MODELLING REAL PRIVATE CONSUMPTION EXPENDITURE - AN EMPIRICAL STUDY ON FIJI

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Abstract

This paper presents a model for Fiji's real private consumption expenditure, with the aim of generating a better understanding of the factors that determine private consumption in Fiji and for the purpose of forecasting consumption expenditure growth. The model is estimated over the period 1979 to 2001 as an error correction model (ECM), allowing for lagged terms so as to capture dynamic adjustment effects. The results suggest that Fiji's real private consumption adjusts fast to equilibrium levels in the current period (t), from a disequilibrium experienced in the previous period (t-1). In the short run, real private consumption growth is significantly affected by changes in income, wealth, the real interest rate and net private transfers. The long run (steady state) model estimates the relationship between consumption, wealth and income. Both the wealth variable and income were significant in determining long run consumption growth. Moreover, results of the forecast evaluation indicate that the parsimonious short run model has the potential to provide reliable consumption forecasts in the medium term.

1.0 Introduction

Private consumption expenditure is the largest component of total spending in Fiji, and accounts for around two-thirds of the nation's Gross Domestic Products (GDP). Private Consumption between 1979 and 2001 has averaged around 65 percent of GDP annually. This makes private consumption in Fiji an extremely important component of aggregate demand, not only because it influences economic growth, but also in the determination of the economic cycle. In this respect, the study of consumption is relevant.

The consumption function has featured in macro-models since Keynes (1936), followed by Modigliani and Brumburg (1954), Friedman (1957), Hall (1978), and the influential consumption model of David, Hendry, Srba and Yeo (1978). Theories and empirical evidence of these studies have formed the foundation for many later studies in consumption behaviour.

In this paper, an econometric consumption model for Fiji is constructed. The Error Correction Model (ECM) approach is employed and time series data is used in the regression. The primary purpose of this study is to generate a better understanding of the factors determining private consumption in Fiji and to estimate a consumption function to be used for medium term forecasting.

Consumption is expressed as a function of explanatory variables such as income, wealth and those that capture income uncertainty and intertemporal substitution effects. Such studies have been common in developed countries, but are limited in small

developing countries such as Fiji, due to unavailability of data on all key variables. Omission of these variables from a consumption model implies that consumption in the model is miss-specified thus raising the familiar econometric problems of spurious regression and omitted variable or measurement errors. The rest of the paper is structured as follows: Section 2 briefly reviews literature. Section 3 provides a commentary on the trends in real private consumption growth for the sample period 1979 to 2001. The subsequent section sets out the consumption model, while Section 5 discusses the methodology. Section 6 presents the empirical results and the final section concludes the paper.

2.0 Literature Review

There is a long tradition of theoretical and empirical work on consumption. Aggregate consumption has featured in macro-models since Keynes (1936) and is especially important for growth in a transitional economy.[1] Keynes (1939) postulates the consumption function as the relationship between consumption and disposable income. The Keynesian model of consumption takes consumption as a fixed portion of current income. This is known in consumption literature, as the Absolute Income Hypothesis (AIH). This hypothesis implies that people adapt instantaneously to changes in income. The AIH proved to be a good first approximation when the economy was stable.

However, theoretical and empirical limitations of AIH led to the development of the Life-Cycle Hypothesis (LCH) by Modigliani and

[1] See Bredin and Cuthbertson (2001).

Brumburg (1954) and the Permanent Income Hypothesis (PIH) by Friedman (1957). LCH says that income varies systematically over the phases of the consumer's life cycle and saving allows the consumer to achieve smooth consumption. To begin with, when individuals start work, income is usually lower than expected, so individuals will borrow; then as their salaries increase as a result of promotions, they will start paying off their debts; finally, they save for their retirement. It should be noted that savings and dissavings will not necessarily be equal, as interest on borrowing will diminish the savings considerably. Furthermore, LCH is also heavily influenced by wealth other than income. If life begins with a certain amount of money, this money will be spent over the lifetime, thus increasing the level of permanent income, and the amount of saving and dissaving will alter accordingly. However, net savings is likely to decrease, as consumption will be boosted by the availability of wealth.

