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FOREIGN EXCHANGE SHOCKS AND ECONOMIC GROWTH IN SELECTED SMALL VERY OPEN ECONOMIES

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ABSTRACT

Using time-series econometric techniques, this paper examines the relationship between foreign exchange shocks and economic growth. These shocks result from a trend stationary process of the level of foreign exchange given the economic structure of the economies under study. The empirical model is motivated by a theoretical framework showing the connection between the localized foreign exchange market and economic growth. The estimation is conducted for ten small very open economies: The Bahamas, Barbados, Guyana, Jamaica, St. Lucia, Belize, Mauritius, Grenada, Fiji and Trinidad and Tobago. The results indicate a noticeable effect of foreign exchange shocks on economic growth. The estimates reveal that the growth of physical capital is also important in determining economic growth, while the results for population growth are more mixed.

KEY WORDS: economic growth, foreign exchange, ARDL, monetary growth model

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1 Introduction

The importance of foreign exchange in promoting economic growth is well documented (Bacha 1990, Taylor 1993, Sepehri et al. 2000). The gap models of this previous literature have been very helpful in allowing for simulating and calculating the contribution of foreign exchange to domestic investment and economic growth (Lensink 1995, Sepehri et al. 2000). Polterovich and Popov (2003) investigate the impact of the foreign exchange reserves accumulation on long-run economic growth. They conclude that while the accumulation is necessary for economic growth, it is not sufficient, because other factors such as institutions and investment climate matter. However, insufficient levels of foreign exchange could result in an unstable exchange rate that makes it difficult to price future investment decisions. Therefore, in the Caribbean context, Worrell et al. (2012) calculate the extent to which foreign currency constraints economic growth in three Caribbean economies – Barbados, Jamaica and Trinidad and Tobago. Summarizing his previous research outlining the balance of payments constrained growth, Thirlwall (2013) argues that economic growth of small open economies is constrained by the current account of the balance of payments. Therefore, in the long run, sustainable economic growth for small open economies would depend primarily on foreign currencies that are necessary for importing technology goods, intermediate products and fuels.

Not having a globally convertible currency means small states are often buffeted by exogenous shocks. Random shocks, which can be positive or negative, tend to have various effects on the economy. The core hypothesis of this paper is positive shocks are good for economic growth while negative ones are harmful. For small very open economies positive shocks can result from favorable commodity prices. Negative ones can come from higher oil prices for the oil-importing small economy. It is widely known that most including the large emerging economies, let alone small very open economies, do not possess a convertible or generally acceptable currency in the global financial centers. To offset the adverse effects of exogenous shocks from small very open economies, according to Moore and Glean (2015), Central Banks would need to demand larger quantities of foreign reserves. In the event of shocks occurring, the reserves should be there to be drawn upon until the macro environment improves or domestic policy response can be implemented to redress negative shocks (Moore & Glean, 2015).

This paper explores the foreign exchange-growth nexus by calculating the effect of shocks on growth. The level of foreign exchange and growth would tend to be endogenous to each other, but the foreign exchange shocks would be exogenous. These shocks which the small economy faces emerge from mainly international events. Hence, their economic growth is endogenous to these events. As far as we are aware, there is no literature on the effects of foreign exchange shocks on economic growth. Worrell et al. (2012) explore at the effect of foreign exchange levels on growth. A natural question emanating from this observation is: to what extent do foreign exchange shocks affect economic growth? This paper aims to fill the gap in the literature by estimating the effects of foreign exchange shocks on economic growth.

Against this background, this study is concentrated on a selected list of several small very open economies. They are The Bahamas, Barbados, Guyana, Jamaica, St. Lucia, Belize, Mauritius, Fiji and Trinidad and Tobago. Small open economies were chosen as they have many similarities and peculiar reserve policies compared to larger economies. This study utilizes autoregressive distributed lagged (ARDL) models, to examine the phenomenon in the aforementioned small very open economies, while controlling for other recognizable determinants of economic growth, using time series data spanning 1970 to 2014. The bound testing methodology of Perasan et al. (2001) will be exploited to check for long run relationships among the variables. This work, therefore, contributes to the literature on the time series of economic growth.

