RESERVE BANK OF FIJI

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# Trilemma or Quadrilemma: the case of a PIC

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## Abstract

This is the first study to examine the trilemma as well as the quadrilemma monetary policy challenges in the case of Pacific Island Countries (PICs)—developing, vulnerable, small island economies with special needs, small markets, fragile natural environments, and limited opportunities for the private sector and where managing foreign reserves has increasingly become an important policy tool. Taking Fiji as an example, the study finds that over the 1975-2014 period, re: the trilemma, monetary independence and exchange rate stability might have been more fervently pursued by the central bank; re the quadrilemma, the focus appears to have shifted to foreign reserves and capital account openness. When the full sample period is split into two subsamples: 1975-1993 and 1994-2013, results show that the policy emphasis might have shifted from monetary independence, capital account openness and foreign reserves in the first subsample to exchange rate stability, monetary independence and foreign reserves in the second subsample. Policy implications are discussed.

## 1. Introduction

Since the proposition of the "impossible trinity" by Mundell (1963), much has been written and studied on the subject relating to monetary policy transmission objectives and mechanisms of central banks around the world. Essentially, the "impossible trinity" or the "trilemma" as it is commonly known as, is the hypothesis that it is impossible for central banks to simultaneously accomplish their statutory "tri-mandates" of monetary independence, exchange rate stability and financial integration[1]. As can be imagined, these mandates are not independent but are indeed interconnected—policy conflicts are then likely to be unavoidable (Orphanides, 2013). To exemplify, a policy to promote monetary independence is not unlikely to simultaneously guarantee exchange rate stability and vice versa (Zeti, 2013); in fact, if anything, their conflicting nature is immediately evident.

In view of the foregoing, increasingly, many commentators appear to have formed the view and central banks accepted the notion that, at best, only any two of the three might be meaningfully achievable under a given set of conditions—the pursuit of all three, in equal stead, may not be a useful or helpful strategy—raising the question: in a given time period, which two of the three mandates have central banks been pursuing more actively, intentionally or unintentionally. That is, what has the tradeoff been? Or, which of the three might have been, albeit unintentionally, paid less attention to?[2]

The "trilemma" situation appears to become even more interesting and challenging in the case of developing and open economies. (Aizenman, 2011)—essentially for the reason that in such economies the dilemma might not be limited to just a trilemma but might in fact be a "quadrilemma". Central banks in developing and open economies such as those located North to North-East of Australia, in the South Pacific region, are often charged with an additional statutory responsibility of maintaining adequate levels of foreign or international reserves. Thus, in the case of such economies, the question becomes: in a given time period, which of the *four* mandates have central banks been pursuing more actively, intentionally or unintentionally. This question, in the case of economies in the PICs, including Fiji, Papua New Guinea, Solomon Islands, Vanuatu, Tonga, Samoa, and Kiribati has not yet been

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[1] The exact objectives might differ across countries. For example deriving the trilemma index will enable the countries to evaluate how the changes in each variable have evolved over time and its implications on macroeconomic policies as well cross country comparison.

[2] See Aizenman et.al (2013) discusses in detail the challenges faced when analysing and understanding the prediction of the trilemma hypothesis under such mixed hybrids regimes.

scientifically investigated. An understanding of the situation in the region will be useful for many reasons. These 'countries with special needs' have small markets, fragile natural environments, and limited opportunities for the private sector. Some are constantly challenged by relative poverty, structural economic weaknesses, lack of capacity to grow, and acute susceptibility to external shocks (e.g. Sharma et al, 2013). Thus, an understanding of how central banks manage and pursue their various monetary policy objectives in the midst of constant, multi–facetted challenges would indeed be of interest to policymakers around the world.

This is the first study to examine the "trilemma" as well as the "quadrilemma" issues in the case of the PICs with a focus on Fiji. Generally, studies involving the region tend to commonly use Fiji as an example for reasons of challenges regarding access and availability of relevant time series data, among others. In the case of the present study, in addition, Fiji is the country of interest because the relevant central bank—Reserve Bank of Fiji (RBF)—has initiated this study, with the intention of policy development and reforms in mind. Over the last five decades, RBF has developed and reformed a number of its policies, including the pegging of the Fiji dollar to its major trading partner countries, the introduction of a new monetary instrument, the Unimpaired Liquid Assets Ratio (ULAR), imposing capital controls and a credit ceiling to safeguard foreign reserves. With respect to monetary policy, the key reforms and developments include the issuing of the Reserve Bank of Fiji Notes (RBF Notes), a new monetary policy framework to target the prices of funds and a repurchase facility. It would be interesting to examine how the "trilemma" and the "quadrilemma" issues might have played out in a country where in addition to the everyday challenges of a PIC, there have been major internal shocks, emanating largely from three separate coup d'état's in 1987, 2000 and 2006.. The sample period is 1975–2013; indeed, a very extensive period spanning 39 years.

In view of the foregoing, the objectives of this study are to examine the trilemma and quadrilemma constraints in the case of Fiji. Accordingly, the research questions are as follows: (i) in the case of Fiji, re the monetary policy trilemma, which two has the RBF been pursuing more actively over the 1975–2013 period? (ii) re: the quadrilemma, which two of the *four* has the RBF been pursuing over the sample period?

The data for the study is obtained from various sources including "The Trilemma Indexes" on the web,[3] RBF and the International Financial Statistics. Over the full sample period, the trilemma results show that monetary independence and exchange rate stability might have been more fervently pursued by the central bank whereas for; re the quadrilemma, the focus appears to have shifted to foreign reserves and capital account openness. When the full sample period is split into two subsamples: 1975-1993 and 1994-2013, results show that the policy emphasis might have shifted from monetary independence, capital account openness and foreign reserves in the first subsample period to exchange rate stability, monetary independence and foreign reserves in the second subsample period. The paper also discusses policy implications.

The rest of the paper is organised as follows. Section 2 provides the context of the study—Fiji's macro–economy and monetary policy evolution. Section 3 is a review of the literature. Section 4 describes the data and methodology. Section 5 reports the main results regarding the trilemma issues with policy implications. Section 6 focuses on moving from trilemma to quadrilemma and section 7 concludes the paper.