PIH is based on the assumption that people prefer their consumption to be smooth rather than volatile. Consumers attempt to maintain a fairly constant consumption pattern even though their income may vary considerably over time. Moreover, they prefer to buy similar quantity of goods from week to week, from month to month, and so on. This is similar to the LCH, where consumers tend to smoothen out fluctuations in their income so that they save during periods of high income and dissave during periods of low income. Consumers will try to decide whether or not a change in income is temporary. If they decide that it is, than it will have a small effect on their consumption. Only when they are convinced that the change in income is permanent will consumption change

by a sizable amount. In doing this, people will tend to look to their long term income prospects, which is known as their permanent income, and adjust consumption to this rather than to their actual income. In order to test the PIH theory, Friedman (1957) assumed that on average, people would base their idea of permanent income on what had happened over the past several years. Hence, the PIH introduces lags in the consumption function. An increase in income should not immediately increase consumption spending by very much, but with time it should have a greater effect.

Hall (1978) took the Life cycle-permanent income approach and applied Rational Expectations Hypothesis (REH). Specifically, the REH implies that people behave as though they have knowledge of the process of generating income. Therefore, people will not change their level of consumption unless new information causes them to revise their future expectations of income. Hall argues that the underlying behaviour of consumers makes both consumption and wealth evolve as a random walk[2]. This is so, since marginal utility evolves as a random walk with trend.[3] Hall suggests that the PIH/LCH of consumption can be formally tested by including lagged variables, such as measures of income and wealth in an autoregression on consumption. According to Hall, for PIH/LCH (under REH) to be consistent with data, all coefficients for lagged variables except for that of the first lag of consumption must be statistically insignificant. Using quarterly US data, Hall shows that lags of consumption beyond the

[2] Refers to a time series in which the change in one period to the next in the value of the variables in question (wealth, consumption) is purely random.
[3] Hall (1978) pp 976.

first lag were not significant. However, Hall's results also show marginal evidence that recent lags of disposable income had predictive powers for consumption, and stronger evidence in favour of lagged measures of wealth such as the price of shares.

Flavin (1981) revisits Hall's hypothesis using a structural econometric model of consumption based on the innovation process in income driving changes in consumption. She finds that consumption is more sensitive to changes in income than proposed by the PIH/LCH. This phenomenon is called "excess sensitivity of consumption.

Campbell and Mankiw (1990) also find little support for PIH. Their model is based on the assumption that while proportion γ of the consumers base their consumption decisions on the Keynesian AIH, of spending current income, the reminder $(1-\gamma)$ proportion use the optimisation model. Campbell and Mankiw found that about 50 percent of the consumers in United States base their consumption decisions on current income and hence, violate the PIH.

Furthermore, well developed financial markets that allow consumers to borrow against future income in order to maintain a regular consumption path is a key assumption in Hall's model. It would therefore not be recommended as an appropriate approach to model consumption in developing countries where financial markets are underdeveloped.

Another influential approach to modelling consumption is the error correction model that of Davidson, Hendry, Srba and Yeo (henceforth DHSY) (1978). The authors present a dynamic time series model of consumption based on the underlying long run equilibrium relationship

between consumption and income. In this approach, it is assumed that the long run relationship during any point in time between income and consumption may be out of equilibrium. This suggests that consumers take time to adjust to changes in income. On the contrary, if such time allowances did not take place, the adjustment would take place immediately.

Early empirical evidence on the DHSY model was favourable, e.g. Davis (1984). Having to test a number of alternative consumption models, Davis concluded that the DHSY model is the best specification for United Kingdom. Molana (1991) also applied the ECM approach and concluded that the ECM would be appropriate in specifying the relationship between consumption and wealth. In another study, Chambers (1991) applies the same approach and finds the ECM to produce good forecasts for the UK economy.

