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A general equilibrium analysis of the economic impact of a devaluation on tourism: the case of Fiji

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Policymakers often see a currency devaluation as a means of increasing a country's exports, providing a boost to economic activity. In an economy where tourism exports are significant, a devaluation will make tourism more competitive, providing a stimulus to the economy through tourism exports. Imports will be more expensive, which is often seen as an inflationary side-effect of the export stimulus. Results from a computable general equilibrium model of Fiji indicate that, while devaluation will increase tourism consumption, the overall effect on the economy will be contractionary, as household consumption, investment and domestic production will all decrease. Policymakers and central banks need to consider the full economy-wide impacts of a currency devaluation when determining the overall benefit to the economy.

Keywords: devaluation; tourism consumption; computable general equilibrium model; Fiji

Currency devaluation means that the price of a country's exports, denoted in foreign currency, will decrease, hence increasing the purchasing power of source markets. Exports will be less expensive on the world market and tourism, being an export industry, is expected to increase as the destination becomes more competitive. Alternatively, imports will be more expensive in the destination. A devaluation impacts both the demand and supply sides of the economy. Assessing the economy-wide effect of a devaluation and its impacts on tourism is therefore more complicated than simply working on the assumption that devaluation is good for exports (including tourism) and bad for imports.

There has been considerable economic analysis, both theoretical and empirical, of the economic impact of a devaluation. A devaluation is a common policy recommendation of the International Monetary Fund (IMF) for many developing countries that face large external imbalances (Reinhart, 1995). There is some but not an extensive literature on the impacts of devaluation on tourism. This may be because, from a partial equilibrium viewpoint, the

conclusions are fairly straightforward; that is, a devaluation of the host currency means that the price of tourism, denoted in foreign currency, will decrease, hence increasing the demand for tourism in the host destination.

This paper estimates the impact of a devaluation of the Fijian dollar on the economy using a static computable general equilibrium (CGE) model. Moreover, the paper will examine to what extent the benefits that the projected increase in tourism and exports bring to the economy exceed the projected decreases in imports. This research differs from the existing literature in two ways. First, in the literature cited below, studies that have estimated the economy-wide impacts of exchange rate movements have not specifically incorporated tourism into their models. Second, studies that specifically look at the economic impacts of a devaluation on tourism have not used an economy-wide model. The computable general equilibrium model implemented in this research can replicate individual sectoral effects as well as incorporating potentially important feedback effects.

The next section outlines the various ways exchange rate movements can impact an economy and then reviews previous research on the economic impact of exchange rate movements on tourism. The paper then describes the Fijian context and explains the model that will be used to assess a 20% devaluation of the Fijian dollar. The subsequent sections describe the underlying benchmark data used in the model and CGE methodology. The results section outlines both aggregate and sectoral changes to the economy estimated in the model as a result of the 20% devaluation, noting that, while the tourism-oriented sectors benefit from the devaluation, other sectors, residents and investment 'lose'.

Impact of exchange rate movements on the economy

There has been considerable research, from both theoretical and empirical perspectives, on the economic impacts of exchange rate movements for different economies (Alexander, 1952; Diaz Alejandro, 1963; Edwards, 1986; Lizondo and Montiel, 1989, for a review of the theoretical impacts). Empirical studies have been conducted covering a range of different single- and multi-country studies (Dervis *et al*, 1981; Kamin and Klau, 1997; Amegbeto and Winter-Nelson, 1998; Acar, 2000; Bird and Rajan, 2000; Costa, 2001; Thissen and Lensink, 2001; Zhang and Fung, 2006; Acharya, 2010).

A devaluation impacts both the demand and supply sides of the economy. It might result in higher prices, which could generate a negative real balance. This could lead to lower aggregate demand and output. Alternatively, a devaluation can have a negative effect on aggregate demand through income distribution. For example, aggregate demand and output may decline if income is redistributed from income groups with low propensity to save to income groups with a high propensity to save. Also from the demand side, if the price elasticities of imports and exports are sufficiently low, the trade balance may worsen (expressed in domestic currency). From the supply side, the benefits that accrue to a country that devalues its currency will depend on the extent to which the capital used in production is imported as well as the extent to which goods and services used in intermediate consumption are imported or domes-

tically produced. The interactions between the exchange rate, real output, real income and employment are diverse and complex and the direction of impacts are ambiguous. As such, the impacts reduce to empirics.

