Hard Pegs versus Intermediate Currency Arrangements in the Pacific

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Outline

I. Introduction
II. A theoretical model of the optimal basket weight
III. Estimating the de facto basket weights
IV. Exchange rate vs. GDP volatility
V. Simulation of optimal shares
VI. Conclusion
1. Introduction

Paper studies the exchange rate choices of the Pacific economies, in particular of those countries that do not use an external currency.

Main research questions:

i. What can the theory tell us?

ii. How has the exchange rate choice affected the volatility of the exchange rate and of economic output?

iii. What are the weights used in the currency baskets?

iv. What are the optimal weights predicted by the model?
1. Introduction

Exchange Rate Arrangements in Pacific Developing Member Countries

<table>
<thead>
<tr>
<th>Pacific DMC</th>
<th>Name of currency</th>
<th>De facto classification (IMF)</th>
<th>Pop. (2013)</th>
<th>GDP per capita (cur. USD, 2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cook Islands</td>
<td>New Zealand dollar (NZD)</td>
<td>External currency</td>
<td>15,225</td>
<td>21,490</td>
</tr>
<tr>
<td>F.S. Micronesia</td>
<td>US dollar (USD)</td>
<td>External currency</td>
<td>102,908</td>
<td>3,057</td>
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<tr>
<td>Fiji</td>
<td>Fijian dollar (FJD)</td>
<td>Currency-basket</td>
<td>863,073</td>
<td>4,652</td>
</tr>
<tr>
<td>Kiribati</td>
<td>Australian dollar (AUD)</td>
<td>External currency</td>
<td>111,117</td>
<td>1,528</td>
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<tr>
<td>Nauru</td>
<td>Australian dollar (AUD)</td>
<td>External currency</td>
<td>10,660</td>
<td>7,502</td>
</tr>
<tr>
<td>Palau</td>
<td>US dollar (USD)</td>
<td>External currency</td>
<td>17,862</td>
<td>13,761</td>
</tr>
<tr>
<td>PNG</td>
<td>PNG kina (PGK)</td>
<td>Managed floating</td>
<td>7,570,686</td>
<td>2,043</td>
</tr>
<tr>
<td>Samoa</td>
<td>Samoan tala (WST)</td>
<td>Currency-basket</td>
<td>187,372</td>
<td>3,641</td>
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<tr>
<td>Solomon Islands</td>
<td>Sol. Island dollar (SBD)</td>
<td>Currency-basket</td>
<td>626,247</td>
<td>1,858</td>
</tr>
<tr>
<td>Timor-Leste</td>
<td>US dollar (USD)</td>
<td>External currency</td>
<td>1,306,000</td>
<td>1,063</td>
</tr>
<tr>
<td>Tonga</td>
<td>Tongan pa’anga (TOP)</td>
<td>Currency-basket</td>
<td>103,347</td>
<td>4,619</td>
</tr>
<tr>
<td>Tuvalu</td>
<td>Australian dollar (AUD)</td>
<td>External currency</td>
<td>11,099</td>
<td>3,434</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>Vanuatu vatu (VUV)</td>
<td>Managed floating</td>
<td>271,089</td>
<td>2,951</td>
</tr>
</tbody>
</table>

Paper studies the exchange rate choices of the Pacific economies, in particular of those countries that do not use an external currency. Main research questions:

i. What can the theory tell us?

ii. How has the exchange rate choice affected the volatility of the exchange rate and of economic output?

iii. What are the weights used in the currency baskets?

iv. What are the optimal weights predicted by the model?
Exchange Policy Regimes

External currencies:
• Independence of monetary policy is lost
• Too much burden for fiscal policy
• But advantageous for tourism

Basket currency system:
• Instrument for monetary policy by using of different weights in basket

Managed float:
• Adequate foreign reserves are needed
• Arbitrary policy, not rule-based.

Free float:
• Too much volatility of exchange rate
Yoshino et al. (2014):
Basket currencies have two advantages:
• Exchange rate fluctuations are typically lower than a hard-peg since the exchange rate risk is more dispersed.
• The weights in the basket may be used as an additional policy tool to achieve a given exchange rate objective.
Building on Yoshino et al. (2003): How to optimally manage the shares in the basket currency optimally to reduce GDP volatility?