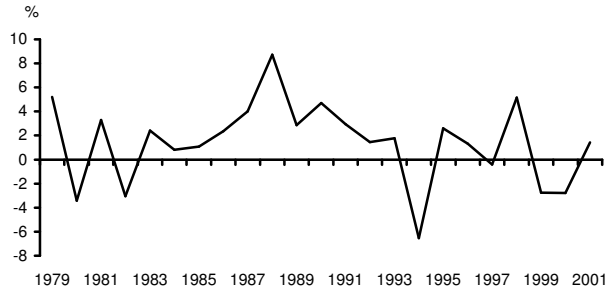
Moreover, alternative theories and other empirical evidence from advanced industrialised countries suggest that consumption is also determined by additional variables, such as demographic factors, liquidity constraints and uncertainty.[4] These variables together with income and wealth will be taken into consideration when specifying an appropriate model for Fiji's private consumption expenditure.

3.0 Trends in Real Private Consumption Growth

Over the sample period (1979-2001), the growth in real private consumption has been quite volatile (see FIGURE 1).

[4] See Muellbauer and Lattimore (1995), Zeldes (1989), and Bredin and Deaton (1985).

FIGURE 1
Real Private Consumption Growth



Sources: Reserve Bank of Fiji & Fiji Islands Bureau of Statistics

In the early 1980s, growth in real private consumption was weak. The weak consumption growth resulted mainly from low levels of household disposable income. However, from the mid 1980s to 1988 real private consumption growth accelerated (from a low 0.8 percent in 1984 to an all-time-high of around 8.7 percent in 1988). Higher levels of household disposable income and the low real interest rate largely contributed to the acceleration in this consumption growth.

Between 1988 and the mid 1990s, growth in real private consumption declined tremendously reaching the all-time-low of negative 6.5 percent in 1994. The decline was largely attributable to a sharp rise in the real interest rate (from a negative 0.2 percent in 1988 to a peak of 10.7 percent 1994). However, between 1994 and 1998 growth in real private consumption was mixed. Consumption growth recovered in 1995 to around 2.6 percent, followed by a two-year downturn ending in 1997 (to around negative 0.4 percent). In 1998 however, growth in real private consumption increased rapidly to around 5 percent.

The following two years, 1999 and 2000 recorded huge declines in consumption growth, resulting from lower household income levels. However, growth in real private consumption did pick up in 2001, resulting from strong domestic demand largely driven by lower lending rates and higher household income.

4.0 Consumption Model

Having reviewed the theory and empirical findings of past studies (in Section 2), a consumption function can be expressed as:

$$C_t = f(Y_t, W_t, Z) \tag{1}$$

where consumption C_t is a function of national disposable income Y_t, wealth W_t and a vector Z for other determinants, which captures liquidity constraints, substitution effects and uncertainties in the shot run.

Following Davidson and Hendry (1981), Blinder and Deaton (1985), Macklem (1994), Tan and Voss (2000), Goh and Downing (2002), amongst others, the long run (steady state) between consumption, wealth and income are estimated in the long run consumption function[5] as follows:

$$\log C_t = \alpha_o + \beta_1 \log Y_t + \beta_2 \log W_t + ec_t \tag{2}$$

where C_t is private consumption, Y_t is disposable income, W_t is the wealth variable and ec_t is the long run residual term. The long run

[5] Having founding a cointegration (long run relationship) exists between consumption, income and wealth variables used in this study.

consumption function (equation 2) is based, fundamentally, on the PIH/LCH. Consistent with the PIH/LCH, it is assumed that households divide their consumption between the present and the future, based on estimates of their ability to consume in the long run. Households try to smoothen their consumption over time and save to spend in retirement. Moreover, households choose their consumption level based on their overall stock of wealth, which includes human wealth as well as non-human wealth (tangible wealth and financial wealth). The most common approach taken is to assume that human wealth is proportional to current income. Hence, equation (2) is a function of current income and current wealth. Since the household balance sheet is not published for Fiji, a proxy for personal sector wealth had to be found. Proxies such as stock price (Hall, 1978) and broad money (Bredin and Cuthbertson, 2001) have been used in the past. However, Quasi money is an appropriate proxy to use in this study. Quasi money comprises of mostly time and savings deposits of resident sectors and is also a component of households' holdings of broad money.

