The Competitiveness of Small Open Economies: An Analysis of The Real Effective Exchange Rate

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Abstract

Small open economies, such as The Bahamas and the rest of the Caribbean, have a significant level of trade openness and are thus subject to global volatility. As such, they must remain competitive. The exchange rate is a key measure of determining their international trade competitiveness and resilience to shocks; therefore, this study seeks to assess the trade competitiveness of the region using the Real Effective exchange rate (REER) model. A panel vector autoregression (PVAR), with fixed effects model, for twelve small open economies was used to assess the short and long-run effects of a shock to key economic variables to the REER. Several robustness tests were conducted and it was determined that all variables were stationary and co-integrated. The overall findings showed that when there was a shock in the short-run, the real effective exchange rate depreciated, making the regional economies more competitive. However, in the long-run, a shock to these economies resulted in an appreciation of the exchange rate, hence reducing competitiveness. The results signal that movements in the real effective exchange rate impact economic activity, in that a real depreciation contributes to growth in small open economies, by improving their competitiveness. An analysis using trade weights also confirm these results. The findings are in line with several studies conducted for the region and for developing countries.

JEL Classification: F41, O24, F13
Keywords: real effective exchange rate, trade competitiveness, panel vector autoregression

Table of Contents

Section 1: Introduction

The real effective exchange rate (REER) is used to measure the level of trade competitiveness of a country. The performance of the export sector is also influenced by the REER. According to the World Bank (2010), the REER is a nominal effective exchange rate index, which is adjusted for relative movements in national price or cost indicators of the home country and/or selected countries. Relative prices are useful indicators about the interaction of economic agents in an economy with the rest of the world. Therefore, the REER plays an important role in agents' choices. As such, it would be beneficial for small open economies to keep the REER close to the equilibrium exchange rate. The equilibrium REER is attained when the value of the REER remains consistent with a concurrent achievement of internal equilibrium, which refers to the clearance of the non-tradable goods market, and external equilibrium, which is related to the sustainability of the current account.

The objectives of this paper are to determine how small open economies real growth, trade openness, level of inflation, money supply and other exogenous factors such US inflation and changes in the Federal funds rate affects movements in the REER; that is, how these changes translate into an depreciation or appreciation of the REER. In addition, the study seeks to analyse the level of impact changes in the selected variables will have on the REER.

Importantly, small open economies, such as the Bahamas and those in the Caribbean, realized that they must remain competitive, as their success in international trade determines productivity, purchasing power for its citizens, and ultimately high living standards. Therefore, using a fixed effects model for a panel of 12 small open economies and a vector auto regression model (VAR) for The Bahamas, using both short-run and long-run scenarios, this study seeks to determine if the REER is under or overvalued. The results show that if the value of the REER is under 100, it signals that there is a depreciation—or in the case of fixed exchange rate regimes—a devaluation of the country's exchange rate, increasing its competitiveness with respect to trade. Conversely, if the value of the REER exceeds 100, it suggests that there is an appreciation (overvaluation) of the country's exchange rate, leading to a loss of competitiveness. In addition, an analysis using trade weights also confirmed these findings.

The rest of the paper is comprised of the literature review, section 2, which presents the influence the REER has on small open market economies. Section 3 describes the empirical framework of the model and discusses the results. Following this, Section 4, proposes some policy recommendations, while section 5 concludes the paper, with a summary of the overall findings.

Section 2 Literature Review

According to Darvas (2021), the real effective exchange rate (REER) is used to assess the equilibrium value of a currency, fluctuations in price or cost competitiveness and drivers for reallocation of production between the tradable and non-tradable sectors. Further, Turner and Van't dack (1993) posited that real effective exchange rates are the most popular measures of international trade competitiveness as they are indicators for loss or gains in countries' ability to compete in global markets. In small open economies (SOEs), specifically in the Caribbean region, trade functions as a crucial driver for economic growth. Santoya & Soutar (2011) assert that decreasing competitiveness could result in a reduction in export receipts, an increase in the import bill and as a result widening the current account deficit. Consequently, it is imperative

for the Caribbean region to remain competitive, as these countries are highly susceptible to global volatility and shocks.

