

**Macroeconomic Interdependence of Pacific Island Countries:
A Study of Vanuatu: 1980-2008**

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Abstract

The financial and banking crises in USA in late 2007 led to a decline in economic activities in the industrialized countries, triggering a world-wide recession since then. The ongoing global economic downturn has brought into sharp focus the subject of macroeconomic interdependence of Pacific island countries, for further examination. The impact of recessionary effects has not been uniform as the degree of global interdependence varies amongst PICs. This paper deals with the case of Vanuatu, which has been able to withstand the onslaught of recession, because of the economic resilience, nurtured by recent prudent fiscal and monetary policies. The paper adopts a VAR model to determine the impact of global and regional shocks on Vanuatu.

Keywords: Global shock, regional shock, real output, financial crisis

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1. Introduction

The ongoing global economic recession since the third quarter of 2008 has been affecting the Pacific island countries (PICs) in different ways. Labeled by United Nations as the Great Recession to distinguish it from the Great Depression of the last century, the current worldwide economic downturn has been described as the product of three crises (UNESCAP 2009). These three crises are: (i) volatility and surge in food and fuel prices in 2008; (ii) the financial crisis in the advanced countries since mid 2007; and (iii) the climate change calamities since 2006. The first one precipitated rapid depletion of foreign exchange reserves of PICs, all of which are highly dependent on imports of food and fuel with their limited export earning capacity being confined to a narrow range of exports, with the exception of Papua New Guinea (PNG).

The financial crisis, which was initially ignited by the sub-prime mortgage loans in the US, and followed thereafter by loan defaults and the consequent burst of property and other asset price bubbles led to fall in economic activities in the industrialized countries. The latter contributed to a rapid decline in imports from developing countries, including PICs. The climate change calamities of early 2008, which included cyclones and flooding, inflicted severe damages to infrastructure and destruction of farms in most of the developing Asia and the Pacific region, causing steep decline in production for subsistence living.

Amongst the 14 independent PICs, two stand out distinctly different from the rest: They were Papua New Guinea (PNG) and Vanuatu. PNG with its mineral exports, which was benefited by commodity price boom during the early 2000s accumulated and then conserved the foreign exchange reserves, avoiding the mistakes during the previous boom-bust episode of the 1990s¹. Careful management this time around avoided the earlier fiscal blow-outs, enabled PNG to build up substantial foreign exchange reserves to meet any eventuality arising out of fall in exports.

Vanuatu, which does not have any mineral resources to take advantage of commodity boom and whose export earning capacities are confined only to a narrow range of agricultural exports, pursued in recent years sound fiscal and monetary policies. Thus, both PNG and Vanuatu have created some fiscal space affording themselves the luxury of fiscal stimulus budgets in the event of falling aggregate demand, especially decline in exports and tourism receipts.

The two PICs have, thus, seemed to have steered clear themselves of the aftereffects of the shocks of global economic crisis, despite substantial macroeconomic interdependence on the rest

¹ The 1990s came to be described as a “lost decade” by PNG’s central bank governor in his policy speech (Kamit 2009) for the reason that the government frittered away the valuable resources on wasteful public sector projects.

of the world. An empirical investigation of macroeconomic interdependence of PICs, as to how these and other shocks of similar nature in the past have affected the island nations, will therefore be of interest to policy makers. This paper, which focuses on Vanuatu, investigates how far shocks to global and regional output, affect the country's growth path. The paper is organized on the following lines: the second section presents a brief review of Vanuatu's growth performance and its macroeconomic interdependence; the third section outlines the modeling methodology employed for the study; the fourth section reports the results; and the fifth and final section presents some policy conclusions.

2. Vanuatu's Economy: a Review

Vanuatu (population 215,000), whose selected key indicators are given in Table 1 is subsistence oriented, dominated by root crops and to a small extent by commercial ranch and fishery activities, which provide livelihood to 80 percent of the population. The country's manufacturing base is small, which is confined to processing coconut oil based soaps and detergents, and biscuits and breads. However, Vanuatu has been historically an open economy with offshore financial institutions (OFC) inherited from the days of the joint Anglo-French condominium rule. The country also provides flag-of-convenience registration of ships. Additionally, absence of all forms of direct taxation, including personal and corporate income taxes, estate taxes, death duties and gift taxes, has made Vanuatu a pure tax free haven in the South Pacific.

