Monetary Policy Transmission Work in Pacific Islands: A Study of Vanuatu

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Abstract

This paper undertakes an empirical study of the transmission mechanism of monetary policy in Vanuatu. We find that monetary aggregate is more important than short-term interest rate, as a channel in transmitting impulses from the monetary sector to the real sector. Keywords: Monetary policy transmission, output, money, prices, bounds test, causality.

JEL classification: E50, E30, P52

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1. Introduction

Vanuatu is one of the six Pacific island countries (PICs) that have their own independent currencies among the 14 PICs, the other eight being dollarised economies with one of the currencies of the three metropolitan countries in the region. Five of the six PICs with independent currencies have fixed exchange rate regimes. They are Fiji Islands, Samoa, Solomon Islands, Tonga and Vanuatu, whereas the sixth country, Papua New Guinea, has had a floating exchange rate arrangement since 1994.

Vanuatu established its central bank, the Reserve Bank of Vanuatu (RBV) in December 1980, soon after independence. This study investigates how the monetary policy instruments employed by RBV have worked during the last three decades. The paper is organised as follows: section 2 provides a background of Vanuatu's economy; section 3 reviews monetary policy implementation and limitations to effectiveness of various transmission mechanisms in Vanuatu; section 4 deals with the methodology adopted for the empirical analysis; and section 5 presents results, summary and conclusions with policy implications.

2. Background

Vanuatu (population 243,304), whose key indicators are given in table 1, is subsistence oriented, dominated by root crops and commercial ranch and fishery activities to a small extent, which provide livelihood to 80 per cent of the population.

Table 1 *Vanuatu: selected key indicators*

Land area (sq.km.'000)	12.2
Population (2009: '000)	243
Per capita GDP (US$) at current prices (2006)	1,799
Aid per capita in US$ (2006)	227
Aid as percentage of GDP (2006)	13.4
Human development ranking (2006)	118
Annual average growth rate (%) (2001–2007)	2.7
Annual average inflation (%) (2001–2007)	2.5
Overall budget balance as % of GDP (2001–2007)	-0.5
Current account balance as % of GDP (2001–2007)	-5.4

Source: ADB, 2006; UNESCAP, 2008

Macroeconomic performance

With the offshore financial centre (OFC) institutions inherited from the days of the joint Anglo-French condominium rule, 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 haven[3]. The services sector, comprising financial and tourism activities, has been a major support to Vanuatu's economy.

Vanuatu's growth during the first decade of its independence (Jayaraman, 2004) was uneven. In the first half of the second decade, its GDP grew at 4.2 per cent per annum. However, in the second half, there was steady deterioration in economic governance, resulting ultimately in loss of trust in government institutions, including the state-sponsored Vanuatu National Provident Fund (VNPF). Consequently, there was a

run on VNPF and the payout of funds led to a sharp rise in liquidity in the banking system. Fresh monetary policy initiatives in 1998, including the introduction of open market operations in the central bank's own short-term securities for liquidity management, stabilised the economy (Jayaraman, 2006).

Fiscal consolidation measures beginning from 2001 contributed to economic recovery by mid-2005. Growth rates were high: 6.5 per cent in 2005, 7.2 per cent in 2006, and 6.7 per cent in 2007. Stronger growth in the tourism and construction sectors helped Vanuatu to grow steadily at 6.6 per cent in 2008, the later half of which witnessed the beginnings of the global economic downturn. A string of budget surpluses built up from 2003 to 2007 provided the much-needed fiscal space to meet the challenges thrown by the global economic crisis with notable success. The RBV also relaxed its monetary stance in December 2008. Thus, Vanuatu weathered the global economic crisis well. Although growth slowed in 2009 across all sectors, it achieved 3.0 per cent growth during that year (UNESCAP 2010, IMF 2010).

3. Monetary policy implementation in Vanuatu

Vanuatu's financial sector includes the RBV[4], four commercial banks (a locally owned bank and three foreign banks), a number of trust and insurance companies, the VNPF and several smaller financial institutions. Given the restrictions that apply to the ability of the offshore banks to deal in domestic currency and to do business with domestic banks, the commercial banks play a more dominant role in the domestic financial system. Vanuatu has no vibrant money and capital markets. There are no attractive financial assets for savers to invest in other than savings and time deposits. Table 2 presents Vanuatu's monetary statistics.

