003).

\( Y_t^* = \) Real potential GDP, de-trended values of real GDP using HPF method in Microfit 4.1.

\( RL_t = \) Real long term interest rate, computed as the difference between nominal long term interest rate and GDP deflator inflation rate.

\( SS_t = \) Average Sugar production per hector used as a proxy for the supply side dummy. Source: Current Economic Statistics, Bureau of Statistics, (December 2003).

\( CPI_t = \) Annual average index of the consumer prices. Sources: Current Economic Statistics (December 2003) and Reserve Bank of Fiji, Quarterly Reviews (various years).
GAP_t = Is computed as the difference between lnY_t and lnY_t^* in Microfit 4.1.

W_t = Is the nominal annual average daily wage rate in all productive sectors classified by the FSIC categories. Source: Current Economic Statistics and Fiji Employment Survey, both of Bureau of Statistics, (various years).

LL_t = Labor force in paid employment. Sources: Reserve Bank of Fiji and Fiji Employment Survey, (various years).

K_t = Real capital stock data is derived by adjusting the capital stock series used by Gounder and Morling (2000). Sources: Reserve Bank of Fiji’s Quarterly Review, (December 2003) and Gounder and Morling (2000).

RS = Nominal simple average of 1-3 years savings deposit rates. Sources: Reserve Bank of Fiji Quarterly Review (various years) and International Financial Statistics CD-ROM, (December 2003).

M1 = Narrow money balance consisting of currency in circulation, demand deposits and bills payable. Source: Reserve Bank of Fiji Quarterly Review (various years) and the International Financial Statistics, (December 2003).

X_t = Quantity of exports determined by nominal (FOB) export value deflated with domestic export unit value index. Sources: Current Economic Statistics, Bureau of Statistics (various years) and International Financial Statistics CD-ROM, (December 2003).

E_t = Nominal exchange rate - the price of a unit of foreign currency in terms of domestic currency. Sources: International Financial Statistics CD-ROM, (December 2003) and Reserve Bank of Fiji, Quarterly Reviews (various years).

P_F_t = Foreign prices computed as trade-weighted average of GDP deflator (1995 = 100) of Fiji’s major trading partner countries. The trading partner countries are Australia, New Zealand, USA, EU/England and Japan. Trade weights are computed as respective trade shares of these economies on Fiji’s total trade with them. Sources: International Financial Statistics CD-ROM, (December 2003) and Reserve Bank of Fiji, Quarterly Reviews (various years).

P_M_t = Import prices computed as import-weighted average export unit value indices (1995 = 100) of Fiji’s major trading partner countries. Import weights are computed as respective shares
Abstract

of import from these economies on Fiji’s total imports. Sources: International Financial Statistics CD-ROM, (December 2003) and Reserve Bank of Fiji Quarterly Reviews (various years).

\( Y_F = \) Trade weighted real GDP Index of trading partner countries expressed in 1995 prices.

\( R M_t = \) Quantity of imports of goods and services, determined by nominal imports deflated with \( P_M \). Sources: Current Economic Statistics and Reserve Bank of Fiji Quarterly Reviews, (various years).


\( COUP = \) Dummy variable for the two political coups in Fiji. Data constructed as 1 since the first coup in 1987 to 2002 and 0 in all other periods.

\( COUP1 = \) Dummy variable to capture the temporary impact of the two coups. Data constructed as 1 in 1986 to 1988 & 2000 and zero in all other periods.

\( NBF = \) Dummy variable for the collapse of the National Bank of Fiji. Data constructed as 1 for 1996 to 1998 and 0 for all other periods.

\( DEV = \) Dummy variable for the two devaluations of the Fiji dollar. Data constructed as 1 for 1987-88 & 1997-98 and 0 for all other periods.

\( DEV2 = \) Dummy variable for the second devaluation. Data constructed as 1 for 1997 to 98 and 0 for all other periods.

\( VAT = \) A permanent dummy for the introduction of VAT in 1992. Data constructed as 1 from 1992 onwards and zero for other periods.

\( VAT2 = \) Temporary VAT dummy for the introduction of Value Added Tax in Fiji. Data constructed as 1 for 1992-1994 and zero in all other periods.

