Received: 16 December 2020 | Revised: 27 February 2022 | Accepted: 29 May 2022

DOI: 10.1002/app5.356

ORIGINAL ARTICLE

ASIA & THE PACIFIC POLICY STUDIES | Australian National University

Why does currency denomination in external liabilities of small island developing states matter? Evidence from Fiji

Devendra Kumar Jain[1] | **Rup Singh**[2] | **Henali Kumar**[3] | **Nikeel Kumar**[2] | **Arvind Patel**[2]

[1]Flame School of Business, Flame University, Pune, India

[2]School of Accounting, Finance and Economics, The University of the South Pacific, Suva, Fiji

[3]School of Economics, Fiji National University, Suva, Fiji

Correspondence
Devendra Kumar Jain, Flame School of Business, Flame University, Pune, India.
Email: dkumar54@gmail.com

Abstract

The valuation effects on international investment position induced by the exchange rate volatility are not uniform or easily manageable in small and vulnerable economies when compared with larger developing or developed countries. To investigate the underlying dynamics, we developed a foreign currency exposure index over the period 2006–2019. The positive reading of the index suggests that though Fiji has a high net negative international investment position (90% of its GDP), it does not pose any serious risk. To ascertain determinants of Fiji's exposure index, we applied fully modified ordinary least square and autoregressive distributed lag bounds test. We have compared both estimates for consistency. Our findings suggest that the underlying determinants of Fiji's currency exposure are foreign debt, trade openness and exchange rate. This article bridges the gap in the literature on currency exposure risks in small island developing states and is the first study of its kind for the Pacific region.

KEYWORDS
Fiji, foreign currency exposure index, international investment position, macro-financial risk, small island developing states

1 | INTRODUCTION

The exchange rate plays an important role in modern financial systems—it is the key variable that dictates a country's net international investment position. This is because the international balance sheet of an economy fluctuates significantly due to the exchange rate, foreign currency debt (domestic and international) and trade balances. These changes can induce significant currency risks in the national assets and liabilities as they change their valuations. Therefore, currency risks and their underlying dynamics are worth investigating for designing a prudent macro-financial risk framework. However, while most traditional models of currency risk discuss exchange rate pass-through and related volatility based on macroeconomic variables (GDP, inflation and trade deficit), they fail to capture currency exposure risks completely (Kindleberger et al., 2011). These risks amplify during economic shocks impacting the prices of assets and liabilities, although not uniformly. Lane and Shambaugh (2010a) and Gourinchas and Rey (2013) for example, find that before the 2008–2009 global financial crisis, asset prices rose more rapidly than real GDP, trade balance, government revenue or corporate incomes in the United States and Europe. Such changes, together with movements in financial markets, are bound to increase exchange rate volatility in economies faced with a trade deficit. But those with a trade surplus can better contain exchange rate volatility by adjusting their foreign exchange reserves and therefore are better placed to raise external funds to mitigate a balance of payments crisis. They can also manoeuvre the policy interest rate to ward off exchange rate volatility, if required. Unfortunately, such options are not available or pragmatic for small island developing states (SIDS) such as Fiji. Additionally, countries with fixed exchange rates lose control of monetary policy as their money supply becomes endogenous to changes in foreign exchange reserves reflecting their balance of payments position.

Historically, currency exposure risk can be linked to the cross-border movements of capital. It became the subject of discussion in macroeconomics after the Asian financial crisis of the 1990s. Currency exposure risk analysis received significant attention under the financial risk management framework at the enterprise level. There are now many tools and instruments to address this issue at this level. At the macroeconomic level, currency exposure risk analysis got the attention of international economists (Lane & Shambaugh, 2010a). Data availability on currency wise exposure was a big challenge for earlier researchers on this topic. For all types of economies (advanced, developing, emerging and small) the turnover of foreign assets and foreign liabilities has doubled. Exchange rate movements can have significant wealth effects through the valuation of foreign assets and foreign liabilities. Sometimes, these valuation effects may exceed trade effects experienced by the volatility of the exchange rate. Therefore, the proposed currency exposure risk analysis may supplement the overall macro-financial risk analysis of an aggregate economy.

Currency exposure risks associated with an external balance sheet of an economy have multiple dimensions. Consequently, there is a need to analyse each category of foreign assets (direct investment, portfolio, other investment and reserve assets) and foreign liabilities (direct investment, portfolio and other investment). The share of each in the total exposure is necessary to

evaluate the macro-financial risks of an economy. Other dimensions include knowing the share of foreign currency-denominated foreign assets, foreign liabilities and currency wise exposure. The foreign currency exposure index captures these dimensions. Analysing the determinants of this index may help policymakers to formulate better policies on trade, capital flows and external debts. This article attempts to innovatively estimate the exposure index by analysing its determinants.

The pioneering work of Lane and Shambaugh (2010a) highlights the embedded currency exposure in the external balance sheets of countries. In the panel study, the authors conclude that aggregate currency exposure is dependent on the net foreign asset position. Major determinants of the aggregate currency exposure index are trade openness and GDP per capita. Fiji was included in the panel study of 117 countries (Lane and Shambaugh, 2010a). Lane and Shambaugh (2010a) recommend the idea of calculating financially weighted exchange rate indices as one of the building blocks to measure cross-border currency exposure. Catão and Milesi-Ferretti (2013) have linked large currency exposure to financial crises, and suggest that net foreign liabilities as a percentage of GDP is a good crisis predictor. Gourinchas and Rey (2013) extend our understanding of the possible role played by the properties of the international balance sheet of countries in absorbing financial shocks. Lane (2013) develops an empirical profile of international currency exposure for a large number of countries. Bénétrix et al. (2015) explain the currency generated valuation effects in international balance sheets with a focus on the global financial crisis of 2008–2009. In their recent study, Bénétrix et al. (2019) provide valuable insights into the currency composition of the international investment position of 50 countries and the evolution of currency exposures.