Table 2 *Vanuatu: selected output and monetary statistics*

	Output growth (%)	Inflation (%)	Interest rate (%)	ER (US$/dom. currency)	M1 (% of GDP)	M2 (% of GDP)
1980–89 (Ave)	8.8	8.8	16.7	0.010272	39.9	110.2
1990–99 (Ave)	5.1	3.2	13.6	0.008522	31.1	107.4
2000–04 (Ave)	0.6	2.5	7.9	0.007692	30.2	103.9
2005	6.5	1.2	7.5	0.009154	34.5	105.4
2006	7.2	2.0	8.3	0.009038	38.7	99.1
2007	6.7	3.9	8.2	0.009762	39.2	101.8
2008	6.6	4.8	5.3	0.009868	38.6	100.2
2009	3.0	4.9	5.5	0.009368	39.2	92.14

Source: International Monetary Fund, 2009; UNESCAP, 2010

Monetary policy objectives

The objectives of the RBV are to promote monetary stability in terms of low inflation and an adequate level of international reserves, while supporting conditions conducive to orderly and balanced economic development. The RBV seeks to keep inflation below 4 per cent and maintain at least 4 months of international reserves (RBV, 2008).

Vanuatu has a fixed exchange rate regime under which the value of the domestic currency, the vatu (Vt), is determined on the basis of an undisclosed transactions-weighted (trade and tourism receipts) basket of currencies of Vanuatu's major trading partners. The RBV quotes daily rates for vatu. Buying and selling rates of vatu against currencies in the basket are quoted daily, with margins ranging between 0.25 and 0.3 per cent around the middle rate. The RBV aims at maintaining a level of international reserves approximately equivalent to cover six months of imports. Within the exchange rate regime, the RBV attempts to guide monetary developments, including domestic credit conditions.

The monetary policy instruments of a central bank are generally categorised into: (i) rules-based instruments[5], and (ii) indirect instruments[6]. In 1988, the RBV introduced its rule-based instrument, which was primarily intended for prudential reasons. It imposed for the first time a reserve requirement on all banks, the so-called Statutory Reserve Deposit (SRD) ratio, under which all commercial banks were required to keep 10 per cent of demand, time and saving deposits of residents in vatu with the RBV. In fact until 1998, the SRD ratio was the only monetary policy instrument of the RBV. The RBV's lender-of-last-resort facility (the advance facility) was more often used by non-banks than commercial banks, as the latter were awash with liquidity.

Box 1 Vanuatu: monetary policy instruments

Reserve requirements

Introduced in 1988, the Statutory Reserve Deposit (SRD) ratio is calculated on a monthly average basis. This requirement is at a stipulated percentage of deposits, which include 50 per cent of residents' demand deposits in foreign currency, as well as all the demand, time and saving deposits of residents in vatu.

Standing facilities

Discount facility: Banks can sell (rediscount) treasury bills and/or RBV notes with an up to 90-day maturity to the RBV.

Repurchase facility: Banks sell government bonds and/or RBV notes to the RBV and subsequently buy back the securities at a specified date and price. In the period between the sale and repurchase of the securities, the RBV provides the bank with temporary liquidity. The discount rate applies to these operations.

Money market operations

RBV notes: The RBV intermittently auctions these RBV notes, which have maturities of 28, 91, 119 and 182 days to absorb excess liquidity.

Policy variable: Reserve money, defined as the sum of currency issued and bank's deposits, is the key monetary policy variable. Bank deposits include compulsory deposits in connection with SRD requirements and excess reserves partly used by banks to meet daily clearing needs and to grant private sector credit.

Intermediate variables: The RBV monitors a set of key monetary aggregates closely (e.g. various levels of money supply, private sector credit and international reserves) in order to assess the efficiency of its policies.

