Effectiveness of Fiscal and Monetary Policies in Pacific Island Countries: A Panel study

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Abstract
For mitigating the adverse effects of global financial crisis of 2008 and the Global Recession from 2009 onwards, Pacific island countries (PICs) undertook countercyclical measures, which included both fiscal and monetary policy actions, as far as their resources and capabilities could permit. This paper evaluates their effectiveness over a longer period extending before the recent crises as well. A panel analysis is undertaken in respect of four PICs, namely Fiji, Samoa, Tonga and Vanuatu for a 26-year period (1986-2011). Using Pedroni's cointegration tests, we find that although fiscal and monetary policies were effective, relative effectiveness depended on country-specific characteristics.

Key Words: Fiscal Policy, Monetary Policy, Financial crisis, Pacific Island Countries.

JEL Classification: F32, H62.

1. Introduction

The global financial crisis of 2008 and the subsequent world economic recession beginning from 2009 with the latter's lingering effects, followed by debt crisis in the Eurozone, have been testing times for the 14 Pacific island countries (PICs)[2]. Six of them which have independent currencies of their own namely Fiji, Papua New Guinea (PNG), Samoa, the Solomon Islands, Tonga and Vanuatu, the other eight PICs being dollarized economies[3], responded with countercyclical policies to mitigate the adverse effects of the world recession. These policies were aimed at stepping up domestic demand in the wake of a declining external

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[2] The 14 PICs are Cook Islands, Fiji, Kiribati, Republic of Marshal Islands, Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu, who form the intergovernmental organization known Pacific Islands Forum (the Forum).

[3] The eight dollarized PICs, which use the currencies of three metropolitan powers in the region as legal tender are: Kiribati, Nauru and Tuvalu (the Australian dollar); Cook Islands and Niue (the New Zealand dollar); and Federated states of Micronesia, Republic of Marshall Islands and Palau (the United States dollar).

demand, through fiscal policy measures including increases in public sector expenditures and through expansionary monetary policy measures such as lower interest rates for facilitating greater flows of bank credit to domestic enterprises. Despite these efforts, however, there have been limited reductions in bank lending rates and the growth of private credit has been anemic. These sluggish responses have raised a key question about effectiveness of fiscal and monetary policies in PICs.

The objective of this paper is to assess the effectiveness of these policies by undertaking a panel study in respect of four small PICs, excluding PNG which is an outlier in terms of larger land area and abundant exportable mineral resources, and the Solomon islands, whose time series data base is incomplete. The paper is organized on the following lines. The next section gives a brief review of economic performance of PICs and fiscal and monetary policies adopted. The third section deals with the modeling and methodology adopted for the empirical investigation. The fourth section reports the results; and the last section presents conclusions with policy implications.

2. A Brief Review of Performance and Policies adopted by PICs

The six PICs, which have independent currencies and hence have the conventional tools, fiscal, monetary and exchange rate policies in their arsenal to resort to countercyclical policies, display a wide variety of characteristics (Table 1). Their populations range from less than 100,000 in Tonga to 7,000,000 in PNG. While Fiji, PNG, Solomon Islands and Vanuatu with large volcanic islands have arable land and a good supply of water, making them suitable for agriculture, Tonga and Samoa, have small populations, with little potential for large scale agriculture and manufacturing and hence have to depend more on remittances, tourism and to a smaller extent, fisheries.

Table 2 presents the annual real GDP growth rates for the six PICs. While PNG, Samoa, Solomon Islands and Vanuatu recorded positive annual growth rates, Fiji and Tonga performed rather poorly. The reasons behind Fiji's and Tonga's poor growth can be traced to political instability following the military coup in 2006 in Fiji, and pro-democracy riots in 2005 in Tonga. Amongst the better performers, the success of PNG and Solomon islands is mainly due to growth in their exports: mineral and non-minerals and tree-crops in case of PNG and exports of timber. In the absence of any spectacular growth in exports, prudent fiscal and monetary policies supported by remittances in the case of Samoa, and tourism receipts in the case of Vanuatu helped to maintain growth (UN ESCAP 2010).

