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Are the Pacific Islands Ready for a Currency Union? An Empirical Study of Degree of Economic Convergence

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ABSTRACT *During the 2003 Annual meeting of Pacific Forum leaders from the 16 member states (14 Pacific Islands and two advanced countries in the region, namely Australia and New Zealand) held in Auckland, an idea of a single currency for the region was mooted. The single currency was indicated to be the Australia dollar. The success of any efforts for achieving such a form of integration depends on the degree of economic convergence of national economies. There are two aspects of convergence: nominal and real. They cover exchange rates, growth rates and inflation rates. Unless there is a high degree of convergence in these spheres, the costs of any premature integration could be disastrous. The objective of this paper is to investigate whether there exists any case at present for a currency union. The paper undertakes an empirical investigation, reports the results and presents some conclusions.*

KEY WORDS: Common currency, economic convergence, Pacific islands, Kalman filter, econometrics

JEL CLASSIFICATIONS: C32, F36, F42

Introduction

The 2003 Annual Meeting of Pacific Forum leaders from the 16 member states (14 Pacific Islands and two metropolitan countries, namely Australia and New Zealand, also known as Forum States), held in Auckland, New Zealand, focused attention on the subject of regional economic integration with the possible adoption of a single currency for the region. The suggested common currency was the Australian dollar.

The idea of a single currency was floated soon after the ratification by Pacific Forum countries of two agreements: the Pacific Agreement on Closer Economic Cooperation (PACER) among all the 16 member countries and the Pacific Island Countries Trade Agreement (PICTA). The latter aims at a phased dismantling of all existing trade

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restrictions on each other's imports by 14 island countries over the next ten years towards a free trade area amongst themselves. As the birth of the euro, the single currency for 12 European countries in 1999, was preceded by similar efforts, which were accompanied by factor mobility and a strong sense of political commitment, the signing of PACER and PICTA raised high expectations in the Pacific region.

A common currency is expected to bring about gains to the 14 Pacific Island countries (PICs) through elimination of currency conversion costs, thereby reducing currency transaction costs on products and services as well as costs associated with exchange rate fluctuations. The theory of optimum currency area (OCA) indicates that the gains would be greater, the greater the volume of intra-trade (Mundell, 1961). The intra-trade volume among the 14 PICs has, however, been found negligible (Jayaraman, 2001). Since PICs trade a great deal with Australia, gains from adopting the Australian dollar are likely to be substantial. Studies (de Brouwer, 2000; Jayaraman, 2003) showed that a currency union between PICs without Australia would not result in as many gains as would result from a larger sized union with Australia. Further, there are uncertainties regarding the sharing of seignorage revenue by Australia with PICs. Furthermore, there are no indications as to whether the Reserve Bank of Australia would be prepared to act as a lender of last resort to commercial banks in crises in PICs (Jayaraman, 2004).

The PICs in the process of forming a currency union either amongst themselves or with Australia have to surrender their monetary sovereignty as they have to abide by a common set of monetary policies. This requires the presence of a high degree of similarity in the shocks they have been experiencing (Mundell, 1961). Countries experiencing common external shocks would be better suited to a currency union because it permits the use of union-wide policies to correct any imbalances, including the adjustment of the common currency. Since the currency union would have a single monetary policy, the more asymmetric the external shocks, the greater would be the risk to the stability of the union. Countries are less likely to face large asymmetric terms of trade shocks if they have similar structures (Masson & Pattillo, 2001a, 2001b).

Most of the adverse effects of asymmetric shocks, including increases in unemployment and declines in income, would be reduced if there were downward flexibility in prices and wages (Soltwedel *et al*. 2000). In the absence of such downward flexibility, the presence of considerable mobility of labour between member countries would be a great help. Additionally, if the monetary union builds in some provision for a mechanism of fiscal transfer to redistribute income or compensate for differences in unemployment between member countries, the asymmetry of shocks will be less of a problem (Masson & Pattillo, 2001a, 2001b; de Brouwer, 2000; McKinnon, 1963; Kenen, 1969). With the possibilities of migration from PICs to Australia and fiscal transfers looking rather uncertain at this stage, it is at least worthwhile to check whether PICs and the two advanced countries of the region – namely Australia and New Zealand – have been experiencing symmetrical shocks so as to emerge as suitable candidate countries for forming a currency union, since a single currency imposes severe restrictions. The latter include adoption of a single legal tender for all member countries with common monetary and exchange rate policies administered by one common central bank, replacing all the existing individual central banks (Mundell, 1961; IMF, 1997, 2001). The success of any ongoing efforts for achieving such a form of integration depends on the degree of economic convergence of national economies. A high degree of convergence would mean that both external and domestic shocks were affecting all member countries in a similar fashion and that a union-wide, common set of policies would, therefore, be appropriate. If the shocks were asymmetric, a common set of policies would be the least desirable, as inability to use the exchange rate for making necessary adjustments would result in greater volatility in output and employment (Bayoumi & Ostry, 1997; Brash, 2000). There are two aspects of convergence: nominal and real. They cover exchange rates, growth and inflation. In the absence of a high degree of convergence in these spheres, the costs of any premature integration could be disastrous.