Box 1 Vanuatu: monetary policy instruments

Monetary instruments: The RBV controls the money supply by monitoring banks' liquidity through indirect instruments:

- **Statutory Reserve Deposit (SRD): primarily a prudential instrument. Since January 2009,** commercial banks have been required to maintain 5 per cent of average vatu deposits and 50 per cent of foreign currency demand deposits for the two months preceding the calculation date.
- **Open market operations: Central for liquidity management purposes.** The RBV regularly buys and sells its own notes in open market operations to regulate banks' liquidity. The notes have maturities of 14 days, 28 days, 63 days and 91 days.
- **Rediscount window and repurchasing agreement facilities:** Primarily lender-of-last-resort facilities. Banks experiencing liquidity shortages can access RBV funds through these facilities. Banks' holdings of RBV notes and government bonds are used as collateral. These facilities have rarely been used since their inception in 1998, because of a generally favourable liquidity situation. The rediscount rate is the RBV's benchmark rate.

Source: *RBV Quarterly Economic Review* (various issues)

Appendix 1 presents the chronological developments in the introduction, as well as changes in monetary policy measures.

Monetary policy transmission

Monetary policy transmission is a process through which changes in monetary policy influence output and price level in the economy. Seven channels of monetary policy transmission have been identified (Mishkin, 1995, 1996, 2001, 2006), the: (i) interest rate, (ii) money supply, (iii) credit, (iv) balance sheet, (v) asset price, (vi) exchange rate, and (vii) expectations channels.

There are constraints that limit the efficiency of transmission mechanisms. Absence of a well-developed financial sector and a vibrant secondary market blunts the effectiveness of the interest rate channel (Fairbairn and Worrell, 1996). The balance sheet approach presupposes that financial assets are important constituents of firms'/consumers' portfolios, and assumes the existence of convertibility between illiquid (consumer durables) and liquid (financial) assets. Empirical studies have shown that markets for assets in developing countries have not attained such sophistication as to be able to function as an efficient conduit for monetary policy (Baksh and Craigwell, 1997). With reference to the asset price channel mechanism and its variants of Tobin's *q* theory[1], the required pre-condition, namely the presence of financial assets constituting a key component of borrowers' and wealth holders' portfolios, is absent in Vanuatu.

To achieve full efficiency, the exchange rate channel transmission mechanism needs a floating system which adjusts to capital flows. Since Vanuatu has a fixed exchange rate regime, this particular channel does not operate. In view of the constraints discussed above, it is more likely that in small island economies with undeveloped money markets, monetary pulses will be transmitted to the real sector through the money supply channel rather than through the interest rate channel.

1 Economics theory of investment behavior where 'q' represents the ratio of the market value of a firm's existing shares (share capital) to the replacement cost of the firm's physical assets (thus, replacement cost of the share capital). It states that if q (representing equilibrium) is greater than one ($q > 1$), additional investment in the firm would make sense because the profits generated would exceed the cost of firm's assets. If q is less than one ($q < 1$), the firm would be better off selling its assets instead of trying to put them to use. The ideal state is where q is approximately equal to one denoting that the firm is in equilibrium. Also called general equilibrium theory or 'q' theory, it was proposed by the US Nobel laureate economist James Tobin (1918-)

4. Variables, data and methodology

The model employed for empirical investigation is simple, since the number of annual observations (1980–2007) is less than 30. We choose two policy variables: monetary aggregate and interest rate. Monetary aggregate is represented by broad money (M2), which includes currency, demand deposits, savings and time deposits in vatu, as well as in foreign currency. Interest rate is proxied by average lending rate (IR), since there is no consistent data series for short-term rate in Vanuatu as the RBV 91-day yield to maturity rate data series is available only from 1999. Besides these variables, we include the nominal exchange rate to check whether it could be a channel for a transmission mechanism. The nominal exchange rate (ER) is expressed as units of US dollar per unit of domestic currency[7].

The target variables are real gross domestic product (RGDP) and price level, which is represented by the consumer price index (P). The annual data series is drawn from two sources: the monetary and exchange rate data from *International Financial Statistics* published by the International Monetary Fund (2008) and RGDP data from the Asian Development Bank (2008) and UNESCAP (2010). The methodology for obtaining the long-run co-integrating equation by ARDL is by the bounds test procedure, which is outlined in appendix 2.