Table 1: PICs: General Indicators

Country	Population ('000) (2011)	Population Growth (1991-2011)	Population Density	Urban Population (%)	GDP per capita (US$)
Fiji	867	1.0	47	52	4399
PNG	7012	2.2	15	13	1767
Samoa	187	0.7	66	20	3383
Solomon Is.	552	2.6	19	20	1517
Vanuatu	241	2.3	19	25	3252
Tonga	104	0.4	145	23	4100

Source: WDI (2012)

Table 2: PICs: Growth Performance: 1995-2011

Year	Real GDP Growth Rate (%)					
	Fiji	PNG	Samoa	Solomon Islands	Tonga	Vanuatu
1995	2.1	-3.3	6.6	5.4	2.9	4.7
1996	4.8	6.6	7.3	1.9	-0.5	7.2
1997	-2.2	-6.3	0.8	-1.7	-3.2	8.6
1998	1.3	4.7	2.4	3.2	3.5	4.3
1999	8.8	1.9	3.1	-1.6	2.3	-3.2
2000	-1.6	-2.5	7.1	-14.2	5.4	2.7
2001	1.9	-0.1	8.1	-8.2	7.2	-2.6
2002	3.2	-0.2	1.8	-2.8	1.4	-7.4
2003	0.9	2.2	3.1	6.5	3.4	3.2
2004	5.5	2.7	3.4	8	1.1	5.5
2005	0.6	3.7	5.2	5	-3.3	6.5
2006	3.4	2.6	2.6	6.1	4.4	7.2
2007	-6.6	6.7	6.1	10.3	-0.3	6.6
2008	-1.2	7.3	3.3	7	1.0	5.7
2009	-2.5	5.5	-0.8	0.4	0.4	3.4
2010	-0.2	7.1	0.2	7.1	3.3	2.2
2011	1.9	11.1	2.1	10.6	2.9	4.3

Source: ADB (2012), UNESCAP (2012)

For their foreign exchange earnings, PICs depend upon a narrow range of exports: fish, fruits and vegetables. Their exports except in the case of PNG (minerals) and Fiji (sugar), are similar and they seek the same markets. There is little inter-regional trade amounting to only 15 percent of total exports (Browne 2006). As the world economy was booming in the early years of this century and just before the full brunt of global recession came to be felt, PICs experienced fairly reasonable growth, average rate being 5.1 percent, thanks to growth performance of commodity-exporting economies of PNG and Solomon Islands.

Table 3: Fiscal Balance % of GDP

	1991-2000	2001-2005	2006	2007	2008	2009	2010	2011
Fiji	-3.4	-5.1	-3.4	-2.1	0.5	-3.0	-2.1	-3.5
PNG	-2.2	-1.3	3.2	2.6	-2.2	-0.1	0.7	-0.2
Samoa	-5.3	-1.1	-0.5	0.6	-1.9	-4.1	-8.4	-6.4
Solomon Is.	-2.8	-5.9	-3.9	-0.7	-3.7	0.1	-2.0	6.3
Tonga	-0.7	2.3	-0.7	3.8	3.6	1.3	-2.7	Na
Vanuatu	-3.3	-0.9	0.9	-0.3	2.1	0.9	2.0	-2.3

Source : ADB (2012) , WDI (2012)

2.1. Twin Deficits

Declining aid for budgetary support and rising domestic public sector expenditure since the 1990s and stagnant tax revenues led to widening budget deficits (Table 3). With continuing dependency on imports of

all food items including rice and wheat, besides fuel and manufactured goods led to further widening trade deficits (Table 4). Remittances (Table 5) continued to provide valuable support to the traditionally remittance dependent economies of Samoa and Tonga, while Vanuatu was helped by the resurgence of tourism in Vanuatu at the cost of Fiji, which experienced political instability following the military coup in December 2006. However, current account balances showed signs of deterioration (Table 6). Thanks to declining prices especially in petroleum products since 2008, inflation moderated in most of the PICs during 2009 (Table 7).

Table 4: Trade Balance (% of GDP)

	1991-2000	2001-2005	2006	2007	2008	2009	2010	2011
Fiji	-12.7	-19.6	-31.2	-26.8	-33.2	-27.0	-24.3	-21.5
PNG	19.2	27.4	40.1	33.5	33.2	19.1	22.9	21.7
Samoa	-60.1	-82.3	-46.1	-38.6	-44.0	-37.2	-44.7	-46.4
Solomon Is.	0.2	-0.6	-17.4	-17.6	-15.4	-13.4	-20.0	3.0
Tonga	-26.7	-28.9	-36.1	-31.2	-36.2	-40.0	-29.3	-26.3
Vanuatu	-22.3	-21.8	-25.3	-29.6	-33.7	-35.3	-27.8	-22.0

  Source : ADB (2012), WDI (2012)

Table 5: Remittances (%GDP)