The objective of this paper is to investigate whether the Pacific island countries either with the two metropolitan countries or on their own, as a sub-group, exhibit any economic convergence and whether there exists any case at present for a currency union. The rest of the paper is organized into three sections. The next section deals with the methodology adopted for the study; the section after reports the results and the final section presents the conclusions.

Methodology

As Hall *et al*. (1992) observe, the study of convergence is concerned with relative long-run behaviour of a number of time series. As time series of economic data are generally non-stationary, for convergence, differences between the series do not have infinite variances, that is, they do not drift indefinitely far apart. If two non-stationary time series are not cointegrated, then they cannot converge. Hall *et al*. (1992) caution us that testing for cointegration of the series is a necessary condition but not a sufficient one under all definitions of convergence. For example, convergence of exchange rates means there exist n-1 cointegrating relations of n currencies, consisting of pairs of exchange rates.

First, however, we consider a simple test for convergence based on the OLS results from a set of static linear regressions of the general form:

$$[X_A - X_B]_t = a + b[X_A - X_C)t + e_t \quad (1)$$

where $X_A$and X_B are the logarithms of two series that we wish to consider for convergence, and another relevant series (explained below) is denoted $X_{C,}$ In equation (1), if $b = 0$ then the difference between X_A and X_B approaches the constant a, indicating that the two series converge. Hence, a non-zero value for b implies that the series in question do not converge amongst themselves. On the other hand, the special case where $b = 1$ implies that a convergence between X_B and the X_C series.

In this study we use equation (1) for investigating convergence in nominal exchange rates (SDR), inflation, real effective exchange rates and real GDP growth rates for finding out whether the island countries and New Zealand are ready to form a currency union. The X_A series represent those of Australia, X_B those of island countries and New Zealand, and X_C those of the United States. The nominal exchange rates are SDR units per unit of the currency of the country concerned and, in the case of Real Effective Exchange Rates (REER), they are the indices reported in the International Financial Statistics of IMF. We let X_B represent, successively, Fiji, New Zealand (NZ), Papua New Guinea (PNG), Samoa (SAM), the Solomon Islands (SOL), Tonga (TON) and Vanuatu (VAN). However, for the REER series, Tonga and Vanuatu are excluded due to lack of data. All empirical results are presented in the next section.

Notice thatequation (1) depicts a *static* model, having constant parameters through time. However, since convergence of exchange rates, growth rates and inflation among the prospective member countries is a gradual and ongoing process, it seems more reasonable to allow for some *dynamic* adjustments in the form of time varying parameters. Hence we follow Hall *et al*. (1992), Haldane & Hall (1991) and Kendall (2000) and incorporate dynamic adjustments by formulating a model with time varying parameters:

$$[X_A - X_B](t) = a(t) + b(t)[X_A - X_C)(t) + e(t) \quad (2)$$

Hall *et al*. (1992) convincingly show that model (2) may reject convergence in two distinct ways. First, if $b(t)$ is different from zero, we reject convergence on the fact that the relationship between X_A and X_B is affected by the relationship between X_A and X_C. This is a specific alternative. However the possibility would exist that X_A and X_B are drifting apart from each other; and neither of them remains affected by X_C. This possibility is covered by the $a(t)$ parameter, which might be regarded as the other general alternative. If X_A and X_B are unaffected by the specific alternative, but nonetheless have not converged, then the parameter $a(t)$ will proxy the unknown true alternative explanation of the movement in X_A and X_B and $a(t)$ will be a non-stationary process reflecting the non-convergence of X_A and X_B, Therefore, the dual requirement for convergence is both $a(t)$ tend to a constant and $b(t)$ tend to zero.

While measuring convergence in the European Community economies on the lines outlined above, Hall *et al*. (1992) apply the Kalman Filter to estimate time varying coefficients for $a(t)$ and $b(t)$. The above procedure was also adopted by Kendall (2000) in his study on exchange rate convergence in the Caribbean Economic Community (CARICOM), and will be used in this paper.

The Kalman Filter was introduced in Kalman (1960) and its first appearance in economics appears to be Rosenberg (1968). A Kalman Filter model comprises two parts, namely:

1. one or more *state or transition equations*, which describe the evolution of a set of unobserved variables, the state variables, over time; and

2. a *measurement or observation equation*, which describes how well the actually observed data are generated from the state variables.