## 2. Study context: Fiji's macro–economy and monetary policy evolution

*The macro–economy*

Overview

Fiji is a small open economy with a population of around 863,892[4] and per capita income of US$5,250.6 (2014). Although it has its own challenges, Fiji is one of the larger and more developed island state in the Pacific. The nation gained independence from the United Kingdom in 1970 and recently returned to a democratic government after a successful general election in September 2014, ending nearly 8 years of military government rule since the coup d'état of 2006.

Fiji has a well-balanced economy owing to its natural resources, low-cost manufacturing and services industries, supported by significant land and sea resources, a competitive and well-educated labour force, and a connection point for major regional telecommunications infrastructure. Foreign exchange generating sectors such as agriculture, forestry, fishing, mining and tourism make up almost one third of GDP. Fiji's manufacturing sector remains a

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[3] http://web.pdx.edu/~ito/trilemma_indexes.htm
[4] Mid-year estimates by Fiji Bureau of Statistics for 2015.

key source of growth given a low-cost, skilled labour force with an industry scale positioned well to be competitive for exports to the developed economies of Australia and New Zealand.

Fiji experienced robust growth in the 1970s, predominantly supported by the agriculture sector while growth slowed to approximately 2 percent from 1980 - 2012 due to political events, natural disasters, poor infrastructure, low investment, external shocks and slow progress in reforms.

Macro–economy 2006-2009

Economic growth in Fiji was low and extremely volatile during this period, due to a wide range of internal and external shocks. These shocks include the succession of tropical cyclones that struck the country in 2007 and early 2008, causing damage to an already struggling agriculture sector and general infrastructure; worsening terms of trade shocks, owing to increasing food and oil prices in 2007-2008; and the contraction in the global economy which caused severe disruptions to major foreign income earners, including personal remittances, mineral water, fish, timber, textiles, and tourism.

In 2006, the economy began heating up underpinned by a strong growth in private sector credit and fiscal expansion. This led to a rise in new lending and deposit rates during the same period, in response to the tight liquidity conditions. The widening trade deficit and declining foreign reserve levels became a concern. To curb this, the RBF imposed a credit ceiling to control outflows of foreign reserve and Government issued its first international bonds totalling US$150 million to assist in financing its deficit.

As a result of these policy measures, including tighter monetary conditions and exchange control measures, there was a slowdown in the growth of private sector credit in 2007 and an improvement in the level of foreign reserves. The improvement in net foreign assets and a reduction in SRD added to the pick-up in liquidity conditions, thus placing a downward pressure on interest rates. On the other hand, the occurrence of natural disasters (floods and tropical cyclones) coupled with fiscal tightening led to a contraction in output in 2007. Fiji's international competitiveness slightly deteriorated[5] while the prevailing low domestic

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[5] As measured by the Real Effective Exchange Rate Index.

demand led to a decline in import demand, and an overall improvement in the trade balance for the year.

In 2008, the economy grew by 1.0 percent in contrast to the 1.4 percent contraction in 2009, mainly attributed to the global economic crisis. Oil and food prices peaked at historical highs in 2008 and as a result inflation was recorded at 9.8 percent towards the mid-year but slowed to 6.8 percent at the end of the year. This translated into a high import bill and worsened Fiji's balance of payments position. The declining trend in global demand led to a significant decline in foreign receipts from tourism, fish, timber, textiles, mineral water and personal remittances. At the end of 2008, the current account deficit widened to 18.2 percent of GDP while foreign reserves fell to critical levels, sufficient to cover 1.9 months of retained imports of goods and non-factor services.

By March 2009, foreign reserves fell to an all-time low and in order to protect Fiji's balance of payments position, the Fiji dollar was devalued by 20 percent in April 2009 together with a tightening of exchange controls. The credit ceiling which was introduced in 2006 was retained to control private consumption and domestic demand. Ceilings were also placed on commercial bank lending rates and interest rate spreads to support the flow of credit to the productive sectors of the economy. At the end of 2009, the current account (8.9 percent of GDP) and foreign reserve levels ($1.1b) stabilised. However, in 2010, there was a slight recovery (0.1%) in the economy due to weak domestic demand, although there was growth registered in the manufacturing, hotel & restaurants and the mining and quarrying sectors.

Macro economy 2010-2014

During 2010-14, the Fijian economy underwent a period of buoyant economic activity, with real GDP growth averaging 3.4 percent per year. This was supported by an accommodative monetary policy stance and a heavy capital budget on the fiscal front. The overnight policy rate was gradually reduced from 3.0 percent in May 2010 to 0.5 percent in November 2011. The rate has since remained unchanged. Inflation has been quite low averaging around 1.7 percent in 2014 as a result of the free education policy and low commodity prices. Fiscal policy concentrated on capital expenditure with the capital–operational mix moving from 21:79 in 2010 to 35:65 in 2014.

In the same period, private sector credit rose on average by 6.3 percent per year with the highest yearly average noted in 2014 at 13.3 percent. The strong growth in commercial banks loan books was supported by a downward trend in lending rates. The outstanding lending rate moved from 7.49 percent in 2010 to an all-time low of 5.77 percent in 2014.

Given Fiji's narrow production base and few close substitutes for goods, a significant share of the demand leaked out of the economy through high imports. The trade balance excluding aircraft as a percent of GDP widened by 30 percent on average during this period. However, strong tourism and remittances helped pay this import bill and sustained Fiji's balance of payments position. Tourism earnings moved from $1,194 million in 2010 to $1,405 million by 2014. Personal remittances noted an all-time high in 2014 at $383 million. Subsequently, foreign reserves remained comfortable in this period, sufficient to buy 4.9 months of retained imports of goods and non-factor services.

Fiji has a fixed exchange rate regime and since 1975 its dollar has been pegged to a trade weighted basket of trading partner currencies, mainly the United States, New Zealand and Australian dollars; the Euro and the Japanese Yen[6]. Given our heavy reliance on goods imports, the current exchange rate regime has worked well in creating a relatively stable domestic currency as well as buffering the effects of global commodity price shocks thereby serving as an anchor for inflation.