Table 1: Vanuatu: Selected Key Indicators

Land Area (Sq.km.'000)	12.2
Population (2006: '000)	215
Per Capita GDP (US\$) Current prices: 2006	1,799
Aid Per Capita in US\$ (2006)	227
Aid as percentage of GDP (2006)	13.4
Human Development Ranking (2006)	118
Annual Average Growth Rate in percent (2001-2008)	3.1
Annual Average Inflation in percent (2001-2008)	2.7
Overall Budget Balance as percent of GDP (2001-2007)	-0.5
Current Account Balance as percent of GDP (2001-2007)	-5.9

Source: ADB (2006), UNESCAP (2008)

These developments have indeed given rise to the emergence of a dual economy, with OFC institutions in Port Vila, the country's capital on Efate, the main island. Commercial tourism is confined to Port Vila and the big island of Santo. The numerous other islands of the country continue to be characterized by subsistence agriculture.

Vanuatu with no mineral resources and limited commercial agriculture is dependent on imports ranging from food and beverages, to fuel and capital goods and transportation machinery and equipment. Vanuatu's exports have been beef, copra, cocoa and *kava*. Export earnings have been far less than expenditures on imports with the result that trade balance always remained negative. The share of trade in the country's gross domestic product (GDP) is in the range of 45 percent to 50 percent of GDP. Dominant trade partners have been Australia, New Zealand, Japan, Singapore, Malaysia, and Thailand.

Table 2: Pacific Island Countries: Macroeconomic Statistics: 1996-2008

Real GDP Growth Rate (%)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Fiji	2.1	4.8	-2.2	1.3	8.8	-1.6	1.9	3.2	0.9	5.5	0.6	3.4	-6.6	-1.2
Papua New Guinea	-3.3	6.6	-6.3	4.7	1.9	-2.5	-0.1	-0.2	2.2	2.7	3.7	2.6	6.7	7.3
Samoa	6.6	7.3	0.8	2.4	3.1	7.1	8.1	1.8	3.1	3.4	5.2	2.6	6.1	3.3
Solomon Islands	5.4	1.9	-1.7	3.2	-1.6	-14.2	-8.2	-2.8	6.5	8.0	5.0	6.1	10.3	7.0
Tonga	2.9	-0.5	-3.2	3.5	2.3	5.4	7.2	1.4	3.4	1.1	-3.3	4.4	-0.3	1.0
Vanuatu	4.7	7.2	8.6	4.3	-3.2	2.7	-2.6	-7.4	3.2	5.5	6.5	7.2	6.6	5.7

Source: ADB (2009), UNESCAP (2009)

After recording negative growth rates in real gross domestic output (RGDP) at -2.6 percent in 2001 and -7.4 percent in 2002, Vanuatu rallied and achieved a steady positive growth from 2003 onwards (Table 2). A comparative picture shows that Vanuatu's economic performance has been far more impressive than other leading PICs's. The country ran budget surpluses in three successive years during the recent five-year period, with very low, sustainable deficits in other years (Table 3).

Table 3: Budget Balances in Five PICs

	2005	2006	2007	2008	2009(est)
Fiji	-3.4	-2.9	-1.3	-1.5	-3.0
PNG	0.0	3.1	2.5	1.0	-3.3
Samoa	0.3	0.3	1.1	-3.2	-5.5
Solomon Islands	2.5	1.5	-1.1	-5.8	-3.7
Tonga	2.4	1.5	1.5	2.0	1.0
Vanuatu	2.1	1.2	-0.3	6.3	NA

Source: ADB (2009), UNESCAP (2009)

Vanuatu's trade deficits have been relatively less amongst PICs during most of the last four years (Table 4). Earnings from exports of services, notably tourism have been providing substantial support to country's balance of payments, minimising the pressures on the fixed exchange rate regime. The current account deficits in the balance of payments (Table 5) have been reasonably small and sustainable, as capital inflows in terms of foreign direct investment have been adequate to cover the deficits.