Over the years, extensive theoretical and empirical research has been conducted on using REER as an appropriate measure of trade competitiveness in and outside of the Caribbean region, along with possible alternative measures. Although there is vast literature on measuring competitiveness, the metrics to measure it are disputable. Various studies explore additional measures of competitiveness and their shortcomings. Turner & Van't dack (1993) and Marsh & Tokarick (1994) analysed several methodologies and reinforced that given the shortcomings of competitiveness indicators, no one indicator gauges a complete assessment. It is also important to note that determinants in explaining how the REER impacts competitiveness and other engines of growth, differ across countries.

Studies have asserted that there are merits to depreciations in the real effective exchange rate (REER), as it favours growth and external competitiveness. According to Maxwell and Moore (2002), the REER is the most widely used metric of external competitiveness. The authors asserted that if a country's export prices rise relative to its trading partners, the REER then appreciates, resulting in a loss of external competitiveness. Under the Marshall-Lerner condition[1], currency devaluation improves the balance of payments (BOP) position as the price of imports rises, relative to the price of exports, which will boost trade competitiveness for domestic goods (Kandil & Mirazaie, 2005).

As previously stated, due to significant trade openness, small open economies are highly susceptible to global volatility. Haughton (2016) examined how temporary monetary shocks and permanent productivity shocks affect the REER and current account in selected Caribbean and Latin American countries using quarterly data over the period 2005Q1-2014Q4.[2] The findings revealed that the REER appreciated sharply for the selected countries, associated with the 2008 Global Financial Crisis. The analysis also found that prior to the financial crisis, the REER for Chile, Argentina, Jamaica and Mexico were higher than the other countries and showed indications of appreciation, while for Bolivia, Costa Rica, Paraguay and Peru the REER exhibited signs of depreciation. Post-crisis data determined that as the countries implemented policies to mitigate the effects of the crisis, the REER for Peru, Argentina, Chile, Columbia and Mexico started to appreciate, while the converse occurred for Bolivia, Costa Rica, Jamaica and Paraguay.

Boamah (1989) utilizes the REER in an attempt to estimate competitiveness in the Caribbean region. The study investigated changes in the REER for Barbados, Guyana, Jamaica and Trinidad and Tobago over the period 1980-1987. The results showed that devaluations in the nominal exchange rate were crucial in improving trade competitiveness in some of the Caribbean countries. Additionally, Barbados was found to be the least competitive, while Jamaica was the most competitive. For Belize, Santoya & Soutar (2011) calculated the real effective exchange rate to assess the competitiveness of the country's external sector. The study utilizes a composite REER index, expanding on earlier investigations by Brownbridge (1987) and Arana (1997) that takes into consideration "third party competition", in addition to a commodity based REER and a tourism-oriented REER. Like Belize, for Caribbean SOEs,

[1] This assumption is based on ideal conditions, i.e., the M-L condition will hold once the sum of price elasticities for a country's exports and imports (in absolute values) is greater than 1.

[2] Jamaica, Bolivia, Argentina, Chile, Columbia, Costa Rica, Mexico, Peru and Paraguay

tourism is a primary foreign exchange and employment generator. Their analysis determined that Belize's REER indices fell, resulting in an exchange rate depreciation and an increase in external competitiveness. Pavlic et al. (2015) investigated the relationship between tourism, the real effective exchange rate and economic growth in Croatia, using 1996-2013 quarterly data. They found that the real effective exchange rate is vital to the tourism industry's competitiveness.

Magud and Pienknagura (2023) examined how external shocks, namely global uncertainty (VIX) and U.S. monetary policy impact the movements in the REER of small open economies using quantile regression analysis.[3] The econometric analysis utilizes variables such as trade openness, inflation (U.S. inflation included), international reserves to M2 and a banking crisis dummy variable for 28 European, African, Asian, North American and Latin American countries. The findings reveal that countries with weak foreign exchange fundamentals tend to experience higher depreciations. Additionally, shocks to the U.S. monetary policy rate depreciate the currencies of small open economies. The study recommends foreign exchange intervention (FXI) as a tool to mitigate the impact of VIX shocks on the REER.

