

IMF Working Paper

Global and Regional Spillovers to Pacific Island Countries

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Asia and Pacific Department

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Abstract

Regional integration of Pacific Island countries (PICs) with Australia, New Zealand, and emerging Asia has increased over the last two decades. PICs have become more exposed to the region's business cycles, and spillovers from regional economies are more important for PICs than from advanced economies outside the region. While strong linkages with Asia would help in the event of a global downturn, PICs remain particularly vulnerable to global commodity price shocks. In this paper, we use a Vector Error Correction Model (VECM) for each PIC to gauge the impact of global and regional growth spillovers. The analysis reveals that the impact on PICs' growth from an adverse oil shock would be substantial, and in some cases even larger than from a negative global demand shock. We also assess the spillovers to the financial sector from the deterioration of the global outlook. PICs should continue to rebuild policy buffers and implement growth-oriented structural reforms to ensure sustained and inclusive growth.

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Executive Summary

Regional integration of Pacific Island countries (PICs) with Australia, New Zealand, and emerging Asia has increased over the last two decades, presenting PICs with large opportunities.² PICs have become more exposed to regional business cycles. And strong linkages with resilient economies in the region (Australia and emerging Asia) have helped cushion the downturn. This integration has greatly benefitted PICs but has also posed challenges because shocks are transmitted more rapidly in a more interconnected world.

The PICs' stronger linkages with Australia and New Zealand are well established.

Australia is by far the largest provider of aid and foreign direct investment (FDI). Australia and New Zealand account, on average, for one-third of PICs' trade, while remittances from these two economies account for about 60 percent of total remittances in Fiji and Samoa. Tourist arrivals from Australia and New Zealand represent 60–70 percent of total arrivals in Fiji, Vanuatu, and Samoa. Also, the PICs' banking sector is dominated by Australian banks.

Linkages with emerging Asia—including China—have also grown substantially, especially over the last 10 years. In particular, PICs' trade with China has increased sevenfold, on average, since the early 2000s, with China becoming the largest trading partner for some (e.g., Solomon Islands). Similarly, FDI patterns have become more diverse, with the share of inward FDI from China and other East Asian trading partners, notably Korea, growing at the expense of such traditional investors as Japan.

Spillovers from regional economies are more important for PICs than from advanced economies outside the region. Australia is by far the main source of direct and indirect spillovers, both over the short and long term, except for the Compact countries (Marshall Islands, Micronesia, and Palau), for which the United States appears to be the most important partner, consistent with the large volume of U.S. aid. Spillovers from New Zealand, directly or through Australia, are also important for several PICs. Over the last decade, shocks from emerging Asia have had a greater impact on PICs' business cycle, while the role of more traditional partners, such as Japan, has declined. In the short run, the elasticity of PICs' output with respect to regional partners' GDP is at times higher than one, pointing to the critical role for policies to stabilize the business cycle.

While strong linkages with Asia and Pacific would help in the event of a global downturn, PICs remain particularly vulnerable to global commodity price shocks. The impact on PICs' growth from an adverse oil shock (whereby oil prices rise 50 percent above the baseline) would be substantial, and in some cases larger than from a negative global demand shock.³

Sound policies can enhance resilience to shocks. Increasing regional linkages offer the potential for greater insurance against risks generated by business cycles in non-regional advanced economies. But PICs should continue to rebuild policy buffers and implement growth-oriented structural reforms to ensure sustained and inclusive growth.

² PICs covered in this paper are the IMF Pacific Island members.

³ These global scenarios are described in the April 2012 *World Economic Outlook*.

I. INTRODUCTION

Growth in the Pacific island countries (PICs) has been weak over the last decade. The crisis in 2008–09 compounded the problem by reducing growth further, especially among the commodity importers. While recovery is still under way, headwinds remain in light of global economic uncertainty. Should downside risks to the global outlook materialize, adverse spillovers would occur mainly through regional partners. Linkages with Australia, New Zealand, and emerging Asia would help offset the downturn, thanks to their strong fundamentals. But PICs remain particularly vulnerable to commodity price shocks. To enhance their resilience to shocks, PICs should continue to rebuild policy buffers and implement growth-oriented structural reforms to ensure sustainable and inclusive growth.

II. PICs BEFORE AND AFTER THE GLOBAL CRISIS

Most PICs seem to be stuck on a low-growth path (Figures 1 and 2). In the 10 years preceding the 2008–09 global financial crisis, PICs' growth averaged just 2 percent a year—a much lower rate than the Asian low-income countries (6 percent), the Eastern Caribbean Currency Union countries (4 percent) and small states (4½ percent), which are similar comparators. Volatility remains high, but it has declined over the last decade (Figure 3). Finally, relative growth performance among PICs has changed over time (Figure 4) in favor of commodity exporters which have benefited from global price trends since 2004, suggesting a different resilience to shocks in the future.

Figure 1 PICs: Real GDP Growth
(In percent)

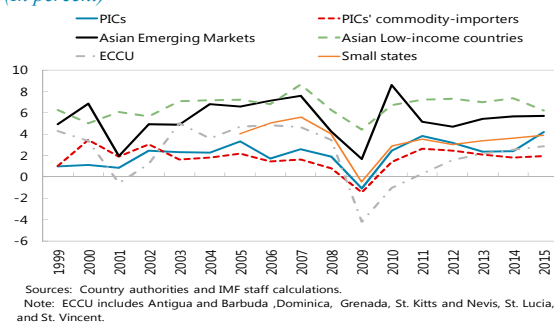


Figure 2: PICs: Real GDP Growth
(In percent)

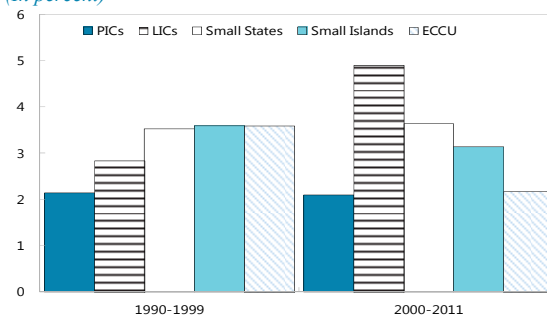


Figure 3. Standard Deviation of Real GDP Growth
(In percent))

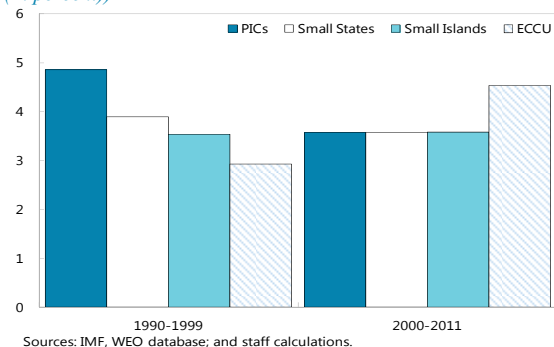
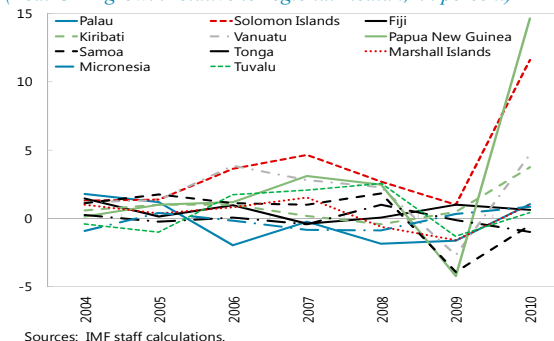
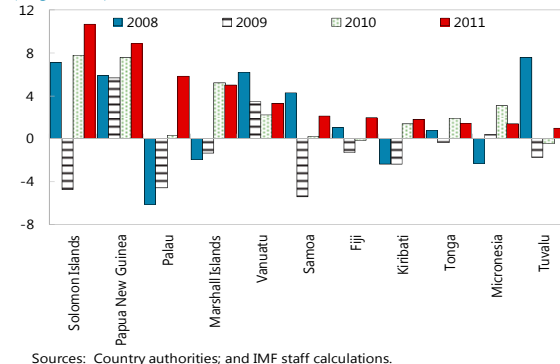


Figure 4. PICs: Relative Growth Performance
(Real GDP growth relative to regional median, in percent)



PICs were hit by the 2008–09 global crisis and have since been recovering only slowly—although at different paces (Figure 5). The flood in Fiji and the earthquake and tsunami in Samoa further reduced growth. Excluding the net commodity exporters (Papua New Guinea and Solomon Islands), average real GDP fell by 1.2 percent in 2009, and growth rebounded to just over ½ percent in 2010 and to about 2 percent on average in 2011. In Papua New Guinea and Solomon Islands, in contrast, real GDP grew by 7–7½ percent in 2010 and 9 percent in 2011. This rapid growth was led by the construction of a liquefied natural gas (LNG) project in Papua New Guinea—amounting to 200 percent of GDP—and strong mining and logging activity in the Solomon Islands.

Figure 5. PICs: Real GDP Growth
(In percent)



PICs' recovery is also proceeding more slowly than those in Asian low-income countries (LICs) and emerging economies, although growth has recently been reverting to pre-crisis levels. The slower recovery reflects PICs' relatively small export base, which precludes a large increase in external demand associated with global recovery. Helped in part by the resilience of Australia during the crisis, PICs have, however, recovered more strongly than some comparators in other regions, such as in the Eastern Caribbean Currency Union (ECCU), which rely more heavily on demand and the business cycle in the United States. In particular, the strength of the Australian and New Zealand dollars continued to support the PIC tourist sector over the last two years (Figure 6).

Figure 6. PICs: Tourists Arrivals
(2005=100)

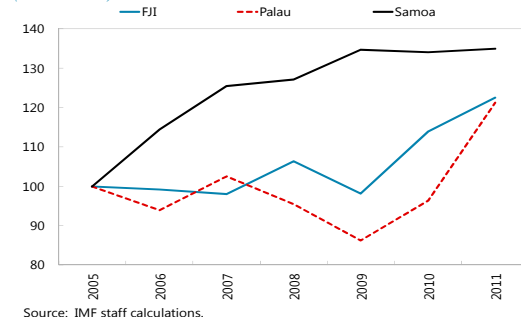
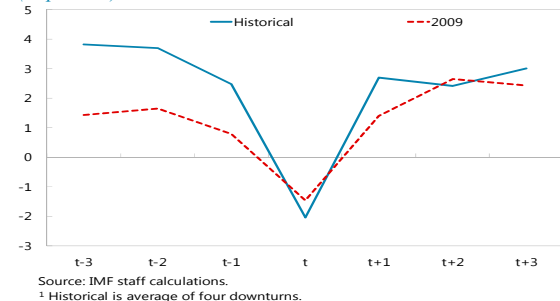


Figure 7. PICs Commodity Importers: Real GDP Growth around Downturns¹
(In percent)



A closer look suggests that PIC net commodity importers are also recovering more slowly than in previous recessions. Over the past four decades, PIC importers have experienced five episodes of economic

contraction—1975, 1980, 1987, 1997, and 2009. Only two of these coincided with global recessions (1975 and 2009). The 2009 contraction was milder than the previous PIC downturns, yet the recovery has been much weaker (Figure 7). The picture differs, however, for net commodity exporters (Figure 8). The contraction was still milder than in previous episodes, but the recovery has been much faster.

What explains the current slow recovery of PIC commodity importers relative to past episodes and to Asian LICs? We conducted a VAR analysis following Berg and others (2010) to identify the shocks that have a larger and more persistent impact on PICs' growth and find that terms-of-trade shocks result in a far greater output loss than do shocks to external demand (Figures 9 and 10). This may explain the milder recession in PICs in 2009 as well as the slower recovery, relative to previous episodes. In contrast, external-demand shocks have a larger impact on output in Asian LICs, which may help explain the greater impact of the global recession on those economies.

Terms-of-trade shocks have a larger impact than external-demand shocks in PICs for several reasons. Given their narrow export and production base and geographical remoteness, most PICs have structural trade deficits. Except for Papua New Guinea and Solomon Islands, PICs are commodity importers and therefore vulnerable to swings in commodity prices. Given the increase in commodity prices and greater commodity price volatility in recent years, terms-of-trade shocks have translated into larger output shocks. Higher import prices have also raised the cost of production and reduced real household income.