Impact of exchange rate movements on tourism

The tourism literature has long recognized the benefits of a devaluation or depreciation on the attractiveness of a destination. In an early study, Gerakis (1965) empirically examines four devaluations and three revaluations, and finds that tourist receipts are responsive to relative price changes. The devaluation of the Mexican peso to the US dollar was the subject of Stronge and Redman's (1982) study, which found that devaluations of the Mexico peso in the 1970s were unlikely to provide benefits to the Mexican tourism industry. Gibbons and Fish (1985) find to the contrary, explaining that the Stronge and Redman study did not take into account the level of prices in Mexico in estimating the real expenditures of American tourists. Casado (1997) noted that Mexico became relatively more competitive in the short term but associated increases in inflation eroded its competitiveness. Cheng *et al*. (2009) investigate the effect of a depreciation on the US tourism balance of trade and find that depreciation raises long-term US export revenue but there is no effect on import spending. In general, devaluations have empirically been found to boost tourism.

The Fijian context

On 15 April 2009 the Reserve Bank of Fiji (RBF) announced a devaluation of the Fiji dollar of 20%. At the same time the RBF announced monetary policy changes and credit controls to assist the business sector to have a more stable interest rate environment and allow depositors to earn respectable interest rates. According to a statement by the RBF (2009a, p 1), it:

> 'took the[se] measures to cushion the severe effects of the global financial crisis on the Fiji economy. The devaluation will bring the Fiji dollar in line with the major trading partner countries such as Australia and New Zealand. The Fiji dollar had appreciated significantly by around 20% since 2007/2008. This is unsustainable. By correcting the value of the Fiji Dollar it is expected that our exporters will benefit and will provide much-needed boost to tourism.'

The primary reason for the devaluation was concern about the level of foreign reserves and banking system liquidity (RBF, 2009b). Foreign reserves had fallen to critically low levels in the first three months of 2009. Foreign reserves were FJ$441 million prior to devaluation and steadily increased to FJ$591 million by 28 April 2009, two weeks after devaluation. Likewise, bank liquidity reached a critically low point of FJ$15 million in late March 2009 but had risen to FJ$102 million by the end of April 2009.

Not surprisingly, Fiji's destination marketing organization, Tourism Fiji,

came out in favour of the devaluation, arguing that it would have immediate and very positive ramifications for the tourism industry (*Fiji Times*, 2009). Fiji has followed a fixed exchange rate regime since 1975. The Fijian dollar is linked to a basket of currencies of its five major trading partners – Australia, Japan, New Zealand, the UK and the USA. The basket is weighted by a three-year moving average of Fiji's direction of trade (Jayaraman and Choong, 2008). The RBF has intervened in the market previously by devaluing the Fijian dollar. In 1988, following the military coup of 1987, the dollar was devalued by 34% in order to limit capital outflows. Ten years later, the dollar was again devalued by 20% as a reaction to the Asian Financial Crisis of 1997 (Jayaraman and Choong, 2008). The justification for these devaluations was that they were corrective measures used to improve the competitiveness of the Fijian dollar. Aside from these major adjustments, the RBF allows the exchange rate to vary by +/–0.07% of the central rate.

A devaluation of the Fijian dollar means that the price of Fiji's exports, denoted in foreign currency, will decrease, hence increasing the purchasing power of source markets. Fijian exports will be less expensive on the world market. This suggests that exports from Fiji will increase. Tourism expenditures are also an export; its unique feature being that it is consumed in the host country. While the tourism industry in Fiji should be able to meet any current increase in demand (as hotel occupancy rates are averaged 45.8% in 2010, the supply of the export of goods may be problematic). While exports will be less expensive; imports will be more expensive.

The impact of exchange rate movements in Fiji has been the subject of some previous research. Jayaraman and Choong (2008) study exchange market pressure over a 31-year period and attempt to determine the factors behind exchange market pressure. They find that exchange rate pressure is positively related to budget deficit, domestic credit to private sector and external debt as well as uncertainty regarding the political situation. Singh (2006) estimates export and import elasticities to determine whether a devaluation would improve Fiji's current account balance. He finds that the high income elasticity for exports would be a trigger for economic growth but argues that the export sector is highly unproductive and the higher cost of imports as inputs would result in inflation and lower international competitiveness. Narayan and Narayan (2007) examine the relationship between output and devaluation for Fiji over the 1970 to 2005 period. They find that devaluations are expansionary in the case of Fiji. Specifically, they note that, in the short run, a 10% devaluation increases output by 2.3% and in the long run by 3.3%. The reasoning behind this is that Fiji's import demand is highly inelastic while its export demand is relatively elastic with respect to the real effective exchange rate.

Similarly, Reddy (1997) identifies the J-curve affect for Fiji following a devaluation with a highly inelastic import demand leading to increased expenditure on imports and a trade balance deterioration in the short run while in the long run the highly elastic demand for imports would result in an improvement in the balance of trade. Reddy argues the slow responsiveness in the short term is a result of time lags in consumer and producer responses, limited domestic capacity to meet the additional export demand and provide import substitutes and Fiji's political instability which discourages long-term investment.