To capture the speed of adjustment and the shot run dynamics, an error correction model can be estimate in the following form:

$$\Delta \log C_t = \alpha_o + \sum_{i=o}^{d} \beta_i \Delta \log Y_{t-i} + \sum_{i=0}^{d} \varphi_i \Delta \log W_{t-i} + \sum_{i=1}^{d} \chi_i \Delta \log C_{t-i} + \sum_{i=0}^{d} \psi_i z_{t-1} + \tau ec_{t-1} + \varepsilon_t \quad (3)$$

where all variable are as previously defined, except Δ which is the first difference operator, ec_{t-1} the one period lagged error correction term

estimated from equation (2) and ε_t is the short run error term. The coefficient on the lagged error correction term measures the speed of adjustment from a disequilibrium position, which may be brought about as a result of shock(s) to the system.

Existing consumption literature[6] is relied upon to choose the appropriate variables for Z. In most empirical studies the common variables considered for Z have been real interest rate, unemployment rate, and net private transfers.[7] The real interest rate is taken to reflect the substitution effects (time preference for households to consume now or at sometime in future), while the unemployment rate is considered as a proxy for uncertainty concerning the future flows of income. Net private transfers reflect the effects of net migration on consumption.

For the purpose of this study, the choice of the unemployment rate, real interest rate, and net private transfers are appropriate variables for Z.

These proxies together with contemporaneous as well as lagged differences of income and wealth, and log of consumption (lagged difference only) can be specified more specifically as:

$$\Delta \log C_t = \alpha_0 + \sum_{i=0}^{d} \beta_i \Delta \log Y_{t-i} + \sum_{i=0}^{d} \rho_i \Delta \log W_{t-i} + \sum_{i=0}^{d} \gamma_i ur_{t-i} + \sum_{i=0}^{d} \omega_i rir_{t-i} + \sum_{i=0}^{d} \psi_i \Delta ptnet_{t-i} + \sum_{i=1}^{d} \kappa_i \Delta \log C_{t-i} + \tau ec_{t-1} + \varepsilon_t \quad (4)$$

[6] Côte and Johnson (1998), Tan and Voss (2000), Sousa (2003).

[7] Net private unrequited transfers is calculated as the difference between private transfers credit (immigrant transfers, gifts, maintenance, salaries pension) and private transfers debit (emigrant transfers, gifts and donations, maintenance, and non resident transfers).

where *ur* is the unemployment rate, *rir* is the real interest rate and *ptnet* is the net private transfers. All the other parameters are the same as defined in equation 3.

Equation (4) is used as a basis for our empirical tests in section 6.

5.0 Methodology

Initially, Engle-Granger (1987) residual based cointegration test is applied. However, given the limitations of the Engle-Granger approach when applying to small sample data (as is the case in this study), the Kremers, Ericcson and Dolado (1992) cointegaration procedure based on the error correction term t-test is preferred. Kremers et.al (1992) have argued that residual based cointegration tests are less powerful than test based on testing the significance of the error correction term in the dynamic model. The error correction t-test is also shown to have good power even when the cointegrating vector is moderately miss-specified. Having found the existence of a cointegarting relationship between consumption, income and wealth, the long run elasticities are estimated using Ordinary Least Squares (OLS). Next the short run dynamics are analysed, that is, analysing how consumption responds to shocks on wealth and income and how these deviations from the long run relation are correlated. The ECM specifications are adopted to estimate the short run dynamics.

6.0 Empirical Findings

6.1 Data

For the empirical analysis annual time series data form 1979 to 2001 is used. The data is obtained from the Reserve Bank of Fiji, the IMF International Financial Statistics, and the Fiji Islands Bureau of Statistics *(see Appendix A)*. Where relevant, all data series were deflated and expressed in real terms. Actual data was available for all variables except for the wealth variable where quasi money is used as a proxy.

6.2 Unit Root

A necessary condition for variables to cointegrate in the long run relationship is their stationarity (or lack thereof) in the Engle-Granger residual based cointegration test. All variables are tested for stationarity using the standard Augmented Dickey-Fuller (ADF) (Said and Dickey 1984) and the Phillips and Perron (1988) procedure. The results of ADF and Phillips – Perron tests are presented in Table 1 and Table 2 respectively. The Phillips – Perron tests provided slightly better results than the ADF test. At the 5% levels all the necessary variables for the long run relation are integrated to order one or I(1).