Despite the broad literature on the positive effects between REER depreciation and external competitiveness, results have been mixed. Kwalingana et al. (2009) stated that an appreciation in the REER leads to a deteriorating trade balance and as a result, a widening current account balance. Meanwhile, Henry (2001) explored competitiveness in Jamaica during the period of 1986-2000 and found that a depreciation in the real effective exchange rate did not increase external competitiveness. Henry (2001) attributed this to a rise in the costs of production, which grew at a faster rate than the depreciation of the real effective exchange rate.

For developing countries, exchange rate shifts are key determinants in macroeconomic performance. The impact and behaviour of the REER is an important topic of discussion for Caribbean-based small open economies as they are price takers in international markets and as they share similar characteristics—trade openness, industry, debt levels, global volatility, exchange rates regimes, and import dependence, in addition to other variables. Growth or decline in external competitiveness is said to be determined by exchange rate volatility on macroeconomic variables (Kandil 2015). Mundell (1973) and Rose (2000) also asserted that exchange rate stability is favourable to economic growth, as it positively impacts trade and investment.

Section 3: Empirical Analysis

3.1 Methodology for The Model

The study used a panel fixed effect model for several small open economies, subject to global volatility, who are major exporters, with significant trade openness. The study covered the period 2000-2022 and include countries such as, Antigua & Barbuda, Bahamas, Belize, Chile, Dominica, Grenada, Guyana, Singapore, St. Kitts & Nevis, St. Vincent & The Grenadines, St. Lucia and Trinidad & Tobago.

In terms of the variables used in the study, capital openness was measured using the Chin-Ito-Index. In addition, the level of inflation for the selected countries, money supply, measured by broad money as a percentage of GDP and net foreign assets were used as independent variables

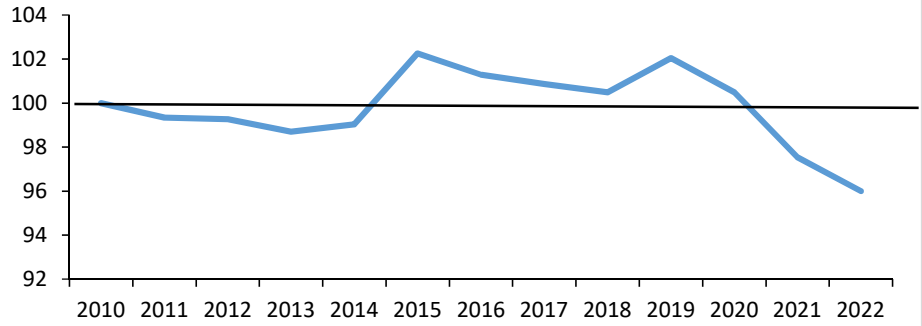
[3] Magud and Pienknagura (2023), using the Illzetski et al. (2021) classification, do not include collapsing exchange rate regimes and rigid regimes (including pegged regimes) in their study.

in the study. Further, other variables included real GDP, broad money to total reserves, trade as a percentage of GDP and the volatility index (VIX). In looking at the terms of trade, the net barter terms of trade index was used, with 2000 as the base year.

Interrupting the results, a value in excess of 100 signals that the exchange rate has appreciated (overvalued), while below 100 means that a depreciation (devaluation) of the real effect exchange rate (REER).

An examination of the Bahamas' REER over the period 2010 to 2022, using 2010 as the base year, revealed that the exchange rate peg has been undervalued for the period 2011 to 2014, signalling a devaluation in the REER, and an increase in the country's competitiveness. However, from 2015 to 2020, the exchange rate peg has been overvalued, signalling an appreciation of REER, inferring a loss of competitiveness. The International Monetary Fund (IMF) 2019 Article IV consultation report also noted that according to their I-REER model the REER was overvalued by approximately 8.0%. Nonetheless, from 2021 to 2022, the REER showed a devaluation, suggesting a decrease in the relative price for exports, contributing to increased competitiveness for the country (see Graph 1). The depreciation in 2021 and 2022 was also as a result of the COVID-19 pandemic, which contributed to a falloff in prices in The Bahamas. This was owing to constrained demand for the country's main export, tourism, given globally imposed travel restrictions.