Methodology

One way to model the economic impact of a devaluation on a host economy is via a CGE model. The other common method is to use regression analysis. Regression analyses, such as those used by Edwards (1986) and Narayan and Narayan (2007), apply econometric analysis to assess the impact of a number of variables, including an exchange rate variable, on an output or national income variable. In contrast, a CGE model follows the interactions and relationships of a small open market economy and solves for a set of prices including production prices, factor prices and the exchange rate and levels of production that clear all markets. Because CGE models, like those used by Thissen and Lensink (2001) and Acharya (2010), can show both macroeconomic and sector effects and take into account the full workings of an open economy, a CGE model is the most appropriate for this type of analysis.

CGE models are simulations that combine the abstract general equilibrium structure formalized by Arrow and Debreu (1954) with realistic economic data to solve numerically the levels of supply, demand and price that support equilibrium across a specified set of markets. CGE models are a standard tool of empirical analysis, and are widely used to analyse the aggregate welfare and distributional impacts of exogenous shocks or policies whose effects may be transmitted throughout the economy.

The standard assumptions of market clearing, zero excess profits and balanced budget for each agent apply. With Fiji being a developing country, the neoclassical assumptions of perfect production markets and factor markets may not always hold. There may be market failures. These have not been taken into account. Nevertheless, the author believes the model is a good representation of the functioning of Fiji's economy. Commodity markets merge primary endowments of households (capital and labour) with producer outputs. In equilibrium the aggregate supply of each good must equal the total intermediate and final demand. Producer supplies and demands are defined by producer activity levels and relative prices. Final demands are determined by market prices. The model is calibrated to the benchmark data. Being a general equilibrium model, the economy is assumed to be in equilibrium in the benchmark. A 'counter-factual' scenario involves applying an exogenous shock or policy simulation to the system. The model output shows the state of the economy after all markets have reached a new equilibrium. CGE models need to have the functional forms of utility and production functions specified. Specific details for the different sections of the economy follow.

To see the effects of a devaluation, not only imports and exports directly but also other areas of the economy, it is worth examining the different demand and supply functions in the model. On the supply side, it is common to model production using the constant elasticity of substitution (CES) family of functions, which includes Leontief, Cobb–Douglas and constant elasticity of transformation (CET) functions. Each production sector, Y_i, produces two types of commodities: domestic goods, D_i, and goods for export, E_i. These goods are assumed to be imperfect substitutes, and they have a constant elasticity of transformation. For production, each sector uses capital, labour and intermediate goods. As such, the sector's i production function is:

$$Y_i = g(D_i, E_i) = f(K_i, L_i, A_{i,j)}, \tag{1}$$

where g is output transformation function, and f is input transformation function. Output transformation is assumed to be the CET:

$$Y_i = \Phi\left(\delta_i^e D_i^{\frac{\eta-1}{\eta}} + (1-\delta_i^e)(E_i \times \Theta)^{\frac{\eta-1}{\eta}}\right)^{\frac{\eta}{\eta-1}}, \tag{2}$$

where Y_i is output; E_i is exports; D_i is domestic production; η is the elasticity of transformation in total supply; δ_i^e is the calibrated share of exports; Φ is the calibrated shift parameter in the transformation function and Θ is a shift parameter ($\Theta = 1$) in the benchmark scenario where there is no devaluation and $\Theta = 0.8$ simulates a 20% devaluation). The value of gross supplies in the economy must equal the sum of the domestic supplies and exports:

$$PY_iY_i = PD_iD_i + PE_iE_i, \tag{3}$$

where PY_i is the price of domestic supplies of commodity i; PE_i is the price of exported goods; and PD_i is the price of domestic supplies. Hence a devaluation of the local currency will see firms produce more exports relative to domestic production depending on the elasticity of transformation.

In terms of intermediate production, an input to a sector i from a sector j is an Armington aggregate of domestic output and imports (Armington, 1969). These goods are imperfect substitutes, even though they are in the same sector. They are assumed to be qualitatively different and intra-industry trade can occur. These goods are assumed to have a CES between them:

$$A_i = \Omega\left(\delta_i^m D_i^{\frac{\gamma-1}{\gamma}} + (1-\delta_i^m)\frac{M}{\Theta_i}^{\frac{\gamma-1}{\gamma}}\right)^{\frac{\gamma}{\gamma-1}}, \tag{4}$$

where A_i is the Armington CES aggregate of domestic supplies; D_i and imported supplies; M_i for each sector; γ is the elasticity of substitution in the aggregate supply function; δ_i^e is the share of imported goods; Ω is the calibrated shift parameter of the aggregated supply function; and Φ is the calibrated shift parameter in the transformation function and Θ is a shift parameter ($\Theta = 1$ in the benchmark scenario where there is no devaluation and $\Theta = 0.8$ simulates a 20% devaluation). Here a devaluation of the local currency will see firms substitute their intermediate production to domestically produced goods relative to the now more expensive imports again to the extent of the elasticity of substitution.