Table 1: Results of Augmented Dickey – Fuller Tests

Variable	ADF Statistics		
	Level	**Log-level**	**1st difference**
Private Consumption (C)		-0.876	-4.575**
Disposable Income (Y)		-0.269	-6.109**
Wealth – Quasi money (W)		-1.487	-2.976^
Unemployment (Ur)	-2.210		-3.499**
Real interest rate (rir)	-3.839**		3.939**
Net private transfers (ptnet)	-1.224		2.936^
Ec_{t-1}	-2.717^		

	Critical Values
** Stationarity at the 1% level (Mackinnon critical values).	–3.807
* Stationarity at the 5% level (Mackinnon critical values).	–3.019
^ Stationarity at the 10% level (Mackinnon critical values).	–2.650

Table 2: Results of Phillips – Perron Test

Variable	PP Statistics		
	Level	**Log-level**	**1st difference**
Private Consumption (C)		-0.899	-4.570**
Disposable Income (Y)		-0.124	-5.933**
Wealth – Quasi money (W)		-1.533	-3.013*
Unemployment (Ur)	-2.615		-4.420**
Real interest rate (rir)	-2.638		-5.839**
Net private transfers (ptnet)	-1.124		-2.670^
Ec_{t-1}	-2.750^		

	Critical Values
** Stationarity at the 1% level (Mackinnon critical values).	–3.786
* Stationarity at the 5% level (Mackinnon critical values).	–3.011
^ Stationarity at the 10% level (Mackinnon critical values).	–2.646

6.3 Cointegration

The results of the Engle-Granger (1987) residual test (reported in Table 1 and Table 2) show that the null hypothesis of no cointegration is rejected at the 10 percent critical level. The test statistics of the error correction term lagged one period is –2.717, which exceeds the critical value of –2.560 (at the 10 percent level) under the ADF test.

An alternative is to use the Kremer et.al (1992) cointegration method, which is preferred over the Engle Granger (1987). To reject the null hypothesis of no cointegration, the coefficient of the error correction term must be significant and have the correct (negative) sign. This is carried out in the short run regression and the results are reported in Table 4 of section 6.5. The results indicate that the coefficient of the error correction term is negative and is highly significant at the 1 percent level of significance (t-statistics of 10.62). This then, confirms that a cointegrating relationship exists between consumption, income and wealth. The results of the long run estimation are discussed next.

6.4 Long Run Estimation

The long run model (equation 1) is estimated using OLS. The log of consumption is regressed against the log of national disposable income and log of wealth. The results of the regression are presented in table 3.

Table 3:Estimated Long Run Model

Dependent variable: Log Consumption; estimation period 1979 – 2001

Constant	2.623**
	(5.387)
Log Income (logY)	0.432**
	(5.046)
Log Wealth (logW)	0.228**
	(4.445)
Adjusted R-squared	0.86
SE	0.05

Notes: t-values are in parentheses. **(*) denotes significance at the one(five) per cent levels.

The long run relationships show that both the income variable and the wealth variable are highly significant, with positive coefficients as expected. The coefficients of the log-levels of income and wealth can be interpreted as the long run elasticities of consumption. The estimated long run elasticity of income is 0.43, about twice as larger than that for wealth which is around 0.23. In New Zealand, income elasticities ranges from 0.15 to 0.84 (McDermott, 1990;Corfield, 1992;Goh and Downing, 2002), while the wealth elasticities ranges from 0.21 to 0.39 (McDermott, 1990;Corfield, 1992). For Czech Republic, income elasticity is around 0.51 (Bredin and Cuthbertson, 2001), while in Canada, the income elasticity and wealth elasticity were 0.89 and 0.32 respectively (Côte and Johnson, 1998). Consistent with findings in New Zealand, Czech Republic and Canada, the results obtained for both income elasticity and wealth elasticity for Fiji are reasonable. Thus, we can interpret the long run results, as, on average, an increase in income by 1 percent will increase private consumption by 0.43 percent, while an increase in wealth by 1 percent will increase private consumption by 0.23 percent.