In terms of investment, government's target of 25 percent of GDP has been achieved since 2013, averaging around 27 percent of GDP, a major improvement from the low investment experienced in the early 2000s and after the political events of 2006, indicating increased confidence in the economy.

*Evolution of monetary policy*

Fiji's twin objectives of monetary policy are specified in Section 4 of the Reserve Bank of Fiji (RBF) Act (1983) which includes price stability and ensuring a comfortable level of foreign reserves. The conduct of monetary policy has evolved significantly over the years in response to the continuously changing economic and financial conditions.

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[6] Prior to this Fiji used to peg its currency to the US dollar.

Pre–1980, Fiji's financial system was heavily regulated and monetary policy was conducted using direct controls on commercial bank lending and interest rates. Control over the quantity of money was the main approach (monetarist approach) when implementing monetary policy. The Central Monetary Authority (now the Reserve Bank of Fiji) used instruments such as reserve requirements of commercial banks (Statutory Reserve Deposit (SRD) ratio) to influence the liabilities of the central bank or the base money that is currency in circulation and deposits with the central bank. The SRD required commercial banks to hold a certain percentage of their total deposit liabilities with the Reserve Bank. Changes in the base money influenced broad money and credit aggregates and finally inflation.

In the early 1980s, Fiji shifted to a more deregulated financial system. The strengthening and deepening of the financial structure was the primary focus of the Central Bank. New instruments like bonds and treasury bills were introduced to influence interest rates and public debt policy leaned towards a more flexible and market determined regime (Waqabaca, 2000). The shift towards a more market-based system led to the introduction of a new monetary instrument called the Unimpaired Liquid Assets Ratio (ULAR) in 1984, which replaced the former Liquid Assets Ratio (LAR). The ULAR was set in relation to banks' deposit and similar liabilities, except that it was a legal requirement and substantial penalties would have been imposed for noncompliance. The new instrument greatly enhanced the effectiveness of monetary policy as changes in the statutory reserve deposit rates had a quicker impact on the lending operations of banks.

Fiji began phasing out the use of direct monetary instruments around the mid-1980s and made decisive moves toward the implementation of monetary policy through market oriented instruments. By the late 1980s the SRD had become inactive and interest rate controls were abolished. The lack of a secondary market led the Reserve Bank to introduce its own securities in 1989 - the RBF Notes, mainly to sterilise the excess liquidity that was in the banking system, due to the lack of credit demand stemming from the uncertainty in the business environment at the time. This prompted a build-up in foreign reserves and a resultant increase in the monetary base.

The Reserve Bank adopted a new monetary policy framework (interest rate framework) in 1997, whereby it began conducting policy through the price of funds instead of the quantity of money. Open market operations became the main instrument of monetary policy. By

purchasing and selling RBF Notes, the RBF was able to manage liquidity and influence short-term interest rates (deposit and lending rates) in the economy, which in turn influences economic activity and consequently inflation with a lag. When interest rates reach desired levels, the Bank maintains liquidity at a level that is consistent with the rate. The Reserve Bank used the 91-day RBF Notes interest rate as a measure and signal of the monetary policy stance, known as the policy indicator rate. Likewise, there were other tools used such as the SRD and the RBF discount facility whereby banks could access funds at rates linked to the policy indicator rate.

Following the political events of December 2006, tighter exchange controls were put in place to safeguard Fiji's external position. Concerns on the outlook for foreign reserves, prompted the RBF to impose direct controls, and in December 2006, the Bank deviated from market-based mechanisms for the purpose of monetary operations. The RBF aimed to control the quantity of credit, instead of the cost of funds by imposing a credit ceiling and suspending OMO. Priority sector guidelines were issued to direct bank lending to non-consumption priority sectors, such as for investment and Small and Medium Enterprises (SMEs).

Following the suspension of OMO and resultant loss of the policy indicator rate, the Bank re-set the interest rates on its lending facilities, linking them to the latest overnight interbank rate. Additional direct measures were imposed in 2009, to ease the deteriorating conditions in the economy including a ceiling on bank credit and credit institutions' lending rate and bank interest rate spreads, revised lending guidelines for banks, and an increase in the SRD. While movements in monetary and credit aggregates and interest rates during 2009 were generally favourable, the downward trend in lending rates, higher deposit rates and the narrowing interest margins all occurred in response to the directives set by the Reserve Bank. In the long run however, such direct controls are viewed as distortionary and could impede on credit growth.

*Current monetary policy*

In January 2010, RBF removed interest rate controls while banks and credit institutions had to justify any large increases in interest rates. In May of the same year the RBF announced a new market-based monetary policy framework. Under the new interest rate framework, the RBF sets an Overnight Policy Rate to signal the stance of monetary policy. The OPR was initially set at 3 percent and is reviewed constantly by the RBF. In addition, an interest rate

corridor was introduced at 50 basis points (bps) on either side of the OPR to improve the effectiveness of market signalling, improve liquidity management and encourage stability and transparency in money market operations. The interest rates at which banks may borrow from the RBF under the Repurchase Facility (REPO) form the upper limit of the band. The interest rate paid on banks' demand deposits (BDD) held at the RBF is 50 bps below the OPR. Furthermore, the RBF also removed its Unsecured Advance and Re-discount Facilities including remuneration on SRD of Banks amongst other changes. A shorter maturity (14-Day) RBF Note rate was adopted instead of the 91-Day RBN rate in terms of operational target. A change in the monetary policy stance reflected a change in the policy rate and will have immediate changes in money market rates and other rates in the economy and eventually the twin objectives of monetary policy.

## 3. Literature Review

Since the proposition of the "impossible trinity" by Mundell (1963), growing literature has attempted to examine the challenges for a country to simultaneously manage exchange rates, interest rates and capital account openness or "trade-offs". One of the early works by Obstfeld & Taylor (1998) coined the expression as "open-economy trilemma" as well, indicating that across economies, trilemma has not gone without challenge. Obstfeld (1998) argues that policymakers will have to face this trade-off even more aggressively in the wake of increasing acceleration of global capital market integration. Nevertheless, Obstfeld et al (2004) found that the constraints of the trilemma were largely "borne out over a long span of modern economic history", rather than the necessary theoretical implications of the Mundell-Fleming model, therefore their analysis implied that the trilemma makes sense as a guiding policy framework.

