



An analysis of Fiji's monetary policy transmission

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Abstract

Purpose – The purpose of this paper is to examine the monetary policy transmission mechanism for the Fiji Islands using a structural vector autoregressive (SVAR) model for the period 1975 to 2005.

Design/methodology/approach – The SVAR model investigates how a monetary policy shock – defined as a temporary and exogenous rise in the short-term interest rate – affects real and nominal macro variables; namely real output, prices, exchange rates, and money supply.

Findings – The results suggest that a monetary policy shock statistically significantly reduces output initially, but then output is able to recover to its pre-shock level. A monetary policy shock generates inflationary pressure, leads to an appreciation of the Fijian currency and reduces the demand for money. The paper also analysed the impact of a nominal effective exchange rate (NEER) shock (an appreciation) on real output and found that it leads to a statistically significant negative effect on real output.

Practical implications – The findings of this study should be of direct relevance to the research and policy work undertaken at the Reserve Bank of Fiji.

Originality/value – For a small economy, such as Fiji, where monetary policy is key to sustainable macroeconomic management, this is the first paper that undertakes a dynamic analysis of monetary policy transmission. The paper uses time series data over three decades and builds a structural VAR model, rooted in theory. This paper will be of direct relevance to the Reserve Bank of Fiji. The approach and model proposed will also be useful for applied monetary policy researchers in other developing countries where inflation rate targeting is a key element of the monetary policy setting.

Keywords Fiji, Developing countries, Monetary policy, Structural VAR model

Paper type Research paper



1. Introduction

In order to gauge the relevance of monetary policy, a body of literature has examined the transmission mechanism of monetary policy. Essentially, this strand of literature is concerned with how a monetary policy shock – defined as a temporary and exogenous rise in the short-term interest rate – affects both real and nominal macro variables, such as real output, prices, the exchange rate and money supply, among others. Some recent studies include Christiano *et al.* (2000), Kim and Roubini (2000), Peersman and Smets (2003),

Saxegaard (2006), Aron and Muellbauer (2002), Elbourne and de-Haan (2006), Disyatat and Vongsinsirikul (2003) and Chionis and Leao (2006).

In this paper, we test the monetary transmission mechanism for the Fiji Islands. More specifically, using a structural vector autoregressive (SVAR) model, we examine the impact of a monetary policy shock on both real and nominal macro variables, such as real output, prices, exchange rates and the money supply. Consistent with the extant literature, we define a monetary policy shock as a temporary and exogenous rise in the short-term interest rate. Monetary policy can potentially impact both the demand and supply side of an economy. The demand side effects are primarily through the effects of monetary policy on savings and investment decisions of households and firms through changes in the interest rate (Tillmann, 2008). The supply side effects of monetary policy are argued through a cost channel; a tighter monetary policy induces a rise in short-term interest rate which leads to a higher cost of working capital; see Barthm and Ramey (2001), Ravenna and Walsh (2006), amongst others. This induces inflation.

Briefly foreshadowing our main results, we find that a monetary policy shock statistically significantly reduces output initially, but then output is able to recover to its pre-shock level. In addition, we discover that a monetary policy shock instigates inflationary pressure, leads to an appreciation of the Fijian currency and reduces the demand for money. We also analysed the impact of a nominal effective exchange rate (NEER) shock (an appreciation) on real output and found that it leads to a statistically significant negative effect on real output. This finding suggest that the 2009 devaluation of the Fiji dollar should foster real output.

The balance of the paper is organised as follows. In the next section we describe how monetary policy operates in Fiji and discuss the institutional arrangements in more detail. In this section we also discuss why the operation of monetary policy in Fiji is important. In Section 3 we provide an overview of selected recent literature on the monetary transmission mechanism. In Section 4, we discuss the SVAR model. In Section 5, we discuss the data and empirical findings, while in the final section we provide some concluding remarks including policy implications.

2. The Fiji context

Fiji is a small Pacific Island country with a population of 838,724 in 2008 ((The) World Bank, 2009). It is one of six Pacific Island countries that have an independent currency, along with Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu. Fiji obtained independence from the UK in 1970 and soon thereafter established a Central Monetary Authority (CMA) and pegged its currency to the US dollar. In 1975, Fiji replaced the peg to the US dollar with a peg to a trade weighted basket of currencies of Fiji's major trading partners. This arrangement still exists. In 1984, the CMA was replaced by the Reserve Bank of Fiji (RBF), which was established by an Act of the Fiji parliament. Since the mid-1980s the RBF has been using monetary policy to realize its stated twin objectives of price stability and maintaining the country's foreign exchange reserves.

The financial sector in Fiji is embryonic and had a major set-back in 1995-1996 when the state-owned National Bank of Fiji, which at one point accounted for one-third of total bank credit, failed (Chandra *et al.*, 2004). It currently consists of five commercial banks, three non-bank licensed credit institutions, two life insurance companies, eight general insurance companies and five insurance brokers. A major proportion of the assets of the insurance sector are invested in government securities as well as in term deposits with

commercial banks. In addition to these financial institutions, the state-sponsored pension institution, Fiji National Provident Fund, invests in long-term government and government guaranteed bonds as well as government short-term securities and deposits with commercial banks (Jayaraman and Choong, 2009).

Prior to 1989 the RBF used a series of direct measures to implement monetary policy. First, a statutory reserve deposit (SRD) ratio existed, whereby commercial banks were required to hold with the CMA or RBF a stipulated proportion of their deposits. Second, all licensed financial institutions, including commercial banks, were required to maintain at least 35 per cent of deposits and other liabilities in the form of government securities and treasury bills. Third, the CMA, and later the RBF, implemented mandated priority sector lending targets. These quantitative targets were gradually abolished beginning in 1989 and were discontinued altogether in the early 1990s as part of a series of financial liberalization reforms. The SRD ratio, however, continues to exist and is set at 5 per cent of all deposits (Jayaraman and Choong, 2009).

Since 1989, the primary instrument for conducting monetary policy has been open market operations (OMO) using RBF Notes, which the RBF sells through a weekly auction. Notes range from 91 to 180 days, although 91 day Notes are now officially recognised as the policy indicator rate (PIR). The RBF uses the PIR to influence the money market interest rate (MMR) and the minimum lending rate (MLR), which is the discount rate at which commercial banks can lend from the RBF. The MLR is normally fixed at 50 basis points above the PIR. Hence changes in the PIR are automatically reflected in the MLR. The rate is set in line with the RBF's objectives of maintaining inflation at 2-3 per cent and an adequate level of international foreign exchange reserves to cover about four months of imports of goods and services.