The estimated long-run equation is:

$$LRGDP_t = 1.644 - 1.155P_t^{**} + 1.228M2_t^{***} - 0.011LIR_t - 0.470LER_t^{*}$$

$$t = \quad (2.420)\ (-3.009) \quad (4.986) \quad (-1.736) \quad (-2.179)$$

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

Figures in parentheses are t-statistics.

The coefficient of the monetary aggregate variable (M2) is statistically significant, with a positive sign. The coefficient, which indicates the magnitude of the long-run elasticity of output with respect to money, is 1.228. The coefficient of price variable, with the theoretically expected negative sign, is also significant. However, the coefficient of interest rate, although with the expected negative sign, is not statistically significant. It is clear that interest rate policy is of no significance. On the other hand, changes in monetary aggregate through direct instruments have significant influence on RGDP.

The results of the Granger causality tests (appendix 2: table A3) show that in the long-run, monetary aggregate, interest rate, price and exchange rate significantly Granger-cause the real output, as evidenced by the significance of the error correction term (ECT) in the equation with LRGDP as a dependent variable. With regard to a short-run relationship, we find in the equation with RGDP as a dependent variable, money, prices and interest rate Granger-cause output, while interest rate does not. It is also seen that in the short run, RGDP significantly Granger-causes prices, interest rate and exchange rate.

5. Results, Summary and conclusions

This paper investigated the monetary policy transmission mechanism in Vanuatu. Vanuatu's money market is shallow with few players. It is dominated by government-issued treasury bills, just as its capital market is saturated with long-term government bonds. Further, there are no secondary markets for short-and long-term debt securities.

The study findings are:

(i) there exists a long-run relationship between real GDP and policy variables, including monetary aggregate and interest rate,

(ii) the linkage runs only from policy variables to target variable to output, and

(iii) interest rate has had no influence on RGDP either in the long run or in the short run.

The conclusion is that monetary aggregate is more important than short-term interest rate as a channel in transmitting impulses from the monetary sector to the real sector. These findings are consistent with the findings of studies conducted in countries with undeveloped money markets: money market is not the conduit of monetary policy changes.

With further development of the financial market, the channels through which monetary policy works will continue to evolve. As such, the question of how monetary policy is transmitted to the real sector in Pacific island economies will be of continuing interest to researchers and policy-makers in years to come.

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Appendix 1

Table A1: Vanuatu: Monetary policy instruments: Chronological developments: 1980–2009

Year	Reserve requirement	Discount lending	OMO	Re-purchase rate	Direct credit controls	Secured advance facility
1980	None		None			10.97
1981	None		None			10.97
1982	None		None			10.97
1983	None		None		As weighted average interest rates on deposits were low and loans were high, guidelines were issued: a) rates on loans to productive sectors be in the range of 12–14%, (b) banks finance credit needs of ni-Vanuatu projects, c) weighted average rate on loans not to exceed 14%, d) spread between deposits and lending not to exceed 4.50%	10.97
1984	None		None			10.97
1985	None		None		Guideline (d) was abrogated	10.97
1986	None		None			10.97
1987	None		None		Direct controls ceased	10.97
1988	SRD introduced at 10%		None		Interest rates market determined	10.97
1989	10%		None			10.97
1990	10%		None			10.97
1991	10%		None			10.97
1995	10%		None			10.97
1996	10%		None			10.97
1997	10%		None			10.97