In assessing a country's policy combination to empirically characterize trilemma trade-offs, Aizenman et.al (2010) found that the three dimensions of the trilemma configurations are converging towards a "middle ground" among emerging market economies that have managed exchange rate flexibility, intermediate levels of monetary independence, financial integration and a sizable holdings of international reserves. They also found that emerging markets with relatively low international reserves to GDP holdings could experience higher levels of output volatility when they choose a policy combination with a greater degree of policy divergence while this heightened output volatility effect does not apply to economies with relatively high international reserves to GDP holdings. Similarly, in exploring the

relationship between each of these three trilemma variables, Shambaugh (2004) found that fixed exchange rates involve a loss of monetary policy autonomy. However, Farhi & Werning (2012) argued that, in a regime with a fixed exchange rate, the institution of capital controls might be beneficial as a means of ensuring the independence of monetary policy.

A study by Aizenman & Ito (2012) attempts to measure the extent of achievement in each of the three policy goals in the trilemma and how policy configurations affect macroeconomic performances, with a focus on the Asian economies. The result indicated that the three policy choices matter for output volatility and the medium-term level of inflation. Greater monetary independence is associated with lower output volatility while greater exchange rate stability implies greater output volatility, which can be mitigated if a country holds international reserves at a level higher than a threshold of about 20% of GDP. These economies' sizeable amount of international reserves holding appears to enhance the stabilizing effect of the trilemma policy choices, and this may help explain the phenomenal build-up of international reserves in the region especially in the aftermath of the Asian crisis. Similarly, Aizenman and Chinn (2010) have shown that an economy with open financial markets and a fixed exchange rate regime faces a need to independently relax monetary policy. It may be able to do so, though temporarily, as long as it holds a considerable amount of international reserves. Hence, one cannot discuss the issue of the trilemma without incorporating a role for international reserves.

In pursing financial integration while maintaining financial stability, Aizenman (2011; p88) have remarked that "….intriguing developments in the three decades since the 1980s – despite the proliferation of greater exchange rate flexibility, international reserves/GDP ratios have increased substantially". The practice of hoarding international reserves and financial integration has generally increased across the economies. Hence, by linking hoarding of reserves and financial stability, it adds a fourth dimension or an extension of the trilemma policy into quadrilemma. He also argued that extending the policy trilemma by adding financial stability to the macro policy goals was one of the consequences of the global liquidity crisis of 2008-2009. Therefore, by extending the Trilemma framework, it provides useful insights on the trade-offs and current challenges confronted by policymakers and central banks and the importance of implementing prudential regulations and policies to protect economies from crises and support financial stability.

## 4. Data and Methodology

### *4.1 The Trilemma/Quadrilemma Indices*

There are three indices employed in the trilemma regression – namely, monetary independence (MI), exchange rate stability (ERS) and capital account openness (KO). In the quadrilemma regression, we used the three indices (MI, ERS and KO) together with the foreign reserves (FR). . We extracted the data of MI, ERS and KO from "The Trilemma Indexes"[7], 1975 to 2013 except for MI where the data are only available up to 2009. We update the MI index till 2013 using data from the Reserve Bank of Fiji with the same methodology.[8] The fourth index FR, from 1975 to 2013, is computed using data from the International Financial Statistics (IMS). We briefly describe each of the four indexes as follows.

Monetary Independence (MI)

We adopt the definition proposed by Aizenman et al. (2010, 2013) in measuring the MI index, which is the reciprocal of the annual correlation between the monthly interest rates in Fiji (home country) and the U.S. (base country). The index is constructed as follows:

$$MI = 1 - \frac{corr(i_i - i_j) - (-1)}{1 - (-1)}$$

where *i* refers to the home country (Fiji) and *j* to the base country (the US). By construction, the maximum value is 1 and the minimum value is 0 where higher values indicate greater MI.

Exchange Rate Stability (ERS)

The definition of ERS too is given by Aizenman et al (2013) which uses annual standard deviations of the monthly exchange between Fiji and the U.S. as follows:

$$ERS = \frac{0.01}{0.01 + stdev(\Delta(\log(exch\_rate)))}$$

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[7] http://web.pdx.edu/~ito/trilemma_indexes.htm
[8] We calculate the MI index (since 2009) based on the outstanding lending rate in Fiji (due to data availability) and the money market yield on the Treasury bill in the US. We find the extended measure is not perfectly consistent with the index obtained from the Aizenman-Chinn-Ito website prior to 2009. However, we find that the main conclusion of the paper stays the same when the data of 1975-2009 are applied.

The scaling ensures that the index lies between 0 and 1, with higher values indicating higher ERS.

Capital Account Openness (KO)

The third index, KO, is also given by Aizenman et al (2013), which in turn was adopted from Chinn and Ito (2006, 2008), based on Exchange Arrangements and Restrictions (AREAER) data provided by the International Monetary Fund. Given that KO is based on reported restrictions, it is a *de jure* index of capital account openness. The KO index is normalised between 0 and 1, with higher indicating greater openness to cross-border capital flows.
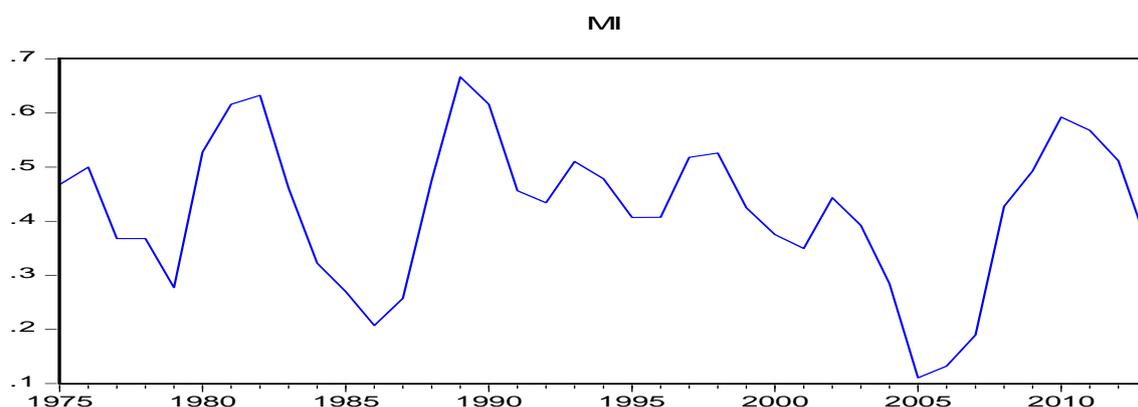
Foreign Reserves (FR)