The effectiveness of monetary policy in Fiji has been a matter of policy debate given the failure of economic policies to improve Fiji's economic performance. Fiji's real GDP growth rate has been mediocre. Fiji's real GDP growth rate was 4.1 per cent from 1971 to 1986, but since then has been subject to several sharp falls associated with the overthrow of elected governments in May and September 1987, May 2000 and December 2006. From 1987 to 1990 real GDP growth was -0.94 per cent. Negative growth was recorded in 1991 (-0.3 per cent), 1997 (-1.8 per cent), 1998 (-1.3 per cent) and 2000 (-8 per cent). The growth rate in 2004 was 3.8 per cent compared to 3.0 per cent in 2003 (Narayan and Narayan, 2004). More alarmingly, the growth rate in 2005 was 0.7 per cent and, while it improved to 3.4 per cent in 2006, in 2007 was again negative (-7 per cent) and in 2008 it was zero ((The) World Bank, 2009).

The effect of the coups was an increase outward migration, resulting in the loss of considerable human capital (Narayan and Prasad, 2007). The official unemployment rate since the coups in 2000 has been 8 per cent, but taking into account informal unemployment, the true unemployment rate is about 35 per cent (Narayan and Prasad, 2007). Among other factors, high unemployment is one reason for the decline in Fiji's ranking on the United Nation's Human Development Index from 44 in 1996 to 103 in 2006 (Mahadevan, 2009). Owing to poor economic performance, Fiji's trade balance has deteriorated over the last decade, lowering foreign reserves and sparking self-realized fears of devaluations. There have been three large devaluations of the Fiji dollar by 33 per cent in 1987, following the first coups in 1987, 20 per cent in 1998 following the onset of the Asian financial crisis and, most recently, a 20 per cent devaluation in 2009 following a weak foreign reserves position. Despite these attempts

to improve the trade balance, the gap between exports and imports has widened. This situation has been exacerbated by the global financial crisis. In 2009, most of Fiji's trading partners, such as Australia, New Zealand, Japan and Europe, were stagnant or contracted, having an adverse effect on exports and inbound tourism to Fiji.

The RBF's response has been to raise official interest rates. Tight monetary conditions have generally prevailed in Fiji since 2008. In early 2009, it was estimated that total banking liquidity was less than F\$50 million, which was expected to put further upward pressure on interest rates in the short term (Mahadevan, 2009), although the RBF has since eased credit through cutting the MLR from 6 to 3 per cent to allow the financial sector to function smoothly, without undermining the objective of protecting foreign reserves (RBF, 2009; Mahadevan, 2009). Fiji's economy differs from many countries in that political instability has been a major contributor to low growth over the last two decades. However, Fiji is similar to a number of countries in that the global financial crisis has contributed to lower growth. Other countries have similarly responded to the global financial crisis easing monetary policy.

3. Overview of literature

In this section, we review some related literature on monetary policy transmission. Chowdhury *et al.* (1995) investigate the relationship between money, prices, output and the exchange rate in Bangladesh for the sample period 1974-1992, using a multivariate VAR model. Their results indicate:

- a bi-directional relationship between broad money supply and inflation;
- a uni-directional relationship running from inflation to narrow money supply;
- that monetary policy in Bangladesh has a significant impact on real output;
- that the monetary policy stance, together with inflation, account for significant fluctuations in the foreign exchange rate; and
- that monetary shocks have a temporary impact on inflation.

Berument and Doğan (2003) employ the VAR methodology and highlight that the degree of openness influences the impact of Turkish monetary policy on output and inflation. In that an increase in openness, they find, has a negative impact on output and prices over the sample period January 1987 to January 2001. Disyatat and Vongsinsirikul (2003) study the monetary transmission mechanism in Thailand. They use the dynamic multiplier procedure and the Engle and Granger (1987) error correction model for the sub-sample periods January 1989 to December 1995 and January 1989 to March 2002 to determine the interest rate pass-through. Their empirical findings suggest that commercial banks act as a medium for monetary policy transmission to real sector activity. Furthermore, they find that investment is sensitive to monetary policy shocks.

Using the general to specific dynamic modeling approach, Qin *et al.* (2005) examine the effect of Chinese monetary policy on the macro economy over the period January 1992 to April 2004. They find that monetary policy is largely demand driven and that the impact of the variables considered (required reserves ratio, interest rates, and a quantity instrument controlling direct base money supply) on the real sector is negligible. This finding suggests that these variables do not impact on real sector indicators in the long-run. Golinelli and Rovelli (2005) use a simultaneous equation model to build a small structural macro-model for the Czech Republic (January 1993 to January 2001),

Hungary and Poland (January 1991 to January 2001). They study the relationship between the output gap, inflation, real interest rate and the exchange rate, and emphasize interest rate and exchange rate channels in determining expected inflation. Their findings suggest support for inflation targeting in these economies.

Elbourne and de-Haan (2006) use a structural VAR model to examine the monetary policy transmission for ten transition countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia). They do not find any evidence of a relationship between financial structure and monetary transmission in these countries.

Chong *et al.* (2006) examine the administered rate setting behaviour of commercial banks and finance companies in Singapore over the period January 1983 to December 2002. They utilize Engle and Granger (1987) error correction and cointegration techniques and establish that the speed of monetary policy transmission is inconsistent across the sectors of the Singaporean economy, with the impact lag of a contractionary monetary policy long relative to an expansionary monetary policy.

Chionis and Leao (2006) explore the transmission of monetary policy to the bank lending/deposit rates in Greece over the period 1996 to 2004 within a bivariate cointegration and error correction framework. They argue that, as a result of the accession of Greece into the European Monetary Union (EMU), interest rate aggregates have become more responsive to the policy rate. They find that the policy rate propagates to other interest rates faster in the post EMU accession period, with the transmission lag being about 2-3 months.

There are two key features of this literature which has relevance to our empirical analysis. The first feature of this literature relates to econometric methodology. Most studies have used a VAR model to analyse monetary transmission. The second most commonly used methodology is cointegration and an error correction framework. None of the studies reviewed here have used a structural VAR model. A structural VAR model offers one to impose theoretically motivated restrictions on the potential relationship between interest rate and other macro variables. Our modelling framework, thus, follows a structural VAR model. The second feature of this literature is that the bulk of the studies are based on developed countries. Monetary policy is also relevant for developing countries, particularly in judging the effectiveness of monetary.