6.5 Short Run Estimation

The short run model (equation 3) is estimated using OLS under the specifications of ECM. Initially, the equation is regressed with difference of log consumption as the dependent variable against contemporaneous as well as lagged differences of log income, log wealth, unemployment rate, real interest rate, net private transfers, and log of consumption (lagged differences only). A 2-lags structure is employed, as apposed to a 4-lag structure commonly used by other researchers, due to the limited sample period. Hendry's general to specific modelling approach is used at arriving at a parsimonious model.[8] The results of the preferred model are presented in Table 4.

Table 4: Estimated Parsimonious Short Run Model

Dependent variable: ΔLog Consumption; estimation period 1979 – 2001

Constant	0.109	(11.787)**
$\Delta \log Y_t$	0.380	(9.700)**
$\Delta \log Y_{t-1}$	0.181	(3.303)**
$\Delta \log Y_{t-2}$	-0.119	(-2.766)*
$\Delta \log W_t$	0.256	(7.012)**
$\Delta \log W_{t-1}$	-0.009	(-0.413)
rir_t	-0.016	(-12.330)**
$\Delta ptnet_{t-2}$	-0.039	(-2.223)*
$\Delta \log C_{t-1}$	0.064	(0.736)
$\Delta \log C_{t-2}$	0.161	(1.780)
ec_{t-1}	-0.865	(-10.627)**
Adjusted R-squared		0.950
SE		0.007
DW		2.017

Notes: t-values are in parentheses. **(*) denotes significance at the one(five) per cent levels.

[8] Hendry (1987).

Turning to error correction specifications, several features of the regression results stand out. The coefficient on the error correction term (ec_{t-1}) is significant and carries the correct sign. The ECM coefficient indicates the speed of adjustment and in this case implies a fast adjustment to the long run relationship. Results suggest that, on average, there is an 87 percent adjustment in the current period (t) to the disequilibrium in the previous period (t-1). Consumers adjust 87 percent of their consumption to changes in short run variables when they are certain that the changes in the variables are permanent in the next period (after a year).

Income growth has a positive contemporaneous effect of consumption growth, as well as a net positive lagged impact. On average, a 1 percent increase in income growth leads to a 0.38 percent increase in private consumption within one year, and on balance, a net increase of 0.06 percent in the next two years.

The wealth variable is significant and appears to have a positive contemporaneous effect on consumption, but no significant lagged impact. On average, a 1 percent rise in wealth leads to a 0.26 percent increase in private consumption within a year.

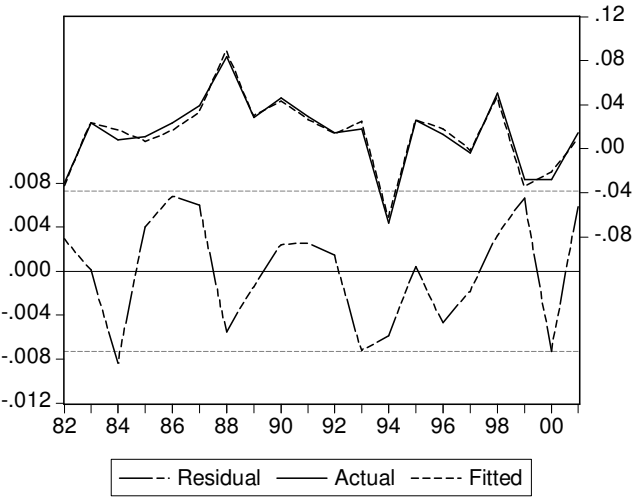
Similarly, the real interest rate variable is also significant and carries the right sign. A priori, a change in interest rate is expected to have an impact on consumption, with consumption rising when interest rate falls, and vice versa. The coefficient suggests that real interest rate has a negative contemporaneous effect on consumption. On average, a 1 percent increase in the real interest rate leads to a decline in private consumption by 0.016 percent and vice versa.

The change in net private transfers (mostly deficit) has a significant negative impact on consumption after a two-year lag. This suggests, that if net private transfers continue to be in deficit, a 1 percent increase would result in a decrease in private consumption expenditure by 0.039 percent, in a span of two years.

However, the unemployment rate is not significant and is dropped from the parsimonious model. This indicates that perhaps households (in Fiji) smoothen their consumption through periods of uncertainty.