Figure 8. PICs Commodity Exporters: Real GDP Growth around Downturns¹ (2005=100)

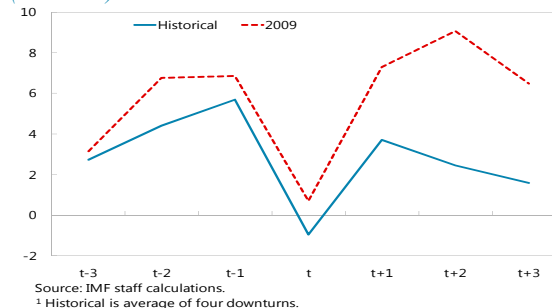


Figure 9. PICs: Response to Change in Loss Output to External Demand

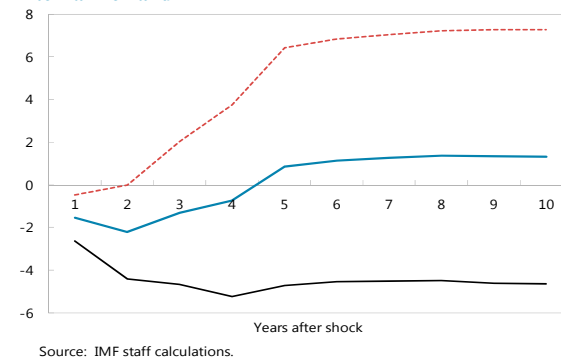
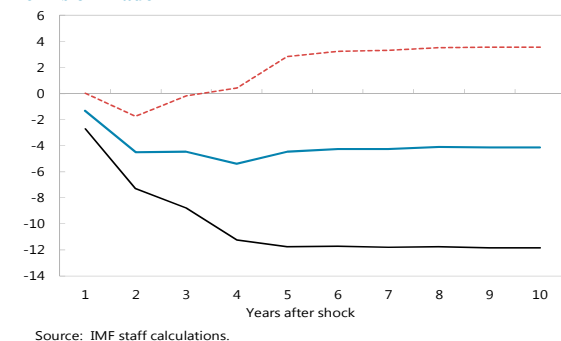


Figure 10. PICs: Response to Change in Loss Output to Terms of Trade

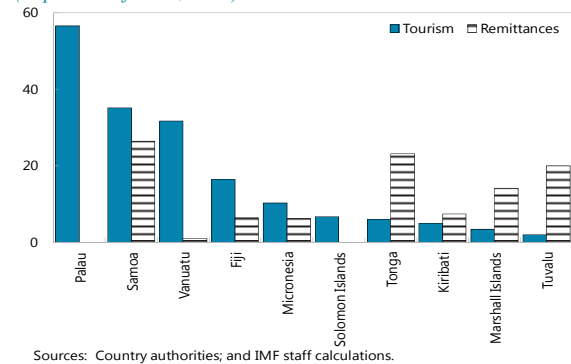


III. CHANNELS OF SPILLOVER: A QUALITATIVE ANALYSIS

If a global downside scenario materializes, the channels of contagion would also vary across PICs.

- Tourism, remittances, and foreign direct investment (FDI).** Fiji, Palau, Samoa, and Vanuatu would be hurt through a fall in tourism, which accounts for between 20 percent and 50 percent of GDP (Figure 11), with spillovers to the broader economy through reduced tourism-related FDI. Remittances would be one of the main channels of contagion in Samoa, Tonga, and Tuvalu, and to a lesser extent in Fiji, Kiribati, Marshall Islands, and Micronesia. Indeed, tourist arrivals and remittances declined during the 2008–09 crisis (Figure 12 panel chart).

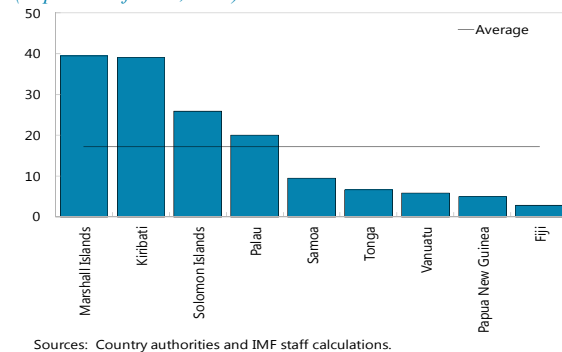
Figure 11. PICs: Tourism and Remittances
(In percent of GDP, 2010)



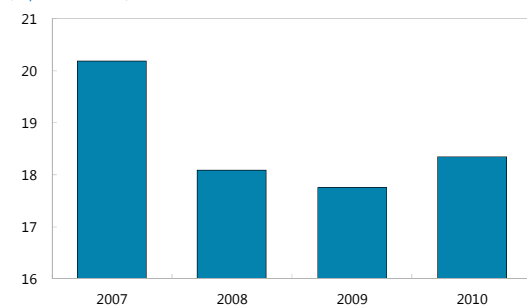
- Terms of trade.** Worsening terms of trade would hurt the trade position in Papua New Guinea and Solomon Islands. However, the negative impact could be mitigated by rises in the price of gold—a metal that both economies increasingly export—if it is perceived as a safe haven. Among the commodity importers, the decline in food and fuel prices could provide some relief to household budgets, mitigating the negative impact on growth.

- Financial channels.** A fall in stock prices in the advanced economies would also affect PICs with large trust funds whose assets are invested offshore (Kiribati, Marshall Islands, Micronesia, Palau, and Tuvalu). A large decline in the value of these trust funds, as occurred during 2008–09, could worsen fiscal sustainability over the medium and long term in Kiribati, Marshall Islands, Micronesia, and Palau.

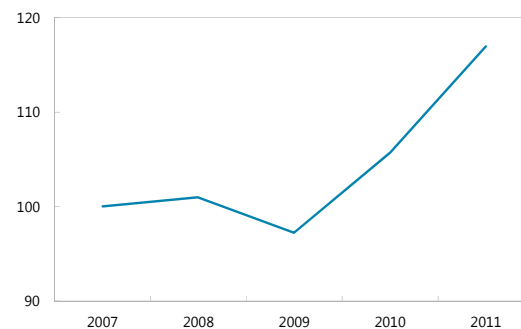
Figure 13. PICs: Grants
(In percent of GDP, 2011)



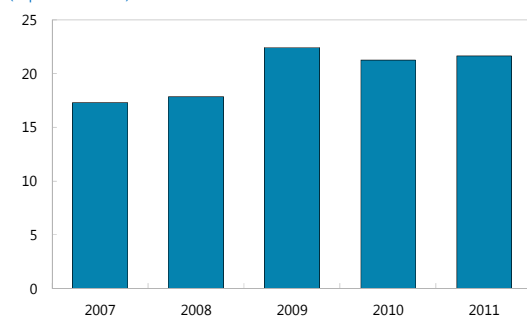
- Aid.** Aid flows (averaging 20 percent of GDP, Figure 13) are expected to hold up well, in line with the experience during previous crisis. The planned increase in the official development assistance (ODA) of Australia and New Zealand over the next few years would continue to support growth in the Pacific island economies.

Figure 12. Pacific Island Countries—Channels of Spillover: Stylized Facts**Remittances**
(In percent of GDP)

Sources: Country authorities; and Fund staff calculations.

Tourists arrivals
(2007=100)**Grants**

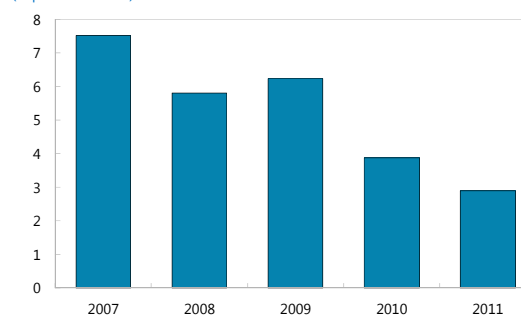
(In percent of GDP)



Sources: Country authorities; and Fund staff calculations.

FDI

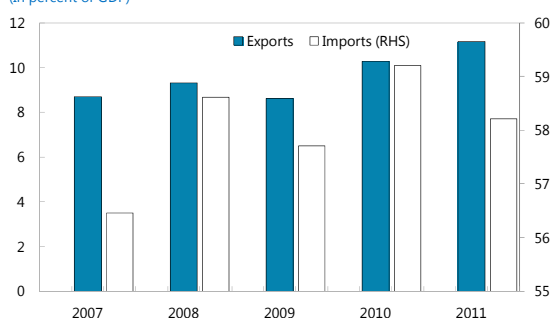
(In percent of GDP)



Sources: Country authorities; and Fund staff calculations.

Exports and Imports

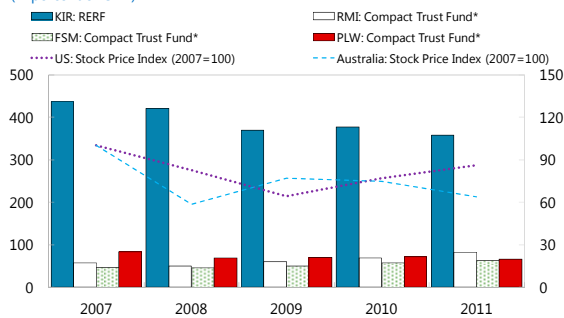
(In percent of GDP)



Sources: Country authorities; and Fund staff calculations.

PICs: Sovereign Investment Fund Balances

(In percent of GDP)



Sources: Country authorities; and Fund staff calculations.

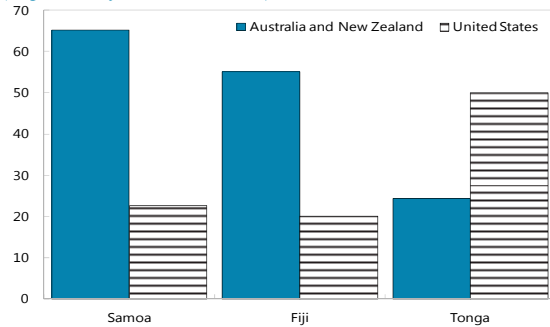
* Fiscal year.

IV. ASSESSING GROWTH SPILLOVERS**A. Stylized Facts**

Understanding growth spillovers from the region is key to assessing how external shocks from the global economy would affect PICs. Stylized facts suggest that direct exposure to Europe is limited. The impact of a global slowdown on PICs would occur through spillovers from regional economies and to a lesser extent from the United States.

Linkages with Australia and New Zealand are strong and well established. This owes to PICs' strong exposure to these economies through trade, tourism, remittances, FDI, aid, and financial channels. Trade with Australia and New Zealand accounts, on average, for one-third of PICs' trade, while remittances from Australia and New Zealand account for about 60 percent of total remittances in Fiji and Samoa (Figure 14). Tourist arrivals from Australia and New Zealand represent 60–70 percent of total arrivals in Fiji, Vanuatu, and Samoa (Figure 15). The PICs' financial sector is dominated by Australian banks (as discussed later in session III). Australia is by far the largest provider of aid. Among OECD countries is also the largest foreign investor (Figures 16 and 17).

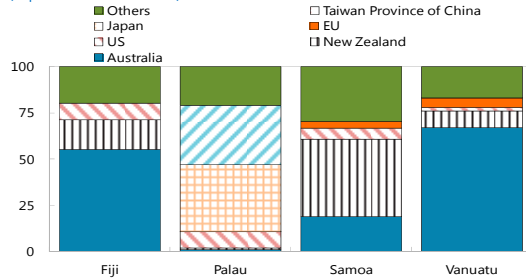
Figure 14. PICs: Remittances by Country of Origin
(In percent of total remittances)



Sources: Country authorities; and IMF staff calculations.

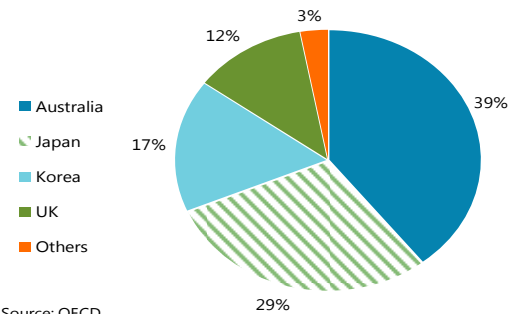
Figure 15. PICs: Tourists by Country of Residence
(In percent of total arrivals)

PICs: Tourists by Country of Residence
(In percent of total arrivals)



Sources: Country authorities; and IMF staff calculations.

Figure 16. PICs: FDI by OECD countries
(In percent of total FDI, 2005-2010 average)

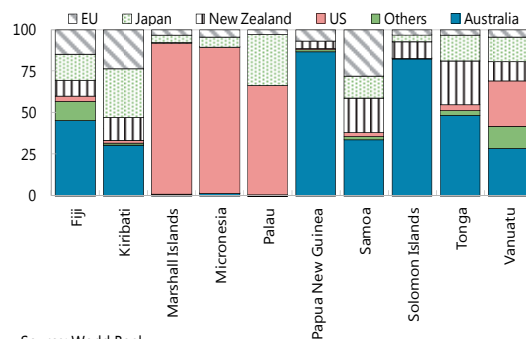


Source: OECD.

¹ Excludes Norway and Denmark.