Our study on Fiji, a country which has had a turbulent macro-economy characterised by devaluations and interest rate rises, adds to the relatively small literature on monetary policy transmission in developing countries. In this regard, our study differs from a recent study on Fiji by Jayaraman and Choong (2008) in two important ways. First, this study is based on a VAR framework, thus theoretically consistent restrictions are not imposed. Second, this study is based on a very short sample period (1990-2006); that is, on 17 years of data, which is unlikely to capture dynamic effects including monetary policy changes (such as devaluation) that took place prior to 1990.

4. Model

Our SVAR model consists of five variables. The endogenous variables are real GDP, M2, the NEER, the consumer price index (CPI) and the interest rate (IR). It follows that the vector of endogenous variables has the following order:

$$Y'_t = [GDP_t, CPI_t, M2_t, IR_t, NEER_t]$$

We consider both non-recursive and recursive structural VAR models. The recursive structure assumes that prices (*CPI*) have no immediate effect on output (*GDP*), money stock (*M2*) has no immediate effect on prices, monetary policy shock (*IR*) has no immediate effect on the money stock (*M2*) and the nominal effective exchange rate (*NEER*) has no immediate effect on monetary policy (*IR*). The relationship between the reduced-form errors and the structural disturbance is given by:

$$\begin{bmatrix} \varepsilon_t^{GDP} \\ \varepsilon_t^{CPI} \\ \varepsilon_t^{M2} \\ \varepsilon_t^{IR} \\ \varepsilon_t^{NEER} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ * & 1 & 0 & 0 & 0 \\ * & * & 1 & 0 & 0 \\ * & * & * & 1 & 0 \\ * & * & * & * & 1 \end{bmatrix} \begin{bmatrix} \mu_t^{GDP} \\ \mu_t^{CPI} \\ \mu_t^{M2} \\ \mu_t^{IR} \\ \mu_t^{NEER} \end{bmatrix}$$

Unlike the recursive identification, which assumes no contemporaneous relationship between monetary policy, money and the exchange rate, an alternative identification scheme relaxes these assumptions. To identify structural shocks of monetary policy, it is useful to use a non-recursive VAR. For example, to obtain the effect of interest rate innovation on the exchange rate, one has to put the interest rate after the exchange rate in the VAR ordering. This implies that monetary policy cannot respond to contemporaneous changes in the exchange rate. For the advantages of a non-recursive VAR over a recursive VAR in a small open economy see Sims and Zha (1998) and Kim and Roubini (2000). The non-recursive VAR model has the following restrictions:

$$\begin{bmatrix} \varepsilon_t^{GDP} \\ \varepsilon_t^{CPI} \\ \varepsilon_t^{M2} \\ \varepsilon_t^{IR} \\ \varepsilon_t^{NEER} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ * & 1 & 0 & 0 & 0 \\ * & * & 1 & * & 0 \\ 0 & 0 & * & 1 & * \\ * & * & * & * & 1 \end{bmatrix} \begin{bmatrix} \mu_t^{GDP} \\ \mu_t^{CPI} \\ \mu_t^{M2} \\ \mu_t^{IR} \\ \mu_t^{NEER} \end{bmatrix}$$

Both in the recursive and non-recursive VAR, ε^{GDP} , ε^{CPI} , ε^{M2} , ε^{IR} and ε^{NEER} are the structural disturbances; that is, output shocks, inflation shocks, money demand shocks, interest rate shocks and nominal exchange rate shocks, respectively; and μ^{GDP} , μ^{CPI} , μ^{M2} , μ^{IR} and μ^{NEER} are the residuals in the reduced form equations, representing unexpected disturbances (given information in the system). The first equation in the non-recursive VAR structure depicts no contemporaneous relationship between real GDP and the nominal variables. The second equation represents a contemporaneous response of inflation to real GDP, but not to nominal variables. The third equation can be perceived as a short-run money demand function: money demand is allowed to respond contemporaneously to shocks to real GDP, prices and the short-term interest rate. The fourth equation is similar to the monetary policy reaction function: the short-term interest rate is allowed to respond contemporaneously to money demand and exchange rate shocks. The last equation depicts a contemporaneous response of exchange rates to nominal and real variables.

From VAR theory we know that one macro variable responds to changes in other macro variables with a lag. For example, if we consider the fourth equation in the non-recursive structure of the VAR, if there is a change in the short term interest rate then it will only have an impact on the money stock and exchange rate in the next period so the coefficients on the current money stock and exchange rate are all zero. This observation suggests that there is no endogeneity in the fourth equation. Similarly, we can show no endogeneity in other equations of the recursive and non-recursive VAR structure (Hamilton, 1994, pp. 328-30).

5. Results

5.1 Data

All data used in this paper are obtained from the IMF publication *International Financial Statistics*. Data are for the period 1975-2005. A plot of the data is provided in Figures 1-5. Some general observations are worth noting here. First, there is a general upward trend in real GDP, M2 and the CPI. Second, we notice structural breaks in all series except for the CPI. For the interest rate and the NEER series, there is evidence of sharp structural breaks. This is not surprising given the structural economic and political changes that the Fijian economy has gone through over the sample period under consideration. This is consistent with previous empirical studies on Fiji, which have shown evidence

Figure 1.
Natural log of real
GDP for Fiji, 1975-2005

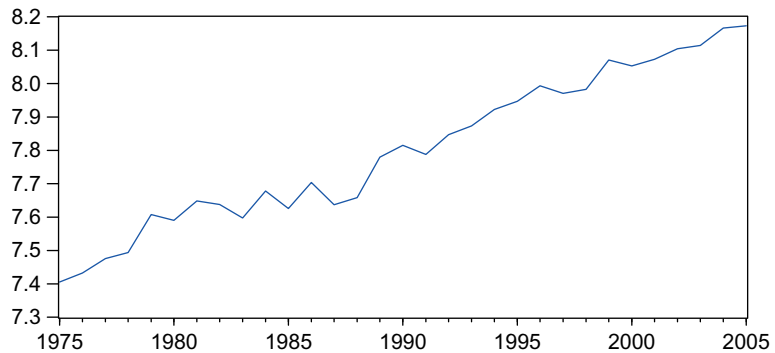
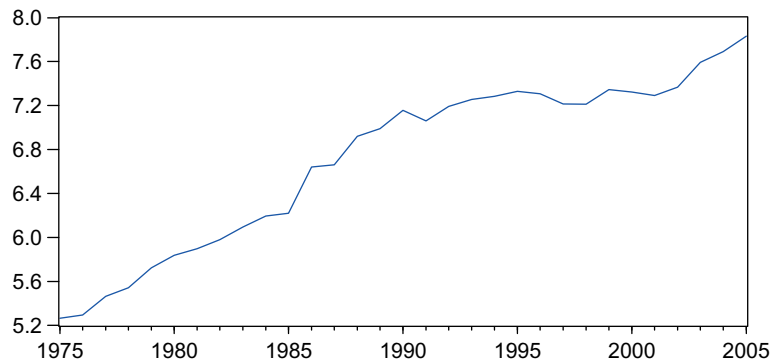