The South Pacific region consists of small island states and with the exception of Papua New Guinea (PNG) almost all suffer the 'population penalty'.[1] A small population impacts the scalability of the economy and limits economic growth. A recent study (Lal et al., 2022) projects that the population of some Pacific Island countries will record negative growth, with and without accounting for the impact of COVID-19, due to influential population variants such as fertility, mortality and net migration. Additionally, there are other challenges such as high dependence on foreign aid and grants including remittances, foreign direct investment, trade capacity constraints and lack of adequate resources and technology (Chand et al., 2020). These countries (SIDS) are also highly vulnerable to natural disasters. As such, political uncertainty, climactic events, the COVID-19 pandemic and external financial shocks can create a huge negative impact on the macro-financial situation of the economy. Further, access to quality data is a major challenge in these economies due to issues related to data generation processes and the statistical capacity of data producers (Jain, Singh & Waqas, 2020). Pacific Island countries have high volatility in GDP growth, which significantly increases their macro-financial risks. Boto and Biasca (2012) show that the volatility of GDP growth (coefficient of variations) in these countries is twice that of some developing countries and other SIDS. The magnitude of foreign currency exposure is an important dimension of the macro-financial risk framework. Lastly, this analysis is based on stock variables that support long-term strategies for managing macro-financial risk.

This article aims to assess the vulnerability of the international balance sheet of Fiji using the conceptual framework of Lane and Shambaugh (2010a). Subsequently, it computes Fiji's aggregate foreign currency exposure index and investigates the country-specific determinants of this index using Phillips and Hansen (1990) and the autoregressive distributed lag (ARDL) bounds

[1]This expresses disadvantages due to small populations, which is also referred as one of the capacity constraints of small and vulnerable economies: see Haque et al. (2012), for example.

method of Pesaran et al. (2001). The article is organised as follows: Section 2 reviews the literature on currency risks. Section 3 describes the key trends in Fiji's financial assets and liabilities, capital flows and the current account. Section 4 explains the methodology and estimates Fiji's foreign currency exposure index while Section 5 includes an analysis of the underlying determinants of the exposure. Section 6 concludes with policy implications.

2 | LITERATURE REVIEW

Macro-financial risk assessment evaluates uncertainty and risks associated with currency exposure (Blanchard, 2007). Lane and Milesi-Ferretti (2008) study the phenomena of cross-border holdings, the development of foreign assets and foreign liabilities, and the transmission of financial shocks through the international balance sheet of an economy. Haim and Levy (2007) use the balance sheet approach to analyse an economy's resilience to exchange rate risks, employing a combination of national balance sheet and foreign currency balance sheet data. Lane and Shambaugh (2010a) recommend comparing assets and liability weighted exchange rate indices to the conventional trade-weighted exchange rate index. They further suggest that the assets and liabilities index should be combined and a new net index created that attaches a positive weight to currencies with long positions and a negative weight to short position currencies. Schmieder et al. (2011) conceptually enrich this framework by adopting a stress-testing model which adds a new dimension to the balance sheet framework. Yartey (2012) discusses the macroeconomic vulnerabilities of small economies (exchange rate risk, public debts and high rollover risks) while Lane (2013) reveals the importance of the increasing internationalisation of balance sheets and recommends a unified approach to joint analysis of international exposure and sectoral balance sheets. More recently, Bénétrix et al. (2015) analyse the recent evolution of international currency exposures focusing on currency generated valuation effects. Ollivaud et al. (2015) empirically suggest that the emerging economies could limit the adverse impact or financial effects of exchange rate volatility due to the reduction in the net foreign currency exposure. The authors further argue that large movements in exchange rates are not truly reflective of trade balances. Bénétrix et al. (2019) expanded on an earlier data set that revolves around the evolution of international currency exposures.

Lane and Milesi-Feretti (2008) analyse the growth in foreign assets and foreign liabilities relative to foreign trade. Davidson (2007) argues that there is a one-way impact of the international currency crisis on small open economies due to misalignment of asset prices, imbalances in international trade, diverse exchange rate regimes and international payment systems using US dollars as a settlement currency. Catão and Milesi-Ferretti (2013) study the determinants of external crises and the role of foreign liabilities and their composition and suggest the ratio of net foreign liability to GDP is a significant crisis predictor. Gourinchas and Rey (2013) examine various aspects of global imbalances and valuation effects on the international balance sheet of countries and argue that capital flows depend on capital scarcity and long-term growth prospects. Countries export capital when the autarky interest rate is below the world interest rate. They also discuss the implications of valuation effects and a high level of negative foreign liability on the overall macro-financial risk management strategies of economies.

3 | VALUATION EFFECTS AND TRENDS IN EXTERNAL BALANCE SHEETS

3.1 | Valuation effects and foreign currency exposure index

The valuation channel describes the capital gains and losses in the external balance sheet (foreign assets and foreign liabilities) or international investment position. The quantitative magnitude of valuation channels has grown during the last two decades. For some economies, it may be equal to or more than the real variables such as trade balance. The net effect is dependent on the currency composition of the international investment position (Lane & Shambaugh, 2010a, 2010b). The focus should shift from current account fluctuations in future net income to the determinants of the net foreign asset position (Gourinchas, 2008). The empirical research on the impact of valuation effects on emerging and developing markets are not conclusive (Lane & Shambaugh, 2010a). Schröder (2019) concludes that the impact of valuation effects depends on the correlation with domestic consumption growth. For some emerging economies, it may be negative. A recent study by Bergant (2021) has surprising findings. While investigating the role of stock-flow adjustment, Bergant (2021) found that countries with large net foreign liabilities could also benefit from valuation effects. It also found that foreign portfolio equity liabilities increased international risk sharing (Bergant, 2021).

These findings align with our objective of analysing the currency composition of foreign assets and foreign liabilities. Since the valuation effects may be high for emerging and developing economies, understanding the direction and propensity of the international investment position through the aggregate foreign currency exposure index is relevant in the context.

3.2 | Trends in Fiji's external balance sheet

Before initiating a detailed analysis, we first review the trends of the net international investment position (NIIP) as a percentage of GDP for Fiji and selected Pacific Island countries (we did not find IIP data for PNG). Figure 1 shows that the NIIP to GDP ratio for Fiji declined from 2005 to 2009 before it stabilised at about −80% around the 2008–2009 global financial crisis. At

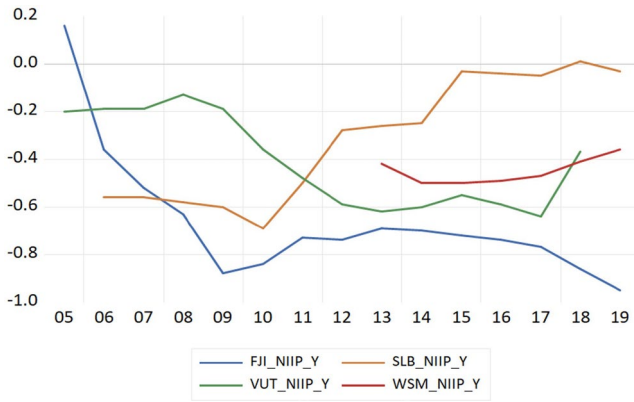

FIGURE 1 Share of net international investment position on GDP (%), 2005–2019. *Source*: NIIP_IMF_dataset_IFS. FJI, Fiji; SLB, Solomon Islands; VUT, Vanuatu; WSM, Samoa

first glance, that figure appears to be alarming; however, as per the crisis indicator developed by Catão and Milesi-Ferretti (2013) the threshold suggested for this indicator (NIIP to GDP ratio) is between −70% to −90%.