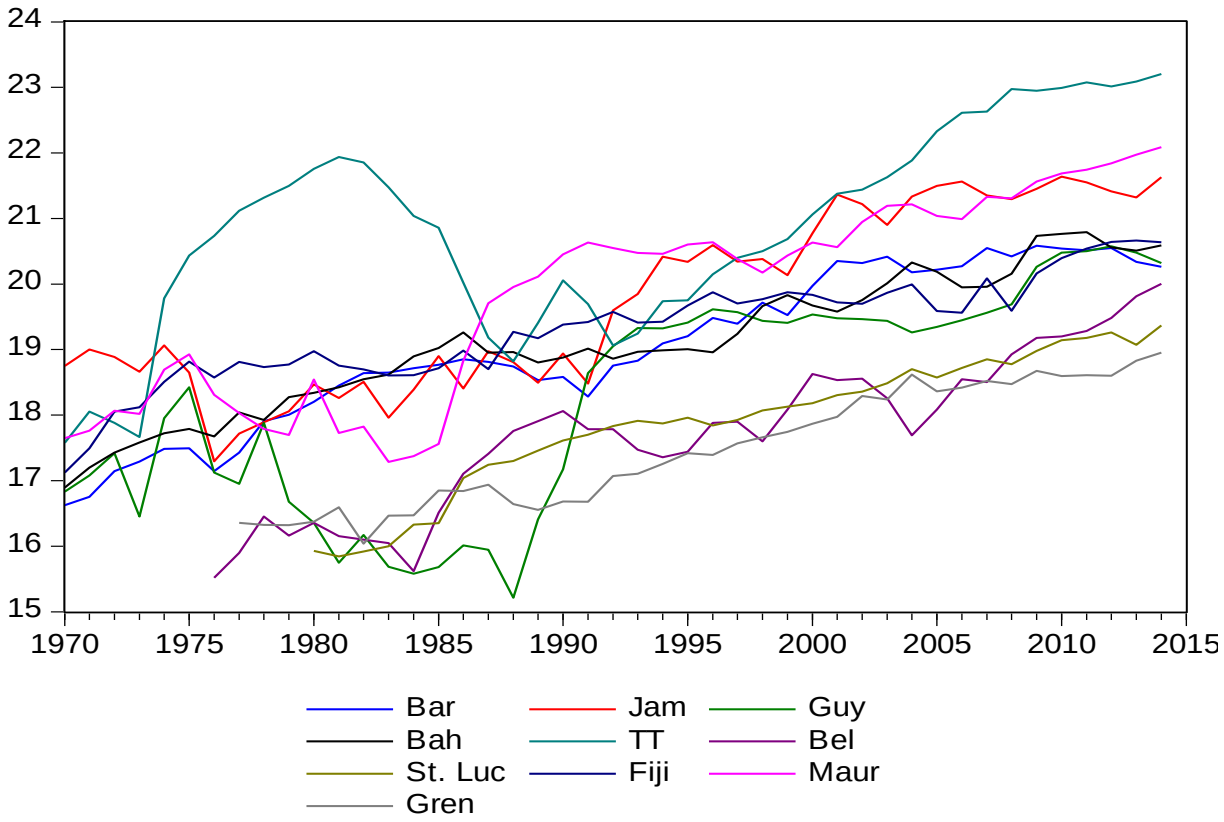
This paper is organized as follows. Section 2 gives the Background. Section 3 presents the theoretical motivation. Section 4 provides is the empirical strategy utilized. Section 5 presents the empirical findings and analysis. Section 6 is the conclusion and policy implications.

2 Background Information

The section presents some stylized facts of the trends of total reserves and foreign exchange shocks. It is evident from Figure 1 that there is a persistent long-term upward trend in the level of foreign exchange reserves held by the ten central banks. For all the economies, except Trinidad and Tobago, there has been a relatively short deviation away from the upward long-term trend. In the case of Trinidad and Tobago, for the period 1973 to 1982, there was a long deviation from

the trend, after which period the level settles into a persistent upward trend. This observation implies the equation of motion characterizing the level of foreign reserves is likely to be a trend stationary process. The trend stationary feature reflects an underlying economic structure in which an ever increasing GDP is accompanied by greater imports and exports, thereby requiring a larger level of foreign exchange reserves to sustain a credible amount of import cover.