The fourth index, FR, is defined as the ratio of total international reserves (net of gold), IR, and GDP. Obviously, the greater the FR ratio the higher the position of holding foreign reserves is taken.
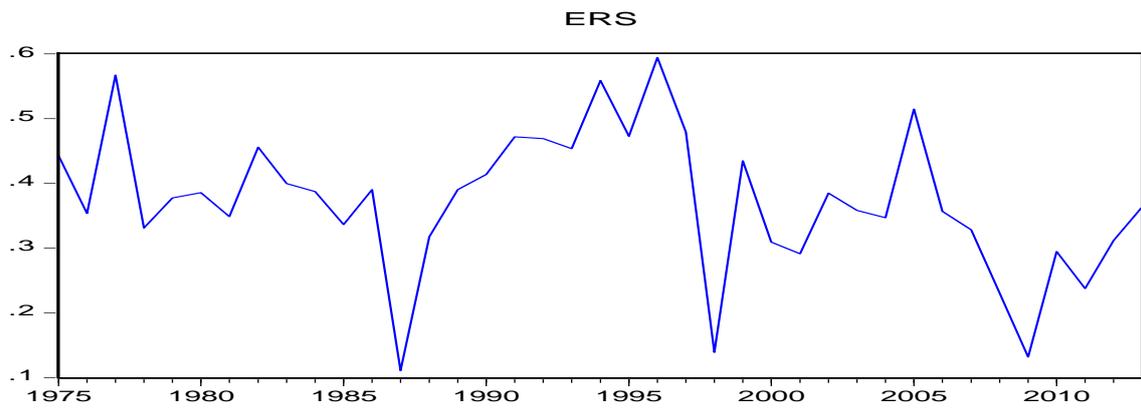
We plot the time series figures of MI, ERS, KO and FR in Figure 1.

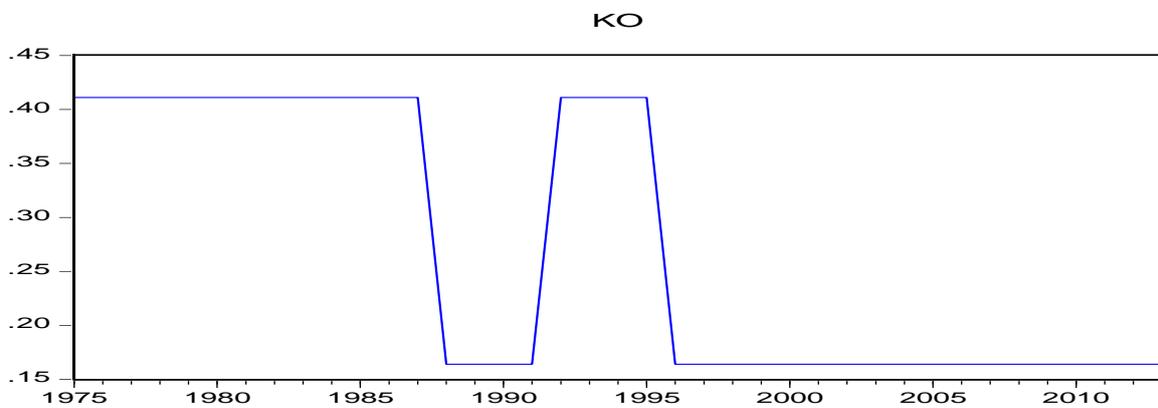**Figure 1. Time Series Plot of MI, ERS, KO and FR, 1975-2013**
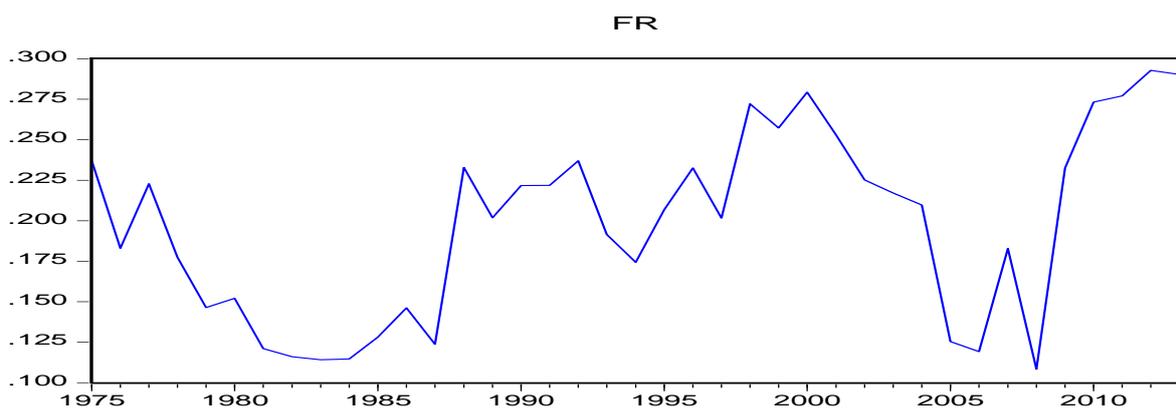
    (a)   Monetary Independence (MI)

(b) Exchange Rate Stability (ERS)

**ERS**



(c) Capital Account Openness (KO)

**KO**



(d) Foreign Reserves (FR)

**FR**



We can see that all the four indexes are fluctuating over the sampling period. MI appears to be relatively volatile as it fluctuates over time from 0.1 to 0.6. For the ERS trend, the three noticeable sharp deciles in 1987, 1997 and 2009 reflect the currency devaluation strategies adopted by the RBF following political events in Fiji. The low KO since 1996 reflects the imposing of capital control by the Fijian government. FR appears to be somewhat higher in

the second half of the sampling years. The big turnaround in 2009 reflects the devaluation of the Fiji Dollar which immediately accelerated the growth of foreign reserves in Fiji. Following that, the International Monetary Fund pumped more foreign reserves to assist Pacific Island member countries, Fiji included[9] following the GFC. Fiji's foreign reserves have also been further boosted by global bond issues in 2006, 2011 and 2015. The foreign reserves build-up in recent years has been attributed to the improvement in economic growth and significant contributions by foreign exchange earners such as tourism earnings, remittances, and foreign direct investment and to a certain extent export-led growth.

