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## **A First Look at the Trilemma *Vis-à-Vis* Quadrilemma Monetary Policy Stance in a Pacific Island Country Context**

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Initiated by a central bank, this is the first study to examine and understand the trilemma as well as the quadrilemma monetary policy challenges in the case of Pacific Island countries. Taking Fiji as an example, over the 1975–2013 period, the trilemma, monetary independence and exchange rate stability might have been the more fervently pursued stance; the quadrilemma focus appears to have shifted to foreign reserves and capital account openness. When the full sample period is split into two subsamples, results show that the policy emphasis might have shifted from monetary independence, capital account openness, and foreign reserves to exchange

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rate stability, monetary independence, and foreign reserves. Policy implications are discussed.

*Keywords:* Monetary independence; exchange rate stability; capital openness; foreign reserves; trilemma; quadrilemma.

## 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 now 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. 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 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, intentional or unintentional. That is, what has the trade-off been? Or, which of the three might have been, albeit unintentionally, paid less attention to?

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 predicament 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 Pacific Island Countries (PICs), including Fiji, Papua New Guinea, Solomon Islands, Vanuatu, Tonga, Samoa, and Kiribati, has not yet been 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, 2013](#)). Thus, an understanding of how central banks manage and pursue their various monetary policy objectives in the midst of constant, multifaceted 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, banks’ unimpaired liquid assets ratio, imposing capital controls, and a credit ceiling to safeguard foreign reserves. It would be interesting to understand how the “trilemma” and “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 are obtained from various published sources including “The Trilemma Indexes” on the web,<sup>1</sup> RBF, and the International

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<sup>1</sup>[http://web.pdx.edu/~ito/trilemma\\_indexes.htm](http://web.pdx.edu/~ito/trilemma_indexes.htm).

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 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 some policy implications.

The rest of the paper is organized as follows. Section 2 provides the context of the study — Fiji’s macroeconomy and monetary policy evolution. Section 3 shows 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 focusses on moving from trilemma to quadrilemma. Section 7 concludes.

## **2. Study Context: Fiji’s Macroeconomy and Monetary Policy Evolution**

### **2.1. *The macroeconomy***

#### *2.1.1. Overview*

Fiji is a small open economy with a population of around 863,892<sup>2</sup> and *per capita* income of US\$5,250.6 (in 2014). Although it has its own challenges, Fiji is one of the larger and more developed island states in the Pacific. The nation gained independence from the U.K. in 1970 and recently returned to a democratic government after a successful general election in September 2014, ending nearly eight years of military government rule since the coup d’état of 2006.

Fiji has a relatively 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 labor force, and a central connecting point for major regional telecommunications. Foreign exchange generating sectors such as agriculture, forestry, fishing, mining, and tourism make up almost a third of GDP. The manufacturing sector remains a key source of growth. Fiji has a fixed exchange rate regime and since 1975 its currency has been pegged to a trade-weighted basket of trading

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<sup>2</sup>Mid-year estimates by Fiji Bureau of Statistics for 2015.

partner currencies, including the U.S., New Zealand, and Australian dollars, the Euro, and the Japanese Yen.<sup>3</sup>

### 2.1.2. *Macroeconomy 2006–2009*

Economic growth in Fiji has been 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 the Government issued its first international bonds totaling 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 but an improvement in the level of foreign reserves. The improvement in net foreign assets and a reduction in banks statutory reserve deposit (SRD) ratio added to the pick-up in liquidity conditions, placing a downward pressure on interest rates. In contrast, 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 deteriorated<sup>4</sup> slightly while the prevailing low domestic 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% in contrast to the 1.4% contraction in 2009, attributed mainly 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% toward the mid-year but declined to 6.8% by the end of the year. This translated into a high import bill and worsened Fiji's balance of payments

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<sup>3</sup>Previously, it was the US dollar only.

<sup>4</sup>As measured by the Real Effective Exchange Rate Index.

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% of GDP while foreign reserves fell to critically low levels, sufficient to cover only 1.9 months of retained imports of goods and non-factor services.

By March 2009, foreign reserves fell to an all-time low and to protect Fiji's balance of payments position, the Fiji dollar was devalued by 20% in April 2009 together with more tightening of exchange controls. The credit ceiling, which was introduced in 2006, mainly to prevent capital flight during the political upheavals, 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. By the end of 2009, the current account (8.9% of GDP) and foreign reserve levels (\$1.1b) had stabilized and credit ceilings removed.