Tripartite Exchange Rate Relationship Chart

- Pacific Country (Home)
  - $e^{X/A}$
  - $e^{X/\$}$

- Australia
  - $e^{A\$/\}$

- United States (Rest of the World)
2. A Model of Optimal Basket Weights

Because one of the three exchange rates is not independent, the Pacific currency–US dollar exchange rate can be expressed as:

$$e^{X/\$} = e^{X/A\$} + e^{A\$/\$}$$

We assume that the monetary authority adjust money supply by intervening in the foreign exchange market in order to maintain the value of the basket at a constant level $\theta$. If $v$ is the weight of the US dollar and $(1 - v)$ is the weight of the Australian dollar in the basket, then the value of the basket can be described as:

$$ve^{X/\$} + (1 - v)e^{X/A\$} = \theta$$

$$e^{X/\$} = \theta + (1 - v)e^{A\$/\$}$$

$$e^{X/A\$} = \theta - ve^{A\$/\$}$$
Government objective function:

$$Min \ w_1(e^{X/\$} - \bar{e}^{X/\$})^2 + w_2(e^{X/A\$} - \bar{e}^{X/A\$})^2 + (1 - w_1 - w_2)(y - \bar{y})^2$$

where $0 \leq w_1 + w_2 \leq 1$.

We further assume:

$$(y - \bar{y}) = c_0 + c_1(r - \bar{r}) + c_2(G - \bar{G}) + c_3(CA - \bar{CA})$$

$$(CA - \bar{CA}) = (BT - \bar{BT}) + (TOUR - \bar{TOUR})$$

where $c_2, c_3 > 0$ and $c_1 < 0$.

Trade and Tourism:

$$(BT - \bar{BT}) = a_0 + a_1(y - \bar{y}) + a_2(e^{X/\$} - \bar{e}^{X/\$}) + a_3(e^{X/A\$} - \bar{e}^{X/A\$})$$

$$(TOUR - \bar{TOUR}) = b_0 + b_1(e^{X/\$} - \bar{e}^{X/\$}) + b_2(e^{X/A\$} - \bar{e}^{X/A\$}) + b_3(Y_w - \bar{Y_w})$$
A Model of Optimal Basket Weights

Solving for the first order condition, \( \partial L / \partial v = 0 \), we obtain the optimal weight of US dollars in the basket as follow:

\[
v = \left( w_1 + w_2 + (1 - w_1 - w_2)(l^2 k^2 + lk^2) e^{A$/$/\$} \right)^{-1} \left[ \begin{align*}
(w_1 \\
+ (1 - w_1 - w_2)(a_2 + b_1)(l^2 k + lk) \left( \theta + e^{A$/$/\$} - \frac{X}{\bar{e}A$/$/\$} \right) \\
+ (w_2 + (1 - w_1 - w_2)(a_3 + b_2)(l^2 k + lk)) \left( \theta - \frac{X}{\bar{e}A$/$/\$} \right) \\
+ (1 - w_1 - w_2) \frac{(l^2 k + lk)}{c_3} (c_0 + c_3(a_0 + b_0) + c_1(r - \bar{r}) \\
+ c_2(G - \bar{G}) + c_3 b_3(Y_w - \bar{Y}_w)) \end{align*} \right]
\]

where

\[
k = a_2 + a_3 + b_1 + b_2
\]

\[
l = \frac{c_3}{(1 - c_3 a_1)}
\]
Estimates of the Currency Weights in the Currency Baskets of the Fiji Islands, Papua New Guinea, Samoa, the Solomon Islands, Tonga, and Vanuatu

<table>
<thead>
<tr>
<th>Variable</th>
<th>F$</th>
<th>SI$</th>
<th>T$</th>
<th>ST</th>
<th>K</th>
<th>Vt</th>
</tr>
</thead>
<tbody>
<tr>
<td>A$</td>
<td>0.230***</td>
<td>0.078***</td>
<td>0.179***</td>
<td>0.208***</td>
<td>1.129***</td>
<td>0.184</td>
</tr>
<tr>
<td></td>
<td>(9.958)</td>
<td>(3.660)</td>
<td>(9.129)</td>
<td>(20.392)</td>
<td>(3.150)</td>
<td>(1.586)</td>
</tr>
<tr>
<td>€</td>
<td>0.235***</td>
<td>-0.059***</td>
<td>0.003</td>
<td>0.000</td>
<td>-0.343</td>
<td>-0.119</td>
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<tr>
<td></td>
<td>(11.053)</td>
<td>(-2.996)</td>
<td>(0.163)</td>
<td>(-0.045)</td>
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<td>(-1.105)</td>
</tr>
<tr>
<td>£</td>
<td>-0.041**</td>
<td>-0.017</td>
<td>0.065***</td>
<td>0.064***</td>
<td>0.598*</td>
<td>0.489***</td>
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<td></td>
<td>(-2.002)</td>
<td>(-0.868)</td>
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<td>0.024</td>
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### Estimation of de facto weights