DUM8991 and DUM8995 are dummy variables to proxy, separately, the post 1989 to 1991/95 period of high private sector confidence following the major tax incentives in tax free zones and export promotion policies.
### APPENDIX B: UNIT ROOT TESTS

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF</th>
<th>PP</th>
<th>Variable</th>
<th>ADF</th>
<th>PP</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>$RL_t$</td>
<td>2.65</td>
<td>1.71</td>
<td>$\Delta RL_t$</td>
<td>4.43</td>
<td>4.29</td>
<td>[1,1,3,3]</td>
</tr>
<tr>
<td>$\ln \left( \frac{I_t}{Y_t} \right)$</td>
<td>0.90</td>
<td>1.55</td>
<td>$\Delta \ln \left( \frac{I_t}{Y_t} \right)$</td>
<td>6.40</td>
<td>0.27</td>
<td>[1,3,1,1]</td>
</tr>
<tr>
<td>$\ln \left( Y_t - Y_t^* \right)$</td>
<td>5.40</td>
<td>0.14</td>
<td>$\Delta \ln \left( Y_t - Y_t^* \right)$</td>
<td>5.90</td>
<td>15.85</td>
<td>[4,4,4,4]</td>
</tr>
<tr>
<td>$C_t$</td>
<td>2.44</td>
<td>2.56</td>
<td>$\Delta \ln C_t$</td>
<td>4.14</td>
<td>6.58</td>
<td>[1,1,1,1]</td>
</tr>
<tr>
<td></td>
<td>0.23</td>
<td>0.11</td>
<td></td>
<td>0.01</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>$WD_t$</td>
<td>2.33</td>
<td>2.88</td>
<td>$\Delta \ln WD_t$</td>
<td>5.27</td>
<td>6.24</td>
<td>[1,1,1,1]</td>
</tr>
<tr>
<td>$R_t$</td>
<td>2.05</td>
<td>1.15</td>
<td>$\Delta R_t$</td>
<td>6.20</td>
<td>10.08</td>
<td>[2,1,1,1]</td>
</tr>
<tr>
<td>$\ln P_t$</td>
<td>3.79</td>
<td>3.74</td>
<td>$\Delta \ln P_t$</td>
<td>4.08</td>
<td>4.08</td>
<td>[0,1,0,0]</td>
</tr>
<tr>
<td>$\ln P_t^*$</td>
<td>0.78</td>
<td>0.87</td>
<td>$\Delta \ln P_t^*$</td>
<td>0.02</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>$\ln M_{1,t}$</td>
<td>2.73</td>
<td>0.02</td>
<td>$\Delta \ln M_{1,t}$</td>
<td>5.46</td>
<td>7.94</td>
<td>[1,1,1,1]</td>
</tr>
<tr>
<td>$\Delta S_{t}$</td>
<td>1.79</td>
<td>2.26</td>
<td>$\Delta \Delta S_{t}$</td>
<td>4.49</td>
<td>32.15</td>
<td>[2,5,1,1]</td>
</tr>
<tr>
<td>$X_t$</td>
<td>2.74</td>
<td>2.42</td>
<td>$\Delta \ln X_t$</td>
<td>6.57</td>
<td>5.91</td>
<td>[0,0,1,1]</td>
</tr>
<tr>
<td>$\ln YT_t$</td>
<td>2.93</td>
<td>2.00</td>
<td>$\Delta \ln YT_t$</td>
<td>3.51</td>
<td>4.59</td>
<td>[1,1,1,1]</td>
</tr>
<tr>
<td>$\ln \left( \frac{P_t}{P_t^*P_t} \right)$</td>
<td>2.71</td>
<td>2.61</td>
<td>$\Delta \ln \left( \frac{P_t}{P_t^*P_t} \right)$</td>
<td>6.38</td>
<td>6.08</td>
<td>[1,1,1,1]</td>
</tr>
<tr>
<td>$\ln RM_t$</td>
<td>2.26</td>
<td>3.64</td>
<td>$\Delta \ln RM_t$</td>
<td>6.38</td>
<td>13.21</td>
<td>[1,1,1,1]</td>
</tr>
<tr>
<td>$\ln PM_t$</td>
<td>2.57</td>
<td>1.37</td>
<td>$\Delta \ln PM_t$</td>
<td>2.97</td>
<td>3.02</td>
<td>[2,2,1,1]</td>
</tr>
<tr>
<td>$\ln POIL_t$</td>
<td>2.34</td>
<td>2.47</td>
<td>$\Delta \ln POIL_t$</td>
<td>3.09</td>
<td>6.10</td>
<td>[1,1,1,1]</td>
</tr>
<tr>
<td>$\Delta \ln CPI_t$</td>
<td>0.17</td>
<td>0.13</td>
<td></td>
<td>0.01</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>$\Delta \ln XP_t$</td>
<td>2.93</td>
<td>1.95</td>
<td>$\Delta \Delta \Delta \ln CPI_t$</td>
<td>4.00</td>
<td>5.15</td>
<td>[1,1,1,1]</td>
</tr>
<tr>
<td>$\ln WP_t$</td>
<td>2.64</td>
<td>1.60</td>
<td>$\Delta \ln WP_t$</td>
<td>4.57</td>
<td>5.31</td>
<td>[4,4,1,1]</td>
</tr>
<tr>
<td>$\ln APL_t$</td>
<td>2.46</td>
<td>3.10</td>
<td>$\Delta \ln APL_t$</td>
<td>4.64</td>
<td>8.25</td>
<td>[1,0,2,3,3]</td>
</tr>
<tr>
<td>$\ln LB_t$</td>
<td>2.70</td>
<td>1.79</td>
<td>$\Delta \ln LB_t$</td>
<td>4.85</td>
<td>6.98</td>
<td>[1,0,1,1]</td>
</tr>
<tr>
<td>$\ln K_t$</td>
<td>2.48</td>
<td>1.79</td>
<td>$\Delta \ln K_t$</td>
<td>3.19</td>
<td>3.03</td>
<td>[1,0,1,1]</td>
</tr>
<tr>
<td>$\Delta SS$</td>
<td>1.45</td>
<td>1.23</td>
<td>$\Delta \Delta SS$</td>
<td>3.48</td>
<td>14.98</td>
<td>[1,0,1,1]</td>
</tr>
<tr>
<td>$\Delta S$</td>
<td>0.64</td>
<td>0.20</td>
<td>$\Delta \Delta S$</td>
<td>0.02</td>
<td>0.00</td>
<td>[1,0,1,1]</td>
</tr>
</tbody>
</table>
Notes on Unit Root Tests