### 2.1.3. *Macroeconomy 2010–2014*

During the 2010–2014 period, the Fijian economy experienced positive economic activity, with real GDP growth averaging 3.4% per year. This was supported by an accommodative monetary policy stance and a heavy capital budget on the fiscal front. The overnight policy rate (OPR) was gradually reduced from 3.0% in May 2010 to 0.5% in November 2011. The rate has since remained unchanged. Inflation has been quite low averaging around 1.7% 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% per year with the highest annual average noted in 2014 at 13.3%. The strong growth in commercial banks loan books was supported by a decline in lending rates, from 7.49% in 2010 to an all-time low of 5.77% 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% on average during this period. However, strong tourism and remittances helped pay for this import bill and sustained Fiji's balance of payment position. Tourism earnings increased from \$1194 million in 2010 to \$1405 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.

## ***2.2. Monetary policy evolution***

Fiji's twin objectives of monetary policy are specified in Sec. 4 of the RBF Act (1983), which include price stability and 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. 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 RBF) used instruments such as reserve requirements (SRD ratio) to influence extent of credit expansion by commercial banks and 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 central bank. Changes in the base money influenced broad money and credit aggregates and finally inflation.

In early 1980s, government policies shifted to a more deregulated financial environment. The strengthening and deepening of the financial system were the primary focus of the central bank. New instruments such as bonds and treasury bills were introduced to influence interest rates and public debt policy leaned toward a more flexible and market-determined regime (Waqabaca, 2000). The shift toward 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. The ULAR was set in relation to banks' deposit and similar liabilities and was a legal requirement with substantial penalties for non-compliance. The new instrument greatly enhanced the effectiveness of monetary policy as changes in the SRD rates had a quicker impact on the lending operations of banks.

Direct monetary instruments were phased out around the mid-1980s, replaced by 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 central bank to introduce its own securities in 1989 — the RBF Notes, mainly to absorb excess liquidity in the system, stemming from a lack of credit demand 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.<sup>5</sup>

In 1997, RBF adopted a new monetary policy framework (interest rate) 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 bank was able to manage liquidity and influence short-term interest rates (deposit and lending rates) in the economy, which in turn influenced economic activity and consequently inflation with a lag. When interest rates reach the desired levels, the bank maintains liquidity at a level that is consistent with the rate. The 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 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. It should be noted that at all times, regardless of the political events, monetary policy remained independent.<sup>6</sup>

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. In early 2009, SRD was reduced to supplement existing measures to maintain an adequate level of liquidity in Fiji's financial system. However, in late 2009, SRD was raised to ensure that liquidity in the

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<sup>5</sup>RBF Notes are available to the general public; Repo market is available only to the six commercial banks operating in Fiji; and OMO is conducted via issues of the RBF Notes.

<sup>6</sup>The replacement of the official policy rate (from 91-day RBF Notes rate to 14-day RBF Notes rate) was a result of a review of the monetary policy framework undertaken in 2010.



banking system was maintained at an acceptable level while safeguarding Fiji's foreign reserves. Although movements in monetary and credit aggregates and interest rates during 2009 were generally favorable, the downward trend in lending rates, higher deposit rates, and the narrowing interest margins all occurred in response to the directives set by RBF.

### **2.3. *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 OPR to signal the stance of monetary policy.<sup>7</sup> The OPR was initially set at 3% 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 signaling, 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 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 among 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), a growing body of 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 *et al.* (2005) coined the expression "open-economy trilemma" as well,

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<sup>7</sup> Changes in the OPR are expected to be passed on to other interest rates in the market, including commercial bank deposit and lending rates. The reverse, however, from market to OPR is not the case, such that if there was a change in the market rates, OPR would not be influenced.

indicating that across economies, trilemma has not gone without challenge. Obstfeld (1998), Hoontrakul (1999), and Lee and Tan (1999) argue that policymakers will have to face this trade-off more aggressively in the wake of increasing acceleration of global capital market integration. Nevertheless, Obstfeld (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 and Chinn (2010) found that the three dimensions of the trilemma configurations are converging toward a “middle ground” among emerging market economies that have managed exchange rate flexibility, intermediate levels of monetary independence, financial integration, and 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 and Werning (2012) argued that, in a regime with a fixed exchange rate, the policy of capital controls might be beneficial as a means of ensuring the independence of monetary policy.