In this paper the state variables are the time-varying regression parameters [$a(t)$ and $b(t)$] to be estimated. Hence for each of the four variables of interest we formulate the following *state space model*:

$$[X_A - X_B](t) = a(t) + b(t)[X_A - X_C)(t) + e_t \quad (3)$$

$$a(t) = a(t)_{-1} + v1_t \quad (4)$$

$$b(t) = b(t)_1 + v2_t \quad (5)$$

For each of the four variables, equation (3) depicts the measurement or observation equation whereas equations (4) and (5) are the state or transition equations. Following usual practice, we assume that the three error terms (e_t, $v1_t$ and $v2_t$) are all distributed normally with zero mean, constant variance with no serial correlation, and independent of each other. Under these assumptions the maximum likelihood estimators of the parameters represent an 'optimal solution' (Harvey, 1981, pp. 104–105; see also Cuthbertson *et al.*, 1992, Chapter 7).

Results

Constant-parameter Models

First, estimating the series of equations in the form of equation (1), we test the null hypotheses that $b_j = 0$ (no convergence) against a two-sided alternative. The results are collected in Tables 1–4.

OLS Results for equation (1) for X_A = Australia

Figures in parentheses are the t-statistics for testing the null that the parameter is zero. The two-tailed 10 percent, 5 percent and 1 percent critical values are 1.714, 2.069 and 2.807, respectively. An * indicates rejection of H_0: $b_j = 0$ (convergence) at the 5 percent significance level.

According to visual inspection of these tables, at 5 percent significance level, for SDR series, we reject the null hypothesis of convergence for PNG, Samoa, Solomons and Vanuatu. For the Inflation series, convergence for Fiji, PNG, Solomons and Vanuatu is rejected, and convergence for Fiji, Samoa and Solomons is rejected for real exchange rate series. As for Growth, only New Zealand is rejected at the 5 percent significance level.

In short, results from the constant parameter models do not provide evidence in support of convergence amongst the economies of concern. Before drawing final conclusions on this question, however, we need to consider the evidence from the time-varying parameter models.

Table 1. Nominal exchange rates (SDR)

Country	$\hat{a}$	$\hat{b}$	R^2	D.W.
New Zealand	−0.26 (−7.69)	0.12 (1.30)	0.07	0.91
Fiji	0.005 (0.11)	−0.20 (−1.63)	0.10	0.77
PNG	0.31 (2.44)	−0.91 (−2.59)*	0.23	1.13
Samoa	−0.34 (−6.92)	−0.59 (−4.32)*	0.45	1.13
Solomons	−0.24 (−1.87)	−1.49 (−4.10)*	0.24	0.56
Tonga	0.01 (0.34)	−0.11 (−1.15)	0.05	0.39
Vanuatu	−4.49 (−180.31)	0.24 (3.50)*	0.35	1.09

Table 2. Inflation

Country	$\hat{a}$	$\hat{b}$	R^2	D.W.
New Zealand	−1.01 (−1.55)	−0.08 (−0.33)	0.005	0.99
Fiji	−0.87 (0.45)	0.82 (5.13)*	0.53	1.76
PNG	−3.17 (−3.33)	0.94 (2.34)*	0.19	0.73
Samoa	−3.31 (−2.77)	0.76 (1.76)	0.12	1.90
Solomons	−5.92 (−8.30)	0.67 (2.6)*	0.23	1.38
Tonga	−2.56 (−2.59)	0.08 (0.21)	0.002	1.75
Vanuatu	−0.81 (−0.89)	0.69 (2.15)*	0.17	1.88

Table 3. Real Exchange Rates (REER)

Country	$\hat{a}$	$\hat{b}$	R^2	D.W.
New Zealand	0.07 (1.84)	−0.21 (−1.02)	0.04	0.32
Fiji	−0.11 (−4.09)	0.46 (3.16)*	0.30	0.43
PNG	−0.07 (−2.21)	0.05 (0.32)	0.004	0.44
Samoa	−0.001 (−0.06)	0.31 (3.55)*	0.35	0.82
Solomons	0.11 (4.15)	0.60 (4.21)*	0.43	0.40

Table 4. Growth

Country	$\hat{a}$	$\hat{b}$	R^2	D.W.
New Zealand	0.34 (0.70)	0.74 (2.34)*	0.19	2.0
Fiji	0.65 (0.63)	0.17 (0.26)	0.002	2.71
PNG	0.15 (0.11)	1.19 (1.41)	0.09	1.36
Samoa	3.17 (2.00)	−0.06 (1.01)	0.0001	1.49
Solomons	1.76 (1.40)	0.58 (0.68)	0.02	1.01
Tonga	−0.93 (−0.71)	−0.36 (−0.43)	0.01	1.12

Time Varying Parameter Models

Prior to estimating the Kalman Filter models, it is important that we investigate the time series properties of the data by conducting tests for integration and cointegration.