The aggregate value of supply in the economy must be equal to the sum of the values of domestic supplies and imports: $PA_iA_i = PD_iD_i + PM_iM_i$ where PD_i and PM_i are the gross price of domestic and import supplies, respectively; and PA_i is the gross price of composite commodity i.

The production of goods follows from a nested Leontief–Cobb–Douglas production function. Output is allocated to the domestic and export markets

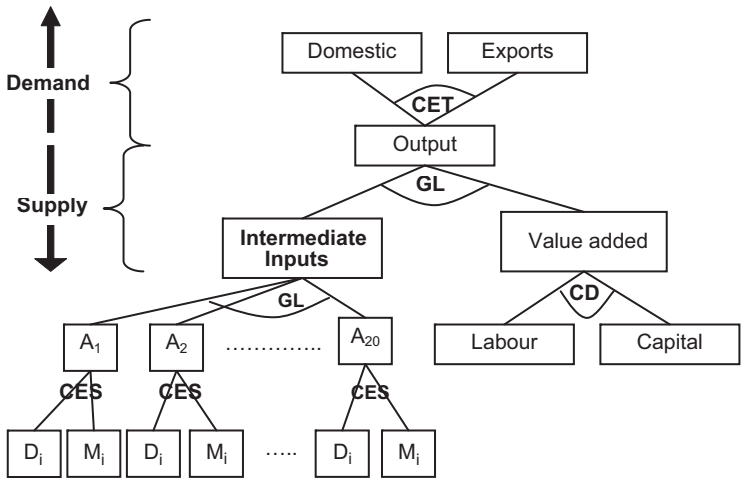

Figure 1. Production schematic.
Note: CD – Cobb–Douglas; CES – constant elasticity of substitution; CET – constant elasticity of transformation; GL = generalized Leontief.

according to a constant-elasticity-of-transformation. Intermediate inputs are Leontief, while labour and capital enter as a Cobb–Douglas value-added aggregate.

The factors of production are combined via a Leontief aggregation. Capital and labour enters as a Cobb–Douglas value-added aggregate. Intermediate inputs from different sectors enter as a Leontief aggregate into a sector *i*'s production function:

$$f(K_i,\ L_i,\ A_{i,j}) = \min\left\{B_i L_i^{\alpha_i} K_i^{(1-\alpha_i)}, \min\left\{\frac{A_{i,1}}{a_{i,1}}, \frac{A_{i,2}}{a_{i,2}}, \ldots, \frac{A_{i,j}}{a_{i,j}}\right\}\right\} \tag{5}$$

This is a constant returns to scale production function. Production can be depicted as in Figure 1.

Armington aggregate is used for private consumption, government consumption, investment, and as an intermediate input for production. So again, the trade-off between domestically produced goods and services and imported goods and services is impacted by movements in the exchange rates.

The demand side consists of the household sector, three types of governments, investment demand and tourism demand.

Consumption

A representative household has an endowment of primary factors of production: capital and labour. They demand investment, private and government goods. The investment and the government sectors' output are exogenous while private demand is determined by utility maximizing behaviour. Consumer utility consists of a nested Cobb–Douglas utility index where the top level is a Cobb–Douglas function of aggregate composite consumption and savings. The second level nest is defined over Armington aggregation of domestic and imported commodities.

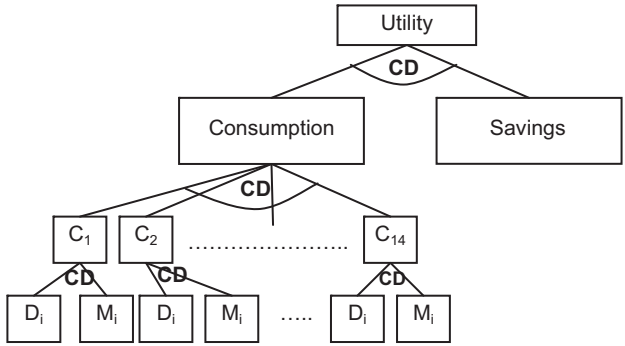

Figure 2. Utility composite.
Note: CD – Cobb–Douglas.

$$U = \kappa C^{\sigma} S^{1-\sigma}, \tag{6}$$

where U is utility; C is aggregate consumption; S is savings; κ is a calibrated shift parameter:

$$C = \prod_{j=1}^{n} c_i^{\alpha_i}, \tag{7}$$

where c_i is consumption by sector:

$$c_i = \mathrm{X}\left(\delta_i^c CD_i^{\frac{\gamma-1}{\gamma}} + (1-\delta_i^c) CM_i^{\frac{\gamma-1}{\gamma}}\right)^{\frac{\gamma}{\gamma-1}}, \tag{8}$$

where CM_i is imported production of consumption good; CD_i is domestic production of consumption good; γ is the elasticity of substitution between domestic goods and services and imported goods and services; δ_i^e is the calibrated share of consumed domestic goods; X is the calibrated shift parameter in the substitution function. A devaluation of the local currency would see residents consume more domestically produced goods relative to imported goods depending on the elasticity of substitution (see Figure 2).