Figure 2.
Natural log of M2
for Fiji, 1975-2005



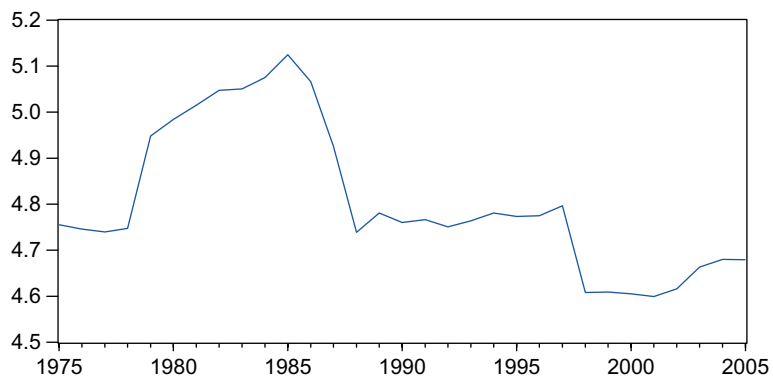


Figure 3.
Natural log of nominal
effective exchange rate
for Fiji, 1975-2005

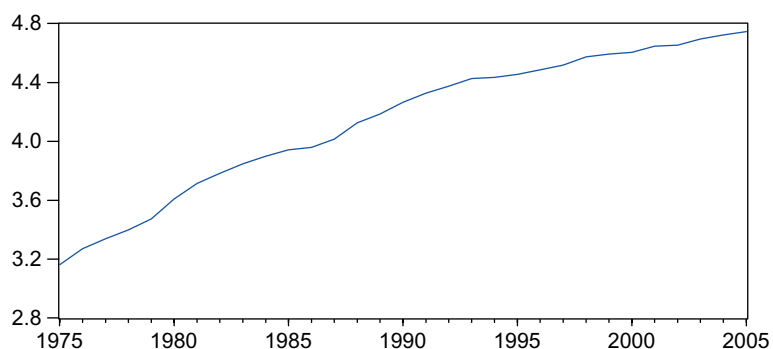


Figure 4.
Natural log of prices
for Fiji, 1975-2005

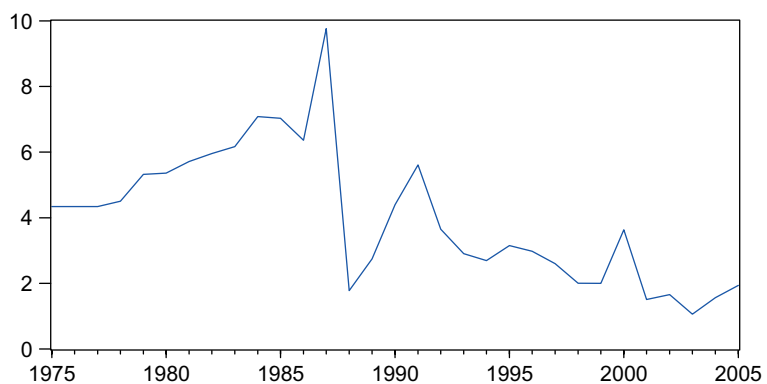


Figure 5.
Interest rate for Fiji,
1974-2005

of statistically significant structural breaks in macroeconomic variables (Narayan and Narayan, 2008).

5.2 Some descriptive statistics

We also compare the mean and volatility (proxied by the standard deviation of the series) for each of the five variables (Table I). We make the following observations. The growth

Panel A: growth rate and volatility			
	<i>Growth</i>	<i>Volatility</i>	
Income	2.69	0.23	
CPI	5.47	0.48	
M2	9.53	0.77	
NEER	-0.01	0.16	
Interest rate	4.56	2.06	
Panel B: kurtosis, skewness and J-B tests			
	<i>Kurtosis</i>	<i>Skewness</i>	<i>J-B</i>
Income	1.8629	0.0256	1.8629 (0.3939)
CPI	1.9059	-0.5409	3.0575 (0.2168)
M2	2.1839	0.6072	2.7653 (0.2509)
NEER	2.0413	-0.5295	2.6357 (0.2677)
Interest rate	3.0906	0.6851	2.4354 (0.2959)

Table I.
Average growth and
volatility of variables

Note: Volatility is measured by the SD of the variable

rate has been highest for M2, followed by the CPI, the interest rate and income. There is a negative rate of growth for NEER, reflecting a depreciation of the Fiji dollar over the time period considered. The growth rate in income has been lower than the growth rate in prices, implying a decline in real income in Fiji. With regard to volatility, we notice that the interest rate has had the highest volatility followed by M2 and the CPI.

We also report some additional descriptive statistics; in particular, we test for normality, using the skewness, kurtosis and Jarque-Bera (JB) statistics. For the income, NEER, and interest rate skewness is positive (has a right tail), while for M2 and the CPI skewness is negative (has a left tail). The kurtosis statistic ranges between 1.9 in the case of income to 3 for M2. Except for income, kurtosis is less than 3, implying that the distribution is peaked (leptokurtic) relative to the normal distribution. Finally, the JB test examines whether the series is normally distributed. Under the null hypothesis of a normal distribution, the J-B statistic is distributed as χ^2 with 2 degrees of freedom. We are unable to reject the null hypothesis of a normal distribution for any of the five series.