A study by Aizenman and 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 whereas 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 pursuing financial integration while maintaining financial stability, (Aizenman, 2011, p. 88) noted 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, adding thereby a fourth dimension or an extension of the trilemma policy into quadrilemma. The author also argued that extending the policy trilemma by adding financial stability to the macropolicy goals was one of the consequences of the global liquidity crisis of 2008–2009. Therefore, the extended trilemma framework provides useful insights on the trade-offs and current challenges confronted by policymakers 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*

The three indices usually employed in trilemma regressions include monetary independence (MI), exchange rate stability (ERS), and capital account openness (KO). In the quadrilemma regression, we use these three plus foreign reserves (FR). Data for MI, ERS, and KO were obtained from "The Trilemma Indexes,"<sup>8</sup> 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 RBF using the same methodology.<sup>9</sup> 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 below.

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<sup>8</sup>[http://web.pdx.edu/~ito/trilemma\\_indexes.htm](http://web.pdx.edu/~ito/trilemma_indexes.htm).

<sup>9</sup>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 that 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.

#### 4.1.1. *Monetary independence (MI)*

We adopt the definition proposed by [Aizenman and Chinn \(2010\)](#) and [Aizenman \(2013\)](#) 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:

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

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

#### 4.1.2. *Exchange rate stability (ERS)*

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

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

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

#### 4.1.3. *Capital account openness (KO)*

The third index, KO, is also given by [Aizenman \(2013\)](#), 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 normalized between 0 and 1, with higher indicating greater openness to cross-border capital flows.

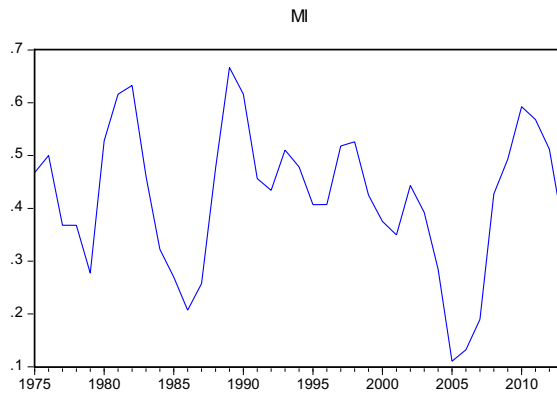
#### 4.1.4. *Foreign reserves (FR)*

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.

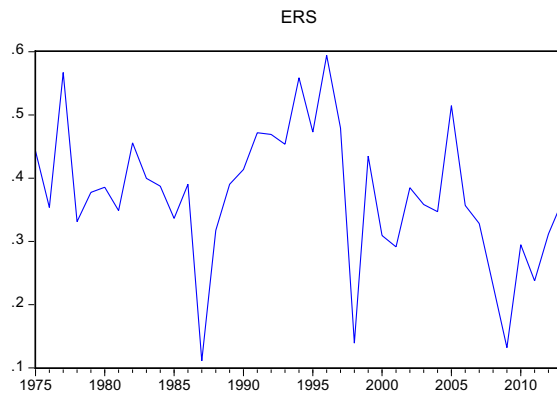
We plot the time-series figures of MI, ERS, KO, and FR in [Fig. 1](#).

We can see that all the four indexes are fluctuating over the sample period. MI appears to be relatively volatile as it fluctuates over time from 0.1 to 0.6. With respect to the ERS trend, the three noticeable declines in 1987,

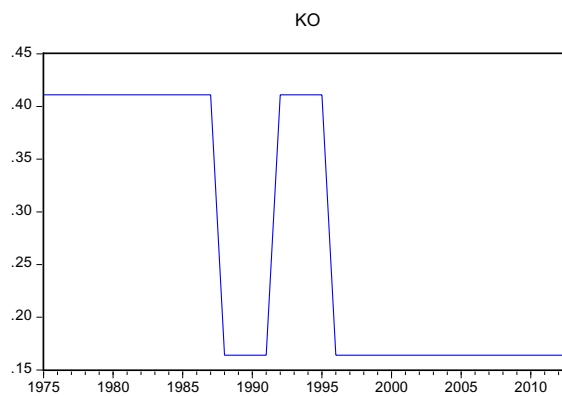
TRILEMMA *Vis-à-Vis* QUADRILEMMA MONETARY POLICY STANCE