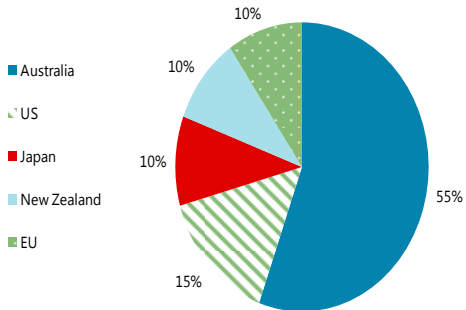
Figure 17: Official Development Aid

PICs: Official Development Assistance by Donors
(In percent of total aid, 2010)



Source: World Bank.

PICs: Official Development Aid by OECD Donors
(In percent of total aid, 2010)

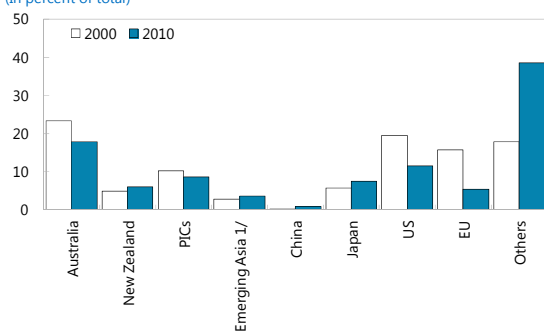


Source: OECD.

Figure 18. Pacific Island Countries: Direction of Trade

Fiji: Exports by Destination

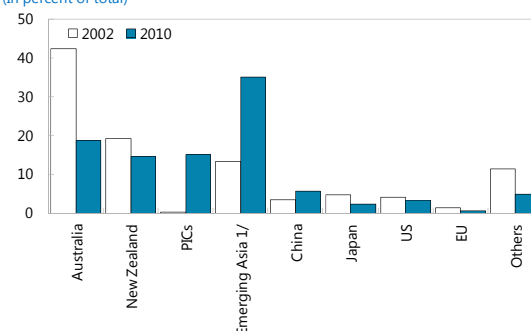
(In percent of total)



1/ Excludes China.

Fiji: Imports by Country of Origin

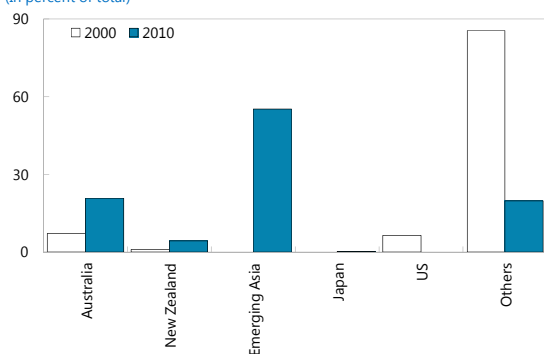
(In percent of total)



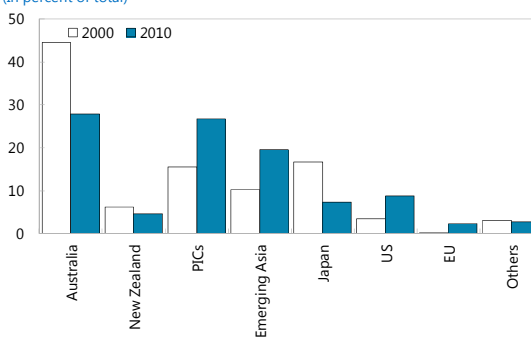
1/ Excludes China.

Kiribati: Exports by Destination

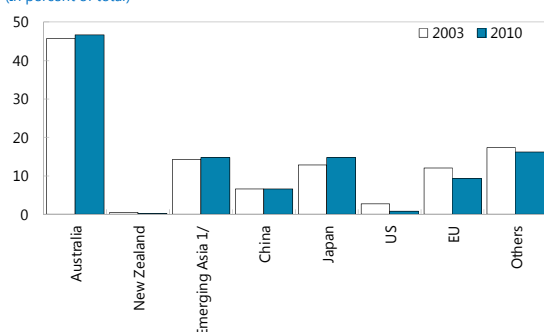
(In percent of total)

**Kiribati: Imports by Country of Origin**

(In percent of total)

**Papua New Guinea: Exports by Destination**

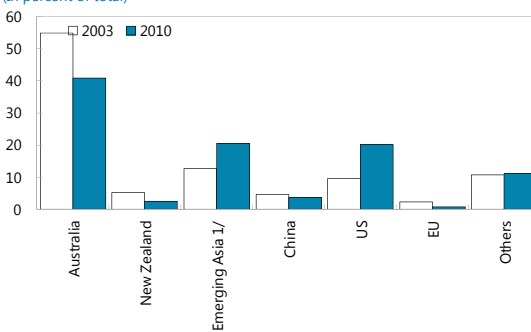
(In percent of total)



1/ Excludes China.

Papua New Guinea: Imports by Country of Origin

(In percent of total)



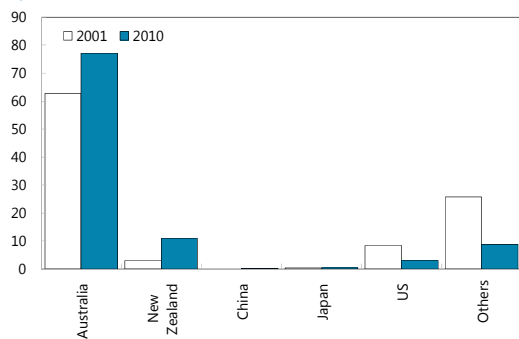
1/ Excludes China.

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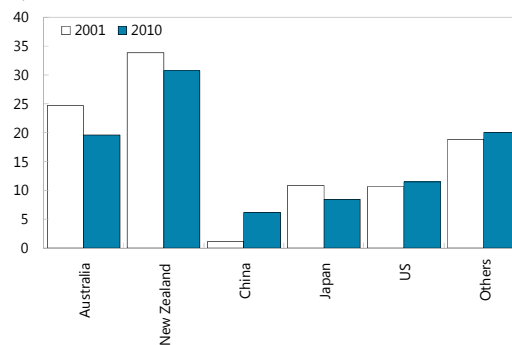
Figure 18 (cont.) Pacific Island Countries: Direction of Trade

Samoa: Exports by Destination

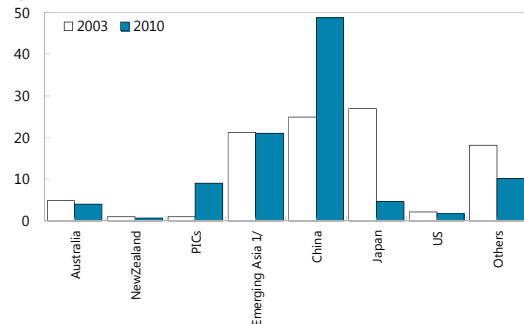
(In percent of total)

**Samoa: Imports by Country of Origin**

(In percent of total)

**Solomon Islands: Exports by Destination**

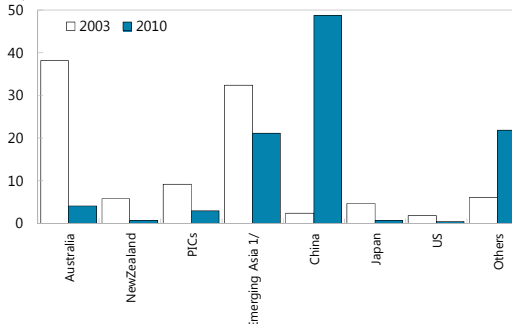
(In percent of total)



1/ Excludes China.

Solomon Islands: Imports by Country of Origin

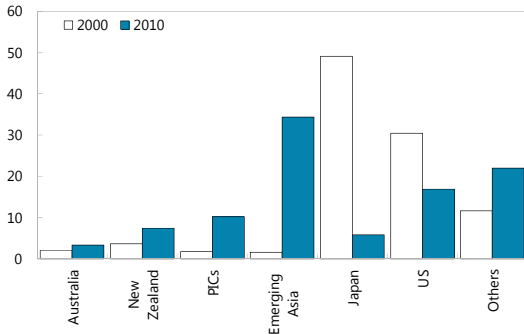
(In percent of total)



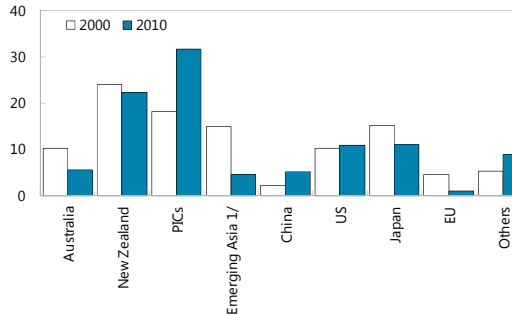
1/ Excludes China.

Tonga: Exports by Destination

(In percent of total)

**Tonga: Imports by Country of Origin**

(In percent of total)

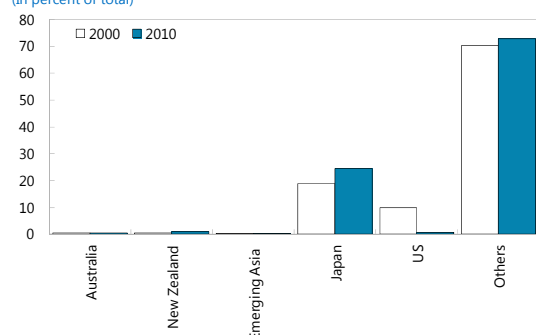


1/ Excludes China.

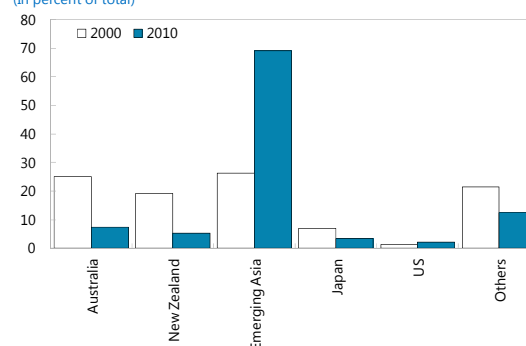
Continued...

Figure 18 (cont.) Pacific Island Countries: Direction of Trade**Vanuatu: Exports by Destination**

(In percent of total)

**Vanuatu: Imports by Country of Origin**

(In percent of total)



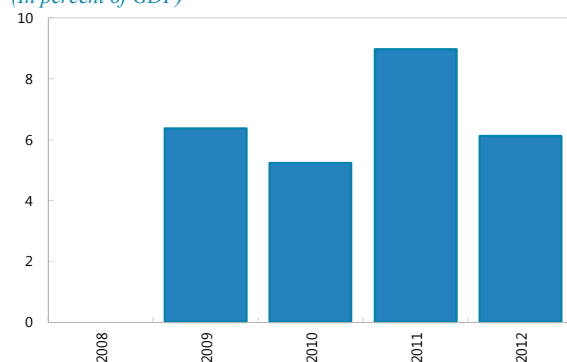
Sources: Country authorities and IMF staff calculations.

The United States has a large impact on some PICs. These include in particular the islands that have signed the Compact Agreement with the United States (Marshall Islands, Micronesia and Palau). The aid from the United States represents over 65 percent of total aid in Palau and 90 percent of total aid in the Marshall Islands and Micronesia. Remittances from the United States account for 50 percent of total remittances in Tonga.

Linkages between PICs and emerging Asia have grown over the last decade. Direction of trade data points to a large increase in China's share of PICs' trade (Figure 18). Trade with China has increased 7 times on average for PICs since early 2000s, with China becoming the first trading partner for Solomon Islands. External financing from China has become substantial for Tonga (Figure 19). Similarly, FDI patterns have become more diverse, with the share of inward FDI from China and other East Asian trading partners, notably Korea, growing at the expense of traditional investors (Japan). (Figure 20)

Figure 19. Tonga: Loan Disbursements from China

(In percent of GDP)



Source: Country authorities.

Figure 20. PICs: FDI by Country of Origin ¹

(In percent of total FDI)



Sources: OECD and UNCTAD.

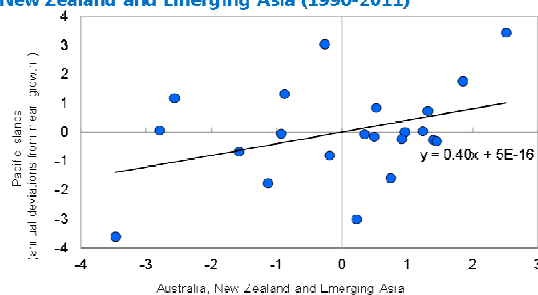
¹ Includes Australia, China, Korea, Japan, France, Germany, Italy, Luxembourg, Netherlands, New Zealand, Sweden, United Kingdom, and United States.