5.3 Unit root properties of the data series

Our test for the non-stationarity of the data series follows the recent work of Lee and Strazicich (2003) who suggest a Lagrange multiplier (LM) test that allows one to incorporate at most two structural breaks in the data series. Their test is based on the following data generating process:

$$y_t = \delta'Z_t + X_t, \quad X_t = \beta X_{t-1} + \varepsilon_t, \quad (1)$$

Here, Z_t consists of exogenous variables and ε_t is an error term that follows the classical properties. The model allows for two structural breaks in the intercept and slope: $Z_t = [1, t, D_{1t}D_{2t}, T_{1t}, T_{2t}]$, where $D_{jt} = 1$ for $t \geq TB_j + 1$, $j = 1, 2$, and 0 otherwise. Here, TB_j represents the break date. The term D_{jt} is an indicator dummy variable for a mean shift occurring at time TB , while DT is the corresponding trend shift variable. Lee and Strazicich (2003) use the following regression to obtain the LM unit root test statistic:

$$\Delta y_t = \delta' \Delta Z_t + \phi \bar{S}_{t-1} + \mu_t \quad (2)$$

where $\bar{S}_t = y_t - \hat{\psi}_x - Z_t \hat{\delta}_t$, $t = 2, \dots, T$; $\hat{\delta}$ are coefficients in the regression of Δy_t on ΔZ_t ; $\hat{\psi}_x$ is given by $y_t - Z_t \hat{\delta}$; and y_t and Z_t represent the first observations of y_t and Z_t , respectively. The unit root null hypothesis is described by $\phi = 0$ and the LM test statistic is given by: $\bar{\tau} = t$ -statistic testing the null hypothesis, $\phi = 0$. The location of the structural break (T_B) is determined by selecting all possible break points for the minimum t -statistic as follows:

$$\text{Inf}_{\lambda} \bar{\tau}(\bar{\lambda}_i) = \text{Inf}_{\lambda} \bar{\tau}(\lambda), \text{ where } \lambda = \frac{T_B}{T} \quad (3)$$

The search is carried out over the trimming region (0.15T, 0.85T), where T denotes sample size. Critical values for the two break case are tabulated in Lee and Strazicich (2003). The results are reported in Table II. Our main findings are as follows. Real GDP, NEER and the interest rate are stationary at the 1 per cent level, while the CPI is stationary at the 5 per cent level. The only variable that is not stationary is M2. Another interesting result is that the time trend is statistically significant at the 5 per cent level and negative for real GDP and M2, and positive and statistically significant at the 5 and 1 per cent levels for interest rate and the CPI, respectively. The trend term is statistically insignificant for the NEER. These results imply that over time while real GDP and M2 have declined, the interest rate and CPI have increased.

The structural breaks for real GDP turn out to be 1999 and 2002, for M2 they are 1990 and 2000, for the NEER they are 1985 and 1991, for the interest rate the break dates are 1986 and 2000, and for the CPI the break dates are 1989 and 1998. These break dates are consistent with those found by Narayan and Narayan (2008), and they mainly correspond with one of the coups, a devaluation or period of financial crisis, such as the Asian financial crisis. A detailed discussion of the major structural changes in the Fijian economy can be found in Narayan and Narayan (2008).

The main implication of our finding regarding the unit root properties of the data series is that we can use the level form of real GDP, NEER, interest rate, and the CPI given that they are stationary in their level form. However, for the M2 variable, because it is non-stationary in level form, we have to take its first difference in modelling these five variables in the proposed SVAR model. Standard information criteria are used to select the lag length of the VARs, which turn out to be 2.

5.4 Estimation of non-recursive and recursive VAR

The estimation results of the non-recursive and recursive VARs are presented in Table III. In the recursive structure most of the coefficients are not significant, whereas in the non-recursive scheme most of the coefficients are significant. The equation of interest here is the monetary policy reaction function. The monetary policy reaction function responds significantly to the contemporaneous changes in the money demand and the exchange rate. However, in the recursive structure we do not see any such changes. Moreover, in the recursive VAR model, the monetary policy reaction function does not have any significant impact on output and prices.

5.5 Impulse response functions of the impact of monetary policy under non-recursive VAR

The impulse response functions of the impact of a monetary policy shock on output, prices, interest rates, nominal effective exchange rates and money supply for the non-recursive

Table II.
Structural break
LM unit root test

	Real GDP		M2		NEER		IR		CPI	
	1999	2002	1990	2000	1985	1991	1986	2000	1989	1998
TB1										
TB2										
α	-2.537***	(-9.394)	-2.296	(-4.913)	-4.808***	(-10.79)	-2.081***	(-9.703)	-2.466**	(-5.943)
t	-0.028**	(-2.315)	-0.167	(-2.681)	-0.026	(-1.355)	0.131**	(2.049)	0.210***	(8.453)
D_{1t}	0.121***	(6.315)	-0.361	(-3.038)	0.092***	(3.178)	1.955***	(7.898)	0.006***	(3.668)
D_{2t}	-0.010	(-0.684)	-0.077	(-0.943)	-0.052*	(-1.709)	-1.265***	(-5.553)	0.038**	(2.239)
T_{1t}	0.038***	(2.246)	0.347	(3.834)	-0.185***	(-8.183)	-1.520***	(-9.304)	-0.143***	(-6.875)
T_{2t}	0.029***	(2.744)	-0.067	(-1.341)	0.078	(5.946)	1.153***	(7.761)	-0.053	(-5.567)
k	8		6		8		2		5	
<i>Critical values for the LM test</i>										
λ_1			0.4						0.6	
	1%		5%		10%		1%		1%	10%
0.2	-6.16		-5.59		-5.27		-6.41		-5.74	-5.33
0.4	-		-		-		-6.45		-5.67	-5.32
0.6	-		-		-		-		-	-5.73

Note: Statistical significance at: *10, **5, and ***1 per cent levels, respectively

Panel A: Non-recursive VAR estimation

$$\begin{bmatrix} \varepsilon_t^{GDP} \\ \varepsilon_t^{CPI} \\ \varepsilon_t^{M2} \\ \varepsilon_t^{IR} \\ \varepsilon_t^{NEER} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ * & 1 & 0 & 0 & 0 \\ * & * & 1 & * & 0 \\ 0 & 0 & * & 1 & * \\ * & * & * & * & 1 \end{bmatrix} \begin{bmatrix} \mu_t^{GDP} \\ \mu_t^{CPI} \\ \mu_t^{M2} \\ \mu_t^{IR} \\ \mu_t^{NEER} \end{bmatrix}$$

30.05 (3.94 ^{***})	0.00	0.00	0.00	0.00
-2.61 (5.59)	47.70 (6.26 ^{***})	0.00	0.00	0.00
-9.76 (9.31)	-17.56 (9.94 [*])	3.95 (5.52)	-0.81 (0.43 [*])	0.00
0.00	0.00	7.06 (2.14 ^{***})	0.71 (0.37 [*])	-9.48 (3.60 ^{***})
-25.77 (7.33 ^{***})	14.16 (10.84)	8.43 (2.96 ^{***})	0.37 (0.31)	14.65 (3.40 ^{***})