	1991-2000	2001-2005	2006	2007	2008	2009	2010	2011
Fiji	1.6	5.7	6.0	4.8	3.5	3.9	5.5	4.1
PNG	0.3	0.3	0.2	0.2	0.2	0.2	0.0	0.1
Samoa	22.8	20.2	24.5	24.3	23.3	26.5	19.7	21.7
Solomon Is.	0.7	1.5	4.5	3.5	3.2	0.4	0.2	0.2
Tonga	15.0	33.5	26.7	33.2	27.1	29.1	19.4	16.5
Vanuatu	8.3	5.0	1.1	1.0	1.1	1.1	1.7	2.9

  Source : ADB (2012), WDI (2012)

Table 6: CA Balance (% of GDP)

	1991-2000	2001-2005	2006	2007	2008	2009	2010	2011
Fiji	-1.0	-5.0	-19.2	-14.0	-17.9	-10.0	-11.3	-11
PNG	4.7	4.8	8.0	2.9	9.9	-6.3	-6.7	-0.4
Samoa	-5.1	-16.8	-16.7	-8.2	-3.3	0.4	-10.9	-13
Solomon Is.	-2.9	0.1	-6.9	-17.7	-22.4	-22.1	-31.7	-8.7
Tonga	-3.3	-1.1	-7.8	-8.3	-8.9	-7.7	-4.6	-8.4
Vanuatu	-7.9	-6.4	-5.8	-10.0	-7.0	-2.2	-6.0	-7.0

  Source : ADB (2012), WDI (2012)

Table 7: Inflation (%)

	1991-2000	2001-2005	2006	2007	2008	2009	2010	2011
Fiji	3.5	2.9	2.5	4.8	7.8	3.6	1.6	7.7
PNG	9.6	7.9	2.4	0.9	10.8	6.9	5.6	8.5
Samoa	3.4	6.2	3.8	5.5	11.5	6.3	2.7	2.9
Solomon Is.	10.5	8.3	11.2	7.6	17.3	2.5	1.1	7.4
Tonga	3.9	10.0	6.1	5.8	10.0	1.8	2.5	6.2
Vanuatu	3.2	2.2	2.6	4.1	5.8	2.8	2.8	0.8

Source: ADB (2012)

2.2. Impact on PICs

It was feared that decline in economic activities and fall in disposable incomes in advanced countries, especially in Australia and New Zealand, would lead to decrease in PICs' exports, decline in tourist arrivals and remittances. Fiji suffered a greater setback in tourism, than initially expected, despite the April 2009 devaluation of its currency by 20 percent. After the December 2006 coup, Vanuatu was benefited from the diversion of tourist traffic away from Fiji during 2007-2009. In 2010, due to heavy discounting by Fiji's national airline, the Fiji airways and the hotel industry, tourist arrivals in Fiji improved and the arrival numbers hit a record at 600,000.

As regards to inward remittances, the prospects for Samoa and Tonga, which contribute to about 25 percent of their GDP, were initially considered not bright due to deterioration in job markets in US, Australia and New Zealand. With rise in joblessness, the overseas Samoan and Tongan residents were expected to be less likely to keep up the past tempo in remitting funds back home in months to come[4].

The global economic downturn with declining demand for mineral and non-mineral products ended the commodity boom. It aided spectacular growth in GDP in PNG in 2007 (6.7 percent) and in 2008 (7.3 percent). PNG's exports are more diversified with petroleum and gas and other mineral products along with agricultural exports including coffee, cocoa and tea (about 95 percent of export earnings). Following the recovery in Australia in late 2009, commodity prices quickly looked up in PNG. Economic growth picked up around 7 percent in 2010 compared to 5.5 percent in 2009.

To sum up, it was initially held that since their financial sectors were insulated as they were not exposed to subprime mortgage loans, PICs could possibly escape the impact of crisis. The second and third round effects of the financial crisis leading to fall in aggregate demand and in incomes in the originating economies came to be felt in all PICs. The transmission mechanisms have been broadly along the following lines: decline in demand for primary products and resultant lower commodity prices; fall in employment and incomes in source countries leading to decrease in tourist arrivals and decline in inward remittances; adverse impact on assets held overseas and erosion of offshore trust funds; and poor domestic private investor confidence.