In Figure 2, we show another indicator of external vulnerability—the ratio of government external debt to GDP—which remained low for Fiji despite a high negative NIIP. We further note the trends in foreign currency-denominated assets (reserve assets) and foreign currency-denominated liabilities (external debt of government) in Figure 3. These remain comfortable. However, after the 2006 political crisis in Fiji and the 2008–2009 global financial crisis, the trends in both variables are showing constant improvements. Further, the International Monetary Fund (IMF) funding for Fiji in 2009 is reflected in a sharp increase in foreign reserves. Other Pacific economies have substantially lower foreign exchange reserves compared to the Fiji Government's external debt and are prone to a debt crisis.

For Fiji, despite the comfort of two indicators (government external debt to GDP and reserve assets), the decline in NIIP to GDP since 2017 is an alarming trend and needs further investigation. It is therefore important to study the currency exposure risk associated with the international

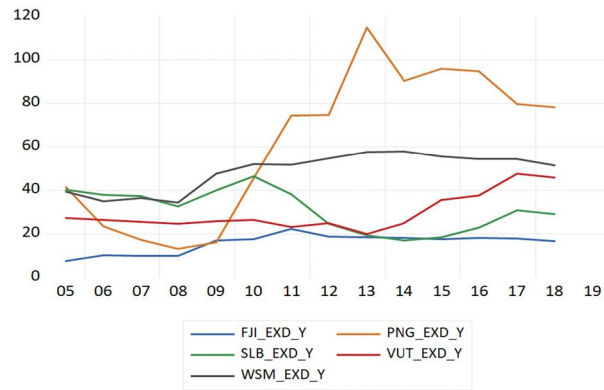

FIGURE 2 Ratio of government external debt to GDP (%), 2005–2019. *Source*: IMF_dataset_IFS. FJI, Fiji; PNG Papua New Guinea; SLB, Solomon Islands; VUT, Vanuatu; WSM, Samoa

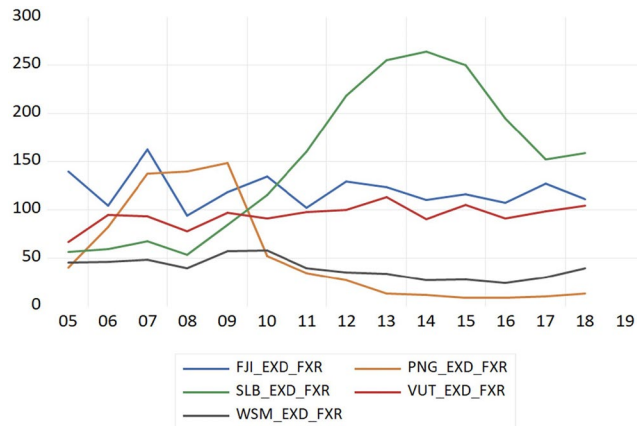

FIGURE 3 Foreign exchange reserve and government external debt (%), 2005–2019. *Source*: IMF-dataset_IFS. FJI, Fiji; PNG Papua New Guinea; SLB, Solomon Islands; VUT, Vanuatu; WSM, Samoa

balance sheet or the NIIP data. The following section describes the methodology for estimating foreign currency exposure and its determinants.

4 | ESTIMATION METHODOLOGY

4.1 | Theoretical framework and basic assumptions

Prior to the Asia financial crisis, empirical studies on the impact of exchange rate movements on the international adjustment process focused on the trade channel. After the crisis, researchers (such as Gourinchas & Rey, 2013; Lane & Milesi-Ferretti, 2008; Lane & Shambaugh, 2010a, 2010b; Tille, 2003) have shifted the focus to the impact of currency movements on the external balance sheet. There has been a massive growth in the cross-border movement of capital since 2000. This has contributed to the quantitative jump in the valuation impact of exchange rate movements on the external balance sheet of an economy or foreign assets and foreign liabilities. Earlier researchers (Lane & Shambaugh, 2010a, 2010b) have advanced our understanding of international currency exposure and its determinants.

Following the basic model of the aggregate foreign currency exposure (FX^{AGG}) index of earlier researchers, we created this index in the context of the macro-financial risk faced by Pacific small island developing states (PSIDS). The main assumption is that the impact of exchange rate movements will be different for foreign assets in domestic currency (FA_DC) from the foreign assets in foreign currencies (FA_FC). Likewise, foreign liabilities in domestic currency (FL_DC) and foreign liabilities in foreign currency (FL_FC) will have a different valuation impact on exchange rate movements and will be a key determinant of FX^{AGG} for developing and emerging economies (Lane & Shambaugh, 2010a).

For international investors, the return (dividend or interest or both) should factor in currency fluctuations as well. The valuation impact of currency movements depends on the aggregate foreign currency exposure. Creating the FX^{AGG} index is the first step towards measuring valuation impact. Additionally, if the domestic currency co-moves with the domestic output, the long position may be desirable in the currency composition of foreign assets and foreign liabilities otherwise, short position. The dynamics of co-moves of domestic currency and domestic output will depend on demand and supply factors (Pavlova & Rigobon, 2007). We have decomposed the external balance sheet (foreign assets and foreign liabilities) in Figures 4 and 5. Our objective is to analyse the macro-financial risk of PSIDS in a country-specific set-up and is different from the objectives of Lane & Shambaugh (2010a).