Graph 1: Real Effective Exchange Rate 2010-2022
2010=100



3.2 Empirical Results for Panel Model Optimizer Test

In conducting the panel model selection optimizer test, the results showed that, the p-values were significant for the majority of the selected variables at the 5.0% level, some with a one year lag. Specifically, according to the p-value, movements in the VIX in the prior year, is a significant contributor to changes in the REER. Similar results were obtained for the US inflation rate and the federal funds rate, which indicated that movements in the both variables lead to an appreciation or depreciation in the REER. The dummy variable used to depict a financial crisis was also significant at the 5.0% level, indicating its importance to changes in the REER. Meanwhile, the reserves to broad money variable also influence changes in the REER, both in the current and prior year, but at the 10.0% level of significance. Inflation in the individual countries also contribute to movements in the REER, both at the 5.0% and 10.0% levels (see Table 1). The REER equation utilized in this study is as follows:

$$LREER = f(VIX(-1), USInfl(-1), FedRate, FC, ResM2(-1), LTOT, Infl(-1) \quad \text{eq(1)}$$

Table 1: Parameter Estimates		
	Coefficients	**P-value**
Constant		
VIX(-1)	-0.0012	0.0006
US Inflation(-1)	0.0102	0.0040
Federal Funds Rate	-0.0104	0.0000
Financial Crisis	0.0255	0.0016
Reserves/M2(-1)	-0.0143	0.0635
Log Terms of Trade	0.0381	0.0701
Individual Countries Inflation Rate (-1)	-0.0027	0.0636
Source: Authors' Estimates		

Further, according to the panel OLS estimation, 59.5% of the independent variables, explained changes in the dependent variable, the REER. In addition, based on the F-test for poolability, 89.6% explains the suitability of the variables.

3.3 Results for the Panel Vector Autoregression Fixed Effects Model

3.3.1 Short-Run and Long-Run Impact

According to the model results, in the short-run a 1.0% increase in the US Federal funds rate, will transmit into a 0.0104% deprecation in the REER for the sample of countries used. Similarly, in the short-run, a 1.0% rise in global volatility in the previous year, would translate into a 0.0012% depreciation in the REER, signalling an improvement in the competitiveness of the selected countries, as the reduction in the rate translates into cheaper export costs. However, a 1.0% rise in the US inflation in the prior year would result in an appreciation in the REER of 0.0102% in the current period, making countries less competitive, owing to a rise in export costs. In contrast, a 1.0% uptick in the individual countries inflation rate, with a one year lag, will transfer into a 0.0027% decrease in the exchange rate, thereby enhancing the competitiveness of the country.

Examination of the long run impact of the selected variables on the REER showed that, upward movements in the terms of trade would lead to an appreciation in the exchange rate; a 1.0% uptick will result in a 0.0381% rise in the REER. Similarly, increases in the global volatility index and the US Federal funds rate would translate into the REER trending upwards. Therefore, the results inferred that in the long-run a rise in the terms of trade, the global volatility index and the US Federal funds rate will result in the loss of competitiveness for small open economies.

3.4 Bahamas REER Vector Autoregression Model

In constructing a REER VAR model specific to The Bahamas, the variable used included broad money for the country, real GDP, inflation, the share of international reserves to broad money, net foreign assets, the summation of exports and imports as a share of GDP as a proxy for measuring the level of trade openness, US inflation and the US Federal funds rate. The data used were all in the natural log form. In addition, all robustness checks, including the test for stationarity, Johensen Co-integrations test, were conducted and the variables were found to be stationary. Further, according to the VAR lag order selection criteria, the Akaike Information Criterion (AIC) and the Hannan-Quinn Criterion (HQIC) tests results selected 3 as the appropriate number of lags for the best fit (model 3). However, for the Bayesian Information Criteria (BIC), which is a good measure of consistent estimation, the appropriate number of lags selected was 2. The test for normality was also conducted and it met the normality criteria. The REER equation utilized in this study is as follows:

$$LREER = f(RGDP, USInfl, FedRate, LNFA, LResM2, LTOT, Infl(-1) \qquad \text{eq(2)}$$