Residential welfare

Residential welfare is defined as the utility the representative household receives. Equivalent variation (EV) takes the initial equilibrium income and prices and computes the change needed to achieve new equilibrium utilities by comparing the benchmark scenario with the simulated (devaluation) scenario. It is the amount of income necessary to get to the new level of utility. The expression for equivalent variation is given by:

$$\mathrm{EV} = \mathrm{E}(\mathrm{U}_1,\mathrm{P}_0) - \mathrm{E}(\mathrm{U}_0,\mathrm{P}_0) \Rightarrow EV = \frac{U_1 - U_0}{U_0} Y_0,$$

where U_1 is the new level of utility, U_0 is the benchmark utility and Y_0 is benchmark income.

Government

In this model, the government agent collects tax revenues to maximize social welfare function which represents its preferences. The role of taxes is to redistribute income, to finance government expenditure, to alter behaviour of the other economic agents, and to stabilize the economy. The tax revenue that the government receives is wholly expended on public consumption and transferred to the representative household. Like Blake (2000), this model is characterized by fiscal neutrality so that public consumption remains constant. Any changes in tax revenues or changes in the prices paid by the government for public consumption goods result in changes in the level of transfers. This is done so that welfare calculations are based solely on household utility. Government consumption is fixed in real terms. Government savings is a flexible residual.

Tourism

Tourism is modelled in the following way: a representative tourist demands tourism in Fiji (a certain quantity of a composite good and service) at an aggregated tourism price level, *PT*. As in the case of the domestic household, tourism demand is obtained by maximizing the utility function of the representative tourist subject to their budget constraint. A constant elasticity of demand function is used, whereby demand varies according to the price of the appropriate bundle of tourism goods and services, hence Fiji faces a downward sloping demand curve for its tourism. Tourism consumption *TC* is related to a composite tourism price (akin to a tourism consumer price index), *PT* and the exchange rate, *PFX* in the following manner:

$$TC = \overline{TC}\left(\frac{PT}{PFX \times \Theta}\right), \tag{9}$$

where $\overline{TC}$ is the base level of tourism consumption, ς is the price elasticity of demand for foreign tourism ($\zeta < 0$) and Θ is a shift parameter ($\Theta = 1$ in the benchmark scenario where there is no devaluation and $\Theta = 0.8$ simulates a 20% devaluation). The elasticity of demand has been set at 0.5, meaning tourism in Fiji is elastic. Tourists are endowed with foreign exchange.

Tourism consumption is composed of the consumption of different commodities, with a Cobb–Douglas function determining how tourists substitute between commodities. The utility of the representative tourist is a Cobb–Douglas function of consumption of the composite goods:

$$TC = \prod_{i}^{n} tc_i^{\theta}, \tag{10}$$

where *TC* is aggregate tourism consumption; *T* is a shift parameter, that is calibrated to ensure the model replicates the benchmark; θ is the share of commodity *i* in tourism consumption; tc_i is consumption by sector;

$$tc_i = \mathrm{X}\left(\delta_i^{tc} TCD_i^{\frac{\gamma-1}{\gamma}} + (1-\delta_i^{tc})TCM_i^{\frac{\gamma-1}{\gamma}}\right)^{\frac{\gamma}{\gamma-1}};$$

TCM_i is imported production of a tourism consumption good; TCD_i is domestic

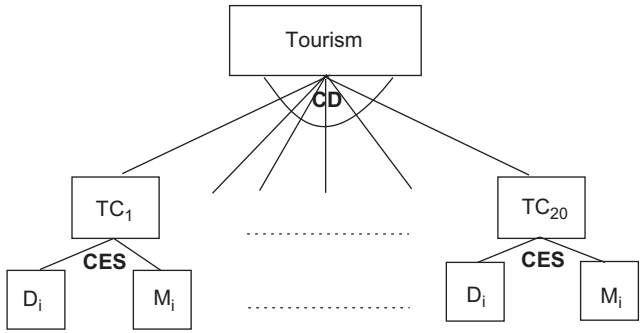

Figure 3. Basic structure of tourism consumption.
Note: CD – Cobb–Douglas; CES – constant elasticity of substitution.