B. Econometric Analysis

Can the growth impulse from still-fast-growing neighbors spill over to PICs in the form of tailwinds to the recovery process or buffers during a downward scenario? A simple correlation analysis between real GDP growth rates of Australia, New Zealand, and emerging Asia suggests an increasing co-movement between PICs' business cycle and its regional neighbors over the last two decades, with the correlation increasing over the last 10 years (Figure 21). The econometric analysis investigates further the relevance of these potential growth spillovers from the global and regional economies.

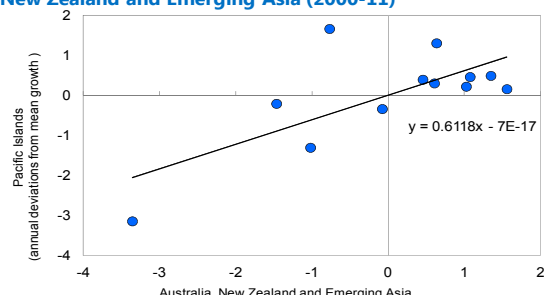
Figure 21. Pacific Island Countries: Correlation of GDP Growth with Neighbors

PICs: Correlation of Real GDP Growth with Australia, New Zealand and Emerging Asia (1990-2011)



Sources: Country authorities; and IMF staff calculations.

PICs: Correlation of Real GDP Growth with Australia, New Zealand and Emerging Asia (2000-11)



Sources: Country authorities; and IMF staff calculations.

(1) Baseline scenario

We use a Vector Error Correction Model (VECM) for each PIC to gauge the impact of global and regional growth spillovers on individual PICs. We use annual data from the late 1970s through 2011.⁴ The analysis examines both short- and long-term dynamics using historical data. We use a cointegration technique to identify the long-run relationship between GDP in PICs and GDP of the main trading partners, using variables expressed in levels.⁵ We use that long-run relationship to build a structural model that captures both long-run and short-run dynamics which is then employed for scenario analysis. Focusing on individual PICs—rather than treating them as a homogenous group—allows us to shed light on spillovers specific to each PIC. The econometric results are summarized below with technical details in the Appendix.

Our main findings can be summarized as follows:

⁴ A shorter sample period may apply depending on country data availability.

⁵ Cointegration models are preferable to single equation models with variables expressed in percentage changes because the former can capture both long-run and short relationships among variables, not the short term.

- Using a sub-sample analysis, the PICs appear to be more integrated with regional economies (Australia, New Zealand, and emerging Asia) than they were twenty years ago. This suggests an increase in growth spillovers from the region.
- Australia is by far the main source of direct and indirect spillovers, both in the short and long term, with the exception of the Compact countries (Marshall Islands, Micronesia, and Palau). Australia sometimes has an indirect impact on the PICs through New Zealand. Direct spillovers from New Zealand are also highly relevant for several PICs.
- Over the last decade, shocks from emerging Asia have had a greater impact than in the past on PICs' business cycle (i.e., the short term). This suggests that the role of emerging Asia in explaining output in the PICs has increased while that of more traditional partners, such as Japan, has declined.
- In the short run, the elasticity of output with respect to regional partners is at times higher than one, suggesting a larger scope for policies to stabilize the business cycle.
- In the short term, the main channel of spillovers is commodity prices, consistent with the analysis presented in the previous section. The adverse oil shock scenario shows a larger and more negative impact on growth than the global demand shock scenario confirming that PICs are very vulnerable to commodity price shocks.

(2) Downside scenarios

8. We simulate the impact on PICs' growth of two external downside scenarios.

These scenarios are consistent with two global scenarios developed using the IMF Global Economy Model (GEM) and presented in the April 2012 *World Economic Outlook (WEO)*.⁶ Using the econometric models discussed above, we estimate the spillovers to individual PICs from global and regional economies.

9. The first downside global scenario from the *WEO* assumes that financial turmoil in the euro area intensifies. This scenario implies that global growth will fall short of *WEO* baseline projections by about 1½ percentage points in 2012 and 2013, with euro area growth rate declining by 2.5 percentage points in 2012 and a further decline of 1.1 percentage points in 2013. The direct spillovers from stress in the euro area to the PICs will be limited. The slowdown in global growth would spill over to the PICs within the same year through its regional partners and the United States.⁷ For the commodity importers, the decline in GDP

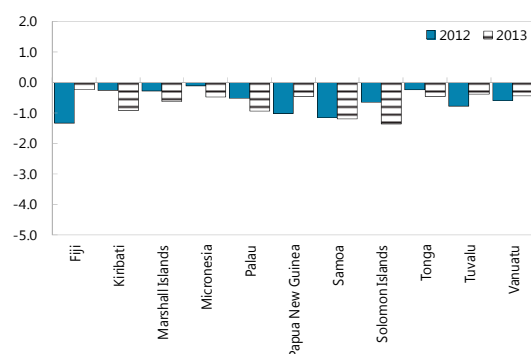
⁶ IMF, *World Economic Outlook*, April 2012, <http://www.imf.org/external/pubs/ft/weo/2012/01/>.

⁷ The U.S. growth rate is estimated to fall by 0.75 percentage point in 2012 and by 0.6 percentage point in 2013. In emerging Asia, growth is assumed to decline by 0.8 percentage point in 2012 and 0.4 percentage point in 2013. For other countries (a grouping of countries in GEM that includes Australia and New Zealand, among others) growth is estimated to decline by 1½ percentage points in 2012 and by ½ percentage point in 2013,

(continued...)

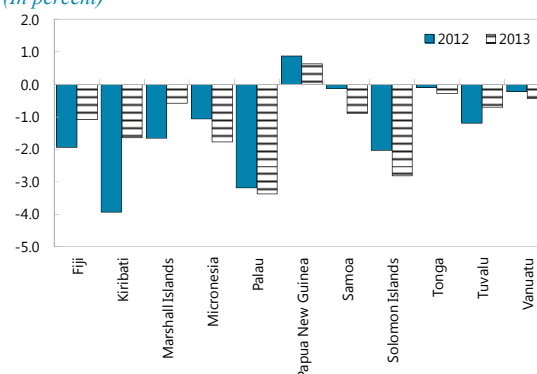
growth is estimated, on average, at a little over $\frac{1}{2}$ percentage point each year, compared with the baseline. For the PIC commodity exporters, the impact on growth would be much larger, declining by almost 1 percentage point in each year of the shock. The milder impact on commodity importers depends on the fact that oil prices would decline under this scenario as a result of lower global growth. (Figure 22a-b, 23, 24, 25).

Figure 22a. PICs: Change of Growth in a Downward Growth Scenario from Financial Turmoil in the Euro Area
(In percent)



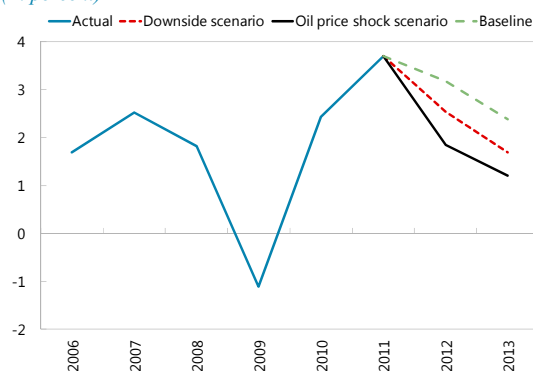
Source: IMF staff calculations.

Figure 22b. PICs: Change of Growth in the Oil-Price-Shock Scenario
(In percent)



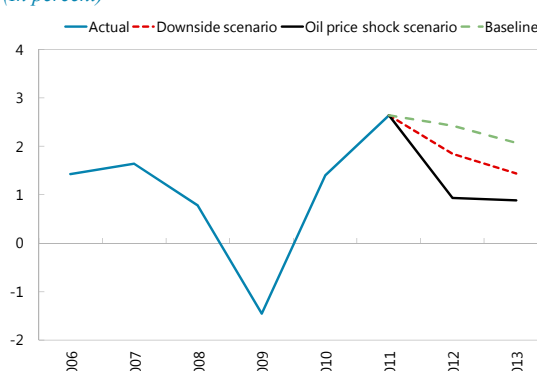
Source: IMF staff calculations.

Figure 23. PICs: Real GDP Growth Under Different Scenarios
(In percent)



Source: IMF staff estimates.

Figure 24. PICs: Real GDP Growth for Commodity Importers
(In percent)



Source: IMF staff estimates.

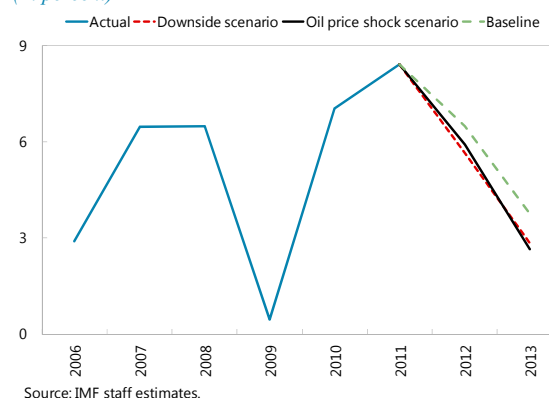
relative to the baseline. However, with more policy space than other countries in this group, the impact on both Australia and New Zealand could be less severe than for other members.

The impact on PICs' growth from an adverse oil shock scenario—the second scenario—would be substantial.

This second scenario assumes a negative oil-price shock triggered by geopolitical uncertainty in the Middle East that would raise the real oil price by 50 percent, relative to the baseline, for at least two years. Global output growth would thus be lower than the *WEO* projection by about ½ percentage point in 2012 and a little more than 1 percentage point in 2013⁸.

Simulations using the VECM model suggest that negative spillovers spurred by higher oil prices will reduce all PICs' growth rates in both years, except for the commodity-exporter Papua New Guinea whose terms of trade would improve.⁹ The decline would average about 1½ percentage points of GDP for commodity importers—where the baseline trend growth is already low, at about 2 percent. On average, this impact on PICs' growth would be larger than in the previous scenario (where the financial turmoil in the euro area intensifies). In part, the PICs' greater sensitivity to global oil and commodity prices reflects the large weight of fuel and food in the consumer price index basket and the relatively larger share of imported items in consumption and investment, owing to their smaller domestic manufacturing base. It also reflects the fact that PICs would have to cope with higher oil prices amid slower growth among their trading partners.

Figure 25. PICs: Real GDP Growth for Commodity Exporters (In percent)



⁸ In this scenario, U.S. growth would fall by 0.7 percentage point in 2012 and 0.4 percentage points in 2013, while growth rates in Australia and New Zealand would decline by 0.6 percentage point in 2012 and by 0.9 percentage point in 2013. Growth in emerging Asia is assumed to decrease by 0.8 percentage point in 2012 and 0.5 percentage point in 2013.

⁹ The sensitivity of PICs' growth rates to global commodity price shocks is similar to Peiris (2012).

V. ASSESSING SPILLOVERS TO THE FINANCIAL SECTOR¹⁰

A. Stylized Facts

The financial sector in the PICs is also closely integrated with regional economies. It consists mainly of foreign-owned banks—primarily Australian—and large provident and/or trust funds. A Papua New Guinea (PNG) domestic bank—Bank of the South Pacific—has branches in Fiji and in the Solomon Islands. Foreign-owned banks are equally split between branches or subsidiaries (Table 1). These banks have been profitable and proved resilient to the global financial crisis. Reflecting their asset allocation mix and large exposure to global financial markets, the provident and trust funds did not cope as well with the crisis.

The size of the banking sector varies across PICs. Not surprisingly, total bank assets (in U.S. dollar terms) are greatest in the largest economies, although not as a percent of GDP. Relative to GDP, the size of the banking system is broadly in line with Asian low-income countries. Reflecting the small size of their economies, the banking sector consists generally of a small number of commercial banks, or just one bank, as in Kiribati and Tuvalu. (Figure 26 and 27)

Figure 26. Total Assets
(In billions USD; 2010)

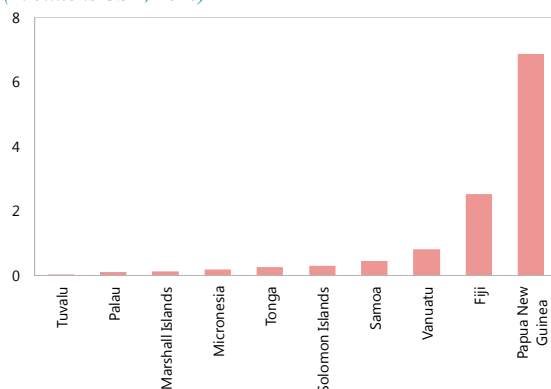
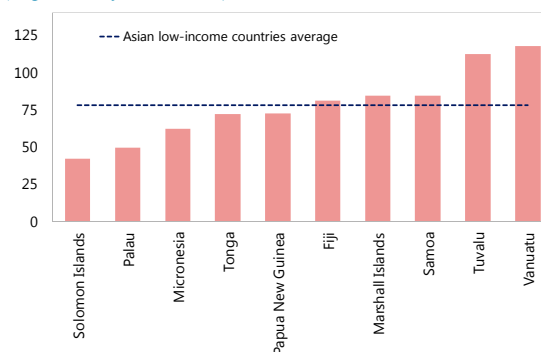


Figure 27. Total Assets
(In percent of GDP; 2010)



Note: the National Bank of Tuvalu performs some monetary functions, including the holding of government accounts and foreign assets.