4.2 | Empirical methodology

The net international investment position is one of the key indicators of imbalances in the external balance sheet of an economy. The availability of data by category and instrument provides the basis for further analysing the contribution of each category or instrument in overall external imbalances. Countries compile and report NIIP data using the 6th edition of the IMF's Balance of Payments Manual, where foreign assets are classified into four functional categories (direct investment, portfolio investment, other investment and reserve assets) and foreign liabilities into three (direct investment, portfolio investment and other investment). The classification by instruments is as follows: (i) equity and investment fund shares; (ii) other equity; (iii) SDRs (Special

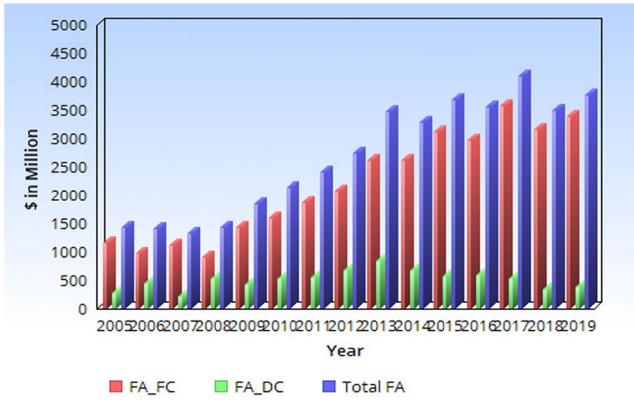

FIGURE 4 Decomposition of Fiji's foreign assets (IIP data), 2005–2019. *Source*: Authors' estimates based on data from Fiji Bureau of Statistics and dataset_IMF_IIP. DC, domestic currency; FA, foreign assets; FC, foreign currency

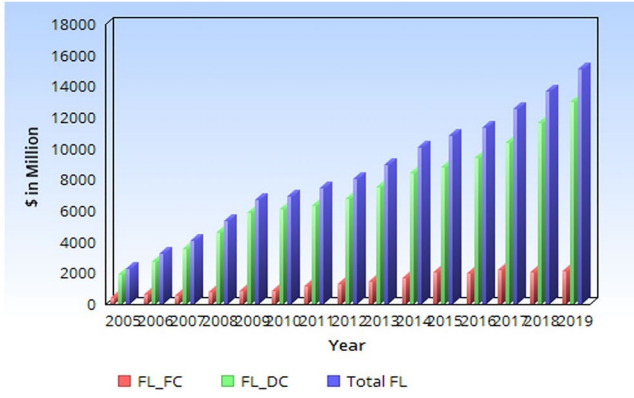

FIGURE 5 Decomposition of Fiji's foreign liabilities. *Source*: Authors' estimates based on data from Fiji Bureau of Statistics and dataset_IMF_IIP; DC, domestic currency; FC, foreign currency; FL, foreign liabilities

Drawing Rights); (iv) currency and deposits; (iv) debt securities; (v) loans; (vi) other account receivables; (vii) other financial assets; and (viii) monetary gold. The changes in NIIP are due to changes in the current account and changes in stock-flow adjustment (SFA). The SFA consists of changes in net capital gain (NCG) and other transactions (OTH) due to the valuation effect of exchange rate fluctuations. NCG is the net capital gain on account of exchange rate changes and revaluation. The variable OTH also represents other *price* changes due to data revision and changes in data generation processes.

Drawing from the methodological insights of Lane and Shambaugh (2010a, 2010b), we further decompose NIIP data to find out the exposure in foreign currency and domestic currency. The composition of foreign assets and foreign liabilities in terms of domestic currency and foreign currency can be used to estimate the total foreign currency exposure index. This index indicates the direction and propensity of foreign currency-denominated portfolios towards the volatility of the exchange rate:

$$FX_t^{AGG} = w_t^{AFC} * \left(\frac{FA_t}{FA_t + FL_t}\right) - w_t^{LFC} * \left(\frac{FL_t}{FA_t + FL_t}\right) \quad (1)$$

where w_t^{AFC} is the weight of foreign currency-denominated assets of total foreign assets and w_t^{LFC} is that of foreign currency-denominated liabilities of total foreign liabilities. The terms $\left(\frac{FA_t}{FA_t+FL_t}\right)$ and $\left(\frac{FL_t}{FA_t+FL_t}\right)$ are respective weights of the total portfolio (FA + FL). The second weight intuitively adjusts the relative net position of a country. This indicator empirically explains the movement of domestic currency against all foreign currencies of a country's portfolio in an aggregate form. A positive reading of the index indicates that the country is in a long position and a negative reading of the index explains the short position of the country. With this index, we can estimate or anticipate the valuation impact of uniform appreciation or depreciation of the domestic currency against foreign currencies in a country's portfolio. This index can be further disaggregated currency-wise in future when currency-wise data of the international investment position is available. Until then, we are dependent on the co-variance of GDP and exchange rate to assess the foreign currency portfolio position. The co-variance indicator heavily relies on the flow variables such as exchange rate and trade. The exposure index as explained in Equation (1) is based on stock variables. The analysis based on stock variables has long-term objectives and points towards structural weaknesses of a macro-economy.

The index measures the movement of domestic currency against foreign currency in the aggregate exposure form of the external balance sheet. The FX_t^{AGG} is affected by the change of currency denomination in foreign assets and foreign liabilities. It is also sensitive to the class (asset or liability) and the size of each category or instrument. This analysis is also helpful in assessing the domestic economy against external vulnerabilities. The classification of foreign currency-denominated assets and liabilities is intuitive due to the lack of accurate data.

4.3 | Data source

Based on the most recent IIP data obtained from domestic sources (Reserve Bank of Fiji and Fiji Bureau of Statistics) and from various international financial statistics (see Appendix A, Table A1 for details), we constructed the series of IIP in foreign currency-denominated assets and liabilities. It is assumed that direct investment and portfolio investment (asset side) are in the destination country's currency. The reserve assets are by default in foreign currency. Some items in other investments (assets) such as balances of commercial banks in foreign countries are estimated as foreign currency-denominated assets. The direct and portfolio investment on the liability side are considered to be in the domestic currency. The external debt, foreign currency deposit accounts, foreign bills and cash stock of foreign currencies are to be taken as foreign currency-denominated liabilities. Fiji does not issue any foreign currency bond domestically. The external debt of the Fiji Government is assumed to be denominated in foreign currency. These estimates can broadly provide a glimpse of foreign currency-denominated, as well as domestic currency-denominated assets and liabilities.

5 | ANALYSIS OF THE DETERMINANTS OF FIJI'S FOREIGN CURRENCY EXPOSURE

5.1 | Fiji's foreign currency exposure index

Theoretically, the aggregate foreign currency exposure (FX_t^{AGG}) index could range between −1 and 1. If it is in the positive territory, the country can be said to have a long position while the negative index represents a short position on foreign currency exposure. In advanced economies, the index will be near 1, but developing and emerging economies will be towards −1. This index tracks the effect of currency movement on the exposure of the financial balance sheet.[2] Figure 6 indicates Fiji's FX^{AGG} index, which has moved positively over the years despite having a high negative NIIP to GDP ratio. This is due to increasing international liability in domestic currency in the form of direct investment. Contrary to the observations in Figure 1, the high negative ratio of NIIP to GDP is not alarming for Fiji as the FX^{AGG} index is still positive (Figure 6). It reveals that Fiji has increased its foreign liabilities in the direct investment category. This category of foreign liabilities is symmetrically assumed to be in the domestic currency.