Panel B: recursive VAR estimation

$$\begin{bmatrix} \varepsilon_t^{GDP} \\ \varepsilon_t^{CPI} \\ \varepsilon_t^{M2} \\ \varepsilon_t^{IR} \\ \varepsilon_t^{NEER} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ * & 1 & 0 & 0 & 0 \\ * & * & 1 & 0 & 0 \\ * & * & * & 1 & 0 \\ * & * & * & * & 1 \end{bmatrix} \begin{bmatrix} \mu_t^{GDP} \\ \mu_t^{CPI} \\ \mu_t^{M2} \\ \mu_t^{IR} \\ \mu_t^{NEER} \end{bmatrix}$$

0.40 (18.85)	0.00	0.00	0.00	0.00
0.60 (26.62)	0.28 (0.16 [*])	0.00	0.00	0.00
0.87 (42.50)	0.54 (0.31 [*])	0.17 (0.07 ^{**})	0.00	0.00
-3.62 (170.77)	1.48 (0.92)	-0.38 (0.33)	1.08 (0.54 ^{**})	0.00
-0.24 (7.31)	0.13 (0.10)	0.00 (0.05)	0.15 (0.09)	0.10 (0.05 ^{**})

Table III.
Estimation of
SVAR models

Notes: Significance at: *10, **5, and ***1 per cent levels, respectively; SE are in parenthesis

VAR are plotted in Figures 6-9. We construct bootstrap percentile 95 per cent confidence intervals to illustrate parameter uncertainty. We consider responses of up to ten years ahead and use 1,000 bootstrapped replications.

Our results reveal that a monetary policy shock has a short-term statistically significant negative impact on output. The impulse response suggests that following a monetary policy shock, output declines in the first year and while it recovers over

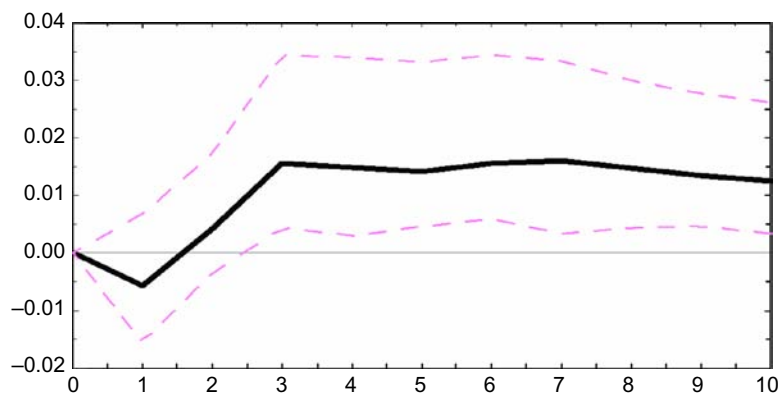


Figure 6.
Effects of monetary
policy shock on output

Figure 7.
Effects of monetary
policy shock on prices

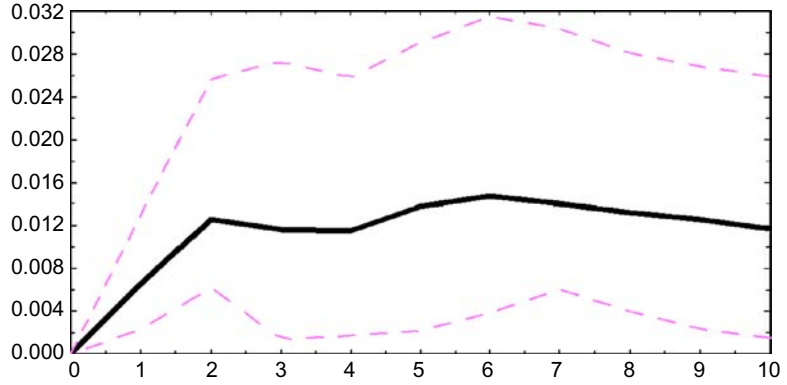


Figure 8.
Effects of monetary
policy shock on nominal
effective exchange rate

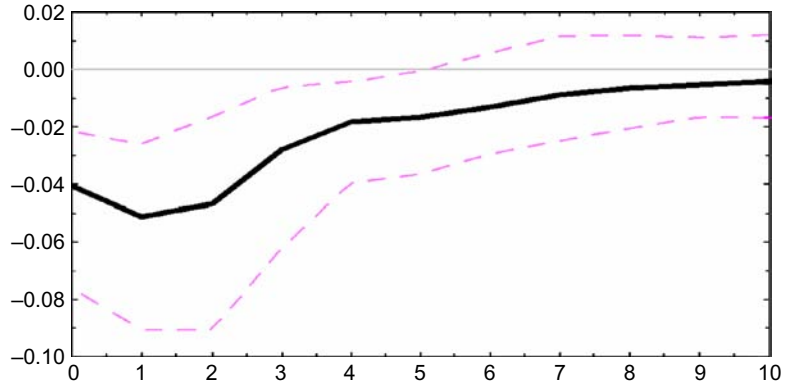
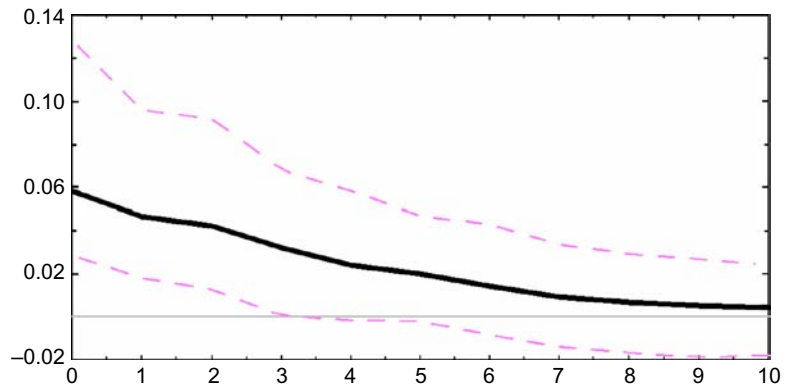


Figure 9.
Effects of monetary policy
shock on M2



the second year it is still negative for most of the second year. After the second year, the monetary policy shock exerts a statistically significant positive effect on output. This finding is consistent with the prediction of Keynesian models with price-wage inertia, where a contractionary monetary policy shock leads to a significant fall in real output. It is also assumed that the impact of a contractionary monetary policy on output is transitory in nature, meaning that output quickly returns to its pre-shock level.