Table 4: Trade Balance (% of GDP)

	2005	2006	2007	2008
Fiji	-25.5	-29.3	-30.4	-32.6
PNG	36.6	39.5	32.4	34.8
Samoa	-41.1	-45.8	-39.8	-44.8
Solomons	-4.2	-12.3	-9.4	NA
Tonga	-40.5	-44.6	-38.3	-43.9
Vanuatu	-22.5	-26.9	-31.7	-34.4

Source: ADB (2009), UNESCAP (2009)

Table 5: Current Account Balance (% of GDP)

	2005	2006	2007	2008
Fiji	-14	-22.5	-15.5	-21.3
PNG	4.2	2.9	4.3	3.3
Samoa	-6.6	-10.8	-4.6	-7.8
Solomons	-9.8	-5.6	-2.8	-6.8
Tonga	-2.6	-9.7	-10.4	-10.4
Vanuatu	-7.4	-5.7	-9.9	-11.4

Source: ADB (2009), UNESCAP (2009)

Vanuatu has a fixed exchange rate regime and this has served the country well. Since most of the imports are sourced from Australia and New Zealand, whose monetary policies have been targeting inflation, inflation has been kept low (Table 6).

Table 6: Inflation: Selected PICs: 2005-2009

	2005	2006	2007	2008	2009 (May)
Fiji	2.4	2.5	4.3	7.5	5.5
PNG	1.8	2.4	0.9	10.6	10.2
Samoa	1.8	3.7	5.6	6.5	12.4
Solomon Islands	7.3	11.2	7.7	15.1	17.8
Tonga	9.9	7.3	5.1	10	12.2
Vanuatu	1.2	2	3.9	4.5	5.8

Source: ADB (2009), UNESCAP (2009)

The latest assessment by IMF (2009) shows that with the strong growth in the tourism and construction sectors and increases in aid inflows, real GDP has grown 6.6 percent in 2008. Inflation rose from 4.1 percent in 2007 to 5.8 percent in 2008, reflecting the effects of higher international prices of food and fuel, higher credit growth, and rise in government spending. Despite higher spending, fiscal surplus increased to 2.3 percent of GDP due to significant over performance on revenues, mainly VAT, reflecting buoyant economic activities and improved tax compliance.

The Reserve Bank of Vanuatu (RBV) is facing the impact of economic slowdown, afflicting all advanced countries. There are indications that new construction activities funded by large capital inflows from Australia and to a lesser extent from New Zealand, have begun to slow down. Although tourist arrivals continued to remain strong, spending by tourists has been on the decline. A further relaxed monetary policy and an accommodative fiscal stance for 2009 should help to cushion the impact on growth. GDP growth is expected to be in the 3-4 percent range in 2009 and to recover thereafter. Lower commodity prices would halt rising inflation and rising international reserves supported by aid inflows would be able to finance imports (IMF 2009).

As noted earlier, Vanuatu has built up a fairly high level of international reserves through prudent fiscal policies (Table 7). It is estimated that Vanuatu's international reserves in early 2009 were equivalent to an import cover of 5.4 months and Vanuatu's budgets have been running surpluses in a row since 2004.