(a) Monetary independence (MI)

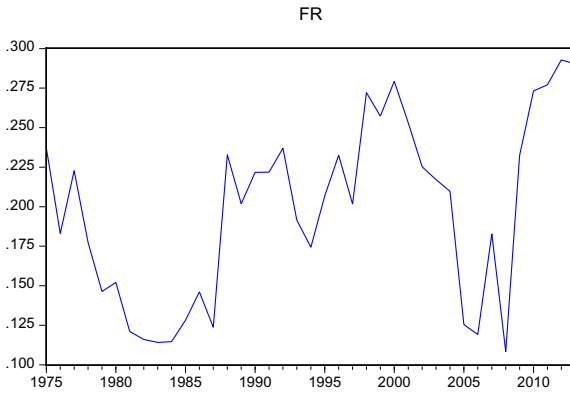


(b) Exchange rate stability (ERS)



(c) Capital account openness (KO)

Fig. 1. Time-series plot of MI, ERS, KO, and FR, 1975–2013.



(d) Foreign reserves (FR)

Fig. 1. (Continued)

1997, and 2009 reflect the currency devaluation strategies adopted by the RBF following political events in Fiji. The low KO since 1996 reflects the effect 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 IMF injected more foreign reserves to assist Pacific Island member countries, including Fiji,<sup>10</sup> following the global financial crisis. Fiji’s foreign reserves have also been boosted by global bond issues in 2006, 2011, and 2015. The foreign reserves build-up in recent years have 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 more export-led growth.

#### 4.2. Methodology

To test the validity of the trilemma hypothesis in Fiji, we closely follow [Aizenman \*et al.\* \(2010\)](#) and [Aizenman and Chinn \(2010\)](#) by estimating a linear regression model of a constant ( $c$ ) on the three trilemma policy indexes, given by the following equation:

$$c = \beta_1 MI_t + \beta_2 ERS_t + \beta_3 KO_t + \varepsilon_t. \tag{1}$$

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<sup>10</sup>SDR allocations to PICs included Fiji (US\$94 million).

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. A high goodness of fit would suggest that a linear specification is suitable for explaining the policy trade-off; a low value would imply that either the trilemma constraint is not binding or the relationship is non-linear. Also, if the trilemma is indeed linear, the predicted values of the regression should hover around the value of  $c$ , and the prediction error would indicate how much of the three policy choices have “not been fully used” (predicted values below  $c$  and residuals negative) or to what extent the trilemma is “not binding” (predicted values above  $c$  and residuals positive). Finally, the relative contribution of the three policies can be further examined using the predicted values  $\hat{\beta}_1\text{MI}_t$ ,  $\hat{\beta}_2\text{ERS}_t$ , and  $\hat{\beta}_3\text{KO}_t$ , where  $\hat{\beta}_i$  is the OLS estimated value of  $\beta_i$  of the above regression.

The quadrilemma configuration suggested by Aizenman (2013)<sup>11</sup> and Mansour (2014) is simply an extension of the trilemma counterpart by considering an additional policy factor, FR, which can be examined by the following regression:

$$c = \beta_1\text{MI}_t + \beta_2\text{ERS}_t + \beta_3\text{KO}_t + \beta_4\text{FR}_t + \varepsilon_t. \quad (2)$$

As with 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 Eq. (2). The relative contribution of the three policies can be further examined using the predicted values  $\hat{\beta}_1\text{MI}_t$ ,  $\hat{\beta}_2\text{ERS}_t$ ,  $\hat{\beta}_3\text{KO}_t$ , and  $\hat{\beta}_4\text{FR}_t$ .

## 5. Empirical Results

In this section, we first report the full sample (1975–2013) of the trilemma and quadrilemma regression results (Table 1). First, we provide a brief discussion on the coefficients. In general, a relatively large/small coefficient of MI, for example, may mean the pillar of the trilemma constraint is more/less on MI rather than on the other two policies. So, for example, a coefficient of 3.0 (holding other things unchanged) would indicate that MI plays a relatively important role in the constraint; if the coefficient, on the other hand, was smaller, say 0.5, its role is less important. Clearly, both regressions achieve

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<sup>11</sup>Read more: <http://www.worldscientific.com/doi/abs/10.1142/S2251361213500018?journalCode=gje>.