1. ADF is the standard augmented Dicky-Fuller F-test and the PP is the Phillips-Perron test. For both the tests the p-values are given in parenthesis.

2. m is the lag length of the first differences of variables included, for example, [1,1,2,2] means that one lagged first difference is found to be adequate in each test in levels and two lags are optimal for their first differences.

3. The sample chosen for the tests are 1972-2002 for levels and 1973-2002 for first the differences of variables.

4. A time trend (T) is included for levels but only for the first difference if it is significant. Microfit 4.1 and E-Views 5.0 are used to compute the test statistics.

5. The unit root test results indicate that all variables except the output gap (lnYt – lnYt*) are I(1) in levels but are stationary in first difference at 5% level. The KPSS test for lnPt and ln\left(\frac{PD}{E_t \times PF}\right) are, respectively: 10.529 and 0.954 against the critical value of 0.146. It rejects the null of stationarity at 5%. The KPSS for ∆lnKt was 0.441 against 0.463 at 5% level. Thus we accepted that the two prices are I(1) and ∆lnKt is I(0).

REFERENCES


<table>
<thead>
<tr>
<th>Working Paper Series</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2006/wp:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Rup Singh and Saten Kumar</td>
<td>Private Investment in Selected Asian Countries.</td>
<td>Action Programmes for Development in the Fiji Islands</td>
</tr>
<tr>
<td>Kanhaiya L Sharma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Heather Booth, Guanyu Zhang, Maheshwar Rao, Fakavae Taomia and Ron Duncan</td>
<td>Population Pressures in Papua New Guinea, the Pacific Island Economies, and Timor Leste</td>
<td></td>
</tr>
<tr>
<td>7. Paresh K Narayan</td>
<td>Macroeconomic Impact of the Informal Sector in Fiji</td>
<td>Determinants of Growth Rate: Some Methodological Issues with Time Series Data from Fiji</td>
</tr>
<tr>
<td>and Biman C Prasad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rup Singh &amp; Fozia Nisha, An Extension to the Neoclassical Growth Model to Estimate Growth and Level effects.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Rup Singh &amp; Saten Kumar,</td>
<td>Cointegration and Demand for Money in the Selected Pacific Island Countries</td>
<td>Biman C. Prasad and Azmat Gani, Savings and Investment Links in Selected Pacific Island Countries</td>
</tr>
<tr>
<td>2. B. Bhaskara Rao &amp; Rup Singh, Estimating Export Equations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Rup Singh, An Investment Equation for Fiji</td>
<td>T.K. Jayaraman, Regional Integration in the Pacific:</td>
<td></td>
</tr>
<tr>
<td><strong>2005/wp:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 B.Bhaskara Rao, Fozia Nisha &amp; Biman C. Prasad The Effects of Life Expectancy on Growth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 B. Bhaskara Rao, Rup Singh, &amp; Neelesh Gounder, Investment Ratio in Growth Equations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 T.K. Jayaraman, Regional Economic Integration in the Pacific: An Empirical Study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 B. Bhaskara Rao &amp; Maheshwar Rao, Determinants of Growth Rate: Some Methodological Issues with Time Series Data from Fiji</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 Sukhdev Shah, Exchange Rate Targeting of Monetary Policy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 Paresh Narayan and Baljeet Singh, Modeling the Relationship between Defense Spending and Economic Growth for the Fiji Islands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 TK Jayaraman, Macroeconomics Aspects of Resilience Building in Small States</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 TK Jayaraman, Some “Shocking Aspects” of a Regional Currency for the Pacific Islands.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Bimal B. Singh and Biman C. Prasad, Employment-Economic Growth Nexus and Poverty Reduction: An Empirical Study Based on the East Asia and the Pacific Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 Biman C. Prasad and Azmat Gani, Savings and Investment Links in Selected Pacific Island Countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 T.K. Jayaraman, Regional Integration in the Pacific:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Philip Szmedra and KL Sharma, Lifestyle Diseases and Economic Development: The Case of Nauru and Kiribati</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Neelesh Gounder, Rural Urban Migration in Fiji: Causes and Consequences</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11 B. Bhaskara & Gyaneshwar Rao, Further Evidence on Asymmetric US Gasoline Price Responses
10 B. Bhaskara Rao & Rup Singh, Demand for Money for Fiji with PC GETS
9 B. Bhaskara Rao & Gyaneshwar Rao, Crude Oil and Gasoline Prices in Fiji: Is the Relationship Asymmetric?
8 Azmat Gani & Biman C. Prasad, Fiji’s Export and Comparative Advantage.
7 Biman C. Prasad & Paresh K Narayan, Contribution of the Rice Industry to Fiji’s Economy: Implication of a Plan to Increase Rice Production
6 Azmat Gani, Foreign Direct Investment and Privatization.
5 G. Rao, Fuel Pricing In Fiji.
3 Sukhdev Shah, Kiribati’s Development: Review And Outlook.