### 4.2 Methodology

The main idea of measuring the trilemma policy configuration is while policy-makers might desire to achieve the three trilemma policy goals (MI, ERS and KO) as much as possible; it may not be feasible to maximize the values of the three indexes simultaneously. Under a linear setting, this means that the weighted sum of the three policy indexes should add up to a constant. Therefore, an increase in one of the three variables has to go along with a drop in weighted sum of the other two. To test the validity of the trilemma hypothesis in Fiji, we closely follow Aizenman et al. (2010a, 2010b) by estimating a linear regression model of a constant (c) on the three trilemma policy indexes, given as the following equation:

$$c = \beta_1 MI_t + \beta_2 ERS_t + \beta_3 KO_t + \varepsilon_t. \qquad (1)$$

Following the literature, we set c=2. The regression model is estimated by the usual ordinary least squares (OLS) and to account for autocorrelation in errors ($\varepsilon_t$), the Newey-West robust standard error is employed. When the goodness of fit for the above regression is high, it would suggest that a linear specification is suitable for explaining the policy trade-off. On the other hand, a low value of fit implies either the trilemma constraint is not binding or the relationship is nonlinear. Also, if the trilemma is indeed linear, the predicted values of the regression should hover around the value of c, and the prediction errors indicate how much of the three policy choices have been "not fully used" (predicted values below c and residuals are therefore negative) or to what extent the trilemma is "not binding" (predicted values above c and residuals are therefore positive). Finally, the relative contribution of the three

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[9] SDR allocations to PICs included Fiji (US$94 million).

policies can be further examined using the predicted values $\hat{\beta}_1 MI_t$, $\hat{\beta}_2 ERS_t$ and $\hat{\beta}_3 KO_t$, where $\hat{\beta}_i$ is the OLS estimated value of $\beta_i$ of the above regression.

The quadrilemma configuration suggested by (Aizenman J. 2013)[10] and (Mansour, 2014)) is a simple extension of its trilemma counterpart by considering an additional policy factor, FR. Therefore, the constraint can be examined by the following regression:

$$c = \beta_1 MI_t + \beta_2 ERS_t + \beta_3 KO_t + \beta_4 FR_t + \varepsilon_t. \qquad (2)$$

Like the case of trilemma, the validity of quadrilemma constraint is assessed by the goodness of fit and the predicted values/residuals of the regression in (2). The relative contribution of the three policies can be further examined using the predicted values $\hat{\beta}_1 MI_t$, $\hat{\beta}_2 ERS_t$, $\hat{\beta}_3 KO_t$ and $\hat{\beta}_4 FR_t$.

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[10] Read More: http://www.worldscientific.com/doi/abs/10.1142/S2251361213500018?journalCode=gje

## 5. Empirical Results

In this section, we first report the full sample (1975-2013) of the trilemma and quadrilemma regression results in Table 1. Clearly, both regressions achieve high goodness of fit (R-squared and adjusted R-squared), implying the validity of linear specification in explaining the policy trade-off in Fiji.[11] In each case, there are "winners "and "losers" in terms of their roles in contributing the trilemma/quadrilemma configuration as the constraints restrict the use of all three/four policy goals simultaneously. The most striking result is that the winners/losers sets in these two regressions are shown to be vastly different. According to the trilemma regression, MI and ERS are the favoured policy goals while in the quadrilemma setting FR, KO and ERS are preferred. The conflicting results seem to assert the importance of FR in Fiji, hence failing to account for FR might point to a different or even misleading conclusion.

**Table 1. Trilemma and Quadrilemma Estimation**

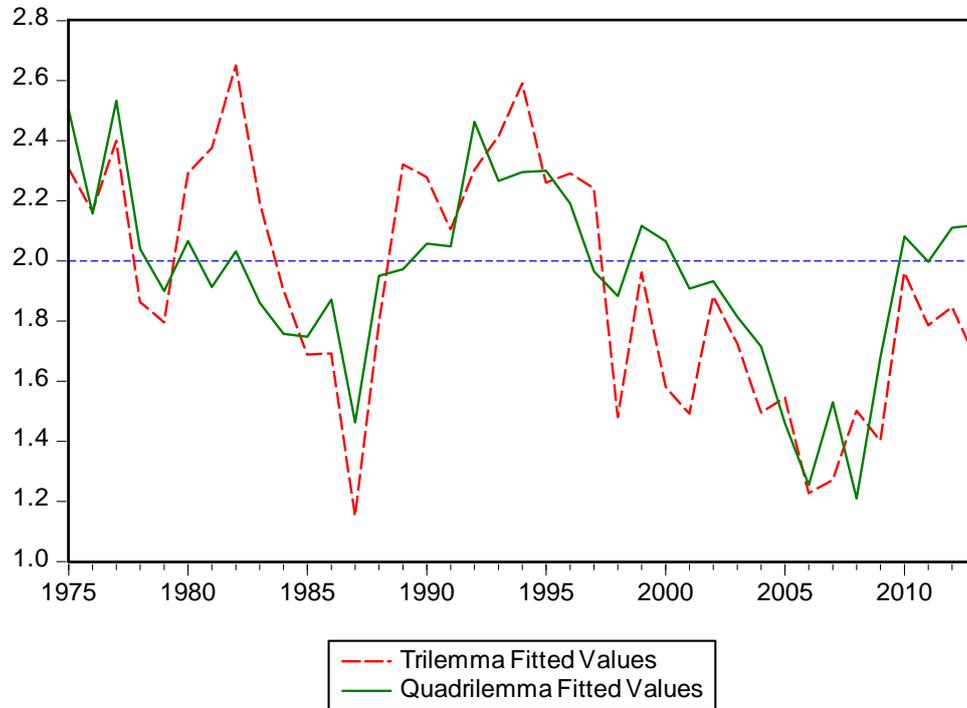|  | Trilemma | Quadrilemma |
|---|---|---|
| **MI** | 1.904*** | 0.516 |
|  | (0.489) | (0.412) |
| **ERS** | 2.278*** | 1.175* |
|  | (0.831) | (0.681) |
| **KO** | 0.993 | 1.508** |
|  | (0.760) | (0.574) |
| **FR** |  | 5.160*** |
|  |  | (0.623) |
| **Observations** | 39 | 39 |
| **R-squared** | 0.960 | 0.977 |
| **Adjusted R-squared** | 0.957 | 0.975 |