10. The banks are well capitalized, with high total capital and Tier 1 capital adequacy ratios. This provides a buffer against financial shocks. Reflecting the vulnerability of PICs to shocks, in many cases the authorities have opted for a capital requirement ratio in excess of the Basel II minimum requirements. Furthermore, several banks exceed the required minimum ratio, which varies widely across the islands.

¹⁰ We wish to thank Ms. Sri Joedianna Pg. Hj Mohammed for collecting the information on the financial sector.

Table 1: Commercial Banks in Pacific Island Countries 1/				
Countries	Australian Banks	U.S. Banks 2/	Others	Domestic Banks
Fiji	ANZ		Bank of Baroda (India)	
	Westpac		Bank of the South Pacific (PNG)	
Kiribati	ANZ			
Marshall Islands		Bank of Guam		Bank of Marshall Islands
Micronesia		Bank of Guam		Bank of the FSM
Palau		Bank of Guam	First Commercial Bank (Taiwan, Province of China)	Asia Pacific Commercial Bank
		Bank of Hawaii		Palau Construction Banks
		Bank Pacific		First Fidelity Bank
Papua New Guinea	ANZ		Maybank (Malaysia)	Bank of the South Pacific
	Westpac			
Samoa	ANZ			National Bank of Samoa
	Westpac			Samoa Commercial Bank
Solomon Islands	ANZ		Bank of the South Pacific (PNG)	
	Westpac			
Timor Leste	ANZ		Caixa (Portuguese), Bank Mandiri (Indonesia)	National Commercial Bank of Timor Leste
Tonga	ANZ			MBf Bank
	Westpac			
Tuvalu				National Bank of Tuvalu
Vanuatu	ANZ		Bred Bank (Banque Populaire, France)	National Bank of Vanuatu
	Westpac			

1/ Subsidiaries highlighted in blue.

2/ Insured under the Federal Deposit Insurance Corporation (FDIC) scheme.

Figure 26. Total Assets
(In billions USD; 2010)

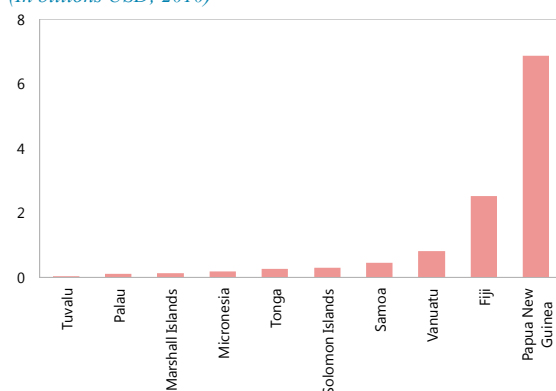
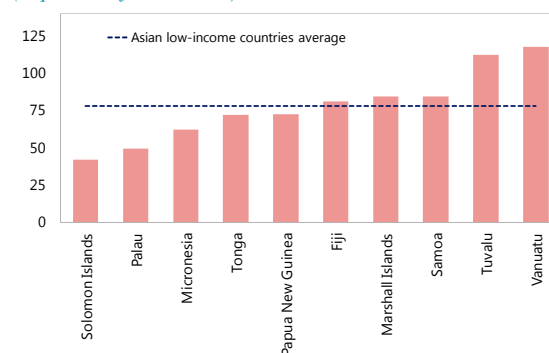


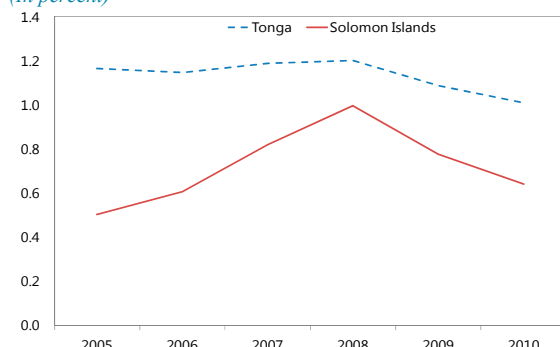
Figure 27. Total Assets
(In percent of GDP; 2010)



Note: the National Bank of Tuvalu performs some monetary functions, including the holding of government accounts and foreign assets.

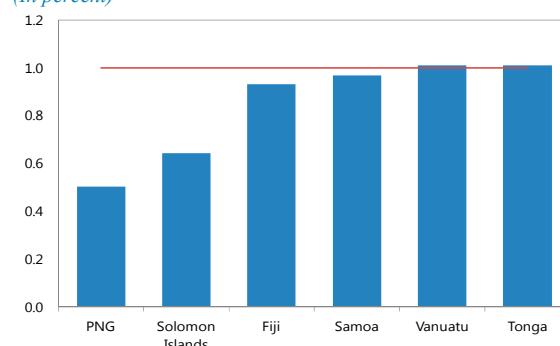
As banks rely largely on domestic deposits for funding, the funding structure provides an additional buffer against turmoil in international financial markets. The lower ratios in Papua New Guinea and Solomon Islands reflect the large excess liquidity these countries have faced since the global financial crisis. Given the large bank capitalization, high loan to deposit ratios do not necessarily imply reliance on wholesale funding. These ratios have been largely stable in recent years, with the exception of Tonga and Solomon Islands, where banks have improved their funding profiles since 2008 by increasing their reliance on deposits. (Figures 30 and 31)

Figure 31. Loan to deposit ratio
(In percent)



Sources: Country Authorities; and IMF staff estimates.

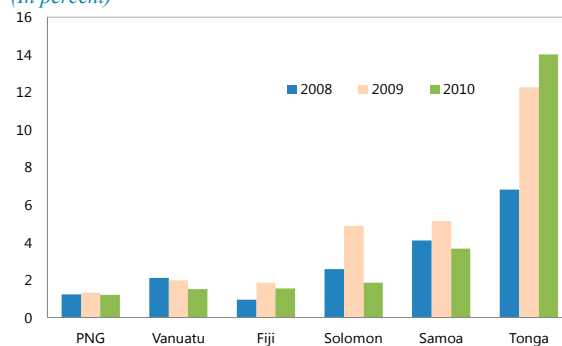
Figure 30. Loan to deposit ratio
(In percent)



Sources: Country Authorities; and IMF staff estimates.

The quality of loans in PICs appears to be relatively good, with some variation reflecting country-specific circumstances, including collateral laws.¹¹ The ratio of loan-loss provisioning to total loans—a proxy for loan quality— suggests a deterioration of this ratio in 2009 followed by an improvement across almost all PICs. (Figure 32)

Figure 32. PICs: Provision Expense to Gross Loans (In percent)



Sources: Country Authorities; and IMF staff estimates.

Provident and Trust Funds

A more direct effect of a global economic slowdown will occur through the impact on the PICs' provident and trust funds. These funds are large both relative to GDP (Table 3) and to the size of the domestic banking system. In some cases, the objective of the funds is to provide retirement benefits, while in others it is to finance budget deficits. The experience during the global crisis highlights the vulnerability of these funds, as demonstrated by the negative returns on investment exceeding 20 percent for the compact trust funds of Micronesia and Marshall Islands (Table 4).

Table 2. Pacific Island Countries: Selected Sovereign Funds

Name	Country	Date created	Estimated value (% of GDP)	
			2007	2010
Trust Fund for the People of the Federated States of Micronesia (FSM Compact Fund)	FSM	2004	48.0	61.6
Trust Fund for the People of the Republic of the Marshall Islands (RMI Compact Fund)	RMI	2004	55.0	71.2
Revenue Equalisation Reserve Fund (RERF)	KIR	1956	436.6	376.2
Tuvalu Trust Fund (TTF)	TUV	1987	335.1	
Petroleum Fund of Timor-Leste (Petroleum Fund)	TIM	2005	583.1	1,418.6
Fiji National Provident Fund (FNPF)	FJI	1966	64.5	69.2
Nambawan Super (Nambawan)	PNG	1961	12.1	12.0
Marshall Islands Social Security Trust Fund (MISSA)	RMI	1991	45.3	40.9
Civil Service Pension Plan (CSPP)	PAL	1987	22.9	18.6

Sources: Annual Reports and authors' estimates.

¹¹ In most Pacific islands, land is owned by the government and by families (communal land) rather than individuals. This makes property rights unclear and introduces constraints to the use of land as collateral.

Table 3. Pacific Island Countries: Rates of Return on Sovereign Fund Assets
(In percent)

	FY06	FY07	FY08	FY09	FY10
FSM Compact Fund	7.7	17.9	(20.1)	(0.2)	11.3
Fiji National Provident Fund	6.2	5.5	4.9	4.8	5.5
Kiribati RERF	7.2	3.4	(8.0)	4.9	4.8
RMI Social Security Administration	9.1	11.6	(9.9)	5.1	...
RMI Compact Fund	12.0	14.9	(21.8)	1.3	8.8
Palau CSPP	5.7	14.3	(13.5)	7.1	5.7
PNG Nambawan	10.9	27.0	7.4	8.7	10.4
Timor Leste Petroleum Fund	4.3	7.5	7.1	0.7	3.6
Tuvalu Trust Fund (TTF)	10.4	9.7	(8.6)	(1.7)	1.8

CSPP = Civil Service Pension Plan, FSM = Federated States of Micronesia, RMI = Republic of the Marshall Islands.

Sources: Annual Reports.

The domestic versus foreign investment split of asset portfolios differs considerably across PICs (Figure 33). For example, all of the assets of Timor-Leste are invested overseas compared with just 5 percent in the case of Fiji. The different split has different implications for the vulnerability of the funds to external shocks.

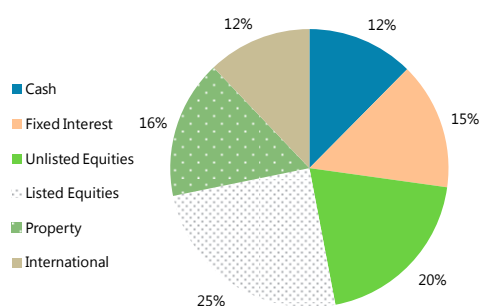
B. Spillovers from a Downside Scenario

While banks in PICs seem somewhat sheltered from shocks through their ownership and funding structures, the financial system remains subject to potential spillovers from a worsening global economy. Financial stress could occur through a fall in stock prices that could affect PICs with large provident and trust funds whose assets are invested off-shore (Kiribati, Marshall Islands, Micronesia, Palau, and Tuvalu). Lower GDP growth attributable to a fall in remittances and tourism receipts would weaken the quality of loans and reduce banks' profitability, which in turn would affect banks' liquidity. Non-interest income, owing largely to foreign exchange activities, plays a key role in determining bank profitability in the region and is higher than in

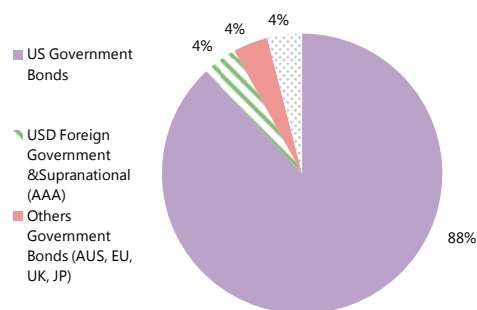
Table 4. Interest and Non-interest Income in Pacific Island Countries and Selected Regional Comparators

	Net interest income (percent of total assets, 2008)	Non-interest operations (percent of average assets, 2008)
Solomon Islands	8.6	8.6
Samoa	6.1	4.9
Vanuatu	3.6	2.9
Tonga	5.8	6.3
Papua New Guinea	3.8	3.0
Fiji	5.2	2.6
Australia	1.6	1.3
New Zealand	1.9	0.8
Indonesia	5.4	3.1
Malaysia	2.3	1.6
Philippines	1.6	0.8

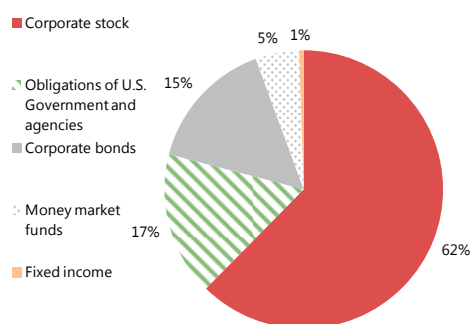
Sources: Central Bank data; IMF, Financial Soundness Indicators database; and staff estimates.