2004/wp:

15 Vincent D. Nomae, Andrew Manepora’a, Sunil Kumar & Biman C. Prasad, Poverty Amongst Minority Melanesians In Fiji: A Case Study Of Six Settlements In Suva
14 Elena Tapuaiga & Umesh Chand, Trade Liberalization: Prospects and Problems for Small Developing South Pacific Island Economies

2003/wp:

10 Khainhaiya L. Sharma, Growth, Inequality and Poverty in Fiji Islands: Institutional Constraints and Issues.
9 B. Bhaskara Rao, Testing Hall’s Permanent Income Hypothesis for a Developing Country: The Case of Fiji.
7 B. Bhaskara Rao, The Relationship Between Growth and Investment.
6 Wadan Narsey, PICTA, PACER and EPAs: Where are we going? Tales of FAGS, BOOZE and RUGBY
4 Michael Luzius, Fiji’s Furniture and Joinery Industry: A Case Study.
3 B. Bhaskara Rao & Rup Singh, A Consumption Function for Fiji.
2 Ashok Parikh & B. Bhaskara Rao, Do Fiscal Deficits Influence Current Accounts? A Case Study of India.
6 Ravinder Batta, Measuring Economic Impacts of Nature Tourism.
5 Ravinder Batta, Ecotourism and Sustainability.
4 TK Jayaraman & Rajesh Sharma, Determinants of Interest Rate Spread in the Pacific Island Countries: Some Evidence From Fiji.
1 T.K. Jayaraman, A Single Currency for the South Pacific Islands: A Dream or A Distant Possibility?

2002/wp:

8 Biman C. Prasad & John Asafu-Adjaye, Trade Liberalisation and Environment in Pacific Forum Island Countries (FICs): Is it a case of “Two Gains For One”?
5 Gyaneshwar Rao, Fiji Exports to Australia and New Zealand under SPARTECA Agreement.
4 Jon Fraenkel, An Introduction to the Economic History of the Pacific Islands.
3 Biman C. Prasad, Trade Liberalisation in the South Pacific Forum Island Countries: A Panacea for Economic and Social ills?
2 Rick Hou & T.K. Jayaraman, Central Bank Cooperation and Coordination in the Pacific Islands.

2001/wp:

6 T.K. Jayaraman, Financial Sector Reforms in the South Pacific Island Countries.
4 Sunil Kumar & Biman Prasad, Savings and Investment Funds: Implications for Economic Growth in Fiji.
2 Oskar Kurer, ALTA and Rent: Who Exploits Whom?
1 R. Sathiendrarakumar, Importance of Marine Tourism and Environmental Protection: In Some Selected Indian Ocean Islands.

2000/wp:

4 T.K. Jayaraman, Monetary Policies In The South Pacific Island Countries: Past Trends And Future Directions.
3 Umesh Chand, Employments and Earnings in Fiji’s Public Health Sector.
2 Philip Szmedra, What Price Agricultural Productivity? Pesticides and the Health of Sugar Farmers in Fiji