This is not a surprising result for Fiji. The RBF has consistently adopted a policy of interest rate hikes in the face of expanding consumer spending. Because, in Fiji's case, the bulk of consumer goods are imported, increasing consumer spending concomitant with declining export performance has led to current account deficits and evaporating foreign reserves, sparking fears of devaluation. Higher interest rates are also a disincentive for investment; thus, there is a direct negative relationship between investment and output through the aggregate demand channel. There is also the growing loss of confidence in the economy due to speculation about devaluations, which has had an ongoing negative impact on investor confidence.

We notice a statistically significant impact of a monetary policy shock on prices. A rise in the interest rate has a positive impact on prices: prices increase sharply over the first two years and then the impact stabilises. This finding is not unexpected from the perspective of either theory or given Fiji's socio-economic structure. Beaudry and Devereux (1994) build a model that shows how a monetary contraction leads to a rise in price. Given Fiji's poor socio-economic structure – high incidence of poverty (40 per cent) and unemployment (35 per cent) – and that its economic growth has been consumption (imported) driven, interest rate rises have generated inflationary pressures. An examination of data on inflation supports this claim. The RBF increased official interest rates twice in 2006, from 2.25 to 4.25 per cent, despite which inflation has increased from 1.8 to around 6 per cent. It should be noted that in Fiji the interest rate spread is high. In 2006, the savings deposit rate was 0.84 per cent while the average lending rate was around 7.89 per cent. A savings deposit rate of less than 1 per cent is not a sufficient incentive for consumers to save.

Not surprisingly, we also notice that a monetary policy shock has a statistically significant effect on money demand: a monetary policy shock reduces money demand over the entire ten-year horizon, consistent with money demand theory. This finding is also consistent with the results in Narayan and Narayan (2008) who estimate a short-run money demand function for Fiji. Over the first five years, as shown in Figure 9, a monetary policy shock exerts a statistically significant negative effect on the NEER. This suggests that an unexpected and temporary rise in the short-term interest rate tends to be followed by a nominal depreciation. The weakening of the currency, following RBF's monetary tightening, makes imports more expensive. This monetary tightening, thus, leads to an overall increase in price and the inflation rate.

We also consider the impact of a NEER shock (an appreciation of the currency) on real output. This is an important policy issue given the unstable nature of Fiji's dollar (Narayan and Prasad, 2008). We find that a NEER shock has a statistically significant negative effect on real output over the entire ten-year period (Figure 10). An appreciation leads to a sharp fall in output over the first two years, then there is a slight improvement in output, but the impact remains negative. The implication of this finding is that an appreciation of Fiji's dollar hurts Fiji's exports more than it benefits Fiji's imports, consistent with the results in Narayan and Prasad (2008).

Figure 10.
Effects of NEER
shock on output

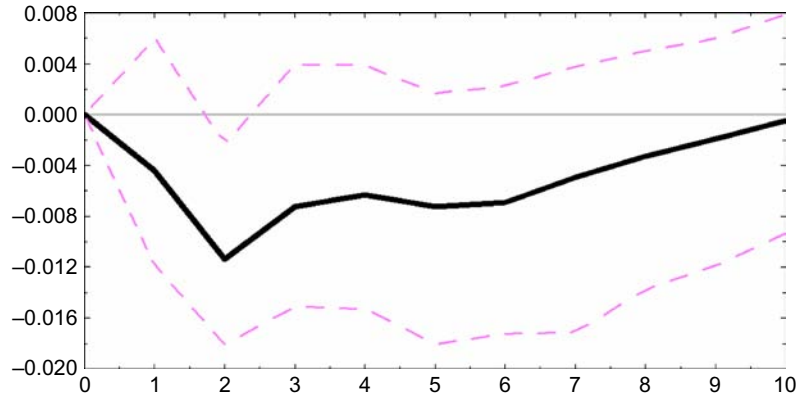


Figure 11.
Effects of monetary
policy shock on output

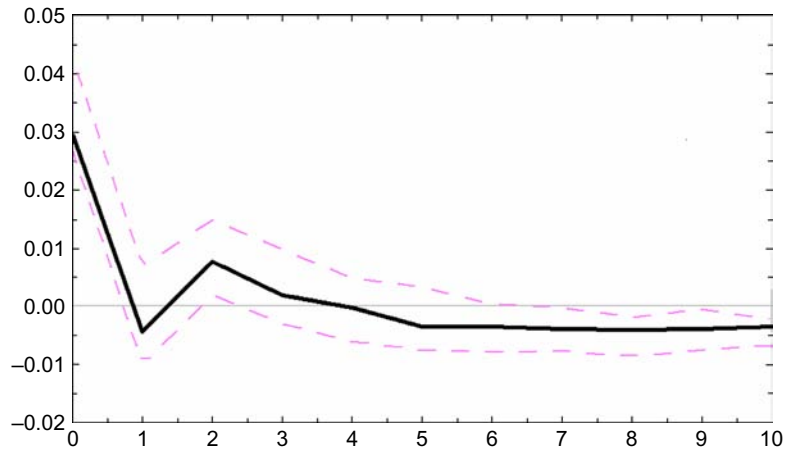
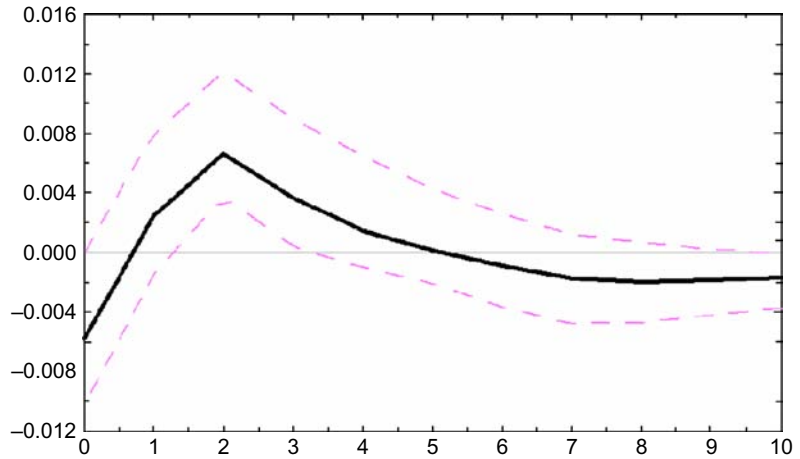