Note: Results are based on Equation (1) via OLS estimation. Newey-West standard errors are in the parentheses. ***p<0.01, **p<0.05, *p<0.1. MI, index of monetary independence; ERS, index of exchange rate stability; KO, de jure capital account openness; FR, foreign reserve ratio to GDP.

In Figure 5, we plot the fitted values of the two regressions. Interestingly, while the two regressions come up with rather dissimilar estimated coefficients, their fitted (predicted) values are fairly close and the predictions tend to stay in the same direction of over or under 2 in most of the sampling year. However, the quadrilemma prediction clearly outperforms its trilemma counterpart. Suppose the overall deviation of the policy constraint can be measured

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[11] We note that the (adjusted) R-squared is non-centred and the goodness of fit should be interpreted just as that with implying any further statistical properties.

as the sum of the regression residuals (in their absolute values). The deviation of the trilemma is 8.279 while the quadrilemma is 5.213.

**Figure 5. Regression Fitted Values: Trilemma vs. Quadrilemma**



Note: Trilemma and quadrilemma fitted values are obtained based on the results from Table 1.

Since over years the policy goals in Fiji have evolved, the full sample might not be most appropriate in understanding the valid in accounting for the change. To address the potential policy change, we split the data into two subsamples, subsample 1: 1975-1993 and subsample 2: 1994-2013.[12] We report the regression results in Table 2. First, the goodness of fit is high in all cases. Secondly, like the full sample results, the inconsistency of trilemma and quadrilemma regressions also appears in the two subsamples. However, the inconsistency is much more pronounced in the second subsample. Finally, we also notice that, according to the quadrilemma regression, the policy emphasis might have shifted from MI, KO and FR in the first subsample to ERS, and MI or FR in the second subsample. In the quadrilemma case, FR was very significant in both subsamples indicating hoarding of high reserves levels after a

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[12] The sample split is somewhat arbitrary. However, given the limited sample size, we are not allowed to further split the sample. Besides, it is believed that the split is able to pick up the policy change(s) in Fiji during the sampling period. following the political crisis and also reconfirms that Fiji policy focus has been formulated more toward a combination of exchange rate stability and monetary policy independence more than toward financial market openness, whether de facto or de jure whiles accumulating foreign reserves.

crisis and following the devaluation of the Fiji dollar. Again KO became insignificant as implied in the trilemma subset above.
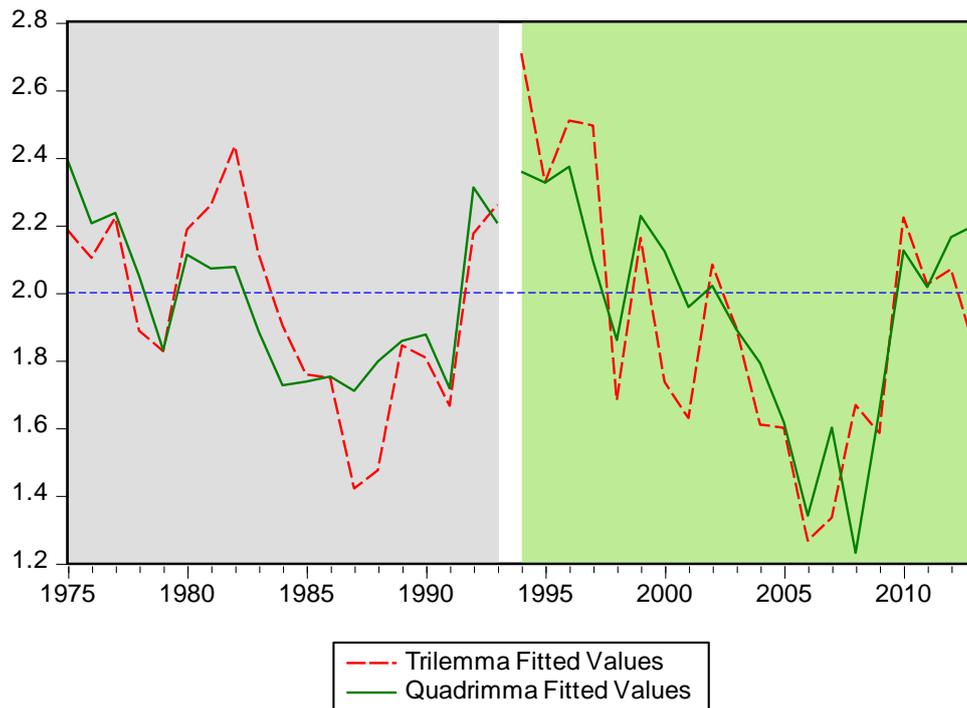
**Table 2. Trilemma and Quadrilemma Estimation, Split Samples**

|  | 1975-1993 | | 1994-2013 | |
|---|---|---|---|---|
|  | Trilemma | Quadrilemma | Trilemma | Quadrilemma |
| MI | 1.394** | 1.032*** | 2.406*** | 0.487 |
|  | (0.605) | (0.343) | (0.593) | (0.699) |
| ERS | 1.419* | 0.0113 | 2.445** | 1.618** |
|  | (0.777) | (0.642) | (0.904) | (0.647) |
| KO | 2.200*** | 2.311*** | 0.465 | 1.094 |
|  | (0.676) | (0.533) | (1.678) | (1.077) |
| FR |  | 4.392** |  | 5.152*** |
|  |  | (1.572) |  | (1.654) |
| Observations | 19 | 19 | 20 | 20 |
| R-squared | 0.981 | 0.988 | 0.961 | 0.974 |
| Adjusted R-squared | 0.977 | 0.985 | 0.954 | 0.968 |

Note: Results are based on Equation (1) via OLS estimation. Newey-West standard errors are in the parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$. MI, index of monetary independence; ERS, index of exchange rate stability; KO, de jure capital account openness; FR, foreign reserve ration to GDP.