The results of the Augmented Dickey Fuller (ADF) unit root tests for integration are presented in the Appendix in Tables A1 to A4. In each case the augmenting lag lengths were chosen with the Hannan-Quinn selection criterion, starting with maximum length of two lags. For the 'levels' tests the ADF test equations included a constant but not trend term, except for New Zealand REER and Inflation for PNG, which did not include either term (based on visual inspection of the t-plots). For the '1st difference' tests both deterministic terms were excluded for all series.

These results, which were obtained in EViews 5.1, may be summarized as follows. For the two exchange rate series (SDR and REER), at conventional significance levels, the tests indicate that the series are integrated to order 1 (i.e. $X \sim I(1)$) for all countries. Moreover, with the possible exception of Vanuatu, the tests strongly suggest that the series are all I(1). However, for Vanuatu, the null of I(1) would only be marginally rejected at the 5 percent significance level, and there is no economic reason to expect that country's inflation to differ from its neighbours. Hence, we judge that the Inflation series is non-stationary for all the countries.

For the growth series, on the other hand, the results shown in Table A4 clearly indicate that the unit root null hypothesis is rejected for each country straight away in 'levels'. These findings are corroborated by visual inspection of the t-plots, which did not indicate evidence of trends of any sort.

Before examining the series directly for evidence of convergence, a further preliminary step in the analysis is required. That is, Hall *et al*. (1992) reasoned that a necessary, but not sufficient, condition for convergence is that the I(1) series be cointegrated. Hence, our next step is to carry out Johansen maximum Likelihood tests for the presence of cointegrating relations amongst SDR, REER and Inflation. The main results of these tests are presented in summary form in Appendix Tables A5–A7. These tests were performed on a set of VAR(1) models, where the unit lag lengths were selected according to the multivariate version of the Hannan-Quinn criterion.

In short, the results form both tests (Trace and Max-Eigenvalue) indicate that there is at least one cointegrating relation for each of the three I(1) series, irrespective of the model specification. This provides evidence that the series *may* have a long run tendency toward convergence, given that cointegration is a necessary but not sufficient condition for convergence.

However, before reaching any definite conclusions it is necessary to estimate a Kalman Filter model for each series, again using EViews 5.1 software. For each country, the relevant estimates of the varying parameters for the SDR, inflation, REER and growth equations are displayed visually in chart form in Figures 1–4. (Numerical details are available on request.)

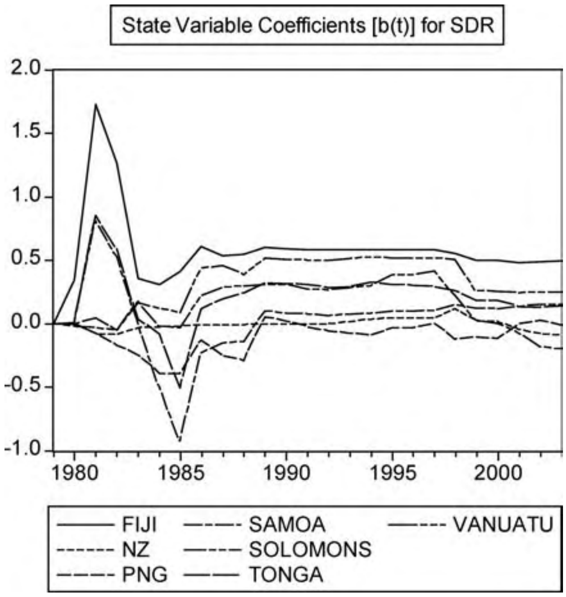

Figure 1. State variable coefficients [$b(t)$] for SDR.

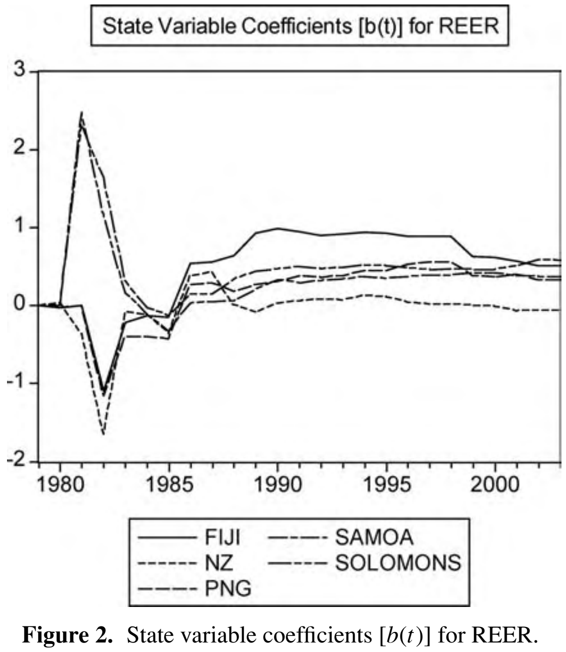

Figure 2. State variable coefficients [$b(t)$] for REER.