3.5 Analysis of the Model Results

3.5.1 Baseline Specification

In the study the baseline specification indicated that a depreciation or an appreciation in The Bahamas' REER is correlated with changes in the real GDP, inflation, the share of international reserves to broad money, net foreign assets (NFA), the summation of exports and imports as a share of GDP as a proxy for measuring the level of trade openness, US inflation and the US Federal funds rate (see Table 1). The model results suggest that a one percent increase in RGDP, ceteris paribus, results in a 0.14 percentage point depreciation in the REER, enhancing the competitiveness and attractiveness of the country, owing to exports becoming relatively cheaper. Similarly, a one percent rise in the US Federal funds rate and the US inflation rate contribute to a 0.36 and 0.12 percentage point decrease, respectively, in the REER, increasing the competitiveness of the country. Further, a one percent firming in the share of international reserves to broad money, the level of trade openness, and Bahamas's inflation rate leads to a 0.35, 0.22 and 0.08 percentage point decline in the REER, thus translating into the country becoming more competitive. Conversely, a 1.0 percent growth in the NFA, ceteris paribus, will lead to a 0.06 percentage appreciation in the REER, leading to a loss of competitiveness, as exports become more expensive (see Table 2).

TABLE 2: CORRELATION MATRIX FOR THE SELECTED VARIABLES

	REER	Inflation	Reserves/Broad Money	Trade Openness	US Inflation	US Federal Funds Rate
REER	1					
INFLATION	-0.076864	1				
RGDP	-0.143416	0.137845				
RESERVES/BROAD MONEY	-0.346677	0.013860	1			
TRADE OPENNESS	-0.216011	0.011044	-0.469659	1		
NFA	0.062827	-0.570773	0.216861	0.051425		
US INFLATION	-0.123078	0.435315	0.464222	-0.232875	1	
US FEDERAL FUNDS RATE	-0.356453	-0.198111	-0.323477	0.223452	0.137630	1

3.5.2 Impulse Response Function

The impulse responses were estimated, with the identifications achieved through Cholesky decomposition. A shock is defined as a Cholesky one-standard deviation. The horizon is measured in years and the dotted lines display the plus or minus two-standard error bands. The impulse response function results showed that a one standard deviation positive shock (increase) to RGDP will trigger an initial depreciation in the REER, as the country becomes more competitive and attractive, with the cost of exports becoming relatively cheaper. However, in following periods, in the medium term and beyond, the REER appreciates and the country loses its competitiveness, due to a rise in export prices, as the exchange rate appreciates in value. Likewise, in line with Bahamas' price-taker status, a positive shock to the trade openness leads to an initial depreciation in the REER, but in the second year and onwards, an appreciation in the exchange rate occurs, translating into a loss of competitiveness. In addition, in terms of the Federal funds rate and the US inflation rate, similar trends were observed, whereby positive shocks to these rates will result in an immediate depreciation in the REER and increase the country's competitiveness. However, in the ensuing years, the REER will appreciate and the competitiveness of the country will diminish.

In summary, the impulse responses revealed that a positive shock to any of the selected variables would trigger an immediate depreciation in the REER, but in the years following will result in an appreciation in the REER. Therefore, an initial shock will translate into increased competitiveness for the country in the short term; however, over the medium to long term the country's competitiveness will decrease.

3.5.3 The Bahamas' Trade Weighted REER Assessment

A further analysis using trade weight was conducted to determine if movements in the real effective exchange rate indeed affect the level of competitiveness and by extension economic activity. In addition, owing to the fact that the economy is trade dependent, with in excess of 80.0% of trade occurring between the USA and The Bahamas, the weights were applied to determine the level of competitiveness of the economy. For a more holistic approach and ease

of calculation, weights for The Bahamas were derived using the Reserve Bank of Australia's method of calculating the Trade Weight Index (TWI). The approach accounted for total merchandise and services of trading states, excluding oil exchanges. The equation denoted for The Bahamas is as follows:

$$W = \frac{X_i^T + M_i^T}{\sum_{i=1}^{N}(X_i^T + M_i^T)} \qquad \text{eq(3)}$$

Where:

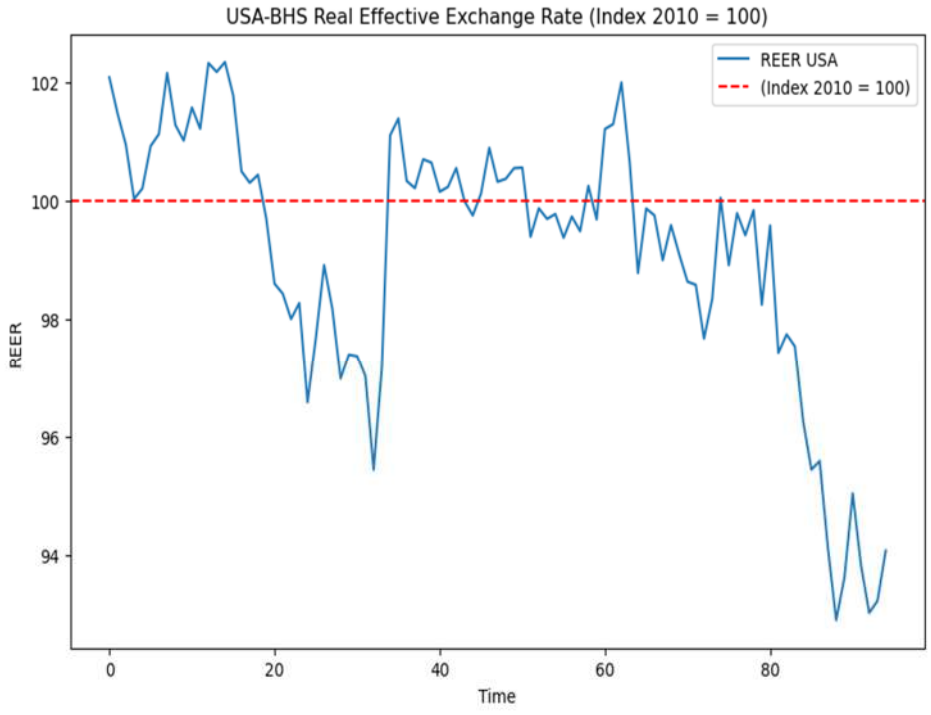
X_i^T = total non-oil exports from The Bahamas to country i

M_i^T = country i's total non-oil imports to The Bahamas

N = number of countries with which The Bahamas trades

The results showed that, in terms of trade competitiveness, when the REER for the Bahamas is above the base year (REER > 100), there is an appreciation of the Bahamian dollar relative to the currencies of its major trading partners. This suggests that the country might experience reduced trade competitiveness due to more expensive exports and cheaper imports, potentially adversely impacting the balance of payments and economic growth.

Graph 2



Further, over the 23 years reviewed, the REER values between the USA and the Bahamas dollar fluctuated, with most periods below the base year (REER < 100), signalling a depreciation of the Bahamian dollar during those years (see Graph 2). As such, the Bahamas likely benefited from enhanced trade competitiveness, with cheaper exports boosting demand and supporting growth in export-oriented sectors. In addition, the REER benefitted from the influences of the one-to-one exchange rate peg between the two countries' currencies.

Section 4: Policy Recommendations

Theories pertaining to the effects of the REER on trade competitiveness varied. Some authors suggest that in order to reduce the current account deficit, a depreciation in the REER might be the best option to bring the current account balance to a surplus. A real exchange rate depreciation in principle causes foreign imports to be more expensive relative to domestic goods, which creates an incentive for the increase in domestic demand and consumption of domestic goods by the local market. In effect, a real depreciation in the REER supports the trade balance and thus boosts export competitiveness, but this is in the context where the country has the competitive advantage in the goods being traded. Some scholars noted that the trade balance would only improve in the context of a currency depreciation if the Marshall-Lerner Condition holds. The Marshall-Lerner Condition suggests that a devaluation of the currency would improve the balance of trade if the sum of the elasticities of demand for exports and imports were greater than one. As such, in consideration of currency depreciation, the Marshall-Lerner Condition should be considered. However, in the short-term, the Marshall-Lerner Condition might not hold due to the lag adjustment. Importers take time to adjust to the fact the imports are more expensive and consumers their consumption.