2.3. Response to the Crisis

Response to the crisis in terms of countercyclical action depends upon whether the country concerned has got any scope for expansionary policies, fiscal or monetary. Further, a greater challenge is to ensure that spending on social protection is not compromised with. While developed countries can consider and strengthen their social safety-nets, which include both unconditional and conditional cash transfers to poor households, and

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[4] However, subsequent developments showed that remittances were resilient. Remittances continued to be almost at the same level in Fiji and in Samoa they declined in 2009 but recovered in late 2010.

public works programmes (Ravallion 2008), there is limited scope in developing countries, since they have little fiscal or current account leeway (Hostland 2008). Further, as international reserves were dwindling in the face of widening trade deficits and rise in current account deficits, there will be mounting pressures on exchange rates (Naude 2009). In fact, Fiji had to devalue its currency by 20 percent in 2009 when there were rumours about the weak currency. In April 2009, its international reserves were low, which were just enough to cover a month's imports and speculators were attacking the currency under the expectations that currency would be devalued.

There are limitations to fiscal expansion, which stem forth from the already entrenched constraints to macroeconomic management in PICs (Jayaraman 2008). Except PNG, Tonga and Vanuatu, all PICs have been running budget deficits in recent years. Any attempt to raise domestic aggregate demand by running fiscal deficits with a view to offsetting declines in external demand would have disastrous effects and can only be inflationary, unless there is effective trimming of their budgets.

Any fiscal stimulus effort is a risky venture unless there are supportive measures in place. These are: (i) undertaking more vigorous revenue collection efforts; (ii) effecting changes in the current expenditure composition by cutting wasteful expenditures and ambitious projects; and (iii) diverting the saved resources towards labour intensive and quick yielding projects including rehabilitation and upgrading infrastructure (Jayaraman 2008). In the absence of fiscal deficits being financed by domestic tax revenue efforts, such deficits eventually lead to monetization of deficits.

On the other hand, expansionary monetary policy to boost domestic demand to compensate for falling external demand for limited range of exports and demand for tourism services would be disastrous. Since the financial sectors in the six PICs under study are at nascent stages, empirical studies have shown that the transmission mechanisms of monetary policy decisions are weak (Jayaraman 2009) and monetary policy is generally ineffective in impacting growth. Further, excess demand created by rise in loose monetary policy will spill over into external sector as increase in demand for imports. Given the current low level of export earnings, expansionary monetary policy or fiscal policy or a combination of both policies for boosting domestic demand are expected to widen trade deficits and exercise pressure on exchange rates.[5]

3. Modeling, Methodology and Data

The two major policy tools available to countries which have independent currencies are both monetary and fiscal policies, besides exchange rate changes. Monetary policy dealing with the quantity of money, interest and exchange rates is believed to have a predominant role in influencing aggregate demand, inflation and output. This owes much to the emergence of monetarism as a countervailing force against Keynesians who lay greater stress on fiscal policy. Monetary policy tools employed in PICs are listed out in Table 8.

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[5] Trade deficits, if not controlled by reducing budget deficits, lead to worsening of the current account imbalances, which would lead to pressures on exchange rate under fixed exchange rate regime, fanning speculation rumours relating to eventual devaluation. For an empirical study on pressures on exchange rate of Fiji, see Jayaraman and Choong (2008).

Table 8: Monetary Policy Frameworks in PICs

Country	Monetary Policy Objectives	Monetary targets	Main Monetary Instruments	Exchange rate Regime
Fiji	Maintain monetary stability and stable financial structure; foster credit and exchange conditions conducive for an orderly balanced development	Broad money (M2)	OMO; discount loans; announced policy indicator rate	Pegged to a basket (US$, AUS$, euro, etc)
PNG	Maintain price and financial system stability, and promote macro-economic stability and growth	Broad money (M3)	OMO; discount windows; policy indicator rate : repos rate	Float
Samoa	Promote economic growth and maintaining price stability and international reserves viability	Broad money (M2)	OMO; discount rate reserve requirements; policy rate: repos rate	Pegged to a basket within a ±2 percent band (NZ$, AUS$, US$, euro)
Solomon Islands	Promote monetary stability and a sound financial structure; foster financial conditions conductive to orderly and balanced development.	Broad money (M3)	Liquid asset requirement;	*De facto* peg to the US$
Tonga	Maintain internal and external monetary stability; promote a sound and efficient financial system; support macroeconomic stability and economic growth.	Broad money (M2)	OMO: statutory reserve deposit; credit ceilings	Pegged to a basket with monthly adjustment band of up to 5 percent
Vanuatu	Maintain low and stable inflation rate and maintain a sufficient level of official foreign exchange reserves.	Broad money (M2)	Statutory reserve deposit ratio; OMO; policy rate: rediscount rate	Adjustable peg, linked to an undisclosed transactions-weighted basket

Fiscal policy, as a tool, deals with effecting changes in the levels of revenue and expenditures of the government. Government is responsible for providing major public goods and services, which are not feasible for the private sector to supply. An excess expenditure over revenue creates fiscal deficit while excess revenue over expenditure creates fiscal surplus.