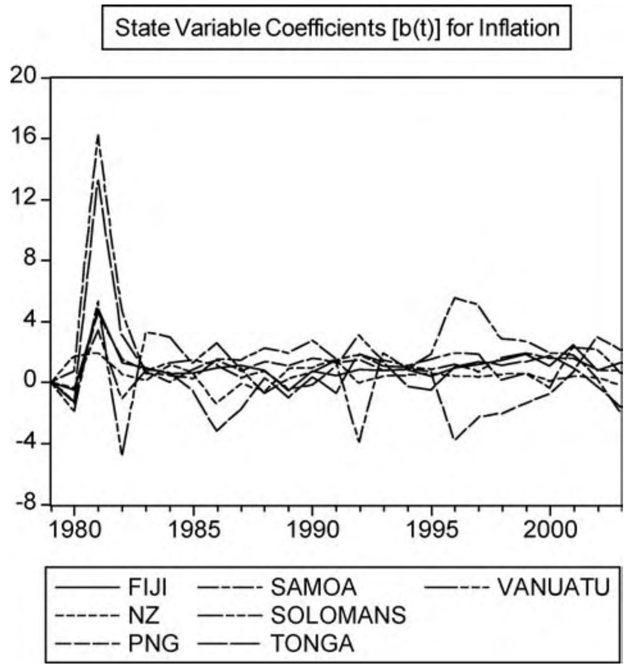

Figure 3. State variable coefficients [$b(t)$] for inflation.

According to Figure 1 there seems to be an emerging convergence in nominal exchange rates (SDR per units of national currencies) in recent years, the reference country being Australia. This is especially so with regard to those of New Zealand and PNG, given that the earlier fluctuations in both series dampen and they converge towards zero. There is no indication, however, that the $b(t)$ parameters for the remaining five countries are converging on zero at all.

As regards convergence in the other nominal variable, namely inflation, Figure 3 reveals that there is a much higher degree of convergence in the later half of the 1990s among all the countries. Figures 2 and 4 relate to real variables, namely real effective exchange rate (REER) indices and growth rates. As de Brouwer (2000) pointed out, REERs are endogenous prices determined by domestic and external prices, which reflect interaction of both domestic fiscal and monetary policies. Convergence in REERs signifies convergence in the monetary and fiscal policies of the prospective members of the currency union. Figure 2 shows although there has been a notable degree of convergence in the mid 1990s onwards, New Zealand and Fiji have not been displaying the common trend.

Figure 4, which refers to growth rates, shows clearly that there has been considerable divergence in growth over the period 1979–2003. This is, of course, consistent with

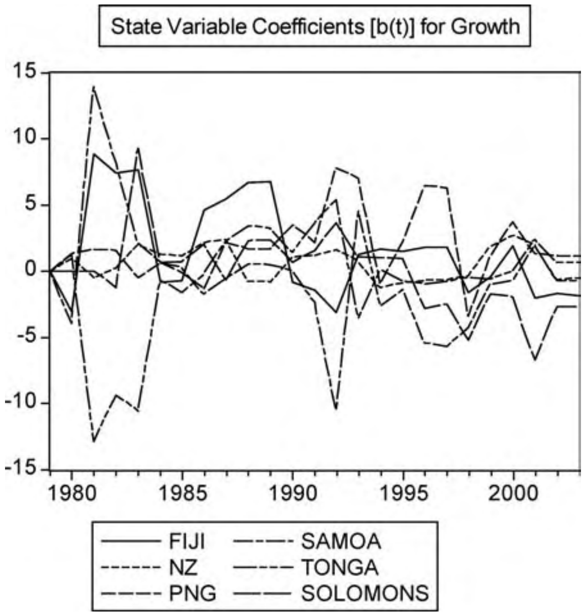

Figure 4. State variable coefficients [$b(t)$] for growth.

the results from the previous tests that the growth rates are not integrated, hence cannot be cointegrated.

Sub Group Economies

Now we turn to the sub-group of island countries and examine the feasibility of a currency union without the two major countries, Australia and New Zealand. The reference country for the sub-group analysis is Fiji. First, we present the OLS from estimating the constant parameter equations in Tables 5–8, followed by the results for the time varying parameter state space models in Figures 5–8. (Additional statistical details are available on request.)