Finally, the fitted and actual values from the parsimonious model are presented in FIGURE 2. Overwhelmingly, the model fits actual yearly consumption growth reasonably well, over the period 1979 to 2001.

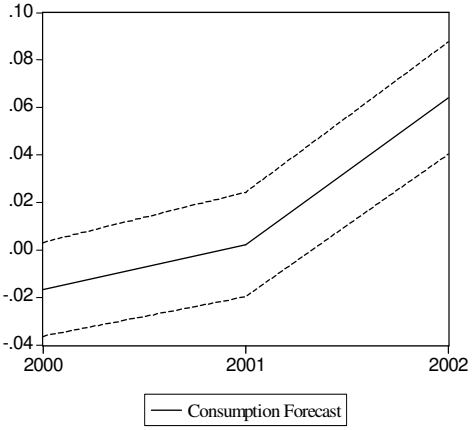
FIGURE 2
Actual, Fitted and Residual Values from Parsimonious Short Run Model



6.6 Forecasts

To evaluate the forecasting ability of the short run parsimonious model the out of sample forecasts were constructed. The model is re-estimated using data for the period 1979-1999. Then, dynamic forecast for the years 2000 – 2002 is made. FIGURE 3 presents the forecasting performance of the model with actual out turns over that period.

FIGURE 3
Out of Sample Forecast Evaluation of the Parsimonious Short Run Model



Forecast sample: 2000 2002	
Included observations: 3	
Root Mean Squared Error	0.011696
Mean Absolute Error	0.011695
Mean Abs. Percent Error	49.15671
Theil Inequality Coefficient	0.159009
Bias Proportion	0.105095
Variance Proportion	0.015486
Covariance Proportion	0.879419

The forecast evaluation results indicate that the model has good forecasting ability. The covariance portion is around 88 percent, indicating that the model is capable of providing reliable forecasts for the medium term.[9]

[9] In terms of providing good forecasts it is preferred that the model has a large covariance proportion and a small bias proportion.

6.7 Diagnostic Tests

In order for the results to be econometrically creditable, it is important to investigate the statistical properties of the model. A number of diagnostic tests have been carried out on the parsimonious short run model.[10]

6.7.1 Serial Correlation

Breusch–Godfrey test for first-order serial correlation in our residuals was performed. There is no significant evidence of the first – order serial correlation in the residuals. Serial correlation is not present up to order seven, suggesting that lag structure used in this model is appropriate.

6.7.2 Normality

The Jarque-Bera LM test is applied. The result of the test shows the Jarque-Bera statistics is not significant, indicating that the residuals from the parsimonious short run model are normally distributed.

6.7.3 Other Tests

The model specifications are tested for linearity. Ramsey's RESET test [11]was applied. The test fails to reject the null hypothesis of linearity in the parameters, indicating evidence of linearity in the model specification. The RESET test is also a general test for omitted variables and incorrect

[10] See Appendix B, Tables B2 for detailed results on diagnostic tests.
[11] RESET stands for Regression Specific Error test, proposed by Ramsey (1969).

functional form. The results, suggests that the model specification is appropriate and the parameters of the model are stable.

7.0 Conclusions

This paper attempted to estimate a consumption function for Fiji in an error correction framework, to investigate the factors that determine consumption and for the purpose of forecasting consumption in the medium term.

The findings reveal the existence of a long run relationship between consumption, income and wealth, suggesting that consumption is significantly determined by income and wealth. Consumption elasticities obtained for income and wealth are reasonable and imply that 43 percent of the consumers in Fiji are sensitive to changes in current income, in the long run.

However, in the short run consumption is determined by other factors other than income and wealth. Real interest rate is highly significant in determining consumption and appears to have a clear negative impact on consumption as expected. Net private transfers is also significant and has a negative impact on consumption with a lag of two years. Moreover, consumption is more sensitive to contemporaneous income as indicated by a higher coefficient.

Furthermore, the study also finds that Fiji's consumption adjusts to equilibrium levels quite fast. The results suggest that Fiji's consumers adjust their consumption behaviour quite early, probably as soon as they

gain the slightest indications that the change in their income would be permanent.