Figure 12.
Effects of monetary
policy shock on prices



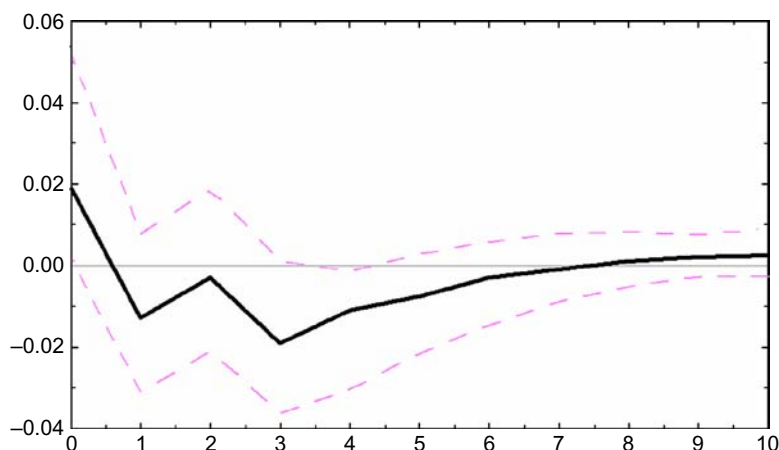


Figure 13.
Effects of monetary
policy shock on M2

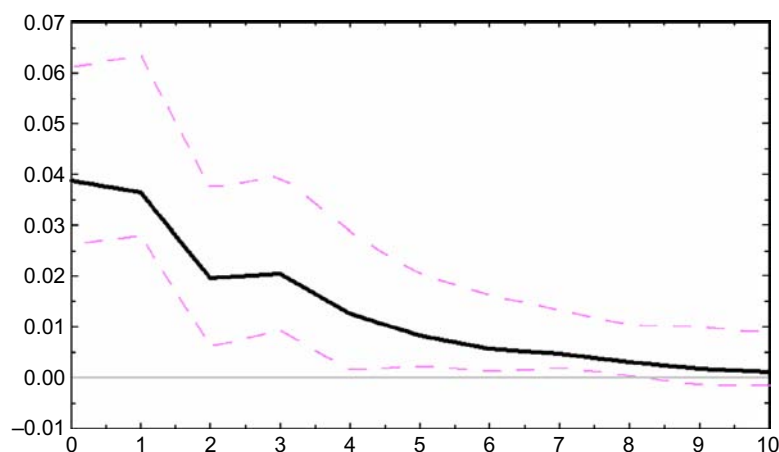
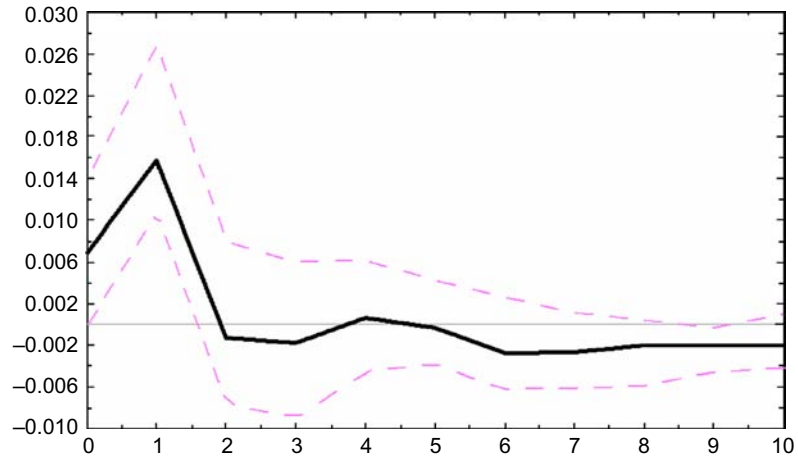


Figure 14.
Effects of monetary
policy shock on NEER

5.6 Impulse response functions of the impact of monetary policy under recursive VAR

The impulse response functions of the monetary policy shock on output, prices, money supply, interest rate and exchange rate under recursive VAR are plotted in Figures 11-14. The monetary policy shock has a significant positive impact on output in the first year, then gradually declines and becomes negative in the second year. From period 7 onwards, the effect remains negative and constant. The effect of a monetary policy shock on prices is insignificant everywhere except from the second half of year one to the first half of year two. The impact of monetary policy on the money supply is not significant. The effect of monetary policy on the nominal effective exchange rate is positive and significant up to period eight. We also examine the effect of the nominal effective exchange rate on output and find it to be positive and significant up to the first half of year one (Figure 15). The findings under the non-recursive VAR structure are more intuitive than the findings under the recursive VAR structure.

Figure 15.
Effects of NEER on output



6. Conclusions and policy implications

The RBF's monetary policy is based on interest rate targeting. What has been unknown, however, is the impact of a monetary policy shock on real and nominal variables, namely real output, prices, exchange rates, money supply. In this paper we examined the monetary policy transmission mechanism for the Fiji Islands, using the SVAR model for the period 1975-2005. The results reported in this paper suggest that a monetary policy shock statistically significantly reduces output initially, but then output is able to recover to its pre-shock level. We discover that a monetary policy shock generates inflationary pressure, leads to an appreciation of the Fijian currency and reduces the demand for money. We also analysed the impact of a NEER shock (an appreciation) on real output and found that it leads to a statistically significant negative effect on real output.

The implication of our findings is clear. In recent times the RBF has used the interest rate policy to dampen consumption demand, which is seen as driving Fiji's economic growth at the expense of declining foreign reserves. This is so because the bulk of Fiji's consumption demand is met through imports. Following the most recent coup (December 2006) economic growth was negative in 2007 and zero in 2008. At the same time, given the poor performance of exports and rising import bill, Fiji's foreign reserves have been declining. This fuelled fears of devaluation (Narayan and Prasad, 2008), leading eventually to a 20 per cent devaluation of the Fiji dollar in April 2009. Based on our results in this paper, this devaluation is likely to boost real output, but the positive effect is small and likely to last for only between one and two years.

In addition, our findings imply that an interest rate rise actually leads to inflationary pressures. This is contrary to the objective of an interest rate rise. We attribute this outcome to Fiji's poor socio-economic conditions, where about 40 per cent of the people are in poverty and 35 per cent of the people are unemployed. This fact, together with a high interest rate spread (a lending rate of 7.89 per cent and a savings deposit rate of 0.84 per cent), is not sufficient for a large proportion of Fiji's poor population to shift from consumption expenditure to savings. This perhaps explains the failure of Fiji's

monetary policy to deliver sustained economic growth. As a result, it is fair to claim that the impact of Fiji's monetary policy is volatile. The challenge for policy makers, thus, is to map a macroeconomic policy framework that arrests the macroeconomic decline experienced by the Fijian economy. This will be an arduous task given the current economic and political climate.

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