5.2 | The model

Given the objective of this paper, the next step is to investigate the underlying factors that determine foreign exchange exposure for Fiji. The literature argues that the net international balance sheet of an economy is determined by macroeconomic factors. The portfolio theory further states that the co-movement of economic activity and exchange rate encourages inward foreign investment. To the best of our knowledge, no country-specific analysis for Fiji or any PICs has been done to date. We intend to fill this gap in the literature. In determining the sources of changes in Fiji's FX^{AGG} index, we use variables suggested in the literature based on Lane and Shambaugh's (2010b) conceptual framework. The theoretically consistent variables are listed below and subject to empirical analysis:

1. EXDTY: External debt to GDP ratio
2. BDTY: Budget deficit to GDP ratio

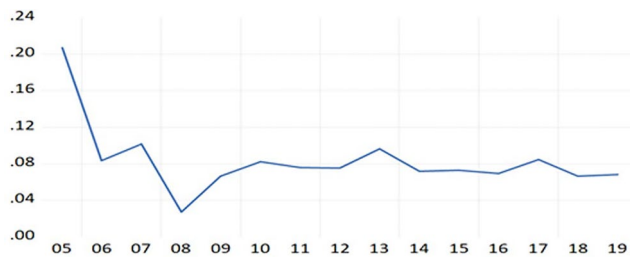

FIGURE 6 Foreign currency exposure index for Fiji, 2005–2019; *Source*: Authors' estimates based on data from Fiji Bureau of Statistics and dataset_IMF_IIP

[2]The lower range indicates less foreign currency-denominated assets in total foreign assets and more foreign currency-denominated foreign liability in the total foreign liabilities.

3. TOPEN: Trade openness index (Imports + Exports)/GDP
4. PD: Domestic consumer price index
5. NEER: Nominal effective exchange rate, end of the period
6. CTY: Current account as a ratio of GDP
7. COV(Y, NEER): Covariance between GDP and NEER

A linear multi-factor long-run relationship between currency exposure and these variables can be stated as follows:

$$FX_t^{AGG} = a + \beta_1 TOPEN_t + \beta_2 COV\,(Y_t NEER_t) + \beta_3 EXDTY_t + \beta_4 BDTY_t + \beta_5 CTY_t + \beta_6 NEER_t + \beta_7 PD_t + \varepsilon_t \quad (2)$$

The covariance variable primarily indicates the volatility of foreign currency assets. This variable has its origin in the foreign currency portfolio management literature. It is assumed that GDP and exchange rate volatility are deterministic factors in the desired level of the portfolio of foreign currencies. In other words, if the value of domestic currency moves in tandem with GDP, it encourages investors to increase their foreign currency portfolio or initiate a long position. Domestic inflation will impact the real returns on nominal prices of foreign currency assets and foreign currency liabilities. Other indicators such as EXDTY, BDTY and CTY are expected to reduce the value of the FX^{AGG} index. This indicates the increasing exposure of foreign currency-denominated assets and liabilities in the international balance sheet of the economy. We assume that the error term (ε_t) follows classical assumptions.

5.3 | Empirical estimates—fully modified ordinary least square

In this section, the estimation is done using the fully modified ordinary least square method of Phillips and Hansen (1990). This method is appropriate for small samples of annual observations and handles serial correlation and endogeneity issues within the time series estimates. The commonly cited limitation of this method is that it is a two-step procedure requiring unit root tests and use of the same order of integration of variables, that is all I(1) variables. Pretesting of unit roots is done with the conventional augmented Dickey Fuller test (Appendix A, Table A2) and we got consistent results—variables are I(1) in levels and difference stationary. Although this is a two-step procedure, Table 1 only shows theoretically consistent long-run results.

In the first model (FM_1), we find theoretically consistent and robust results of the determinants of foreign currency exposure (except for the covariance term).[3] It is clear from the estimates that trade openness and external debt are important factors underlying FX^{AGG} in Fiji. Initially, we noted that the budget deficit, NEER and domestic price variables were also important. However, the current account was insignificant and thus in model two (FM_2), it was removed. Due to the theoretical significance of the covariance between output and exchange rate on the determination of foreign exchange exposure, we experimented further by reintroducing the COV(Y, NEER) term. In model three (FM_3), while the covariance term was insignificant, it also implicated the domestic price level and current account deficit. We cautiously removed it together with domestic prices and re-estimated (FM_3). The current account variable was retained, consistent with the theory, and it also turned out to be significant in model 4 (FM_4). The results are good.

[3]We initially added COV(Y, NEER), but the cointegrating vector was not stabilising.

TABLE 1 Determinants of Fiji's foreign currency exposure index sample: 2006–2019 (annual observations)

Variable	FM_1	FM_2	FM_3	FM_4	FM_5
Covariance (Y, NEER)	–	–	0.117	–	0.395
			(0.642)		(0.014)**
Trade openness	1.732	1.690	1.341	0.832	−0.763
	(0.002)***	(0.001)***	(0.003)***	(0.005)***	(0.001)***
External debt	−15.364	−13.871	−13.706	−4.235	−0.975
	(0.006)***	(0.006)***	(0.008)***	(0.008)***	(0.006)***
Budget deficit	−5.516	−5.810	–	–	–
	(0.009)***	(0.004)***			
Current Account deficit	0.0317	–	−0.138	−0.198	−0.103
	(0.646)		(0.107)	(0.090)*	(0.085)*
Nominal effective exchange rate	−1.520	−1.226	−2.629	−2.794	−2.680
	(0.090)*	(0.097)*	(0.021)**	(0.031)**	(0.032)**
Domestic price level	7.013	6.063	6.148	–	–
	(0.008)***	(0.009)***	(0.150)		
Constant	−9.076	−10.091	−0.979	3.463	−6.163
	(0.10)*	(0.05)*	(0.085)	(0.090)	(0.023)**

Note: All estimates are made using Microfit 4.2. The p-values are in parentheses.