Table 7: Official International Reserves

	Target Months of Import Cover	Actual Months of Import Cover End 2007	Actual Months Of Import Cover End 2008	Actual Months of Import Cover May-09
Fiji	4.0	4.4	2.9	3.5 (Sept 2009)
PNG	5.0	13.0	10.9	9.1
Samoa	5.0	4.7	4.4	4.3
Solomon Islands	3.0	3.7	2.5	2.1
Tonga	5.0	4.4	4.8	4.7
Vanuatu	4.0	7.0	5.8	5.4 (Dec 2008)

Source: ADB (2009), UNESCAP (2009)

3. Modeling Methodology, Data and Results

Supply and Demand Shocks

Macroeconomic interdependence is signified by transmission of shocks from one economy to another. These shocks affect both supply and demand sides of a given economy. They may be either internal or external. Internal supply shocks are of two kinds: positive and negative. Positive domestic supply shocks, which boost supply, stem from policy reforms and institutional improvements aiming at better governance, thereby increasing productivity. On the other hand,

negative supply shocks dent supply. The usual negative shocks for a small economy, which is dependent on fuel and food and other strategic imports, are external, such as rise in oil price, or fall in terms of trade. Domestic negative supply shocks happen to be natural disasters, such as earthquakes and cyclones or man-made disasters, including ethnic rivalries, social unrest and military coups.

Demand shocks are also of two kinds. Positive ones are those stepping up aggregate demand, including rise in private sector activities or fiscal stimulus in times of depressed domestic demand. Negative demand shocks, which reduce aggregate demand usually emanate from fall in investor confidence that decreases capital formation. These shocks might originate either within a country or outside the country.

The VAR statistical procedure is a popular, standard procedure to investigate how shocks from one particular country to another are transmitted. The choice of econometric modeling to study the impact of shocks on Vanuatu is, however, dictated by the limited number of annual observations available for the study. National income data are available only from 1980, as they have been compiled only after independence. Accordingly, our study covers a short, 29-year period (1980-2008). We choose five variables: real gross domestic product (RGDP) of USA, RGDP of Japan, RGDP of Australia, RGDP of New Zealand, and RGDP of Vanuatu. All real outputs are expressed in index numbers in order to remove the influence of exchange rate changes. The outputs of USA and Japan represent those of the two big players on the global economic scene, while the outputs of Australia and New Zealand represent two major regional outputs in the Pacific.

The Model

For investigating the nature of macroeconomic interdependence of Vanuatu, we adopt a vector autoregression (VAR) modeling methodology. The VAR model comprises five equations and the moving average representations are given below:

$$USA_t = \sum \alpha_{1i}u_{t-j} + \sum \alpha_{2i}v_{t-j} + \sum \alpha_{3i}w_{t-j} + \sum \alpha_{4i}\gamma_{t-j} + \sum \alpha_{5i}\delta_{t-j} \quad (1)$$

$$JPN_t = \sum \beta_{1i}u_{t-j} + \sum \beta_{2i}v_{t-j} + \sum \beta_{3i}w_{t-j} + \sum \beta_{4i}\gamma_{t-j} + \sum \beta_{5i}\delta_{t-j} \quad (2)$$

$$AUS_t = \sum \phi_{1i}u_{t-j} + \sum \phi_{2i}v_{t-j} + \sum \phi_{3i}w_{t-j} + \sum \phi_{4i}\gamma_{t-j} + \sum \phi_{5i}\delta_{t-j} \quad (3)$$

$$NZ_t = \sum \lambda_{1i}u_{t-j} + \sum \lambda_{2i}v_{t-j} + \sum \lambda_{3i}w_{t-j} + \sum \lambda_{4i}\gamma_{t-j} + \sum \lambda_{5i}\delta_{t-j} \quad (4)$$

$$VAN_t = \sum \eta_{1i}u_{t-j} + \sum \eta_{2i}v_{t-j} + \sum \eta_{3i}w_{t-j} + \sum \eta_{4i}\gamma_{t-j} + \sum \eta_{5i}\delta_{t-j} \quad (5)$$

where

USA = RGDP of USA;

JPN = RGDP of Japan;

AUS = RGDP of Australia;

NZ = RGDP of New Zealand;

VAN = RGDP of Vanuatu

u = shock to RGDP of USA;

v = shock to RGDP of Japan;

w = shock to RGDP of Australia;
 γ = shock to RGDP of New Zealand; and
 δ = shock to RGDP of Vanuatu

We assume that initially a shock to output of USA affects the outputs of Japan, Australia, New Zealand and Vanuatu; a shock to Japan's output affects outputs of Australia, New Zealand and Vanuatu; a shock to Australia's output affects the outputs of New Zealand and Vanuatu; and a shock to the output of New Zealand affects Vanuatu's output; and Vanuatu's output affects none of the other countries. Accordingly, we enter the variables (RGDP) in that order, namely: USA, JPN, AUS, NZ and VAN. We employ the Akaike information criterion for determining the lag length.