Figure 33. Pacific Island Countries: Trust and Provident Fund Investments**Papua New Guinea**

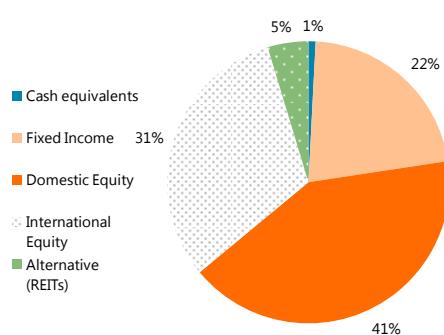
As of March 31, 2011.

Timor-Leste: Petroleum Fund Portfolio

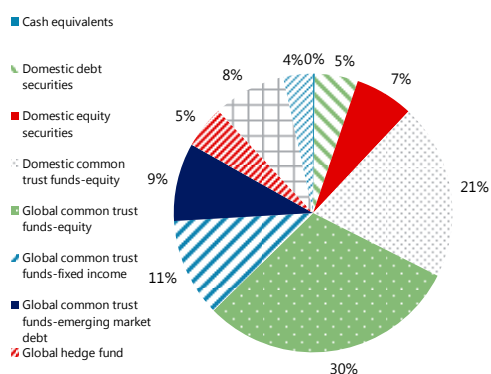
The Timor-Leste Petroleum Fund (PF) Law was amended in 2011 to allow higher investment in equities (up to 50 percent of the PF) and for the PF to be used to secure government borrowing (up to 10 percent of the PF).

Palau

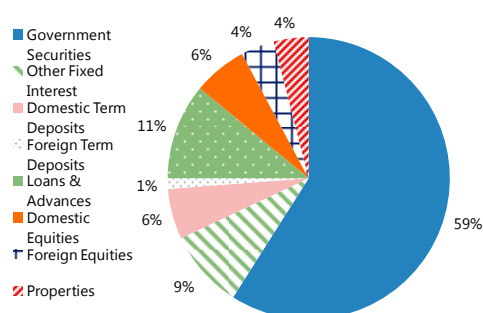
As of September 30, 2010.

Marshall Islands

As of September 30, 2010.

Micronesia

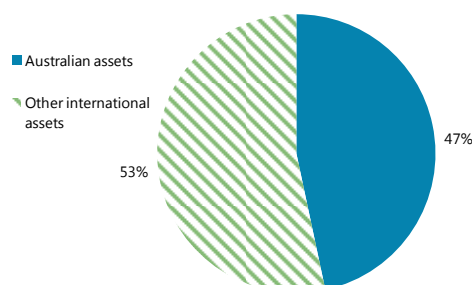
As of September 30, 2010.

Fiji

As of June 30, 2011.

Figure 33 (cont.) Pacific Island Countries: Trust and Provident Fund Investments

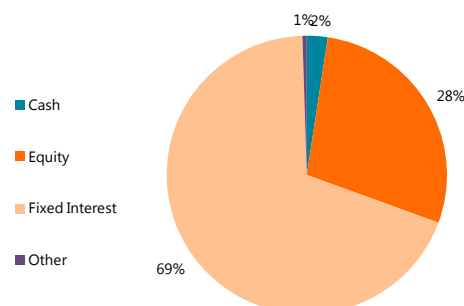
Tuvalu



As of March 31, 2011.

Source: Authors' estimates.

Kiribati



As of Dec 31, 2010.

other regional comparators (Table 4).¹² Thus, a slowdown in tourism and remittances will put downward pressure on profits. Banks may attempt to make up for this lost revenue through higher interest rates, which could further stifle credit growth.

A prolonged slowdown in credit growth would hinder private-sector development and lower prospects for inclusive growth. Both demand and supply factors are likely to lead to lower credit growth: tighter credit standards, as occurred after the global financial crisis, will likely follow heightened global uncertainty and turmoil in global financial markets; and lower economic growth coupled with potentially higher interest rates will reduce demand for credit. During 2008–09, credit growth fell across all PICs, with commodity exporters experiencing the largest decline, although from a high base. Since then, credit growth has remained anemic, with some

Figure 34. Credit to Private Sector
(In percent of GDP)

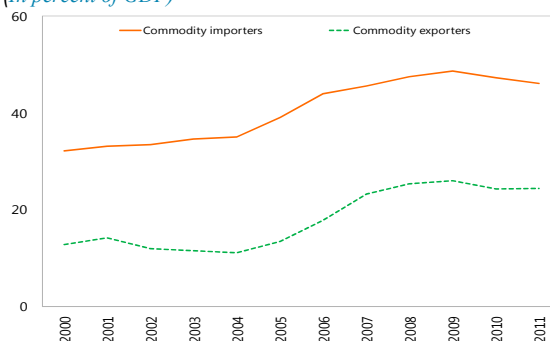
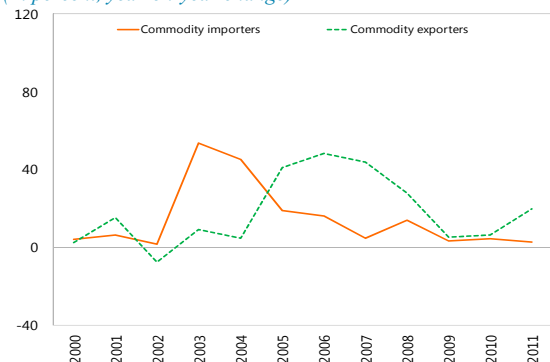


Figure 35. Credit to Private Sector
(In percent, year-on-year change)



¹² See Davies and Vaught (2011) for a more detailed discussion of bank profits in PICs.

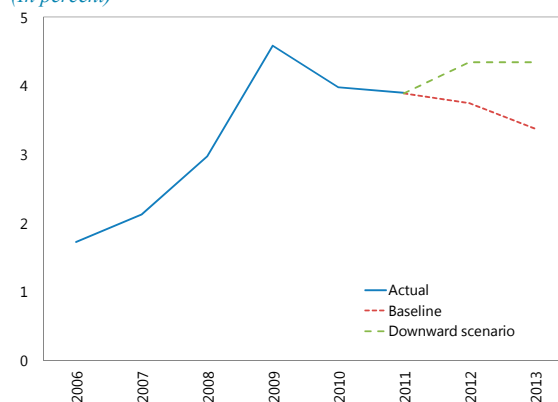
mild signs of pick up in commodity exporters, but it has not yet recovered in commodity importers.¹³ (Figures 34 and 35)

The deleveraging of European banks could trigger a funding shock to Australian banks given their relatively high reliance on wholesale funding, but this risk is limited.

Australian banks have been highly resilient to the global crisis, mainly because of sound regulation and supervision. The government's Guarantee Scheme for Large Deposits and Wholesale Funding for banks, introduced in late 2008 also helped maintain access to funding, as did the swap arrangement between the Reserve Bank of Australia and the U.S. Federal Reserve. Indeed, a recent IMF study (Jauregui and Schule, 2012) suggests that Australia is better placed to cope with shocks from the deterioration of the global outlook than any other country because of its large policy space and flexible exchange rate.

Our analysis suggests that the ratio of provisions to loans would increase by nearly 1 percent in the event of a downside scenario (Figure 36). To estimate the impact of negative spillovers on PIC banks from a global slowdown, we use the growth results generated by the previous VECM analysis for the PICs and previous IMF analysis (Jauregui and Schule) to gauge the impact of the deterioration of the global outlook on Australia.¹⁴ We then estimate the impact of the slowdown on banks' provisioning. Indeed, simple econometric analysis suggests that the ratio of provisions to loans in PICs is linked to both the Australian and domestic business cycle, with all coefficients significant and with the expected sign.

Figure 36. PICs: Impact of a Downward Scenario on the Financial Sector: Ratio of Provisions to Loans
(In percent)



VI. WHAT ROLE FOR POLICIES? REBUILDING POLICY BUFFERS AND IMPLEMENTING STRUCTURAL REFORMS

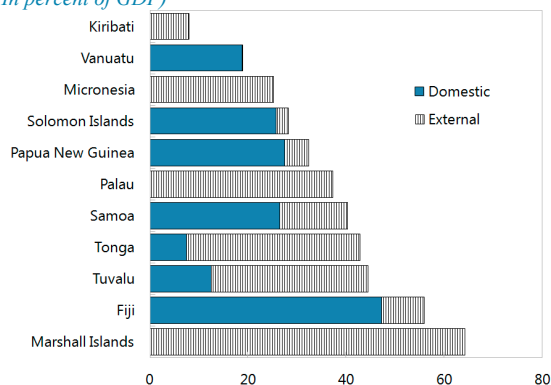
The policy response to a downward economic scenario would vary across PICs depending on their policy space. Fiscal space is limited in PICs with high public debt, which narrows the scope for countercyclical policies in Marshall Islands, Fiji, Tuvalu and Tonga (Figure 37). In some countries with large trust funds, fiscal rules that prevent additional draw-downs to finance budget deficits in the face of a crisis could lead to pro-

¹³ In commodity exporters (Papua New Guinea and Solomon Islands), favorable terms of trade continue to support growth. Investment in the commodity sector has been financed lately mainly offshore through FDI.

¹⁴ According to Jauregui and Schule, Australian growth rate drops by 1½ percentage points in the first year after the global negative shock and by 1 percentage point in the second year.

cyclical policies. Papua New Guinea and Vanuatu still have some fiscal space. And several islands have accumulated comfortable levels of foreign exchange reserves (Fiji, Papua New Guinea, Tonga, and Vanuatu), which could provide a temporary cushion. Greater exchange rate flexibility would be warranted in economies with relatively weak monetary transmission mechanisms. This is also the case in Papua New Guinea, where the exchange rate channel of monetary policy continues to be effective, but excess liquidity is currently weakening interest rates and credit channels. In Vanuatu, lower-than-anticipated inflation could allow a pause in monetary tightening.

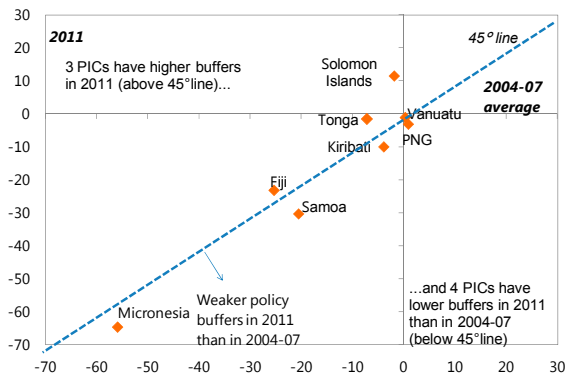
Figure 37. PICs: Public Debt, 2010
(In percent of GDP)



To strengthen their resilience to shocks, PICs will need to step up the rebuilding of policy buffers (Figure 38). Most PICs have made progress on this front after the crisis, especially with regard to reserves. However, more than half of the PICs emerged from the 2008–09 crisis with somewhat less comfortable fiscal buffers (higher debt and larger fiscal deficits) than before the crisis. Implementing growth-oriented structural reforms would help boost investor confidence and ensure sustainable and inclusive growth. Focusing on the quality of spending, for example, on education and infrastructure, could be key in lifting long-term growth potential. While rebuilding policy buffers, additional assistance from donors would also provide countercyclical support in several islands.