Table 5. Nominal exchange rates (SDR)

Country	$\hat{a}$	$\hat{b}$	R^2	D.W.
PNG	0.30 (3.04)	−0.58 (−2.65)*	0.26	0.26
Samoa	−0.39 (−8.84)	−0.19 (−1.87)	0.13	0.62
Solomons	−0.24 (−3.14)	−1.10 (−6.41)*	0.64	0.88
Tonga	−0.04 (−0.93)	0.20 (2.38)*	0.20	0.54
Vanuatu	−4.51 (−184.81)	0.44 (8.14)*	0.74	1.01

Table 6. Inflation

Country	$\hat{a}$	$\hat{b}$	R^2	D.W.
PNG	−3.87 (−3.32)	1.10 (2.17)*	0.17	0.77
Samoa	−3.21 (−2.56)	0.68 (1.25)	0.06	1.85
Solomons	−5.58 (−7.83)	0.37 (1.20)	0.06	1.63
Tonga	−2.93 (−2.54)	0.49 (0.97)	0.04	1.56
Vanuatu	−0.44 (−0.48)	0.32 (0.84)	0.03	2.07

Constant parameter models ($X_A = Fiji$)

Tables 5 and 6 show, respectively, that convergence in SDR is rejected for all island countries except for Samoa, but for inflation only in the case of PNG is convergence rejected. As regards the two real series, REER and Growth, convergence is rejected in all cases excepting REER for PNG. Clearly, the preponderance of evidence from these tests is against the notion of convergence amongst the sub sample of Island States.

Varying parameter models ($X_A = Fiji$)

Just as for the entire sample of countries, we can also develop a set of state space models just for the island countries, using Fiji as the reference, to allow for convergence to occur over time. The resulting time varying estimates of the $b(t)$ parameters are displayed in Figures 5–8.

Considering Figure 1 for SDR we find that only the Solomon Islands and Tonga show any tendency towards convergence in more recent years but not clearly towards zero, the reference country being Fiji. Moreover, inspection of the remaining figures (Figures 6 to 8) reveals that there is a substantial degree of divergence with regard to inflation, REER and growth rates without any consistent trend. (Further numerical details are available on request.) Hence, even considering just the island countries themselves, there does not seem to be much evidence in support of convergence for the series of concern.

Summary and Conclusions

A currency union for its success depends on fulfilment of certain pre-conditions, better known as OCA criteria. The later include the pre-requirement of existence of

Table 7. Real exchange rates (REER)

Country	$\hat{a}$	$\hat{b}$	R^2	D.W.
PNG	0.01 (0.37)	−0.12 (−0.68)	0.02	0.50
Samoa	0.03 (0.85)	0.38 (2.73)*	0.02	0.57
Solomons	0.14 (3.92)	0.57 (3.47)*	0.34	0.43

Table 8. Growth

Country	$\hat{a}$	$\hat{b}$	R^2	D.W.
PNG	0.16(0.13)	0.89(3.42)*	0.36	1.36
Samoa	2.76(1.74)	0.88(2.76)*	0.27	1.43
Solomons	1.41(1.16)	0.64(2.58)*	0.26	1.05
Tonga	−1.41(−1.03)	0.97(3.52)*	0.37	1.17

Figures in parentheses are the t-statistics for testing the null that the parameter is zero. The two-tailed 10%, 5% and 1% critical values are 1.714, 2.069 and 2.807, respectively. An * indicates rejection of H_0: $b_j = 0$ (convergence) at the 5% significance level.

a very large volume of pre-union intra-trade amongst prospective members. Further, there should be a high degree of mobility within the union, especially in the absence of downward wage and price flexibility coupled with fiscal transfers to mitigate the impact of asymmetric shocks hitting the diverse economies. The adverse impact of shocks would be minimized if there were a high degree of convergence in key

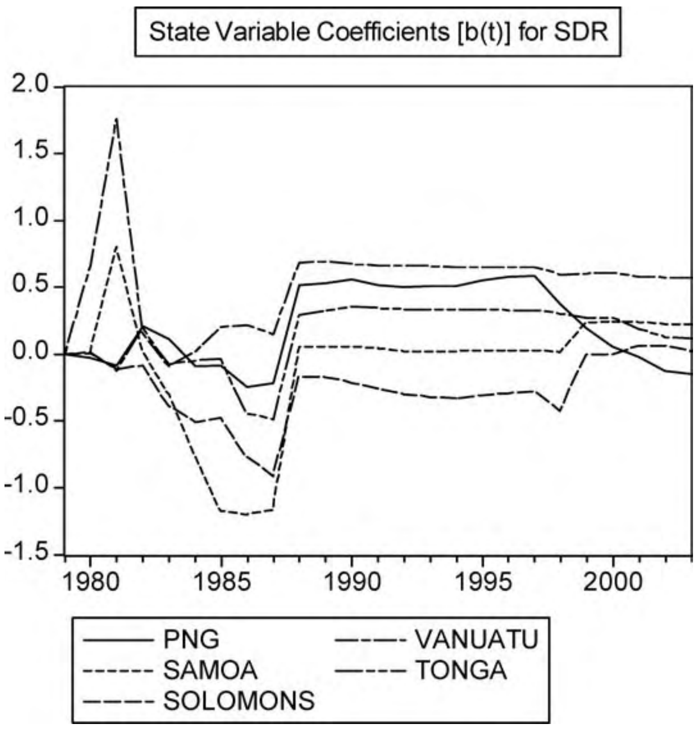

Figure 5. State variable coefficients $[b(t)]$ for SDR (Island Countries).