Two measures

Two approaches are employed; the first approach is to determine how each endogenous variable responds over time to a shock in that variable and in every other endogenous variable. The second approach traces the response of the endogenous variable to such shocks. Accordingly, we have two measures: One measure is to determine how much of the total variance of Vanuatu's output is explained by the variance of USA, Japan, Australia and New Zealand output shocks. The first measure, known as variance decomposition analysis enables us to conclude about the proportion of changes in a variable resulting from its own shocks as well as shocks to other variables in the system (Enders 1995: 311). For instance, if a USA, Japan, Australia and New Zealand shock explains none of the forecast error variance of Vanuatu's RGDP at all time horizons, it would mean economic growth of Vanuatu may evolve independently of the global and regional shocks.

The second measure is known as impulse response function analysis. It is an effective way to visualise the movements of a time series in response to different shocks in the system (Enders 1995: 306). When employed, it would measure the response of Vanuatu's output to a 1 standard deviation shock to outputs of USA, Japan, Australia and New Zealand. It would thus enable us to trace out the effects of shocks to Vanuatu's GDP by global or regional shock.

4. Results and Interpretations

For undertaking the econometric exercises, all the variables were transformed into logs and were examined in regard to their stationarity properties.

Unit root tests

We employed three testing procedures for examining the order of integration of each series. The first test is proposed by Dickey and Fuller (1979, ADF) with the null hypothesis of unit root process. However, one of the problems with the ADF tests is that the test has low power in examining the properties of the series. Indeed, Pantula, *et al.* (1994) have argued that unit root tests based on the ordinary least squares (OLS) estimator such as ADF tests, are the least

powerful among the test statistics they examined. Hence, we also apply the Ng-Perron (NP) and KPSS unit root tests. The test suggested by Kwiatkowski, *et al.* (KPSS, 1992) with the null hypothesis of stationarity, while the test developed by Ng and Perron (2001) has a similar null hypothesis as ADF test. Table 8, which reports the results of three unit root tests, shows that variables are non-stationary in levels. After first difference, however, all unit root tests reveal that the series are of I(1).

Table 8: Results of Unit Root Tests

Country / Variable	ADF		Ng and Perron		KPSS	
	Level	First Difference	Level	First Difference	Level	First Difference
Log USA	-2.8045(1)	-3.8610**(0)	-9.5276(2)	-12.6359**(0)	0.1674** (0)	0.1415(6)
Log JPN	-1.3735(1)	-2.9397*(0)	-6.2129(1)	-8.5244**(0)	0.1679**(4)	0.4125(3)
Log AUS	-3.0169(1)	-4.4232** (0)	-13.9518(1)	-13.2997**(0)	0.1556**(1)	0.2779(8)
Log NZ	-2.0100(1)	-2.9424*(0)	-9.9955(1)	-11.1470**(0)	0.1615**(3)	0.1018(2)
Log VAN	-2.7415(3)	-3.1505** (0)	-16.1806(1)	-11.0142**(0)	0.2387**(0)	0.1341(1)

Notes: The ADF critical values are based on Mckinnon. The optimal lag is chosen on the basis of Akaike Information Criterion (AIC). The null hypothesis for both ADF and Ng-Perron tests is a series has a unit root (non-stationary) while the null hypothesis of the KPSS test is does not contain unit root (stationary). The asterisk ** denotes the rejection of the null hypothesis at the 5% level of significance.