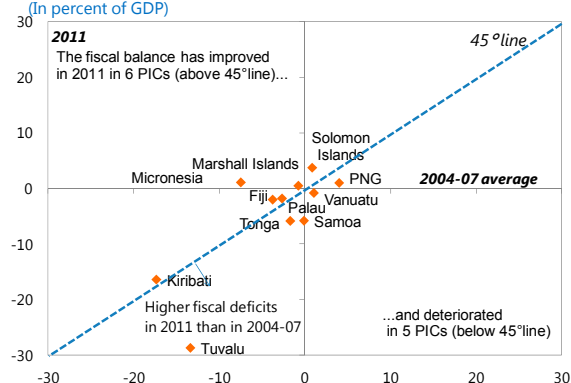
Figure 38. Pacific Islands: Rebuilding Policy Buffers

Overall Buffer Index, 2004-07 and 2011



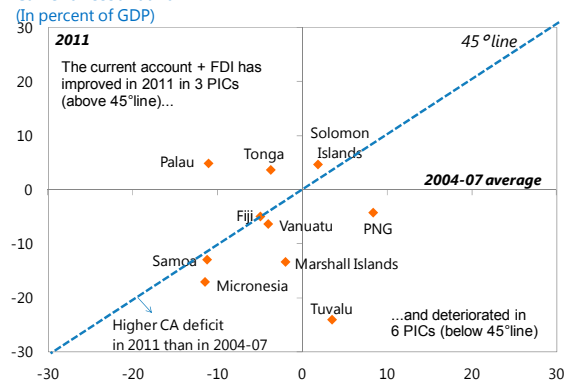
Fiscal Balance

(In percent of GDP)



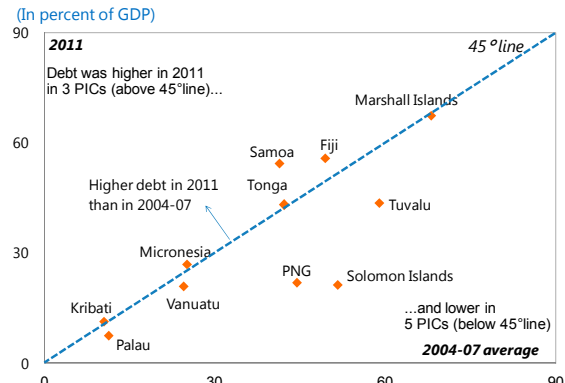
Current Account and FDI

(In percent of GDP)



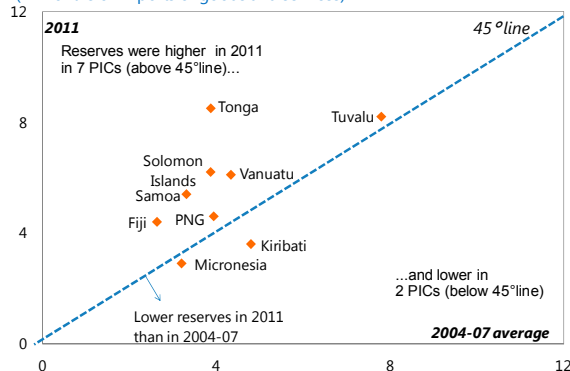
Gross Debt

(In percent of GDP)



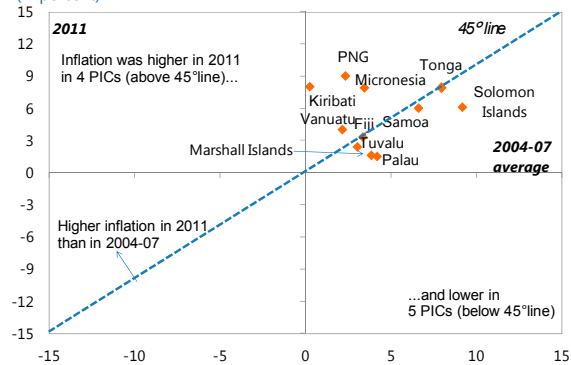
Reserves

(In months of imports of goods and services)



Inflation

(In percent)



Sources: IMF, WEO database; staff estimates.

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APPENDIX

TECHNICAL SUMMARY OF ECONOMETRIC METHODOLOGY AND RESULTS

a. Econometric Methodology

Econometric analysis has allowed us to gain an understanding of the short-run and long-run relationships between GDP in each of Pacific Island country (PIC)¹⁵ and GDP in other countries or regions. The analysis has also enabled us to assess the relevance of commodity price shocks in PICs, using measures of real oil prices, real food prices, or real non-oil commodity prices. We also investigated country-specific factors: such as shocks to sugar output in Fiji, the role of aid and remittances, and the impact of changes in global equity prices.

We employed three methodologies to this end. First, we used a cointegration analysis to test and estimate long-run relationships using a vector error correction model (VECM). Second, within the VECM, we used the impulse response analysis to gauge the impact on each PIC's real GDP of a shock to the other variables in the model. And third, a structural version of the error-correction model gave us estimates of the immediate impact of shocks and formed the basis of the scenario analysis.

b. Summary of Econometric Results for Each Country

Using the Johansen procedure, we found a cointegrating relationship for 10 of the 11 countries examined. A text table for each country (see below) summarizes the results of the trace and maximum eigenvalue tests. For each country, we present the cointegrating relationship: the coefficient on the partner GDP variable is the long-run elasticity of growth in the PIC with respect to external partner GDP. Details are provided of any restrictions on the long-run elasticities that were imposed and not rejected; for example, in some cases the coefficient estimate was close to one, suggesting that when trading partner's GDP increases over the long run, GDP in the PIC under examination increases by an equal percentage. From this long-run equation, a variable that is constructed that measures the deviation from long-run equilibrium. This variable is then used in a structural equation for each country, together with other variables that could influence growth in the short run. The structural equation shows the immediate, or within-the-same-period, spillover to the PIC from external demand and the impact of other shocks (e.g., food and fuel prices or global equity prices). The parameter estimates from the long-run equation and the structural equation are then used as inputs into the scenario analysis.

¹⁵ The PICs include Fiji, Kiribati, Marshall Islands, Micronesia, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu.

Fiji

Long-run equation:

We found a long-run cointegrating relationship between log real GDP in Fiji and log real GDP in Australia.¹⁶

$$\ln(RGDP^{Fiji}) = 0.8 * \ln(RGDP^{AUS}) + constant$$

Table A1: Fiji Cointegration test results

	Eigenvalue	Trace Test		Maximum Eigenvalue Test	
		Test Statistic	p-value	Test Statistic	p-value
None *	0.80	61.53	0.00	33.38	0.00
At most 1 *	0.72	28.15	0.00	26.84	0.00
At most 2	0.06	1.31	0.25	1.31	0.25

Indicates 2 cointegrating equations at the 0.01 level

Structural equation:

$$\begin{aligned}
 D(\ln(RGDP^{Fiji})) = & 1 * D(\ln(RGDP^{AUS})) \\
 & -0.77 * ECM(-1) \\
 & -0.03 * \ln(realoil) + 0.10 * \ln(sugar\ output) + constant
 \end{aligned}$$

In the short run, supply factors also matter in determining GDP in Fiji: on the domestic side, sugar output has a positive and significant coefficient, consistent with the importance of the sugar sector in the economy. A 1 percent increase in sugar production would boost GDP by 0.13 percent. As expected, higher international oil prices have a negative impact on output in Fiji.

¹⁶ The cointegration analysis suggests two long-run relationships at work (i.e., two cointegrating vectors): one between Australia and New Zealand and one between Fiji and Australia (Table A1). The relationship between Australia and New Zealand is 1 to 1 in the long run, consistent with previous IMF analysis (see Yan Sun, 2011 for the importance of growth spillovers from Australia to New Zealand). Direct growth spillovers from Australia to Fiji were found to be stronger than from New Zealand. In the long run, a 1 percent increase in GDP in Australia will raise GDP in Fiji by 0.8 percent.

Kiribati

Long-run equation:

A long-run cointegrating relationship was found between log real GDP in Kiribati and log real GDP in Australia.

$$\ln(RGDP^{KIR}) = 1 * \ln(RGDP^{AUS}) + constant$$

The restriction that the long-run elasticity was equal to one was not rejected (χ^2 : 3.63, p-value 0.06).

Cointegration test results:

	Eigenvalue	Trace Test		Maximum Eigenvalue	
		Test Statistic	p-value	Test Statistic	p-value
None *	0.47	17.33	0.03	16.38	0.02
At most 1	0.04	0.95	0.33	0.95	0.33

Indicates 1 cointegrating equation at the 0.05 level

Structural equation:

$$D(\ln(RGDP^{KIR})) = 0.43 * D(\ln(RGDP^{AUS})) \\ -0.75 * ECM(-1) \\ +0.05 * \ln(\text{world equity prices}) -0.08 * \ln(\text{realoil}) + constant$$

In the long run, growth in Australia spills over to Kiribati one for one. In the short run, fluctuations in Australian GDP affect Kiribati with an elasticity of 0.4. Real oil-price shocks have a large impact on Kiribati GDP in the short term: a 10 percent increase in oil prices reduces GDP growth by 0.8 percentage point. World equity prices also influence Kiribati GDP in the short run, with a 10 percent rise in world equity prices boosting GDP by 0.5 percent.

Marshall Islands

Long-run equation:

We found a long-run cointegrating relationship between log real GDP in Marshall Islands and the United States.

$$\ln(RGDP^{MHL}) = 1 * \ln(RGDP^{USA}) + constant$$

The restriction that the long-run elasticity was equal to one was not rejected (χ^2 : 5.68, p-value 0.06).

Cointegration test results:

	Eigenvalue	Trace Test		Maximum Eigenvalue	
		Test	p-value	Test	p-value
None *	0.95	38.57	0.00	38.57	0.00
At most 1	0.11	1.44	0.23	1.44	0.23

Indicates 1 cointegrating equation at the 0.01 level

Structural equation:

$$\begin{aligned} D(\ln(RGDP^{MHL})) = & 0.65 * D(\ln(RGDP^{USA})) \\ & -0.91 * ECM(-1) \\ & -0.03 * \ln(realoil) + constant \end{aligned}$$

In the long run, fluctuations in U.S. growth spill over to the Marshall Islands one for one. In the short run, the impact is smaller but still large, with a short-run elasticity of 0.65. Real oil-price shocks have a strong impact on Marshall Islands GDP in the short term, with a 10 percent increase in oil prices reducing GDP growth by 0.3 percent.

Micronesia

Long-run equation:

A long-run cointegrating relationship was found between log real GDP in Micronesia and the United States.

$$\ln(RGDP^{FSM}) = 1 * \ln(RGDP^{USA}) + constant$$

The restriction that the long-run elasticity was equal to one was not rejected (χ^2 : 0.05, p-value 0.82).

Cointegration test results:

	Eigenvalue	Trace Test		Maximum Eigenvalue	
		Test Statistic	p-value	Test Statistic	p-value
None *	0.73	20.67	0.01	20.67	0.01
At most 1	0.15	2.28	0.13	2.28	0.13

Indicates 1 cointegrating relationship at the 0.01 level

Structural equation:

$$D(\ln(RGDP^{FSM})) = 0.84 * D(\ln(RGDP^{USA})) \\ -0.58 * ECM(-1) \\ -0.08 * \ln(realoil) + constant$$

In the long run, fluctuations in U.S. growth spill over one for one to Micronesia, as in the Marshall Islands. Most of this impact occurs quickly, with a short-run elasticity of 0.84. Real oil-price shocks have a large impact on Micronesia GDP in the short term, with a 10 percent rise in oil prices lowering GDP growth by 0.8 percent.

Palau

Long-run equation:

A long-run cointegrating relationship was found between log real GDP in Palau and the United States.

$$\ln(RGDP^{PLW}) = 1 * \ln(RGDP^{USA}) + constant$$

The restriction that the long-run elasticity was equal to one was not rejected (χ^2 : 1.48, p-value 0.46).

Cointegration test results:

	Eigenvalue	Trace Test		Maximum Eigenvalue	
		Test Statistic	p-value	Test Statistic	p-value
None *	0.72	21.60	0.01	18.84	0.01
At most 1	0.17	2.76	0.10	2.76	0.10

Indicates 1 cointegrating equation at the 0.01 level

Structural equation:

$$D(\ln(RGDP^{PLW})) = 1.23 * D(\ln(RGDP^{USA})) + 0.66 * D(\ln(RGDP^{PLW}(-1))) \\ - 0.64 * ECM(-1) \\ - 0.05 * \ln(realoil) + constant$$

In the long run, fluctuations in U.S growth spill over one for one to Palau, as in both the Marshall Islands and Micronesia. In the short run, the impact is estimated to be greater than one suggesting an overshooting in the near term. Real oil-price shocks have a large impact on Palau GDP in the short term, with a 10 percent increase in oil prices reducing GDP growth by 0.5 percent.

Papua New Guinea

Long-run equation:

A long-run cointegrating relationship was found between log real GDP in Papua New Guinea and log real GDP in Australia and aid to PNG.

$$\ln(RGDP^{PNG}) = 0.21 * \ln(RGDP^{AUS}) + 0.29 * \ln(Real\ AID^{PNG}) + constant$$

Cointegration test results:

	Eigenvalue	Trace Test		Maximum Eigenvalue	
		Test Statistic	p-value	Test Statistic	p-value
None	0.72	25.70	0.14	23.16	0.03
At most 1	0.12	2.54	0.98	2.31	0.98
At most 2	0.01	0.24	0.63	0.24	0.63

Max test indicates 1 cointegrating equation at the 0.05 level

Structural equation:

$$D(\ln(RGDP^{PNG})) = 0.55 * D(\ln(RGDP^{AUS})) \\ -0.07 * ECM(-1) \\ +0.02 * \ln(realoil) + constant \text{ and dummy}$$

There is a long-run relationship between Papua New Guinea GDP, Australia GDP, and real aid to PNG. Growth spillovers from Australia are large: holding the other variables constant, a 1 percent increase in Australian GDP would raise output in PNG by 0.8 percent. Aid also appears to be important in the long run, but not in the short run. The coefficient on the real oil price is positive, consistent with PNG being a commodity exporter.