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Rolling Regression on Fiji Dollar Basket Currencies
Rolling Regression on Pa’anga Basket Currencies
Rolling Regression on Tala Basket Currencies
Comparison of Exchange Rate Volatility

Fluctuation of Monthly-Averaged-Exchange-Rates-to-US Dollar of the Pacific Developing Member Countries with Currency Boards Compared to the Australian Dollar–US Dollar Exchange Rate
4. Comparison of Exchange Rate Volatility


AUD/USD [7.30%]  PGK/USD [5.71%]  VUV/USD [4.61%]
Comparison of GDP Volatility

Fluctuation of Gross Domestic Product in the Pacific Developing Member Countries with Currency Boards versus Pacific Developing Member Countries with External Currencies

-30% -20% -10% 0% 10% 20% 30%

FIJ [11.02%]
FSM [3.88%]
KIR [9.54%]
RMI [4.86%]
PAL [7.80%]
SOL [13.16%]
TON [10.52%]
TUV [6.50%]
SAM [10.75%]
4. Comparison of GDP Volatility

Fluctuation of Gross Domestic Product of Papua New Guinea and Vanuatu versus Pacific Developing Member Countries with External Currencies
We simulate the optimal share of the US dollar and the Australian dollar in each country’s basket currency for 2002 to 2012.

Four government objectives are studied:
1. minimizing fluctuations of the exchange rate against the US dollar, i.e. \( w_1 = 1 \);
2. minimizing fluctuations of the exchange rate against the Australian dollar, i.e. \( w_2 = 1 \);
3. minimizing fluctuations in GDP, meaning that \( w_1 \) and \( w_2 \) become equal to 0; and
4. putting equal weight on GDP and exchange rates minimization, i.e. \( w_1 \) and \( w_2 \) equal to \( 1/3 \).
Optimal Shares of US Dollar and Australian Dollar when \( w_1 = 1 \)  
(Minimize Exchange Rate Fluctuations to the US Dollar)
Optimal Shares

Optimal Share of US Dollar and Australian Dollar when $w_2 = 1$
(Minimize Exchange Rate Fluctuations to the Australian Dollar)

- a) Fiji dollar
- b) Solomon Islands dollar
- c) pa'anga
- d) tala
Optimal Shares

Optimal Share of US Dollar and Australian Dollar when $w_1$ and $w_2 = 0$

(Minimize Gross Domestic Product Fluctuations)

a) Fiji dollar

b) Solomon Islands dollar

c) pa’anga

d) tala
5. Optimal Shares

Optimal Share of US Dollar and Australian Dollar when \( w_1 \) and \( w_2 = 0.3333 \) (All Objectives with Equal Weights)

- **a) Fiji dollar**
- **b) Solomon Islands dollar**
- **c) pa'anga**
- **d) tala**
• Addition to literature: Loss function that includes minimization of GDP fluctuations and exchange rate fluctuations

• Rolling regression results indicated that Fiji Islands and the Solomon Islands maintained rather constant shares baskets, Samoa and Tonga often reviewed it.

• Comparing GDP volatility and exchange rate fluctuations of Pacific DMCs with hard pegs to Pacific DMCs with intermediate regimes, we find that Pacific DMCs with intermediate regimes maintained rather stable exchange rates, but had difficulties in stabilizing the fluctuations of their GDP.
Simulations for various loss functions indicated that irrespective of the loss function,

- the Fiji Islands and Tonga would be better off pegging their currency to the US dollar.
- Solomon Islands would be better off pegging their currency to the Australian dollar.
- For Samoa, a basket currency would be the best policy to implement.

Overall, results suggested that Pacific DMCs with intermediate currency regimes put strong emphasis on stabilizing the exchange rate, rather than using the exchange rates as a shock absorber for external economic shocks.
Thank you very much for your attention

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1. Literature Review

- Constantly evolving literature and new evidence on optimal exchange rate policies
- 1990s: Peg against international currency popular instrument in developing countries
- Post Asian FC 1997: Bipolar prescription as intermediate regimes make countries more vulnerable to crisis (Obstfeld and Rogoff, 1995)
- Latest IMF research shows that intermediate regimes are more vulnerable to crisis compared to free floats (Ghosh et al. 2014)
Exchange rate of microstates (Imam, 2010):
- Limited capacity to operate monetary policy
- Underdeveloped financial markets
- Illiquid exchange markets results in high volatility of exchange rate
- Micro states of lack credibility resulting in fear of floating and high levels of dollarization
- Microstates are often integrated in economy of former colonial power and form an optimal currency area with them.
- Conclusion: Best to adopt an external currency.

Exchange rates of the Pacific (Freitag, 2011):
- Recommends Pacific States with own currency should switch to USD.