production of tourism consumption good; γ is the elasticity of substitution between domestic goods and services and imported goods and services; δ_i^{tc} is the calibrated share of consumed tourism domestic goods; X is the calibrated shift parameter in the substitution function. The tourism transition mechanism is the way in which a change in tourism demand (through a change in the parameter, *TC*) affects the economy. An increase in tourism demand (*TC*) leads to increases in demand for the individual goods and services. This would then, through the rest of the model, lead to changes in prices and further effects on tourism consumption in total and on demand for individual goods and services. Like the resident household, a devaluation of the local currency would see tourists consume more domestically produced goods relative to imported goods depending on the elasticity of substitution (see Figure 3).

Data

The underlying benchmark data used to model the economy comes from Kumar (2001). This original data set was constructed for the year 2002. The input–output table was then put through a RAS procedure to update the matrix to 2007 with the target GDP by sector data published by Fiji's Bureau of Statistics. RAS is a widely used methodology to balance or update input–output tables. It is used when new information on the matrix row and column sums becomes available. The input–output table has been aggregated into 14 sectors listed in Table 1. The table differentiates final demand into household consumption, exports, tourist expenditures, government consumption, government investment and private investment. The table also differentiates final payments into labour income, operating surplus, several different taxes (company taxes, production taxes, tariffs) and imports.

Findings

The 'shock' to the economy involves a 20% decrease in the nominal exchange rate. The macroeconomic results are shown in Table 2. The results show that, as expected, the devaluation makes Fiji more competitive in terms of tourism and has a positive impact on tourism with international tourists, who hold

Table 1. Aggregated sectors used in the model.

Agriculture	Retail and wholesale trade	Health
Forestry, fishing and mining	Hotels	Education
Manufacturing	Restaurants	Other government services
Electricity and water	Transport	Informal sector
Construction	Business service	

Table 2. Percentage change in variables as a result of a 20% devaluation.

Variable	%
Tourism consumption	5.3
Price of tourism	–0.6
Welfare	–14.3
Consumption	–20.7
Investment	–21.3
Price of investment	0.7
Labour	3.0
Wage rate	–5.2
Capital	–0.7
Return to capital	–6.5
Domestic production	–9.6
Exports	9.5
Imports	–38.8
Net value added	–5.0

foreign currency. Tourists are now able to purchase more tourism in Fiji. Tourism consumption increases by 5.3%. Likewise, for other exports, the devaluation has a positive effect with exports increasing by 9.5% but imports are now more expensive in terms of Fijian dollars so imports are estimated to decrease by 38.8%. However, the devaluation is estimated to have negative impacts on the economy also. Net value added is estimated to decrease 5.0% and domestic production decreases by 9.6% as firms choose to export rather than supply goods and services on the domestic market. Imports, which are inputs into this domestic production, are now more expensive. Labour increases 3.0% as a result of the decrease in the average wage rate relative to the consumer price index. Capital decreases marginally by 0.7% and the return to capital falls by 6.5% relative to the consumer price index. Of greater concern are the large estimated decreases in residents' consumption and investment. These components of final demand are estimated to fall 20.7% and 21.3%, respectively. Decreases in private consumption and investment, which was not fully offset by the increase in labour, have occurred decreasing overall Fijian residents' welfare by 14.3%. As the representative households are endowed with primary factors, the decrease in wage rate and return to capital mark a decrease in consumption resulting in lower savings/investment and consumption. Further, in residents' consumption bundle, they substitute away from more expensive imported goods but not entirely.

Table 3. Percentage change in sectoral variables as a result of a 20% devaluation.

Sector	Net value added (%)	Domestic production (%)	Exports (%)	Imports (%)	Employment (%)	Capital (%)
Agriculture	–8.8	–13.2	3.4	–4.8	–9.5	–8.2
Forestry, fishing and mining	–0.3	–10.3	1.8	–0.8	–1.3	0.2
Manufacturing	–10.8	–17.3	11.2	–40.2	–11.6	–10.4
Electricity and water	–15.2	–15.2		–1.4	–16.2	–15.0
Construction	–13.2	–13.2		–19.4	–13.3	–12.1
Retail and wholesale trade	6.5	–2.5	9.8	–5.7	5.5	7.0
Hotels	7.2	7.1		–10.3	6.3	7.8
Restaurants	7.8	7.8		–4.4	6.9	8.5
Transport	22.6	11.1	14.7	–71.4	22.0	23.7
Business Services	–8.0	–10.1	3.5	–19.1	–8.9	–7.6
Health	–4.2	–4.2		–4.1	–4.7	–3.4
Education	–6.3	–6.3		–2.1	–6.4	–5.0
Other government services	–1.6	–3.7	3.9	–10.2	–2.4	–1.0
Informal sector	10.0	1.1	3.4	–7.9	8.7	10.2

At a sectoral level, some industries benefit and some lose from the devaluation. Table 3 shows net value added, domestic production, exports and imports, employment and capital by the 14 sectors.