Variance decomposition analysis

Variance decomposition analysis is based on Cholesky factorization with the following ordering,² namely: log USA, log JPN, log AUS, log NZ and log VAN. The analysis is done up to a 10-year horizon. The results of variance decomposition procedure are presented in Table 9 and depicted in Figure 1. We find that there is a strong evidence of country-specific shock. About 68 percent of the variability in Vanuatu's output at the one-year-ahead forecast is attributed to its own innovation. However, the impact of shock decreases over the remaining time horizons and by 10 years ahead.

In the short run, a USA shock explains the variation in Vanuatu's output to an extent of 6 percent, which decreases in the medium term to less than 3 percent, although in the long run to a larger extent, but not exceeding 10 percent. A shock to Australia explains the variability in Vanuatu's output in the short-term to about 19 percent and in the long-run about 47 percent. We find a New Zealand shock explains relatively a small variation to the Vanuatu's output in the first year. However, the impact grows to around 30 percent in the long run. However, this can be contrasted with the impact of a Japan shock on Vanuatu's output: a Japan shock accounts for not more than 4 percent for the entire time horizon.

² We used different orderings of the variables. However, the findings are robust to changes. Table 10 shows the correlation coefficients of residuals are low.

Table 9: Vanuatu's Output: Results of Variance Decomposition Analysis

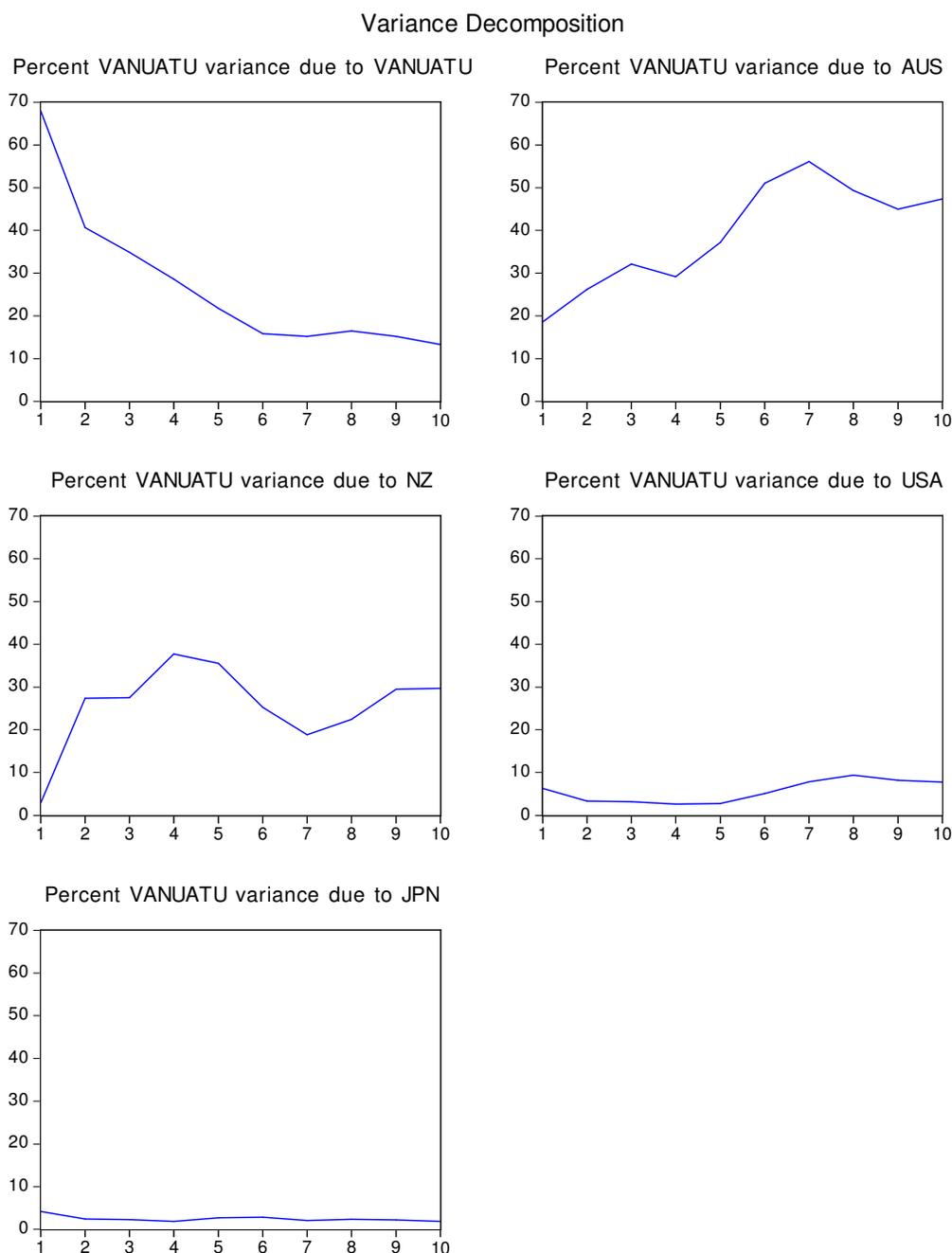
Period	S.E.	USA	JPN	AUS	NZ	VAN
1	0.0312	6.3208	4.2005	18.6002	2.9487	67.9299
2	0.0459	3.3204	2.3785	26.2048	27.4024	40.6939
3	0.0503	3.1920	2.2709	32.1695	27.5041	34.8635
4	0.0556	2.6130	1.8656	29.1834	37.7370	28.6010
5	0.0666	2.8011	2.7230	37.1486	35.5594	21.7679
6	0.0854	5.0933	2.8086	51.0002	25.2635	15.8344
7	0.1001	7.8421	2.0551	56.0681	18.8775	15.1572
8	0.1091	9.3930	2.3300	49.3057	22.4587	16.5126
9	0.1177	8.2124	2.1559	44.9763	29.4540	15.2015
10	0.1280	7.7989	1.8448	47.3228	29.7271	13.3064