***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Alternatively, without domestic prices but a combination of COV(Y, NEER) and current account deficit, we got model five (FM_5), which was even better and our preferred estimate. In addition, FM_5 broadly agrees with the findings of Lane and Shambaugh (2010a) and Catão and Milesi-Ferretti (2013).

Our findings suggest that Fiji's foreign currency exposure can be contained with a better external debt policy and by encouraging external liabilities in the direct investment category. Most of these underlying determinants are policy sensitive. Fiscal policy could be reconfigured to manage external debt and budget deficit. Additionally, managing trade costs and boosting Fiji's trade competitiveness could promote favourable currency exposure in the long run. Fiji manages a fixed exchange rate system with a basket of currencies. If the exchange rate and output volatility are contained, the net external position could also be managed. The real GDP and household incomes in Fiji experience large volatilities because Fiji is small (with limited domestic capacity) and is vulnerable to shocks due to natural disasters, political developments and international prices. An obvious limitation in the above analysis is the short span of annual observations (2006–2019) used for estimation, which is improved somewhat with the use of high-frequency (quarterly) observations below.

5.4 | ARDL and structural break tests

We subjected the above findings to sensitivity tests by: (i) re-estimating our model in Equation (2) using the ARDL-bounds testing procedure of Pesaran et al. (2001); and (ii) using higher frequency data. This method is robust with the use of data that may not be uniformly ordered and it ignores

the need for pretesting for unit roots. In addition, the test for break dates is easily implemented for the ARDL. To benefit from a larger sample, we re-estimated the FX^{AGG} with quarterly data but could not get a uniform quarterly dataset for all the determinants (independent variables) used in our estimation. Therefore, we considered a selective list of variables with some proxies. Equation (3) is a long-run estimate of Equation (2) using quarterly data from $2006Q_2$–$2019Q_4$, with at most four lags of variables. The F-statistic confirming cointegration was 7.81 against the 95% critical value of 4.25. A break date of 2009Q3 was identified by the Bai-Parron (2003) test and included in the model to represent a regime shift (due to the 2008–2009 global financial crisis and the 2009 Fiji dollar devaluation). Tests on seasonality could not confirm the prominence of any seasonal effects. The CUSUM and CUSUM squares tests show parameter stability (see Appendix B, Figures B1 and B2). Our best long-run estimate of the ARDL is:

$$\begin{aligned} \ln FX_t{}^{AGG} = {} & 30.04 + 3.21 \ln P_t - 4.33 \ln NEER_t - 1.02 \ln FXR_t \\ & (6.73)^{***}(3.51)^{***}(9.26)^{***}(9.45)^{***} \\ & -0.29 \ln CTY_t + 0.41 DUM_{2009} + 0.001T \\ & (4.72)^{***}(4.52)^{***}(9.02)^{***} \end{aligned} \tag{3}$$

FXR is gross foreign exchange reserves and *** denotes significance at the 1% level. Values below the coefficients are the respective t-ratios.

These results broadly confirm our earlier findings. We find that higher domestic prices increase the exposure index (not shown earlier), but a depreciation in the Fiji dollar and stronger foreign exchange reserve position reduced FX^{AGG}. In addition, we find that an increase in the current account deficit would reduce the exposure but importing more international savings (i.e., net borrower position) and the 2009 dummy (global financial crisis and devaluation in Fiji dollar) increased the exposure index. The inclusion of foreign exchange reserves (FXR) tends to reduce Fiji's foreign currency exposure.

6 | CONCLUDING REMARKS

Currency movements are a significant contributor to capital gains and losses on account of the foreign assets and foreign liabilities of an economy. While the literature generally covers the impact of currency movements on real variables (such as trade, GDP and balance of payments), it pays little attention to the impact of currency movements on the foreign assets and foreign liabilities of an economy. Economies with reserve currencies that are long on currency exposure have a natural hedge against GDP fluctuations. Trade surplus economies can ward off negative impacts with high foreign exchange reserves. For world economies that are short on currency exposure, a constant evaluation of their foreign currency exposure in their international balance sheet is needed. The long-term objective of currency exposure risk analysis is macro-financial stability. This study is the first of its kind to analyse the macro-financial risk framework for SIDS. We show the importance of estimating the foreign currency exposure of a country—a measure of the direction of foreign currency-denominated exposure in the international investment position. The objective of earlier studies on this topic was to measure cross-border currency exposures (and their determinants) of the world economies, segregating them into three major groups as developed economies, emerging economies and developing economies. The objective of this study is to assess and measure the currency exposures of Fiji, a small and vulnerable economy of the Pacific region that is starved of credible research useful for monetary policy. The findings

are consistent with our earlier work on the sovereign risk of the Fiji economy, which applied a contingent claim approach (see Jain, Singh & Patel, 2020).

In estimating the foreign currency exposure, the real issue is having positive values of FX^{AGG}, which Fiji does. Even countries with zero or positive NIIP figures are prone to currency risks in their international balance sheets. The important factor is the share of foreign currency-denominated items on either side of the balance sheet. If a country can raise international liability in domestic currency and foreign assets in foreign currency, its high negative NIIP will give a positive value of FX^{AGG}. The findings of this study confirm earlier studies and are consistent with the theory. In portfolio management, the desired foreign currency portfolio depends on GDP, exchange rate and exchange rate volatility. Additionally, we have established the significance of other variables (domestic inflation, financial market shocks, external debt and current account deficits), in the overall assessment of currency risk at the macro level for a small and vulnerable economy. Our estimates in Section 5 are robust and free from biases (unit root, serial correlation and heteroscedasticity) and the results indicate that Fiji's currency exposure can be largely managed by policy on external debt, exchange rate management, and trade and foreign reserves. The control over macroeconomic volatility is also important for this small economy. The management of currency exposure at this stage is easier in Fiji because it is in the positive territory of FX^{AGG}.

ACKNOWLEDGEMENT

No funding or grant has been received for this research.

CONFLICT OF INTEREST

No conflict of interest/competing interest is reported by the authors.

DATA AVAILABILITY STATEMENT

The data that supports this study is available on request from corresponding author.

ETHICS STATEMENT

This research does not involve human participants or harms any animals.

ORCID

Devendra Kumar Jain https://orcid.org/0000-0002-4903-0361

REFERENCES

Bai, J., & Perron, P. (2003). Critical values for multiple structural change tests. *Econometrics Journal*, *6*(1), 72–78.