Table 1. Trilemma and quadrilemma estimations.

	Trilemma	Quadrilemma
MI	1.904*** (0.489)	0.516 (0.412)
ERS	2.278*** (0.831)	1.175* (0.681)
KO	0.993 (0.760)	1.508** (0.574)
FR		5.160*** (0.623)
Observations	39	39
$R^2$	0.960	0.977
Adjusted $R^2$	0.957	0.975

*Notes:* Results are based on Eq. (1) using 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.

high goodness of fit ( $R^2$  and adjusted  $R^2$ ), implying the validity of linear specification in explaining the policy trade-off in the case of Fiji.<sup>12</sup>

In each case, there are “winners” and “losers” in terms of their roles in contributing to 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 favored policy goals, whereas 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.

In Fig. 2, we plot the fitted values of the two regressions. Interestingly, although 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 either above or under 2 in most part of the sample period. However, the quadrilemma prediction clearly outperforms its trilemma counterpart. If the overall deviation of the policy

<sup>12</sup>We note that the (adjusted)  $R^2$  is non-centered and the goodness of fit should be interpreted just as that with implying any further statistical properties.



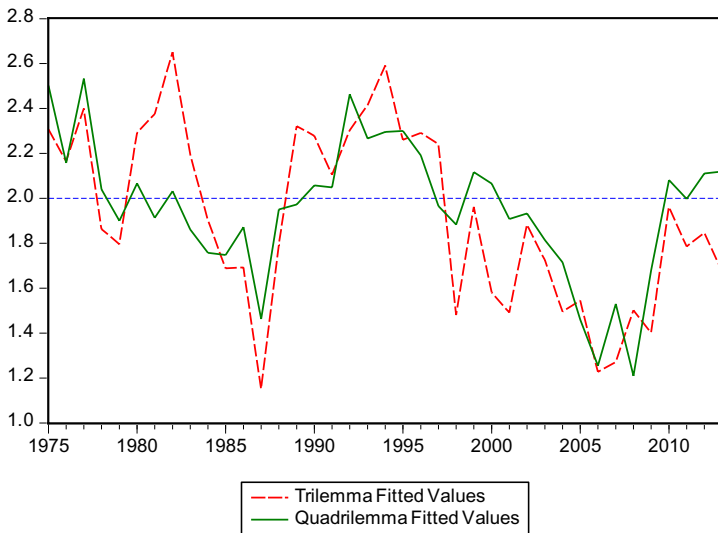


Fig. 2. Regression fitted values: Trilemma versus quadrilemma.

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

constraint can be measured as the sum of the regression residuals (in their absolute values), the deviation of the trilemma is 8.279, whereas that of the quadrilemma is 5.213.

Given that the monetary policy goals and instruments have evolved considerably over the sample period, examining the full sample might not be the best approach in understanding the issues on hand. To address this, we split the data into two subsamples as follows: subsample 1, 1975–1993 and subsample 2, 1994–2013.<sup>13</sup> We report the regression results in Table 2. First, the goodness of fit remains high in all cases. Secondly, similar to 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. From Fig. 1, it appears that Fiji has enjoyed relatively higher degree of capital openness (KO) in the first subsample than the second; this might explain why KO is significant in the first subsample only. Also, the significance of KO in the quadrilemma regression in the whole sample (Table 1) might be due mainly to its role in subsample 1. Finally, we also note that, according to the quadrilemma regression, the policy emphasis might have shifted from MI, KO, and FR in

<sup>13</sup>While this has been done somewhat arbitrarily, it allows us to examine the impact of major policy changes/stance over the period.

Table 2. Trilemma and quadrilemma estimation, split samples.

	1975–1993		1994–2013	
	Trilemma	Quadrilemma	Trilemma	Quadrilemma
MI	1.394** (0.605)	1.032*** (0.343)	2.406*** (0.593)	0.487 (0.699)
ERS	1.419* (0.777)	0.0113 (0.642)	2.445** (0.904)	1.618** (0.647)
KO	2.200*** (0.676)	2.311*** (0.533)	0.465 (1.678)	1.094 (1.077)
FR		4.392** (1.572)		5.152*** (1.654)
Observations	19	19	20	20
$R^2$	0.981	0.988	0.961	0.974
Adjusted $R^2$	0.977	0.985	0.954	0.968

Notes: Results are based on Eq. (1) using 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.