Notes: Cholesky Ordering: log USA, log JPN, log AUS, log NZ, log VAN

Table 10: Correlation Matrix of the Reduced Form VAR residuals

	VAN	AUS	NZ	USA	JPN
VAN	1	0.3951	0.0993	-0.2514	-0.1404
AUS		1	0.0609	0.1534	-0.0730
NZ			1	0.3786	-0.2858
USA				1	-0.2340
JPN					1

Figure 1: Variance Decomposition of Vanuatu's output



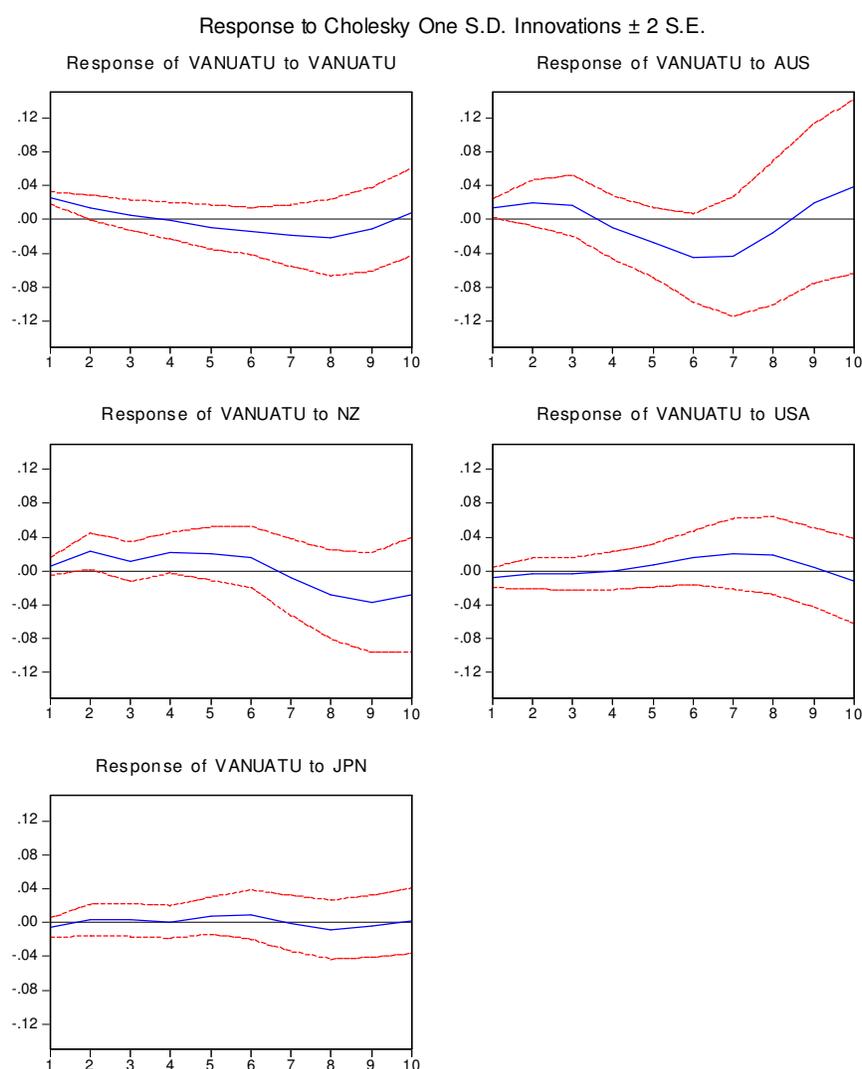
Impulse response function

Figure 2 illustrates responses of Vanuatu output to a one standard deviation shock to outputs of USA, Japan, Australia and New Zealand. Since the variables are in logs and as they are entered into IRF analysis in their first differences, the vertical axis shows the value in percentages. The horizontal axis shows the passage of time: in this case 10 years are displayed. In each graph,

point estimates of the function are represented by a solid line while the dotted lines indicate a two standard deviation band around the point estimates.

Vanuatu's output in response to its own shock in the first two years is significant. The response thereafter becomes negative, which is not significant as well. The impact reverts to a positive trend, though not significant once again. Vanuatu's response to regional shocks, measured by Australia and New Zealand's GDP is marginally significant in the first year and becomes in next remaining years not significant. In contrast, both Japanese and global shocks have no significant effect on the Vanuatu's GDP.

Figure 2: Vanuatu: Results of Impulse Response Function Analysis



5. Conclusions and Policy Recommendations

By employing variance decomposition and impulse response function analyses, we investigated the effects of global and regional and own shocks on Vanuatu's economic growth. We find that country-specific shock is the most important of all the three shocks in the short-term. If