The tourism-oriented sectors such as hotels, restaurants, transportation and the informal sector witness increases in net value added, domestic production, employment and capital. For example, the net value added of the hotel sector increases by 7.2% with domestic production increasing by 7.1%. Employment and capital are estimated to increase in the hotel sector by 6.3% and 7.8%, respectively. The transportation sector is the sector that sees the most variability with net value added expected to increase by 22.6%. Exports in that sector are estimated to increase by 14.7% and domestic production of transportation is estimated to increase by 11.1%. Imports decrease across all sectors with the transportation sector estimated to decrease by 71.4%. Other non-traded sectors, such as the utilities sector and the health and education sectors witness a decline not only in imports but also in domestic production. the construction sector also follows this pattern which goes to explain, in part, the large decrease in private sector investment. While the other traded sectors see increases in the exports but this is not enough to offset the decreases in domestic production and net value added as a result of the drop in employment and capital.

CGE models have been criticized for their reliance on elasticities in determining the model results. As such, a sensitivity analysis has been undertaken to assess the extent to which results vary by differing elasticities. The price elasticity of demand for tourism determines how sensitive tourism demand is to changes in the price of tourism. In the benchmark scenario, the assumption has been made that tourism to Fiji is elastic (0.5), meaning that Fiji competes internationally with several other destinations. For example, other South Pacific

Table 4: Sensitivity analysis for the elasticity of tourism demand.

Elasticity of tourism demand	0	0.5	1	1.5	2
Tourism consumption	6.8	5.3	4.1	3.2	2.3
Welfare	–14.0	–14.3	–14.5	–14.7	–14.8
Consumption	–20.4	–20.7	–21.0	–21.2	–21.4
Investment	–20.9	–21.3	–21.6	–21.9	–22.2
Wage rate	–5.2	–5.2	–5.2	–5.1	–5.1
Return to capital	–6.5	–6.5	–6.6	–6.6	–6.7
Domestic production	–9.2	–9.6	–9.8	–10.1	–10.2
Exports	8.8	9.5	10.0	10.5	10.9
Imports	–36.8	–38.8	–40.3	–41.5	–42.5

Table 5. Sensitivity analysis for the elasticity of transformation.

Elasticity of transformation	0	1	2	3
Tourism consumption	15.4	5.3	2.0	0.3
Welfare	–17.1	–14.3	–13.3	–12.8
Consumption	–24.4	–20.7	–19.4	–18.8
Investment	–26.2	–21.3	–19.5	–18.6
Wage rate	–3.1	–5.2	–6.0	–6.5
Return to capital	–6.4	–6.5	–6.5	–6.4
Domestic production	–9.1	–9.6	–9.8	–10.0
Exports	6.9	9.5	10.5	11.1
Imports	–53.3	–38.8	–32.5	–28.9

destinations offer a similar product to Fiji and so international tourists might substitute to these destinations when faced with a higher price of tourism in Fiji. Table 4 shows the values of several key macroeconomic variables for differing values of the elasticity of tourism demand.

As can be seen from Table 4, the variables remain qualitatively the same. Tourism consumption varies most with the price elasticity of tourism, ranging from a 2.3% increase when the elasticity is set at 2.0, very elastic, to an increase in 6.8% when tourism demand is perfectly inelastic. The other variables do not vary greatly. For example, residents' welfare decreases by 14.8% when tourism demand is very elastic and to 14.0% when tourism demand is inelastic.

The ease with which sectors can substitute production from exports to goods and services sold on the domestic markets is determined by the elasticity of transformation. The greater the degree of substitution, the more firms will opt to sell goods and services on the export market relative to the domestic market, in the case of a devaluation. When there is no substitution between exports and the domestic market, all the results yield large changes compared to when the ability to transform domestic output into exports is very elastic. When producers cannot substitute from one market to the other, the effects are more pronounced. Here, tourism consumption varies from 15.4% in the perfectly inelastic case to 0.3% when the elasticity of transformation is set at 3.0. Welfare varies between –17.1% and –12.8% (Table 5).

Table 6. Sensitivity analysis for the elasticity of substitution.