Year	Reserve requirement	Discount lending	OMO	Re-purchase rate	Direct credit controls	Secured advance facility
1998	VNPF payouts were financed by issuance of government bonds. SRD was replaced by PRA at 16%	Intro. at 6.20%	Intro. of RBV notes 5.20%	Intro. rate at 6.20%		10.97
1999	PRA abolished SRD increased to 10%	5.87	3.40%	5.87		Abolished in May
2000	10%	7%	3.50%	7%		
2001	Reserve requirement at 10% of all vatu deposits and 50% of demand deposits in foreign currency	6.50% re-discount facility and re-purchase agreement amalg-amated	3.29%	6.50%	None	
2002		6.50%	4.98%	6.50%		
2003	No changes in the SRD ratio from 2001-2007	6.50%	4.15%	6.50%		
2004	10%	6.50%	3.50%	6.50%		
2005	10%	6.25%	4.34%	6.25%		
2006	10%	6.25%	5.16%	6.25%		
2007	10%	6.00%	4.25%	6.00%		
2008	In November, 2008 SRD was reduced to 8%	6.00%	4.30%	6.00%		Reintro. in October, allowing banks to borrow at 8.75% against RBV notes and government bonds. In November, reduced to 7.75%
2009	5%	6.00%	2.35%	6.00%		

Source: Reserve Bank of Vanuatu Quarterly Economic Review, various issues

Appendix 2

A brief note on empirical methodology

Since the number of observations is not large enough, we resort to the autoregressive distributed lag (ARDL) procedure, developed by Pesaran et al. (2001). There are two steps involved in estimating the long-run relationship between money, output and other variables. The first step is to examine the presence of a long-run relationship among all variables in the equation. Once the long-run relationship is confirmed in the model, the long-run coefficients are estimated using the associated ARDL model. For examining the existence of co-integration, we utilise the bounds test approach.

Accordingly, the following models are constructed for Vanuatu:

$$\Delta LRGDP_t = \delta_1 + \beta_1 LRGDP_{t-1} + \beta_2 P_{t-1} + \beta_3 M2_{t-1} + \beta_4 LIR_{t-1} + \beta_5 LER_{t-1} + \beta_6 TREND + \sum_{i=1}^{p} \alpha_{1i} \Delta LRGDP_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta P_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \Delta M2_{t-i} + \sum_{i=0}^{p} \alpha_{4i} \Delta LIR_{t-i} + \sum_{i=0}^{p} \alpha_{5i} \Delta LER_{t-i} + \varepsilon_{1t} \quad (1)$$

$$\Delta P_t = \delta_2 + \beta_{21} LRGDP_{t-1} + \beta_2 P_{t-1} + \beta_3 M2_{t-1} + \beta_{24} LIR_{t-1} + \beta_{25} LER_{t-1} + \beta_{26} TREND + \sum_{i=1}^{p} \alpha_{21i} \Delta LRGDP_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta P_{t-i} + \sum_{i=0}^{p} \alpha_{23i} \Delta M2_{t-i} + \sum_{i=0}^{p} \alpha_{24i} \Delta LIR_{t-i} + \sum_{i=0}^{p} \alpha_{25i} \Delta LER_{t-i} + \varepsilon_{2t} \quad (2)$$

$$\Delta M2_t = \delta_3 + \beta_{31} LRGDP_{t-1} + \beta_{32} P_{t-1} + \beta_3 M2_{t-1} + \beta_{34} LIR_{t-1} + \beta_{35} LER_{t-1} + \beta_{36} TREND + \sum_{i=1}^{p} \alpha_{31i} \Delta LRGDP_{t-i} + \sum_{i=0}^{p} \alpha_{32i} \Delta P_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \Delta M2_{t-i} + \sum_{i=0}^{p} \alpha_{34i} \Delta LIR_{t-i} + \sum_{i=0}^{p} \alpha_{35i} \Delta LER_{t-i} + \varepsilon_{3t} \quad (3)$$

$$\Delta LIR_t = \delta_4 + \beta_{41} LRGDP_{t-1} + \beta_{42} P_{t-1} + \beta_{43} M2_{t-1} + \beta_4 LIR_{t-1} + \beta_{45} LER_{t-1} + \beta_{46} TREND + \sum_{i=1}^{p} \alpha_{41i} \Delta LRGDP_{t-i} + \sum_{i=0}^{p} \alpha_{42i} \Delta P_{t-i} + \sum_{i=0}^{p} \alpha_{43i} \Delta M2_{t-i} + \sum_{i=0}^{p} \alpha_{4i} \Delta LIR_{t-i} + \sum_{i=0}^{p} \alpha_{45i} \Delta LER_{t-i} + \varepsilon_{4t} \quad (4)$$