3.1.   St. Louis Equation

The monetarists (Friedman and Meiselman, 1963; Anderson and Jordan, 1968; Carlson, 1978) were of the view that monetary policy was more powerful than fiscal policy in achieving various economic goals. The Keynesians held the opposite view that fiscal actions were more effective in stabilizing growth. For undertaking a study on the relative effectiveness of two main policy actions, namely monetary and fiscal policy changes, we resort to the time series econometric procedure based on St. Louis equation developed by the Federal Reserve Bank of St. Louis of the USA (Anderson and Jordan 1968).

Critics were of the view that there were certain deficiencies in St. Louis equation. The deficiencies are the following: (i) the St. Louis equation is a reduced form equation and the policy variables (money supply and government expenditure) included in this equation were not statistically exogenous; and (ii) the St. Louis equation suffered from specification error due to omission of relevant variables such as interest rates (Stein, 1980; Ahmed *et al.,* 1984). As Rahman (2005) notes, Sims's (1980) vector autoregression (VAR) approach when applied to St. Louis equation addresses the problem of endogeneity because it assumes all the variables in the system are endogenous.

3.2.   Pedroni's Panel Cointegration Test

Following Pedroni (1999), to test for a cointegration relationship among variables for a panel of countries, we specify the following panel cointegration regression:

$$Y_{it} = \alpha_i + BB_{it} + M_{it} + ER_{it} + \varepsilon_{it} \qquad (1)$$

for $t = 1,...,T$; $i = 1,...,N$; where T refers to the number of observations over time and N refers to the number of individual members in the panel. Y is the natural logarithm of real GDP and BB is the natural logarithm of real budget balance and RER is the natural logarithm of real exchange rate index.

Seven test statistics, as recommended by Pedroni (1999), are used to test for panel cointegration. These tests are the panel *v*-statistic, panel *p*-statistic, panel *t*-statistic (non-parametric), panel *t*-statistic (parametric), group *p*-statistic, group *t*-statistic (non-parametric) and the group *t*-statistic (parametric).

3.3.   Granger Causality

Engle and Granger (1987) have shown that if two nonstationary series are cointegrated, a vector autoregression (VAR) in first differences will be misspecified. To overcome this problem, a model with a dynamic error correction representation is required by assuming that real GDP, budget balance, real money and real exchange rate are cointegrated. Hence, we extend this to a panel data model as follows:

$$\Delta Y_{it} = \alpha_{1i} + \sum_p \beta_{11ip} \Delta Y_{it-p} + \sum_p \beta_{12ip} \Delta BB_{it-p} + \sum_p \beta_{13ip} \Delta M_{it-p} + \sum_p \beta_{14ip} \Delta ER_{it-p} + \gamma_{1i} ECT_{t-1}$$

$$(2)$$

$$\Delta BB_{it} = \alpha_{2i} + \sum_p \beta_{21ip} \Delta Y_{it-p} + \sum_p \beta_{22ip} \Delta BB_{it-p} + \sum_p \beta_{23ip} \Delta M_{it-p} + \sum_p \beta_{24ip} \Delta ER_{it-p} + \gamma_{2i} ECT_{t-1}$$

$$(3)$$

$$\Delta M_{it} = \alpha_{3i} + \sum_p \beta_{31ip} \Delta Y_{it-p} + \sum_p \beta_{32ip} \Delta BB_{it-p} + \sum_p \beta_{33ip} \Delta M_{it-p} + \sum_p \beta_{34ip} \Delta ER_{it-p} + \gamma_{3i} ECT_{t-1}$$

$$(4)$$

$$\Delta ER_{it} = \alpha_{4i} + \sum_p \beta_{41ip} \Delta Y_{it-p} + \sum_p \beta_{42ip} \Delta BB_{it-p} + \sum_p \beta_{43ip} \Delta M_{it-p} + \sum_p \beta_{44ip} \Delta ER_{it-p} + \gamma_{4i} ECT_{t-1}$$

$$(5)$$

4. Results and Discussions

Data

For empirical investigation, we focus on four PICs, namely the Fiji Islands, Samoa, Tonga and Vanuatu, leaving out PNG as an outlier and the Solomon Islands, whose data series of are incomplete. Annual time-series of data for the period 1986–2011 are obtained from the International Financial Statistics published by International Monetary Fund (2012) and Key Indicators published by Asian Development Bank (2012) . Key variables employed in the study are given in Tables 9 to 12.