Bénétrix, A., Gautam, D., Juvenal, L., & Schmitz (2019). *Cross-border currency exposures. New evidence based on an enhanced and updated dataset* (IMF Working Paper WP/19/299). International Monetary Fund. https://www.imf.org/en/Publications/WP/Issues/2019/12/27/Cross-Border-Currency-Exposures-48876

Bénétrix, A. S., Lane, P. R., & Shambaugh, J. C. (2015). International currency exposures, valuation effects and the global financial crisis. *Journal of International Economics*, *96*, S98–S109. https://doi.org/10.1016/j.jinteco.2014.11.002

Bergant, K. (2021). The role of stock-flow adjustment during the global financial crisis. *Journal of International Money and Finance*, *110*, 102261. https://doi.org/10.1016/j.jimonfin.2020.102261

Blanchard, O. J. (2007). *Current account deficits in rich countries* (NBER Working Paper No. 12925). National Bureau of Economic Research. https://doi.org/10.3386/w12925

Boto, I., & Biasca, R. (2012). *Small island economies: Vulnerabilities and opportunities* (Briefing No 27). Brussels Rural Development Briefings. http://brusselsbriefings.net

Catão, L., & Milesi-Ferretti, G. (2013). *External liabilities and crises* (IMF Working Paper WP/13/113). International Monetary Fund. https://www.imf.org/external/pubs/ft/wp/2013/wp13113.pdf

Chand, R., Singh, R., Patel, A., & Jain, D. K. (2020). Export performance, governance, and economic growth: Evidence from Fiji – a small and vulnerable economy. *Cogent Economics & Finance*, *8*(1), 1802808. https://doi.org/10.1080/23322039.2020.1802808

Davidson, P. (2007). *John Maynard Keynes*. Palgrave Macmillan.

Gourinchas, P., & Rey, H. (2013). *External adjustment, global imbalances and valuation effects* (NBER Working Paper No. 19240). National Bureau of Economic Research. https://doi.org/10.3386/w19240

Gourinchas, P.-O. (2008). Valuation effects and external adjustment: A review. In K. Cowan, E. Sebastian, R. Valdés, & K. Schmid, *Current account and external financing* (Vol. 12, Ch 6, pp. 195–236). Central Bank of Chile.

Haim, Y., & Levy, R. (2007). *Using the balance sheet approach in Financial stability surveillance* (Bank of Israel Discussion Paper 01/07). Financial Stability Area, Bank of Israel.

Haque, T., Knight, D., & Jayasuriya, D. (2012). *Capacity constraints and public financial management in small Pacific Island countries* (Policy Research Working Paper No. 6297). World Bank. http://hdl.handle.net/10986/12207

Jain, D., Singh, R., & Waqas, A. (2020). Macro-financial risk analysis in the South Pacific: An application. *International Journal of Trade and Global Markets*, Special issue, 1–13.

Jain, D. K., Singh, R., & Patel, A. (2020). Mapping of sovereign risks in small island economies: An application of contingent claim approach to Fiji. *Cogent Economics & Finance*, *8*(1), 1727158. https://doi.org/10.1080/23322039.2020.1727158

Kindleberger, R., Charles, P., & Aliber, Z. (2011). *Manias, panics, and crashes: A history of financial crises*. Palgrave Macmillan.

Lal, S., Singh, R., Chand, R., Patel, A., & Jain, D. K. (2022). Projecting populations for major Pacific Island countries with and without COVID-19: Pro-active insights for population policy. *Journal of Population Research*, *39*(2), 257–277. https://doi.org/10.1007/s12546-021-09272-2

Lane, P. (2013). *Risk exposures in international and sectoral balance sheets*. Paper presented at the First IMF Statistical Forum, Washington, DC, 12–13 November 2013. https://www.imf.org/external/np/seminars/eng/2013/sta/forum/pdf/SessionII/Philip_Lane.PDF

Lane, P. R., & Milesi-Ferretti, G. M. (2008). International investment patterns. *The Review of Economics and Statistics*, *90*(3), 538–549. https://doi.org/10.1162/rest.90.3.538

Lane, P. R., & Shambaugh, J. C. (2010a). Financial exchange rates and international currency exposures. *The American Economic Review*, *100*(1), 518–540. https://doi.org/10.1257/aer.100.1.518

Lane, P. R., & Shambaugh, J. C. (2010b). The long or short of it: Determinants of foreign currency exposure in external balance sheets. *Journal of International Economics*, *80*(1), 33–44. https://doi.org/10.1016/j.jinteco.2009.09.007

Ollivaud, P., Rusticelli, E., & Schwellnus, C. (2015). *The Changing Role of the Exchange Rate for Macroeconomic Adjustment* (OECD Economics Department Working Papers No. 1190) OECD Publishing. https://doi.org/10.1787/5js4rfhjf15l-en

Pavlova, A., & Rigobon, R. (2007). Asset prices and exchange rates. *Review of Financial Studies*, *20*(4), 1139–1181. https://doi.org/10.1093/revfin/hhm008

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289–326. https://doi.org/10.1002/jae.616

Phillips, P. C. B., & Hansen, B. E. (1990). Statistical inference in instrumental variables regression with I(1) processes. *The Review of Economic Studies*, *57*(1), 99–125. https://doi.org/10.2307/2297545

Schmieder, C., Puhr, C., & Hasan, M. (2011). *Next generation balance sheet stress testing* (IMF Working Paper WP/11/83). International Monetary Fund. https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Next-Generation-Balance-Sheet-Stress-Testing-24798

Schröder, M. (2019). Valuation effects and risk sharing during the era of financial globalization. *The North American Journal of Economics and Finance*, *48*, 467–480. https://doi.org/10.1016/j.najef.2019.03.002

Tille, C. (2003). The impact of exchange rate movements on US foreign debt. *Current Issues in Economics and Finance*, *9*(1), 1–8. https://www.newyorkfed.org/research/current_issues/ci9-1.html

Yartey, C. A. (2012). *Barbados: Sectorial balance sheet mismatches and macroeconomic vulnerabilities* (IMF Working Paper WP/12/13). International Monetary Fund. https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Barbados-Sectoral-Balance-Sheet-Mismatches-and-Macroeconomic-Vulnerabilities-25679

AUTHOR BIOGRAPHIES

Dr Devendra Kumar Jain is Associate Professor of Finance at the Flame School of Business, Flame University, Pune, India. He received his PhD from the School of Accounting, Finance and Economics at The University of the South Pacific, Fiji.

Dr Rup Singh is Deputy Head of the School of Accounting, Finance and Economics at The University of the South Pacific, Fiji.