Finally, the results of the forecast evaluation suggest that the short run model constructed in this study has relatively good forecasting abilities and can produce a reliable forecast for Fiji's private consumption in the medium term.

Appendix A Data Definition and Sources

Series	Definition and Sources
Real Private Consumption	Is defined as the sum of household outlays on consumer goods and services as in the National Accounts. Real values were obtained by deflating the nominal values with the consumption deflator. Data source is the IFS International Financial Statistics November 2003 issue.
Real Disposable Income	Is defined as the real private disposable income, calculated as: National disposal income less government final expenditure. Real values were obtained by deflating nominal values with the consumption deflator. Data source is the Fiji Islands Bureau of Statistics, *Current Economic Statistics,* various issue.
Wealth	Quasi money is used as a proxy for wealth. Quasi money comprises time and savings deposits of resident sectors other than central government. Real values were obtained by deflating nominal values with the consumption deflator. Data was obtained from IFS *International Financial Statistics* November 2003 issue.
Real Interest Rates	Is defined as the commercial bank weighted average lending rate after adjusting for Inflation. Reserve Bank of Fiji, *Quarterly Review, various issue*.
Net Private Transfers	Is calculated as the difference between private transfers credit (immigrant transfers, gifts, maintenance, salaries pension) and private transfers debit (emigrant transfers, gifts and donations, maintenance, and non resident transfers). Reserve Bank of Fiji, *BOP Summary*, MPC 2 October 2003.
Unemployment Rate	Calculated as Annual percentage change of people who meet the ICLS (1982) definition of those without jobs in the reference period. Bureau of Statistics, *Current Economic Statistics*, various issues; Reserve Bank of Fiji, *data base* (2002).
Consumption Deflector	The Consumer Price Index (CPI) is used as the consumption deflator. Where appropriate, all nominal values are deflated by the CPI to obtain real values. Data source is the IFS *International Financial Statistics*, November 2003 issue.

Appendix B Diagnostic Tests

This appendix presents the results of various diagnostic tests of the short run error correction model in more detail.

Table B1 presents the pairwise correlation matrix between the contemporaneous variables contained in the initial and parsimonious model. The correlations do not appear strong, with the strongest between the real interest rate and net private transfers at –0.3755. This suggests that there is no presence of strong multicollinearity in the model. The pairwise correlation matrix was also done for the lagged variables (not reported), with similar conclusion.

Table B1: Pairwise Correlation Matrix

	$\Delta logW_t$	$\Delta logY_t$	ur_t	$\Delta ptnet_t$	rir_t
$\Delta logW_t$	1.0000	0.1168	-0.0832	-0.2066	0.1173
$\Delta logY_t$	0.1168	1.0000	-0.2626	-0.0364	-0.0420
ur_t	-0.0832	-0.2626	1.0000	-0.0557	-0.1672
$\Delta ptnet_t$	-0.2066	-0.0364	-0.0557	1.0000	-0.3755
rir_t	0.1173	-0.0420	-0.1672	-0.3755	1.0000

The results of the tests for normality, serial correlation and specification error are presented in Table B2. The Jarque-Bera test was applied to test for normality. The results indicated that the residuals from the parsimonious model are normally distributed.

Table B2: Diagnostics for Parsimonious Short Run Model

			Probability
Normality:			
Jarque-Bera statistic	χ^2 -statistic	1.557	0.459
Serial Correlation:			
Breusch-Godfrey Serial	F-statistic	0.217	0.806
Correlation LM Test	χ^2 -statistic	0.650	0.722
Specification Error:			
Ramsey RESET Test	F-statistic	0.868	0.460
	LR-statistic	4.429	0.109

Notes: **(*) denotes significance at the one (five) per cent levels. LR is a likelihood ratio statistic.

To test the presence of serial correlation, the Breusch-Godfrey Lagrange multiplier (LM) test was used. The results (in Table B2) suggest that serial correlation is not present up to order seven.

Finally, Ramsey's RESET test was applied to test for specification error in the model. The results (in Table B2) suggest that there is no evidence of specification error, thus the model specification is appropriate.

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