Table 9: Fiji: Key Variables

Years	RGDP Index	BB (% of GDP)	M2 (% of GDP)	Price Index	Exch. Rate Index
1986-1995 (ave)	112.0	-3.8	48.9	62.2	83.8
1996-2000 (ave)	137.1	-3.8	43.3	82.7	105.7
2001-2005 (ave)	153.1	-4.8	52.2	94.9	115.8
2006	163.3	-2.8	67.6	102.5	102.4
2007	161.9	-2.0	71.7	107.4	95.3
2008	163.6	0.6	64.3	115.7	94.3
2009	161.5	-4.1	69.8	120.0	115.7
2010	161.2	-1.2	66.9	126.6	113.5
2011	164.4	-3.5	66.4	137.4	106.1

Source: IMF (2012) and ADB (2012)

Table 10: Samoa: Key Variables

Years	RGDP Index	BB (% of GDP)	M2 (% of GDP)	Price Index	Exch. Rate Index
1986-1995 (ave)	110.7	-4.7	38.0	52.8	86.6
1996-2000 (ave)	129.4	0.6	34.6	72.9	105.3
2001-2005 (ave)	164.1	-1.1	39.5	89.0	113.0
2006	182.4	-0.5	44	103.7	102.6
2007	194.2	0.6	42.5	109.5	96.6
2008	187.0	-1.5	45.8	122.1	97.6
2009	183.8	-4.3	50.3	129.9	100.8
2010	186.9	-7.4	51.5	130.9	91.7
2011	190.9	-6.5	47.4	137.7	85.5

Source: IMF (2012) and ADB (2012)

Table 11: Tonga: Key Variables

Years	RGDP Index	BB (% of GDP)	M2 (% of GDP)	Price Index	Exch. Rate Index
1986-1995 (ave)	125.6	1.5	30.4	43.1	68.9
1996-2000 (ave)	147.0	-1.3	32.2	56.9	75.7
2001-2005 (ave)	169.4	2.3	41.5	83.5	107.0
2006	172.3	-0.7	43	106.4	104.4
2007	170.6	1.3	47.4	112.7	101.6
2008	175.2	1.6	44.1	124.5	100.1
2009	175.0	0.8	44.1	126.2	104.9
2010	174.1	-5.7	45.6	130.7	98.2
2011	176.2	-7.9	40.6	139.4	89.1

Source: IMF (2012) and ADB (2012)

Table 12: Vanuatu: Key Variables

Years	RGDP Index	BB (% of GDP)	M2 (% of GDP)	Price Index	Exch. Rate Index
1986-1995 (ave)	140.5	-3.3	113.4	66.9	103.3
1996-2000 (ave)	180.8	-3.9	101.5	85.2	113.8
2001-2005 (ave)	190.5	-0.9	94.9	96.7	114.9
2006	219.8	0.9	94.1	102.0	101.3
2007	234.1	0.1	97.7	106.1	93.8
2008	248.6	2.2	99.6	111.2	92.8
2009	257.1	-0.9	95.4	115.9	97.7
2010	265.0	-3.4	84.7	119.2	88.7
2011	276.4	-1.5	80.3	120.2	81.9

Source: IMF (2012) and ADB (2012)

4.1. Panel Unit Root Tests

Before assessing the effectiveness of both monetary and fiscal policies, we proceed to the examination of unit root properties for real GDP (*Y*), budget balance (*BB*), real money (*M*) and real exchange rate (*ER*). We employ four types of panel unit root tests proposed by Levin, Lin and Chu (2002), Breitung (2000), Im *et al*. (1997) and Maddala and Wu (1999)[6]. According to results shown in Table 13, we do not reject the null hypotheses of unit roots in regards to real GDP, budget balance, real money and real exchange rate in levels. However, we could reject the null hypothesis at the first difference. Thus, these series are of I(1) stochastic processes for the entire panel of PICs.