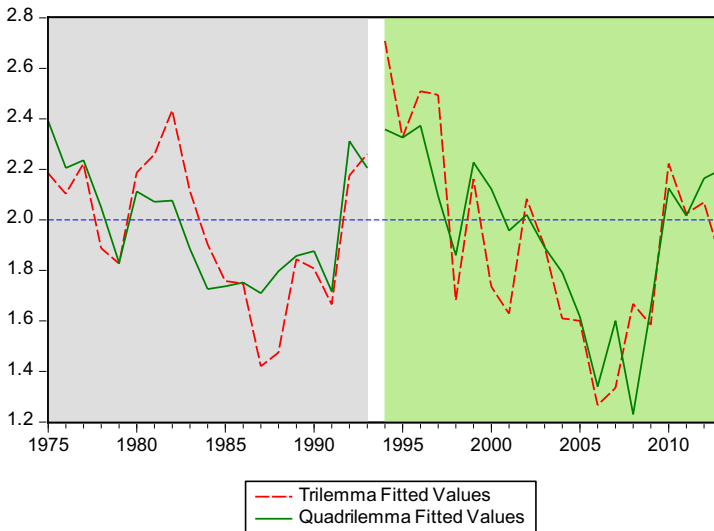


Fig. 3. Regression fitted values: Trilemma versus quadrilemma, split samples.

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

the first subsample to ERS and MI or FR in the second subsample. In the quadrilemma case, FR is relatively significant in both subsamples indicating hoarding of high reserve levels after a crisis and the subsequent devaluation of the currency, undertaken to improve the level of foreign reserves and commercial banks' liquidity. Again, KO is insignificant, consistent with the trilemma subset above.

We also plot the fitted/predicted values of the subsample regressions in Fig. 3. Consistent with Fig. 2, 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 outflows.

## 6. Moving from Trilemma to Quadrilemma

Finally, we plot the contributions of the trilemma/quadrilemma policies over the two subperiods in Fig. 4 using the product of the estimated coefficient of each index from Table 2 and the respective subsample average. In both the cases, it is clear that in Fiji, the policy configuration had moved from a “three-pillar” to a “two-pillar” over time. However, in the trilemma case, the two pillars in the second subsample are ERS and MI, whereas they are ERS and FR for the quadrilemma case. The trilemma case seems to align with the finding of Aizenman (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 is considered, its role overtakes the emphasis on monetary independence.

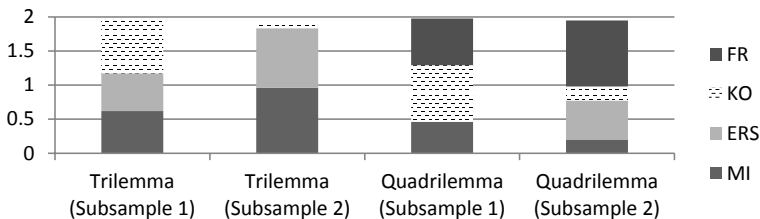


Fig. 4. Phase-wise contributions of the policy objectives in Fiji.

## 7. Conclusion and Some Policy Implications

In the wake of increasing interest in understanding the monetary policy stance of central banks around the world, recognizing especially that policymakers 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 in a PIC context, with Fiji as an example. The sample period is 1975–2013, and for analysis purposes it was split into two subsamples: 1975–1993 and 1994–2013.

Over the full sample period, with respect to the trilemma, results show that monetary independence and exchange rate stability might have been more fervently pursued by the central bank; with respect to 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 and foreign reserves in the second subsample. The inclusion of foreign reserves in the regression appears to dilute the importance of monetary independence. With respect to capital openness, the effect appears 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 stance. 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 the country's foreign reserves. Over the years, Fiji has imposed exchange controls 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, which could be explored in future studies. 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. In the meantime, this study provides the first insight into the trilemma *vis-à-vis* quadrilemma monetary policy stance in a PIC context — the findings are likely to be useful for policy considerations across the region and other developing economies.

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