MACROECONOMIC EFFECTS OF FOREIGN EXCHANGE RESERVES

Evidence from the Caribbean

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Introduction

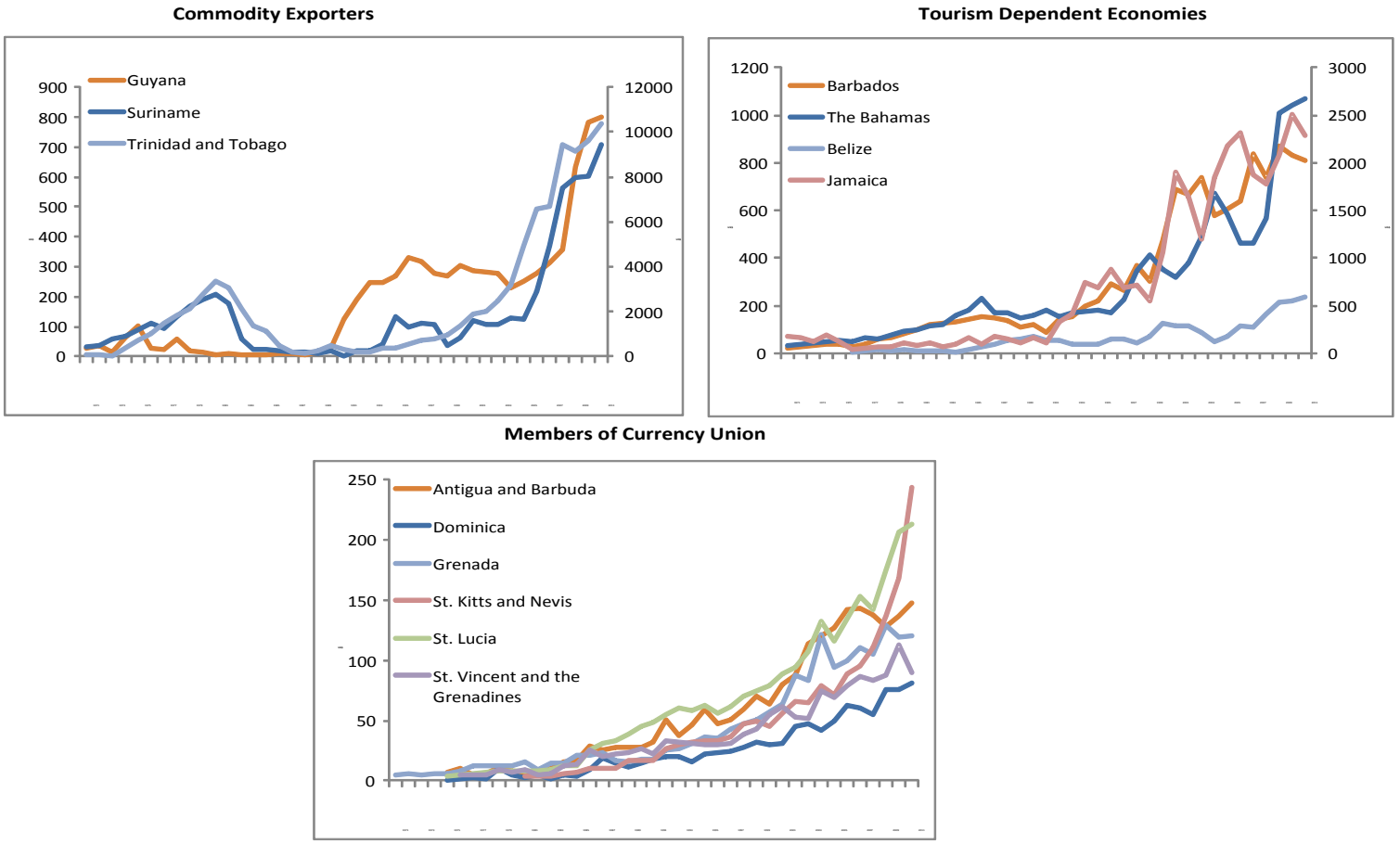
- Previous work on foreign exchange reserves in developing countries have largely concentrated on the relative importance of the motives, costs and adequacy of foreign reserve accumulation.

- However, macroeconomic effects of exogenous foreign exchange reserve accumulation are one area that has not been well discussed in the literature.

- Against this background, this paper seeks to determine the long-run influences of foreign exchange reserves on macroeconomic variables for a group of small Caribbean open developing economies.

Stylised Facts: The behaviour of the Macroeconomic data

Figure 1: Evolution of Foreign Exchange Reserves in the Caribbean



Stylised Facts: Correlation Analysis

Table 1: Correlation between Reserves and Macro Variables

	Capital	Consumption	Debt	Exports	GNI_LC	GNI_USA	Imports	Maturity
Reserves	0.97	0.95	0.88	0.9	0.96	0.94	0.94	-0.08

- The correlation analysis as well as economic theory formed the basis for the *a priori* expectations.

Review of Literature

- Historically, policy makers usually hold international reserves for several reasons: to finance external payments imbalances in order to smooth current consumption; to intervene in exchange markets; and to provide a buffer to cushion the economy against future exigencies (Heller, 1966; Landell-Mills, 1989; Wyplosz, 2007).

- However, in recent times, accumulation of foreign exchange reserves has been abetted by policymakers' desire to prevent currency appreciation, and to maintain the competitiveness of the tradable sector in these countries (Rodrik, 2006; Aizenman, 2007; Fakuda and Kon, 2008; Carasco et al; 2013).