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[6] These panel unit root tests are more superior to the univariate time series tests (ADF and PP tests) and the test proposed by Levin, Lin and Chu (2002) and Breitung (2000), with the assumption of homogeneity across individuals. On the other hand, the tests proposed by Im *et al*. (1997) and Maddala and Wu (1999) are well-known with good small sample properties and they also allow for individual specific effects and dynamic heterogeneity across groups to examine price differences between countries (Esaka, 2003, p. 234).

Table 13: Panel Unit Root Tests

Panel Unit root tests	Y		BB		M2		ER	
	Level	1st Difference	Level	1st Difference	Level	1st Difference	Level	1st Difference
Null: Unit root (assumes common unit root process)								
Levin, Lin & Chu t*	1.604 [0.9457]	-3.259*** [0.0006]	0.734 [0.7688]	-4.984*** [0.0000]	0.949 [0.8288]	-6.936*** [0.0000]	1.650 [0.9505]	-4.329*** [0.0000]
Breitung t-stat	-0.768 [0.2211]	-2.421*** [0.0077]	0.722 [0.9951]	-3.857*** [0.0000]	-1.249 [0.1058]	-6.936*** [0.0000]	0.788 [0.7848]	-1.982** [0.0237]
Null: Unit root (assumes individual unit root process)								
Im, Pesaran and Shin W-stat	1.582 [0.9432]	-2.604*** [0.0046]	-0.384 [0.3503]	-5.130*** [0.0000]	0.282 [0.6111]	-9.736*** [0.0000]	1.494 [0.9324]	-2.315** [0.0103]
ADF - Fisher Chi-square	3.183 [0.9768]	25.496*** [0.0045]	10.219 [0.4215]	42.534*** [0.0000]	6.881 [0.7366]	113.064*** [0.0000]	3.394 [0.9706]	20.885** [0.0219]

Notes:

Under the null hypothesis, the IPS test statistic is asymptotically distributed as a standard normal distribution. The (common) lag length is chosen on the basis of the AIC. The numbers in parentheses denote lag length and those in brackets are P-values. The P-values are estimated from the one-tail test of the standardized normal distribution.

Under the null hypothesis, the probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. The lag length is chosen on the basis of the AIC and is set equal to the value chosen by the individual ADF regressions. Hence, we cannot present the common lag length, because the lag length varies country by country (regression by regression).

*** Significant at the 1 percent level.

4.2. Panel Pedroni's Cointegration Tests

Next, we proceed to examine the effects of budget balance, real money and real exchange rate on real GDP in the long run by using Pedroni's (2004) cointegration tests. The results are presented in Table 14. The null hypothesis of no cointegration is rejected by two within-dimension panel cointegration statistics and by three between-dimension panel cointegration statistics provided by Pedroni (1999). Hence, we have strong evidence to conclude that all these variables are cointegrated.

The long run estimates for each of the four PICs (country-specific effect), based on Pedroni's FMOLS estimator, are shown in Table 15. For all four PICs, it is found that the coefficients of budget balance (*BB*) have the theoretically expected negative sign, which is also significant at least at 0.05 levels. The coefficients range between 4.7 (Fiji) and 7.0 (Tonga). The coefficients of monetary measure (M) have also the theoretically expected signs and are significant as well for all four countries. They range from 0.7 (Fiji) to 7.5 (Vanuatu). As expected, the coefficients on the real exchange rate (ER) are positive and statistically significant for all countries at 0.05 marginal levels.

Overall, it is found that fiscal policy is more effective in Fiji, Samoa and Tonga while monetary policy is more effective in Vanuatu. For the panel long- and short run elasticities exhibited in the last two rows, the sign of budget balance, real money and real exchange rate are consistent with the country-specific effect and statistically significant on real GDP for these PICs. It is interesting to note that fiscal policy is more effective than monetary policy in PICs in the panel estimates. This may suggest that although fiscal policy is more effective as a policy tool in stabilizing and stimulating economic activity in PICs, the effectiveness of the policy tool may be vary depending on country-specific characteristics.

Table 14: Pedroni Residual Cointegration Test Results

Test Statistics	
Panel cointegration statistics (within-dimension)[a]	
Panel ρ-statistic	-1.0293 [0.2349]
Panel PP type *ρ*-statistic	1.9636* [0.0580]
Panel PP type *t*-statistic	1.5419 [0.1215]
Panel ADF type *t*-statistic	3.0870*** [0.0034]
Group mean panel cointegration statistics (between-dimension)[b]	
Group PP type *ρ*-statistic	2.7390* [0.0094]
Group PP type *t*-statistic	2.1318*** [0.0411]
Group ADF type *t*-statistic	4.5782*** [0.0001]

Notes:
The number of lag truncations used in the calculation of the seven Pedroni statistics is 3. The numbers in brackets are P-values.
[a] The within-dimension tests take into account common time factors and allow for heterogeneity across countries.
[b] The between-dimension tests are the group mean cointegration tests, which allow for heterogeneity of parameters across countries.
*, ** and *** Significant at the 10, 5 and 1 percent levels, respectively.