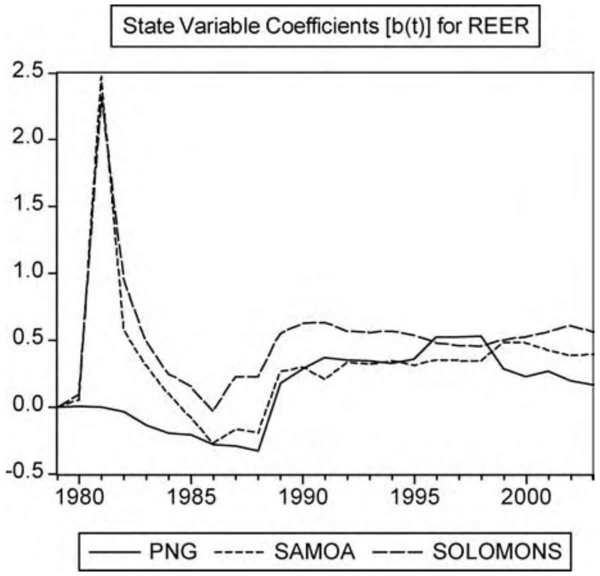

Figure 6. State variable coefficients $[b(t)]$ for REER (Island Countries).

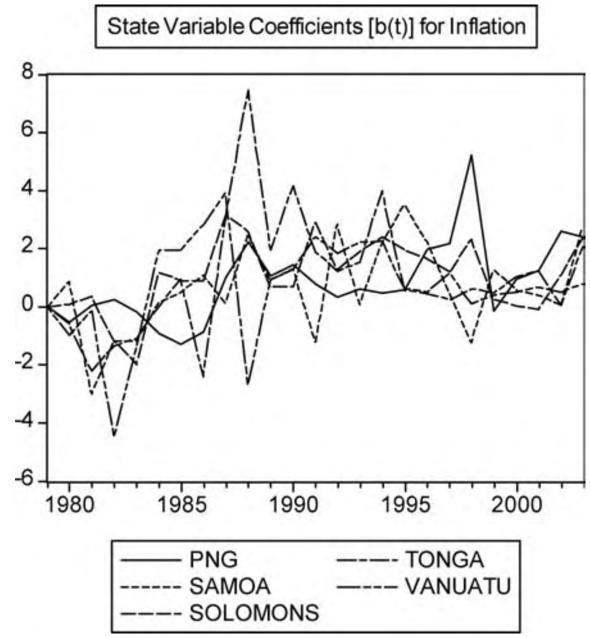

Figure 7. State variable coefficients $[b(t)]$ for inflation (Island Countries).

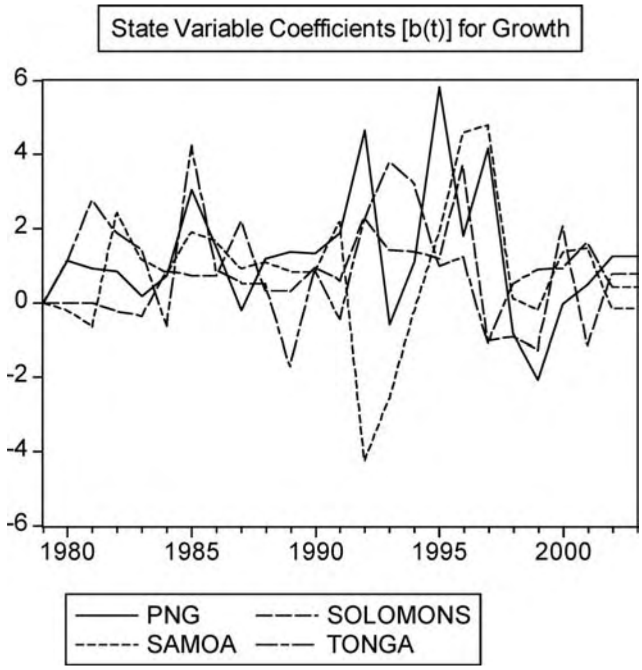

Figure 8. State variable coefficients [$b(t)$] for growth (Island Countries).

indicators, which include both real and nominal. These include nominal exchange rates and inflation as well as REER and growth rates. Although nominal convergence was initially stressed with regard to the European Monetary System, for entry into European Monetary Union, real convergence was given greater emphasis (Hall *et al.*, 1992). The reasoning behind this argument is that a currency union, from which there is no easy exit for any member country, will have to adopt one common set of monetary, exchange rate and fiscal policies for dealing with external and internal shocks, which are expected to impact all countries in a similar manner. As noted earlier, a high degree of convergence would render the aspiring countries suitable candidates for currency union. If there is no convergence in any key indicators, a common set of policies would prove disastrous.