Elasticity of substitution	0	1	3	5
Tourism consumption	9.4	7.9	6.0	4.8
Welfare	–15.3	–14.9	–14.5	–14.2
Consumption	–22.0	–21.5	–20.9	–20.5
Investment	–22.8	–22.3	–21.5	–21.1
Wage rate	–5.0	–5.0	–5.2	–5.2
Return to capital	–5.8	–6.1	–6.4	–6.6
Domestic production	–10.6	–10.3	–9.8	–9.4
Exports	11.7	10.9	9.9	9.2
Imports	–5.7	–17.3	–33.0	–43.6

Lastly, the elasticity of substitution describes the degree to which economic agents can substitute domestically produced goods with imported goods. Table 6 shows that, with increasing substitutability, the benefits to the resident households decrease. The greater the degree of substitutability, the more significantly imports decrease, while tourism demand is higher when there is no possibility of substituting imports for domestically produced goods.

Conclusion

This research examines the impact of a devaluation on the economy of Fiji, using a CGE model. Overall, this devaluation had a detrimental effect on the economy; that is, the net benefit is negative because the benefits gained from the increase in tourism and other exports do not outweigh the negative impacts in other areas of the economy. In terms of policy decisions, there is a need to take into account the full impact of a devaluation and to acknowledge the underlying structure of the economy and the limitations the economy may have in taking advantage of the economic benefits of a devaluation. Consistent with the tourism research literature, there was an increase in tourism demand for Fiji. Similarly, the level of foreign reserves and banking system liquidity recovered as a result of the devaluation. Nevertheless, other areas of the economy have suffered, with private consumption, investment and domestic production all estimated to decrease as a result of the devaluation. At the sectoral level, the tourism-oriented sectors, such as the hotel sector, the restaurant sector and the transportation sector, are expected to benefit while other sectors are estimated to lose out. Qualitatively, the results are robust to different values of the elasticities of tourism demand, the elasticity of transformation and the elasticity of substitution.

The results confirm other research conducted on the issue of devaluations in developing countries. Fish and Dickinson Gibbons (1985) did not significantly improve Mexico's balance of payments problems in the 1970s. Further, they argue that the benefits of the devaluation are short lived. As Strizzi and Meis (2001) note, currency devaluations, especially in developing regions such as Latin America and the Caribbean, indicate a degree of economic and financial volatility that can weaken investor and creditor confidence. Kamin and Klau (1997) note that devaluations are more contractionary in Latin America than

in Asia or in industrialized countries. This would seem to support the evidence of the 'New Structualists' (Krugman and Taylor, 1978).

With respect to research conducted in Fiji, the results in this paper reinforce Singh's (2006) argument that the export sector may be highly unproductive and the higher cost of imports as inputs will result in lower international competitiveness. The results conflict with those of Narayan and Narayan (2007), who found that previous devaluations in Fiji were expansionary. This may be the result of different methodologies – a CGE model versus an econometric model – or it may be that, now, Fiji's economy is not structured to shift demand away from more expensive imports to domestically produced products. This was noted by Reddy (1997) and appears still to be the case in Fiji – highly inelastic import demand leads to increased expenditure on imports and trade balance deterioration and that limited domestic capacity is unable to meet the additional export demand and provide import substitutes.

Some time has passed since the 2009 devaluation. Data published by the Reserve Bank of Fiji (RBF, 2011) show that the results obtained using the CGE model in this paper align qualitatively with the official statistics. For example, in 2009 the domestic economy contracted by 3.0%, tourism arrivals increased by 16.5% in 2010, and new lending by commercial banks for investment purposes experienced a 64% contraction in 2009. Exports rose approximately 13% in compared to a 14% contraction in 2009. Imports declined 20% in 2009. While other policies, excluding the devaluation, have had an economic impact, the model used in this paper goes some way to represent what has happened in the Fiji economy.

Welfare changes depend on (a) how much exporting versus non-exporting sectors contribute to the economy, and (b) linkages between exporting and non-exporting sectors, and consequently the multiplying effect of exporting sectors. Fiji's exports are mainly driven by the exports of tourism, which have the effect of stimulating economic growth. However, the increase in exports of tourism and other sectors comes at the expense of deteriorating terms of trade and the weaker power of imports, which results in a decrease in GDP and welfare.

Hence there is a need to strengthen the inter-sectoral linkages in the tourism-oriented sectors. This issue has been noted by several authors (Sinclair, 1998; Telfer and Wall, 2000; Valle and Yobesia, 2009; Pratt, 2011). This is easier said than done in a geographically remote South Pacific country with limited natural resources, land tenure issues and a lack of local capital for large investments, and, in many cases, the absence of a significant local entrepreneurial class. Nevertheless, the issue has been acknowledged by both the private and the public sector in Fiji with the RBF now offering scholarship to local chefs to be trained overseas in the preparation of high-quality foods using local ingredients. Further, there has been a concerted effort of many of the resorts in Fiji to start their own gardens to supply their restaurants.

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