we compare the effects of regional shocks with global shocks, we find regional shocks are much more important than global shocks in the short- and long-run. The indications are clear: Vanuatu is more integrated with the region (Australia and New Zealand) than with USA and Japan.

Since internal shocks are the most important factor responsible for the variability in domestic output, it is obvious that Vanuatu has done well mainly because of its past sound domestic policies, both on fiscal and monetary fronts. In other words, Vanuatu's policy reforms in the past have paid dividends. Prudent fiscal policies and cautious public financial management have produced strings of budget surpluses. Supportive monetary policies have contributed to maintaining price stability as well as exchange rate stability. Further, due to appropriate fiscal policies, Vanuatu's debt level has been relatively low. It is at 29 percent of GDP as compared to debt levels in Solomon Islands (43 percent) and in Fiji (48 percent). Additionally, careful monetary management measures have contributed to avoidance of negative demand shocks.

Based on the foregoing reasoning, it is apparent that while Vanuatu is more integrated with the region (Australia) than with USA and Japan, Vanuatu's output is more autonomous, as it is dependent on its own policies. Hence, the policy recommendations that stem forth from the analyses are:

- Identify areas for further reforms at micro and macro levels, which are supportive of generating positive, domestic supply shocks
- Avoid actions generating negative, domestic demand shocks
- Minimize impact of negative, external supply shocks arising out of volatility in imported food & fuel prices
- Promote local food production: root crops, vegetables & fruits

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