We also plot the fitted/predicted values of the subsample regressions in Figure 6. Similar to Figure 5, the regression predictions are similar across trilemma and quadrilemma with the latter appearing to outperform the former. We also observe that the deviation from the policy constraint becomes somewhat larger in the second subsample, implying that the trilemma is binding but has weakened over time. This might reflect political crises and policies that were put in place to safeguard against capital outflow.

**Figure 6. Regression Fitted Values: Trilemma vs. Quadrilemma, Split Samples**



Note: Trilemma and quadrilemma fitted values are obtained based on the results from Table 2, split into two subsamples, 1975-1993 and 1994-2013.

## 6. Moving from Trilemma to Quadrilemma

Finally, we plot the contributions of the trilemma/quadrilemma policy over the two sub-periods in Figure 7 using the product of the estimated coefficient of each index from Table 2 and the respective subsample average. In both the trilemma and quadrilemma cases, it is clear that in Fiji, the policy configuration had moved from "three-pillar" to "two-pillar" over time. However, in the trilemma case the two pillars in the second subsample are ERS and MI while they are ERS and FR for the quadrilemma case. The trilemma case seems to align with the finding of Aizenman et al (2013) that "among developing countries, the policy combinations of monetary independence and exchange rate stability have been quite dominant…" Yet, when the holding of foreign reserves has been considered, its role overtakes the emphasis on monetary independence. In general, we can tell from Figure 7 that, in Fiji, the policy configuration moves from "three-pillar" to "two-pillar" over time.

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**Figure 7. Phase-wise contributions of the policy objectives in Fiji**
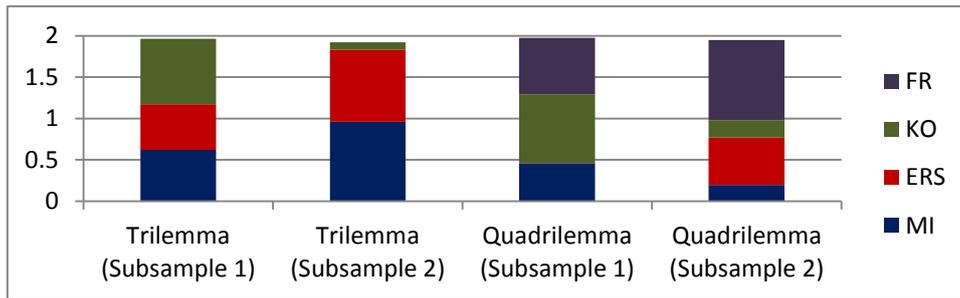


## 7. Conclusion and some policy implications

In the wake of increasing interest in understanding the monetary policy stance of central banks around the world, recognising especially that policy makers may intentionally or unintentionally be pursuing only two of the three objectives—the so called "trilemma" predicament and that foreign reserves might in the case of developing, open economies make the policy choice more challenging, this is the first study to examine the trilemma and quadrilemma case of Fiji, a PIC. The sample period is 1975—2013, and for analysis purposes was split into two subsamples: 1975-1993 and 1994-2013.

Over the full sample period, re the trilemma, results show that monetary independence and exchange rate stability might have been more fervently pursued by the central bank; re the quadrilemma case, the focus appears to have shifted to foreign reserves and capital account openness. When the full sample period is split into two subsamples: 1975-1993 and 1994-2013, results show that the policy emphasis might have shifted from monetary independence, capital account openness and foreign reserves in the first subsample to exchange rate stability and foreign reserves in the second subsample. Including foreign reserves appears to reduce the importance of monetary independence. As for capital openness, it seems that its effect is uneven over the years in both the trilemma and quadrilemma cases.

In view of the above, policy focus might continue to be driven by a combination of exchange rate and monetary independence. Past policy implications borne out of a combination of tools to meet its monetary policy objectives such as imposing credit ceilings, and tightening exchange controls have assisted in safeguarding foreign reserves outflows. Fiji's twin monetary policy objectives of price stability (keeping inflation low) and maintaining an adequate level of foreign reserves are supported by Fiji's trilemma options. In terms of

exchange rate stability, Fiji's fixed exchange rate regime acts as a nominal anchor in keeping inflation low. Therefore, Fiji's strong ERS index has positive implications on its monetary policy objectives of inflation and foreign reserves.

Increased monetary independence in Fiji is also found to have a diminishing effect on inflation, with domestic interest rates particularly independent of global interest rates. In terms of macroeconomic policies, countries with greater monetary independence do tend to have lower output volatility. The increased focus on exchange rate stability and monetary independence with minimal financial openness has augured well for its foreign reserves. Over the years Fiji has imposed exchange controls in order to protect its foreign reserves. In a crisis situation such as in 2009, the ERS index reflected greater stability, which was adjusted by the devaluation of the Fiji dollar in order to boost foreign reserves that were at critically low levels.

Since 2000 exchange rate stability has become the most pursued macroeconomic policy goal, while monetary independence and financial integration have converged. This is an indication that developing countries have been leaning against the trilemma, which may explain why some economies have significant foreign reserve holdings. In Fiji's case, a stable exchange rate with exchange controls works well and has kept inflation low. However, if the trilemma is "relaxed", whereby monetary independence and financial openness converge, it may lead to a further increase in international holdings.[13] It will be interesting to see how the trilemma and quadrilemma policy trade-offs evolve in the years ahead and how these might be aligned to other statutory objectives of the Reserve Bank and of the Fijian Government.

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[13] This can be explored further in future research.

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