Table 15: Pedroni's Fully Modified OLS Estimates

	Intercept	BB	M	ER
Fiji	-6.445***	-4.774***	0.718**	0.212**
	(-0.869)	(-5.236)	(4.086)	(4.003)
Samoa	-11.386**	-5.504**	4.800**	0.815**
	(-2.698)	(-2.781)	(3.623)	(2.678)
Tonga	-4.443	-6.977***	3.737***	0.439
	(-0.143)	(-5.172)	(4.360)	(1.135)
Vanuatu	-37.208***	-4.886**	7.520***	0.420**
	(-6.959)	(-5.172)	(4.360)	(4.020)
Panel long run	-16.674***	-5.063***	0.734***	0.551***
	(-13.892)	(-3.727)	(4.198)	(5.147)
Panel short run	-37.437***	-2.118**	0.575***	0.320**
	(-14.216)	(-3.090)	(4.3604)	(3.840)

Notes: The number of lag truncations used in the calculation of the seven Pedroni statistics is 4. Numbers in parentheses below regression coefficients are t-values. ** and *** Significant at the 5 and 1 percent levels, respectively.

Table 16: Panel Granger Causality Test Results

Dependent Variable	F-statistics				ECT (t-statistics)
	ΔY	ΔBB	ΔM	ΔER	
ΔY	-	4.158**	2.761*	4.332**	-0.209**
					(-2.151)
ΔBB	2.468	-	2.741*	0.524	-0.022
					(-1.035)
ΔM	3.217**	2.866*	-	0.886	-0.007
					(-1.379)
ΔER	3.003**	0.610	2.846*	-	-0.008
					(-1.394)

Note: *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.

Figures in parentheses are t-statistics.

4.3. Panel Granger Causality Test

Since it is found there is co-integration between real GDP, budget balance, real money and real exchange rate, we can further investigate the Granger causality direction by the panel error correction model (ECM). The coefficients of all ECM items are negative, but ECT is only statistically significant for the first equation, that is, real GDP (Y) as the dependent variable. This further indicates that budget balance, real money and real exchange rate play a pivotal role on the economic activity of these PICs in the long term.

Looking at the short-run causal relationship, budget balance, real money and real exchange rate are found to be statistically significant at 10 percent level in real GDP (Y) equation, indicating that these variables Granger cause real GDP. In budget balance (BB) equation, monetary measure (M) appears to be statistically significant. In monetary measure (M) equation, both budget balance and real GDP are found to be statistically significant, while real GDP and monetary measure appear to be statistically significant.

In summary, there is bi-directional causality between real GDP and monetary measure, real GDP and real exchange rate, budget balance and monetary measure. On the other hand, there is a unidirectional causality from budget balance to real GDP, and monetary measure to real exchange rate. Overall, we can conclude that both fiscal policy and monetary measure do Granger cause real GDP.

5. Conclusions and Policy Implications

The effectiveness of policy tools on growth and growth stabilization has long been one of the contentious issues in economic literature. Using a panel data set for four PICs - Fiji, Samoa, Tonga and Vanuatu, covering a 26-year period (1986-2011), we empirically test the effectiveness of fiscal and monetary policies on real GDP. Based on Pedroni's cointegration tests, it is found that budget balance and monetary measure has a significant effect on real GDP in the long-term for these four PICs. For short-term effect, using panel Granger causality test, we find a direct effect of both fiscal and monetary tools as well as an indirect effect on economic activities in the four PICs.

The empirical results have clear policy implications, which have a bearing on employment of fiscal and monetary policy tools that would stabilize and promote economic activities. Policy makers should pay close attention to reduce the level of fiscal budget deficit as well as to maintain the optimal level of market financial liquidity. The results also indicate the presence of indirect causality relationship between expansionary monetary policy and economic activities via exchange rate. Expansionary monetary policies would eventually be inflationary resulting in the depreciation of currency. Therefore, PICs would do well to exercise due caution in the employment of fiscal and monetary policies.

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