There are a number of policies, which could be used to achieve an improvement in the trade balance, such as demand side and supply side competitiveness. A long-term economic strategy to boost competitiveness would be to improve supply side performance. In order to do so, the country should work to maintain its macroeconomic stability to make the country more attractive to inward investment, which could raise productivity and increase a country's capacity for exporting.

As exchange rate volatility and currency misalignment on international trade flows were determined to negatively impact trade, the present currency peg regime with the US dollar lends to the stability of the currency, which is vital for trade efficacy. However, the extent also depends on the structure of production, as well as the degree of economic integration across other countries. (Auboin and Ruta, 2013)

Further, a depreciation in the real exchange rate could heighten a country's risk premium, which might make it more susceptible to external and domestic balance sheet effects due to the sudden increase in the stock of external and/or domestic dollar denominated debt, respectively (Berganza and Garcia-Herrero, 2004). Fixed exchange rate regimes tend to magnify the effects of balance sheet effects, beyond the scale of the real depreciation, as fixed exchange regimes normally amass larger sums of external debt. Therefore, a country should evaluate which policy measure would bring about the wanted results, as well as their trade-offs.

Foreign currency reserves play a vital role in the Bahamas, as the small service based economy has a high reliance on imports for consumption and capital development. Capital controls (or exchange controls) protect the economy from depletion of foreign exchange and ensures the country is able to meet its needs. As a result, the import cover ratio, measured in weeks, should be maintained at 12 weeks minimum; thereby assisting in ensuring macroeconomic growth.

A recommendation to offset the effects of changes in the REER is for higher income nations to invest in capital-intensive industries, while lower income countries may invest in labour intensive sectors. This could impact the goods that are needed to carry out the country's labour force and development plan. Investment in the nation's premier industry would also boost long-

term gains, as most tourism industries are resilient to losses in competitiveness during a depreciation (Harris and Serju-Thomas, 2020).

Policies that raise productivity, such as technological advancement and adoption through investment and education are long-term and capital intensive. However, these measures could boost export performance and compete more effectively with imports. Other long-term recommendations include improving the ease of doing business, and investments in human capital.

Section 5: Conclusion

Movements in the REER have implications for a country's level of competitiveness. The study, which is in line with similar studies, found that there is a long-run co-integrating relationship between the REER and general economic fundamentals. In addition, both domestic and external factors are pivotal for small open economies REER.

Overall, the study indicated that a depreciation or an appreciation in the REER is correlated with changes in real GDP, domestic inflation, the share of international reserves to broad money, net foreign assets (NFA), the summation of exports and imports as a share of GDP as a proxy for measuring the level of trade openness, US inflation, the US Federal funds rate and the level of volatility. Examination of the impact of changes in the selected variables on the REER revealed that in the long run, a rise in the terms of trade, the global volatility index and the US Federal funds rate would result in an appreciation in the exchange rate for small open economies, and hence a loss of competitiveness for these countries. However, with a depreciation in the REER, and in the case of fixed exchange rate countries, a devaluation would likely enhance the competitiveness and attractiveness of the country, owing to exports becoming relatively cheaper.

The impulse responses also revealed that a positive shock to any of the selected variables would trigger an immediate depreciation in the REER, but in the years following would result in an appreciation in the REER. Therefore, an initial shock would translate into increased competitiveness for the country in the short term; however, over the medium to long-term, the country's competitiveness would decrease. The reduction in competitiveness could result in a decline in export receipts and an increase in the import bill, thereby widening the current account deficit.

In summary, although a depreciation in the REER would result in cheaper exports, this would result in more expensive imports, which could adversely impact economic growth. Further, an appreciation in the REER would translate into more expensive exports, thus reducing the level of competitiveness of a country and by extension economic growth. As such, it is prudent for countries to pursue policies that would aid in achieving an equilibrium exchange rate, which would likely ensure price stability.

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