Review of Literature: Theory

- Polterovich and Popov (2002) and Cruz and Kriesler (2008) argue that international reserves are used to promote growth. They suggest that the accumulation of foreign exchange reserves contributes to economic growth by increasing both the investment/GDP ratio and capital productivity.

- The seminal paper by Balassa (1978; 1985) demonstrates that there is a positive relationship between exports and economic growth.

- Fukuda and Kon (2008) argue that foreign exchange reserves are expected to have a positive impact on total external debt outstanding and export and a negative effect on the average maturity and consumption.

Review of Literature: Empirics

Authors	Results
Fukuda and Kon (2008)	Uses an unbalanced panel of 135 countries found that an increase in foreign exchange reserves raises external debt outstanding and shortens debt maturity. Their results also imply that expanding foreign exchange reserves may lead to a decline in consumption, but can also enhance investment and economic growth.
Olokoyo et al (2009)	Examines the case of Nigeria and found, using an autoregressive-distributed lag co-integration analysis, that there is a long-run linkage with foreign reserves and income, level of trade openness, foreign capital inflow and inflation. The level of foreign capital inflow and inflation had negative links with foreign reserves while local income and trade openness had a positive relationship with foreign exchange reserves.
Gibbs (2012)	Found a positive and significant long run effect of reserves on economic growth for the small open economy of Barbados.

The Empirical Model

- The theoretical framework utilized in this empirical setup was that of Fakuda and Kon (2008) who developed a simple open economy model where increased foreign exchange reserves decrease the costs of liquidity risk. .
- The models are expressed as follows:

The Effects on External Debt and its Maturity:

1. $D(Debt_{j,t}/\ GNI_{j,t}) = a1[D(FOR_{j,t}\ /\ GNI_{j,t})] + a2(\ log\ GNI_{j,t}) + a3(Controls_{j,t})$

2. $Maturity_{j,t} = b1(Foreign\ Reserve_{j,t}/\ GNI_{j,t}\mathbf{)} + b2(log\ GNI_{j,t}\ ) + b3(Controls_{j,t})$

The Impacts on Macroeconomic Variables

1. $CON_{j,t}/GDP_{j,t} = c1\ (FOR/\ GNI_{j,t}) + c2(log\ GNI_{j,t}) + c3(Controls_{j,t})$

2. $EXP_{j,t}/GNI_{j,t} = d1(FOR/\ GNI_{j,t}) + d2(log\ GNI_{j,t}) + d3(Controls_{j,t})$

3. $INV_{j,t}/GDP_{j,t} = e1(FOR_{j,t}/\ GNI_{j,t}) + e2(log\ GNI_{j,t}) + e3(Controls_{j,t})$

4. $DGDP_{j,t}/GDP_{j,t} = f1(FOR_{j,t}/\ GNI_{j,t}) + f2(log\ GNI_{j,t}) + fb3(Controls_{j,t})$

Methodology

- The econometric methodology consists of three main steps:

1. Several types of panel unit root tests are used to determine the order of integration for each series.
2. Panel Co-integration Test were utilized to determine the existence of unique co-integration relationship.
3. The PDOLS Estimation Method was used to derive the long run estimates.

Data

The data is a balanced panel data of 13countries and the sample period is 1980 to 2012.

Results

Table 3: PDOLS Long-run Results

Variables	Equations					
	Debt	Maturity	Consumption	Investment	Exports	Growth
Reserves	-0.52*	-0.13*				
GNI	0.26**	0.06***		0.06**		1.00*
Imports	2.96*		0.79*	0.13**	-1.26*	-0.27*
Openness	-1.41***	0.14**	-0.79*		2.26*	0.23*
R-squared	0.95	0.53	0.94	0.64	0.99	0.99

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

Robustness Checks

- Some additional exercises were undertaken to explore possible effects arising from non-linearities in the context of reserves accumulation. They include:

1. The introduction of import cover variable and an import cover- reserves interaction term into the growth equation to see if the impact of foreign reserves on growth varies with level of import cover.
2. Interest rates was interacted with reserves to determine if the coefficient on foreign reserves was different dependent on whether the interest rates were low or high.
3. Markov switching regressions were undertaken to see if the parameter on foreign reserves was different dependent on whether the economy is in a bust or boom period.

Conclusion

- The evidence revealed that foreign exchange reserves have a statistically significant negative influence on consumption and debt maturity and a positive impact on exports and economic growth.
- No significant relationship was found between investment and reserves while external debt had a sign not hypothesized by the theory.
- In addition the effect of foreign reserves on economic growth was shown to depend on the level of import cover and exports and consumption on the regime of the interest rates.
- Markov switching analysis was also conducted to see if foreign reserves vary according to the state of the business cycle. The results showed very few cases of different regimes.

Conclusion

- These results imply that if Caribbean governments are to boost economic growth they must accumulate foreign reserves. Those countries who are below the standard 3 month import reserves cover must seek to improve the level of reserves given that they are heavily dependent on imports for their goods and services.
- The paper suggests that reserves can affect growth through the exports and investment channels. Therefore reserves should be used to augment exports and productive investment.
- On the contrary Caribbean governments should avoid employing reserves to fuel consumption and external debt as the findings in this article indicate that reserves negatively impact these two components.

Thank you all!