$$\Delta LER_t = \delta_5 + \beta_{51} LRGDP_{t-1} + \beta_{52} P_{t-1} + \beta_{53} M2_{t-1} + \beta_{54} LIR_{t-1} + \beta_{55} LER_{t-1} + \beta_{56} TREND + \sum_{i=1}^{p} \alpha_{51i} \Delta LRGDP_{t-i} + \sum_{i=0}^{p} \alpha_{52i} \Delta P_{t-i} + \sum_{i=0}^{p} \alpha_{53i} \Delta M2_{t-i} + \sum_{i=0}^{p} \alpha_{54i} \Delta LIR_{t-i} + \sum_{i=0}^{p} \alpha_{55i} \Delta LER_{t-i} + \varepsilon_{5t} \quad (5)$$

The variables employed are log of real output (LRGDP), log of M2 as percentage of GDP (LM2), log of interest rate (LIR), log of nominal exchange rate (LER). TREND stands for time trend. Δ denotes the first difference operator and ε_t are white noise error terms. The joint significance of the lagged levels in these equations is examined by using the F-test, where the null and alternative hypotheses are expressed as follows:

For Equations (1) to (5):

$H_0 : \beta_{1i} = \beta_{2i} = \beta_{3i} = \beta_{4i} = \beta_{5i} = 0$ (there is no long-run level relationship)

$H_1 : \beta_{1i} \neq \beta_{2i} \neq \beta_{3i} \neq \beta_{4i} \neq \beta_{5i} \neq 0$ (there is a long-run level relationship)

where $i = 1,2,...,5$

Unit root tests revealed that variables were all of I (1). The results of bounds tests to examine the long-run relationship between real output, price, money, interest rate and exchange rate using the bounds test developed by Pesaran et al. (2001) are reported in table A2. The computed F-statistics for the real output equation suggest rejection of the null hypothesis of no co-integration for the equation, with LRGDP as dependent variable. However, the null hypothesis is not rejected for other equations. Thus, the findings show that there is a long-run equilibrium relationship between real output and prices, monetary aggregate (M2), interest rate and exchange rate in Vanuatu.

Table A2 *Results of bounds tests*

Dependent variable			Computed F-statistic	
LRGDP			18.30***	
LP			1.03	
LM2			0.29	
LIR			1.39	
LER			1.02	
	Pesaran et al. (2001)[a]		Narayan (2005)[b]	
Critical value	Lower bound value	Upper bound value	Lower bound value	Upper bound value
1%	3.41	4.68	4.537	6.370
5%	2.62	3.79	3.125	4.608
10%	2.26	3.35	2.578	3.858

[a]Critical values are obtained from Pesaran et al. (2001), table CI(iii) Case III: unrestricted intercept and no trend, p.300. [b] Critical values are obtained from Narayan (2005), table case III: unrestricted intercept and no trend, p.10. *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.

The long-run estimated equation by OLS for real GDP as dependent variable is shown as follows:

$$LRGDP_t = 1.644 - 1.155P_t^{**} + 1.228M2_t^{***} - 0.011LIR_t - 0.470LER_t^{*}$$
$$t = \quad (2.420)\ (-3.009) \quad (4.986) \quad (-1.736)\ (-2.179)$$

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

Figures in parentheses are t-statistics.

The coefficient of the monetary aggregate variable (M2), which has a positive sign and is also statistically significant, indicates the magnitude of the long-run elasticity of output with respect to money is 1.228. The coefficient of price has the theoretically expected negative sign, and is also significant. However, the coefficient of interest rate, although with the expected negative sign, is not statistically significant. Exchange rate (units of US$ per one unit of vatu) also has a negative sign, indicating depreciation would contribute to a rise in output.

Equation (1) is adequate, as the diagnostic test results indicate that disturbance terms are normally distributed and serially uncorrelated with homoscedasticity of residuals, confirming the model has a correct functional form.