Samoa

Long-run equation:

A long-run cointegrating relationship was found between log real GDP in Samoa and log real GDP in both Australia and New Zealand.

$$\ln(RGDP^{WSM}) = 0.16 * \ln(RGDP^{AUS}) + 1 * \ln(RGDP^{NZL}) + constant$$

The restriction that the long-run elasticity was equal to one was not rejected (χ^2 : 0.67, p-value 0.41).

Cointegration test results:

	Eigenvalue	Trace Test		Maximum Eigenvalue	
		Test Statistic	p-value	Test Statistic	p-value
None *	0.60	38.32	0.00	28.09	0.00
At most 1	0.27	10.23	0.26	9.89	0.22
At most 2	0.01	0.34	0.56	0.34	0.56

Indicates 1 cointegrating equation at the 0.01 level

Structural equation:

$$\begin{aligned} D(\ln(RGDP^{WSM})) = & 0.21 * D(\ln(RGDP^{AUS})) + 0.50 * D(\ln(RGDP^{NZL})) + 0.16 * D(\ln(RGDP^{WSM}(-1))) \\ & - 0.85 * ECM(-1) \\ & + 0.05 * \ln(\text{realcommodity}) + \text{constant} \end{aligned}$$

Australia and New Zealand affect Samoa in both the short and long run, but the direct growth spillovers from New Zealand to Samoa are larger than from Australia. Over the long run, a 1 percent increase in GDP in New Zealand—holding other variables constant—will raise Samoan GDP by 1 percent, while the direct impact of Australia is much smaller. In the short run, the elasticity of Samoa's GDP with respect to that of New Zealand is 0.5.

Solomon Islands

Long-run equation:

A long-run cointegrating relationship was found between log real GDP in Solomon and log real GDP in Australia.

$$\ln(RGDP^{SLB}) = 1 * \ln(RGDP^{AUS}) + constant$$

The restriction that the long-run elasticity was equal to one was not rejected (χ^2 : 3.16, p-value 0.02).

Cointegration test results:

	Eigenvalue	Trace Test		Maximum Eigenvalue	
		Test Statistic	p-value	Test Statistic	p-value
None *	0.61	23.33	0.02	16.19	0.05
At most 1	0.34	7.15	0.12	7.15	0.12

Indicates 1 cointegrating equation at the 0.05 level

Structural equation:

$$\begin{aligned}
 D(\ln(RGDP^{SLB})) = & 0.47 * D(\ln(RGDP^{SLB}(-1))) \\
 & -0.25 * ECM(-1) \\
 & +0.12 * \ln(realcommodity) - 0.04 * \ln(realoil) + constant
 \end{aligned}$$

Australia is the main source of growth spillover, with a long-run elasticity of 1. In the short run, however, there is no immediate impact on growth from Australia (but the impact begins to be felt after one year through the error correction term). GDP for Solomon Islands is heavily influenced by international commodity prices, with non-oil commodity prices having a strong positive impact on growth, as might be expected for a commodity exporter. As an oil importer, however, higher oil prices are a drag on growth.

Tonga

Long-run equation:

A long-run cointegrating relationship was found between log real GDP in Tonga and New Zealand.

$$\ln(RGDP^{TON}) = 0.47 * \ln(RGDP^{NZL}) + constant$$

Cointegration test results:

Table A1: Tonga Cointegration test results

	Eigenvalue	Trace Test		Maximum Eigenvalue	
		Test Statistic	p-value	Test Statistic	p-value
None *	0.52	21.24	0.01	20.61	0.00
At most 1	0.02	0.63	0.43	0.63	0.43

Max test indicates 1 cointegrating equation at the 0.01 level

Structural equation:

$$\begin{aligned} D(\ln(RGDP^{TON})) = & 0.27 * D(\ln(RGDP^{TON}(-1))) + 0.17 * D(\ln(RGDP^{NZL})) \\ & -0.71 * ECM(-1) \\ & -0.065 * \ln(realcommodity) + constant \end{aligned}$$

New Zealand's growth spills over to Tonga both in the short run and in the long run. In the short run, a 1 percent increase in New Zealand GDP boosts GDP in Tonga by 0.2 percent, other things beign equal. However, over the long run the effect is twice as large. Commodity prices negatively affect the business cycle. Sub-sample analysis suggested the increasing importance of emerging Asia in generating growth spillovers in Tonga, but the above equation was preferred for the scenario analysis.

Tuvalu

Given the short data sample, long-run analysis was not feasible for Tuvalu but short-term dynamics (i.e., using growth rates) suggest that the elasticity of Tuvalu with respect to world GDP is 0.5. Moreover, spillovers from regional economies would also occur through Tuvalu's trust fund, whose assets are invested offshore. The elasticity of Tuvalu GDP with respect to world equity prices is 0.05: a 10 percent increase in the world stock market will affect GDP growth in Tuvalu by ½ percentage point through wealth effects. For the scenario analysis, the elasticity of GDP in Tuvalu with respect to global oil prices is assumed to be 0.02, in line with other countries in the study.

Vanuatu

Long-run equation:

A long-run cointegrating relationship was found between log real GDP in Vanuatu and log real GDP in New Zealand and real tourism receipts.

$$\ln(RGDP^{VUT}) = 0.2 * \ln(RGDP^{AUS}) + 0.3 * \ln(\text{real Tourism receipts}) + \text{constant}$$

Cointegration test results:

	Eigenvalue	Trace Test		Maximum Eigenvalue	
		Test Statistic	p-value	Test Statistic	p-value
None	0.61	27.60	0.09	22.89	0.03
At most 1	0.17	4.72	0.84	4.60	0.79
At most 2	0.00	0.11	0.74	0.11	0.74

Trace test indicates 1 cointegrating equation at the 0.10 level; Max test indicates 1 cointegrating equation at the 0.05 level

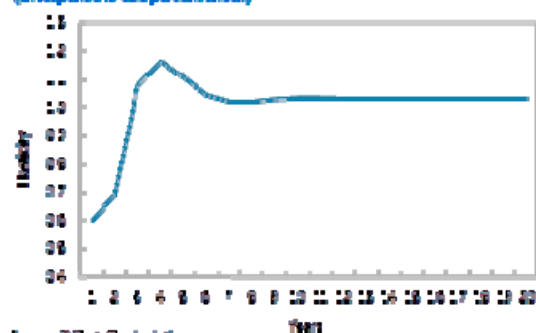
Structural equation:

$$\begin{aligned} D(\ln(RGDP^{VUT})) = & 0.27 * D(\ln(RGDP^{AUS})) + 0.20 * D(\ln(RGDP^{VUT}(-1))) \\ & -0.69 * ECM(-1) \\ & +0.13 * D(\ln(\text{real tourism receipts})) + \text{constant and dummy} \end{aligned}$$

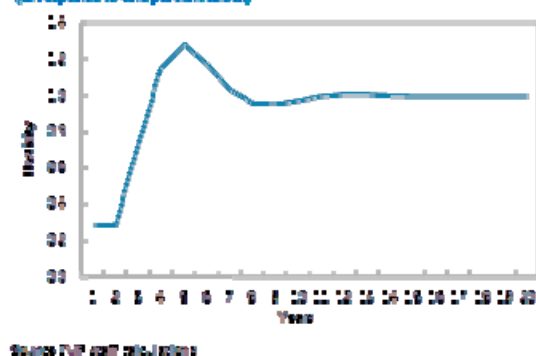
Australia is the main source of spillovers over both the short and long run. Sub-sample analysis suggests that Australia's importance has increased over time. Real tourism receipts are also relevant, both in the short-run and in the long run, consistent with the importance of tourism in the economy. Tourism receipts capture growth spillovers from economies other than Australia. The long-run elasticity of Australia and tourism with respect to Vanuatu GDP is 0.3.

Figure A. Pacific Island Countries: Growth Spillovers

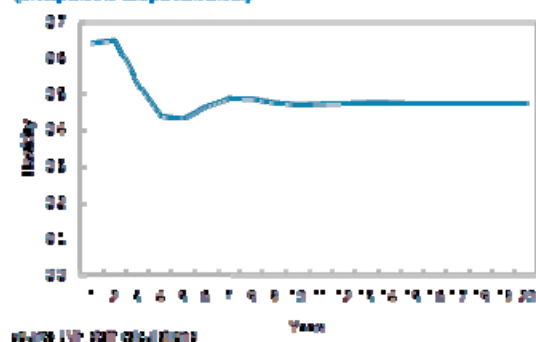
Response of Samoa GDP to Changes in New Zealand GDP
(In response to one percent shock)



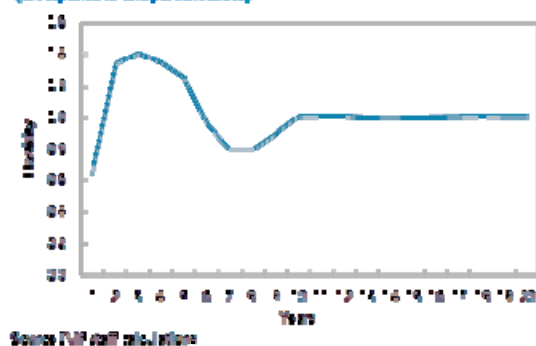
Response of Marshall Islands GDP to Changes in US GDP
(In response to one percent shock)



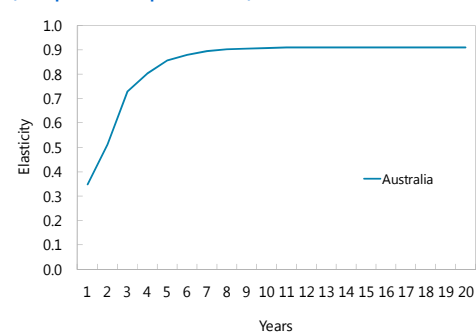
Response of Micronesia GDP to Changes in US GDP
(In response to one percent shock)



Response of Palau GDP to Changes in US GDP
(In response to one percent shock)



Response of Fiji GDP to Australia GDP
(In response to one percent shock)



Response of PNG GDP to Australia GDP and Real Aid
(In response to one percent shock)

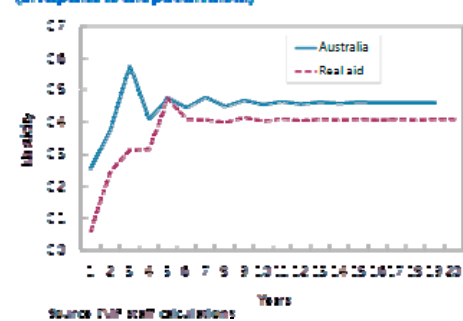
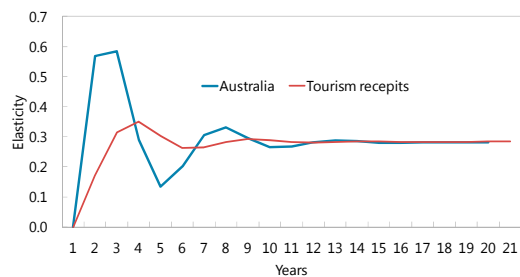


Figure 25 (cont.). Pacific Islands Countries: Growth Spillovers

Response of Vanuatu GDP to Changes in Australia GDP and Tourist Receipts

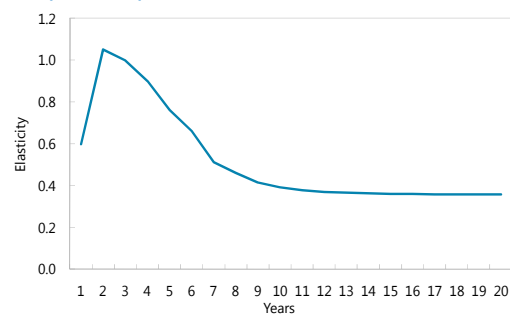
(In response to one percent shock)



Source: IMF staff calculations.

Response of Solomon Islands GDP to Australia GDP

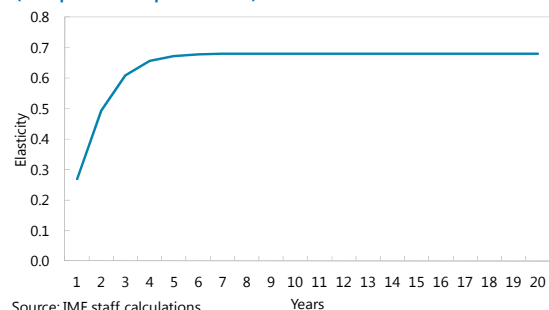
(In response to one percent shock)



Source: IMF staff calculations.

Response of Tonga GDP to New Zealand GDP

(In response to one percent shock)



Source: IMF staff calculations.