Henali Kumar is Assistant Lecturer in the School of Economics at the Fiji National University, Fiji.

Nikeel Kumar is Assistant Lecturer in the School of Accounting, Finance and Economics at The University of the South Pacific, Fiji.

Arvind Patel is Professor of the School of Accounting, Finance and Economics at The University of the South Pacific, Fiji.

How to cite this article: Jain, D. K., Singh, R., Kumar, H., Kumar, N., & Patel, A. (2022). Why does currency denomination in external liabilities of small island developing states matter? Evidence from Fiji. *Asia & the Pacific Policy Studies*, 1–18. https://doi.org/10.1002/app5.356

APPENDIX A

TABLE A1 Detailed data sources

SN	Variable	Data set	Details line
1	EXR	Data.imf.org_IFS	Exchange rates, National currency per US dollar, End of period, Rate
2.	PD	Data.imf.org_IFS	Prices, Consumer price index, All items, Index
3.	CTY	Data.imf.org_IFS	Balance of payments, Analytic presentation, Current account, Net (excluding exceptional financing), Balance on goods, services, and income [BPM6], US dollar
4	FXR	Data.imf.org_IFS	International reserves and liquidity, Reserves, Official reserve assets, Market value/price, US dollar
5.	IIP 6 (FA and FL)	https://www.rbf.gov.fj/statistics/nsdp/	IIP (accessed on 30 August 2020)

TABLE A1 (Continued)

SN	Variable	Data set	Details line
6.	TOPEN	https://www.rbf.gov.fj/statistics/nsdp/	Trade
7	NEER	https://www.rbf.gov.fj/statistics/nsdp/	Exchange rate
8.	EXDTY	https://www.rbf.gov.fj/statistics/nsdp/	External debt
9	BDTY	https://www.rbf.gov.fj/statistics/nsdp/	National accounts

TABLE A2 Unit root test (ADF) for FM-OLS variables (annual series)

Variable	Order	ADF-stats	Critical value	Nature of variable
COV(Y,E)	1	2.35	4.19	I(1)
ΔCOV(Y,E)	0	3.68	3.42	I(0)
TOPEN	1	4.18	4.19	I(1)
ΔTOPEN	0	4.23	3.42	I(0)
EXDTY	1	2.45	4.19	I(1)
ΔEXDTY	0	5.69	4.35	I(0)
BDTY	1	2.46	4.19	I(1)
ΔBDTY	0	7.68	3.42	I(0)
CTY	1	3.15	4.20	I(1)
ΔCTY	0	3.67	3.42	I(0)
NEER	1	0.19	4.19	I(1)
ΔNEER	0	2.52	3.42	I(1)
PD	1	2.09	4.19	I(1)
ΔPD	0	3.56	3.42	I(0)
FXAGG	1	1.44	4.19	I(1)
ΔFXAGG	0	4.71	3.42	I(0)

Note: Variables are unit root (in levels) and difference stationary. Maximum lags tested were 4 with intercept and trend for level variables but no trend terms for difference equations. Tests were conducted in Microfit-4.1. Log transformations are used where relevant.

Abbreviations: ADF, Augmented Dickey Fuller; FM-OLS, fully modified ordinary least square

APPENDIX B

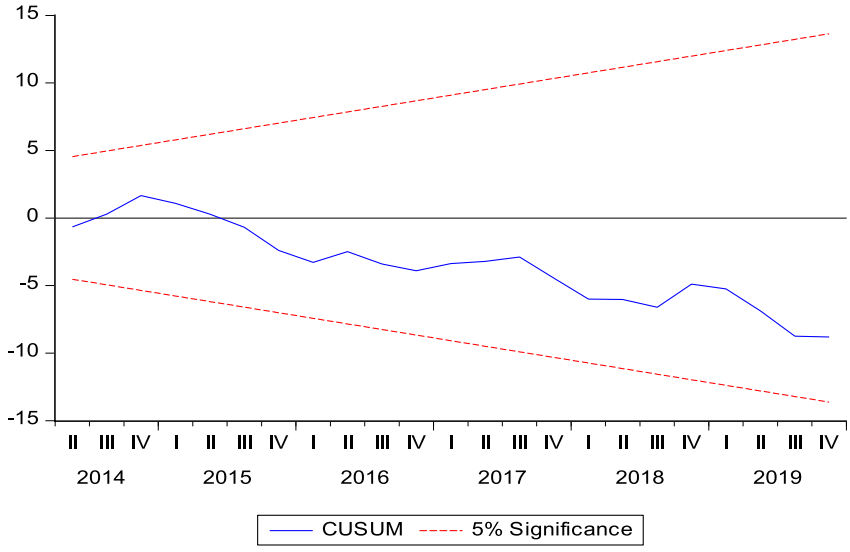

FIGURE B1 The CUSUM test (stability of coefficients)

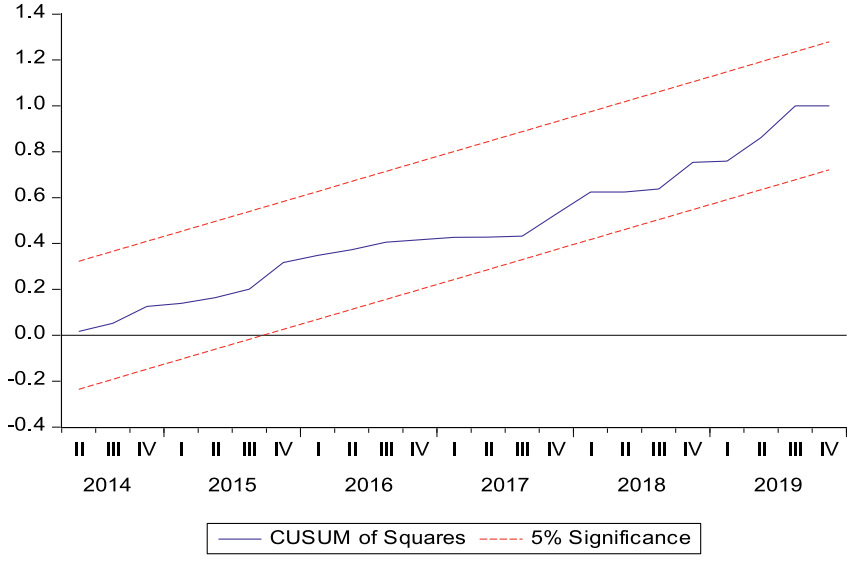

FIGURE B2 The CUSUM of squares test (stability of the model)