Granger-causality tests

Table A3 shows the results of the Granger-causality tests with regard to the significance of the policy variables (money, interest rate) in explaining the variations in both output and prices, both in the long and short run. In the long run, M2, IR, P and ER significantly Granger-cause RGDP, since the error correction term (ECT) in the equation with LRGDP as dependent variable is significant. The magnitude of ECT indicates the speed of adjustment of any disequilibrium towards a long-run equilibrium, which is 47 per cent within a year. However, ECT is not significant in the other four equations, indicating that the long-run relationship exists in only one direction – the linkage runs from money, interest rate, price and exchange rate to output and not otherwise. This also confirms the results we obtained from bound tests that there is only one co-integrating equation, which was the equation with output as the dependent variable.

With regard to short-run relationship, we find in the equation with RGDP as dependent variable, money, prices and interest rate Granger-cause output, while interest rate does not. It is also seen that in the short run, RGDP significantly Granger-causes prices, interest rate and exchange rate. For monetary measure, there is no evidence of Granger causality.

Table A3 *Granger-causality test results*

Dependent variable	F-statistics					ECT (t-statistics)
	ΔLRGDP	ΔLP	ΔLM2	ΔLIR	ΔLER	
ΔLRGDP	-	44.8203***	8.3153***	1.3421	7.2601**	-0.4673*** (-8.8366)
ΔLP	12.8028***	-	1.7185	0.7721	1.3377	-0.1281 (-1.4359)
ΔLM2	0.1384	0.3136	-	0.0285	0.2861	-0.0117 (-0.0071)
ΔLIR	3.7845*	0.4593	2.4283	-	1.8409	-0.3570 (-1.0241)
ΔLER	4.0488**	3.5529*	1.1668	2.3707	-	-0.1405 (-1.0222)

Note: *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.
Figures in parentheses are t-statistics.

(Endnotes)

1 The 14 PICs are: Cook Islands, Fiji Islands, Kiribati, Marshall Islands, Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. These 14 PICs, together with two metropolitan countries, namely Australia and New Zealand, form the regional inter-governmental organisation, known as Pacific Islands Forum (the Forum).

2 The eight dollarised economies, using one of the three major currencies as legal tender, are: Kiribati, Nauru, and Tuvalu (Australian $); Cook Islands and Niue (New Zealand $); Marshall Islands, Federated States of Micronesia and Palau (US $).

3 For an impact study of OFC on Vanuatu's economic growth, see Jayaraman and Choong (2010).

4 The RBV's responsibilities are governed by three key laws: the Reserve Bank Act (1980), the Financial Institutions Act (1999) and the International Banking Act (2002). Its supervisory functions were expanded to cover offshore banks and the VNPF in 2003. The RBV's monetary policy stance for the year ahead has been publicly announced in semi-annual statements since 2003.

5 The rules-based instruments, which are based on the regulatory power of the central bank include: (i) liquid asset ratio, a requirement for a bank to hold minimum amounts of specified liquid assets, typically as a percentage of its liabilities; (ii) reserve requirements, a requirement for a bank to hold minimum balances with the central bank, typically as a percentage of its liabilities; and (iii) standing facilities, which are monetary instruments used at the initiative of banks and bearing a pre-specified interest rate, allowing banks to borrow from (refinance facility) or deposit funds with the central bank (deposit facility) (IMF, 2004).

6 Indirect instruments are linked to money market conditions. These are used at the discretion of the central bank. These include: open market operations conducted by the central bank as a participant in the money market, including (i) buying/selling bonds issued by government and government agencies on the secondary market; and buying/selling assets under a repurchase agreement in the repo market, or foreign exchange swaps; and (ii) open market-type operations, which are monetary operations based on auction techniques that are regulated by the central bank. They involve primary market issuance of the central bank's own securities or government securities issued exclusively for monetary policy purposes (IMF, 2004).

7 The reason for using the nominal exchange rate instead of real exchange rate is that one can isolate changes in the nominal exchange rate on real economic activity separately from changes in prices, since the real exchange rate is already adjusted for changes in prices and using this variable would make it difficult to isolate price changes (inflation) from exchange rate changes (Dabla-Norris and Floerkemeir, 2006).