The study findings show that growth rates have not converged either for all Pacific Forum countries, comprising island countries and the two metropolitan countries, namely Australia and New Zealand or for the subgroup of island countries. For the total group, whilst there is some evidence of convergence in nominal exchange and inflation rates in recent years, it is not pronounced, as there is still considerable divergence between major countries including Fiji and PNG. Hence, our study fails to find any meaningful level of support for a currency union amongst the total group of countries.

With regard to the sub-group of countries, the position is worse. There is a high degree of divergence amongst nominal and real exchange rates, and there is no clear pattern of convergence in inflation. Further, there is total absence of convergence in growth rates. Thus, our study was not able to find any credible evidence to support the case for any currency union among the island countries.

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Appendix. Unit Root Test Results

Table A1. (log) SDR

	Levels		1st Difference	
	ADF Statistic	P-value	ADF Statistic	P-value
AUS	−1.447	0.5421	−4.135585	0.0002
NZ	−2.728	0.085	−3.030524	0.0041
Fiji	−1.068404	0.711	−4.157507	0.0002
PNG	1.017442	0.9953	−2.865250	0.0062
Samoa	−2.767	0.078	−2.044354	0.0415
Solomons	−0.039326	0.9456	−2.483718	0.0155
USA	−1.592468	0.4702	−2.899457	0.0057
Vanuatu	−2.441755	0.1416	−3.743544	0.0007
Tonga	−0.394376	0.8952	−3.966392	0.0004

Table A2. (log) Real Effective Exchange Rate (REER)

	Levels		1st Difference	
	ADF Statistic	P-value	ADF Statistic	P-value
AUS	−1.612	0.4610	−3.536	0.0011
NZ	0.287	0.7600	−2.957871	0.0049
Fiji	−1.484286	0.5234	−3.294143	0.0021
PNG	−0.747466	0.8158	−4.888039	0.0000
Samoa	−1.32917	0.5989	−4.758394	0.0000
Solomons	−1.070629	0.7101	−3.188826	0.0028
USA	−1.639622	0.4472	−2.763257	0.008

Table A3. Inflation

	Levels		1st Difference	
	ADF Statistic	P-value	ADF Statistic	P-value
AUS	−1.671	0.4322	−4.727867	0.0001
NZ	−1.653280	0.4411	−5.913531	0.0000
Fiji	−2.551024	0.1167	−6.911517	0.0000
PNG	0.058	0.6911	−4.924	0.0000
Samoa	−2.340324	0.1687	−11.71224	0.0000
Solomons	−0.576686	0.4564	−5.857233	0.0000
USA	−2.447	0.1400	−3.816	0.0005
Vanuatu	−3.106649	0.0401	−7.349567	0.0000
Tonga	−1.587076	0.1042	−5.254464	0.0000

Table A4. Growth Rates

	Levels		1st Difference	
	ADF Statistic	P-value	ADF Statistic	P-value
AUS	−4.176945	0.0038	−5.840410	0.0000
NZ	−5.102120	0.0004	−6.284984	0.0000
Fiji	−8.124515	0.0000	−7.130312	0.0000
PNG	−3.164382	0.0363	−4.770177	0.0001
Samoa	−3.647078	0.0131	−5.747037	0.0000
Solomons	−2.716265	0.0093	−5.281024	0.0000
Vanuatu	−4.367988	0.0039	−6.454630	0.0000
Tonga	−1.869308	0.0599	−4.679207	0.0001
USA	−3.942071	0.0063	−7.280752	0.0000

Table A5. Cointegration tests for SDR (based on VAR1 model)

Series: LAUSSDR LNZSDR LFIJISDR LPNGSDR LSAMOASDR LSOLOMONSDR LUSASDR LVAUATUSDR LTONGASDR
Selected (0.05 level*) Number of Cointegrating Relations by Model

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	4	5	5	5	3
Max-Eig	2	2	1	1	1

*Critical values based on MacKinnon-Haug-Michelis (1999).

Table A6. Cointegration tests for REER (based on VAR1 model)

Series: LAUSREER LNZREER LPNGREER LSAMOAREER LSOLOMONREER LUSAREER
Selected (0.05 level*) Number of CI Relations by Model

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	1	1	1	1	1
Max-Eig	1	1	1	1	1

*Critical values based on MacKinnon-Haug-Michelis (1999).

Table A7. Cointegration tests for Inflation (based on VAR1 model)

Series: AUSINF NZINF FIJIINF PNGINF SAMOAINF SOLOMONINF USAINF VANUATUINF TONGAINF
Selected (0.05 level*) Number of Cointegrating Relations by Model

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	3	3	3	3	3
Max-Eig	1	1	1	2	2

*Critical values based on MacKinnon-Haug-Michelis (1999).