Figure 1: The Log of International Reserves

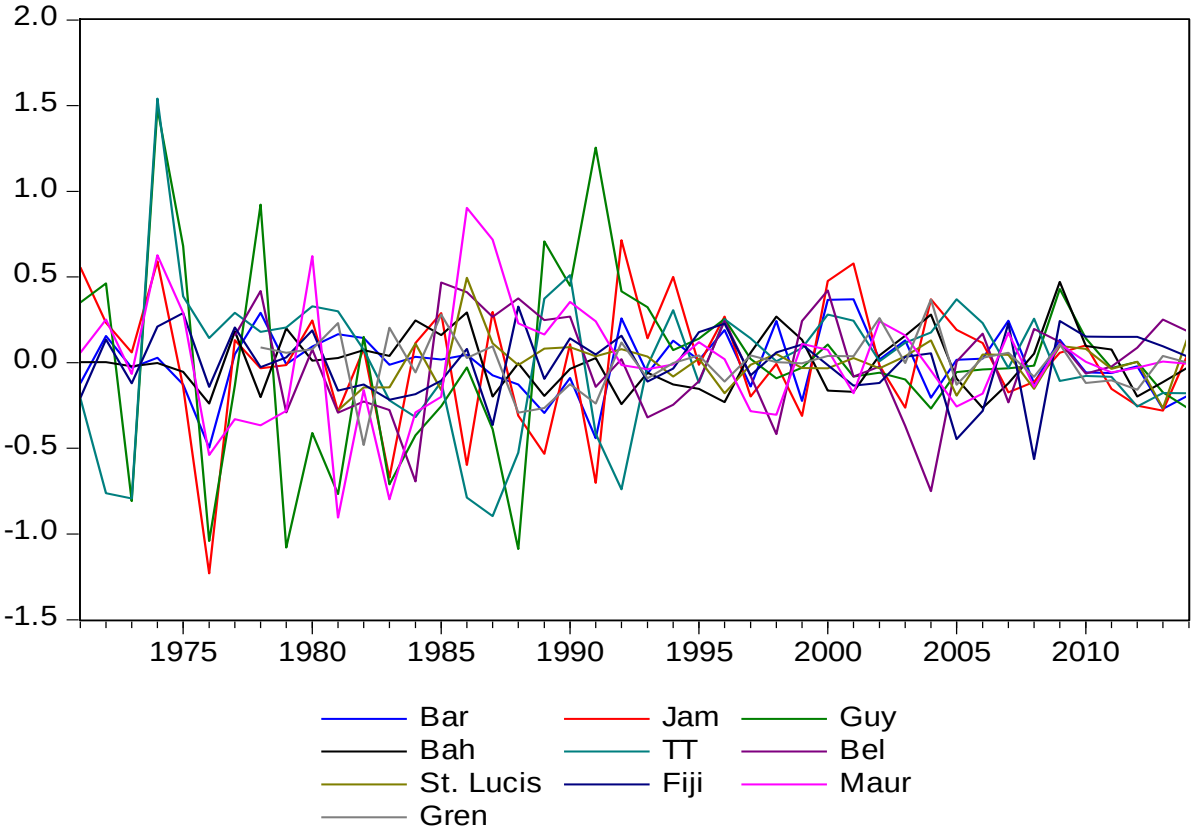


The deviations from the trend result from shocks emanating from international events such as a commodity price shock, particularly shocks to oil price and commodity prices that form the main exports. These shocks can be positive or negative. For example, Trinidad and Tobago (TT) – the only oil producer in our sample – experienced periods of persistent positive shocks to the level of international reserves as the world market price of oil increased. The other small economies would face many negative shocks and shorter periods of positive shocks, except for The Bahamas that experienced a long period of persistent positive deviations from trend over the period 1979 to 1986. From 1973 to 1982, TT experienced a long period of positive shocks, while the other countries experienced mainly periods of negative shocks and a few years of positive

ones. Since most of the countries are tourism-based economies, the business cycles in the large advanced economies would impose positive and negative shocks on the level for international reserves.

The estimated shocks are reported in Figure 2. These were calculated using an autoregressive model with a deterministic trend component. The residuals of the equation measure the shock component. One noticeable feature of Figure 2 is the relatively more severe swings in the shocks of the 1970s and early 1990s. The period of reduced volatility of the shocks coincide with some period of the Great Moderation that started around the mid-1980s until the Great Recession of 2008. This feature supports the idea that the shocks are exogenous to domestic economic growth of the small very open economies. We argue that the shocks determine economic growth of the small economies. This type of causality cannot be deciphered by Granger predictability tests. Later we estimate an augmented Neo-Classical growth model in the time series context. In other words, economic theory motivates our empirical model instead of predictability tests.

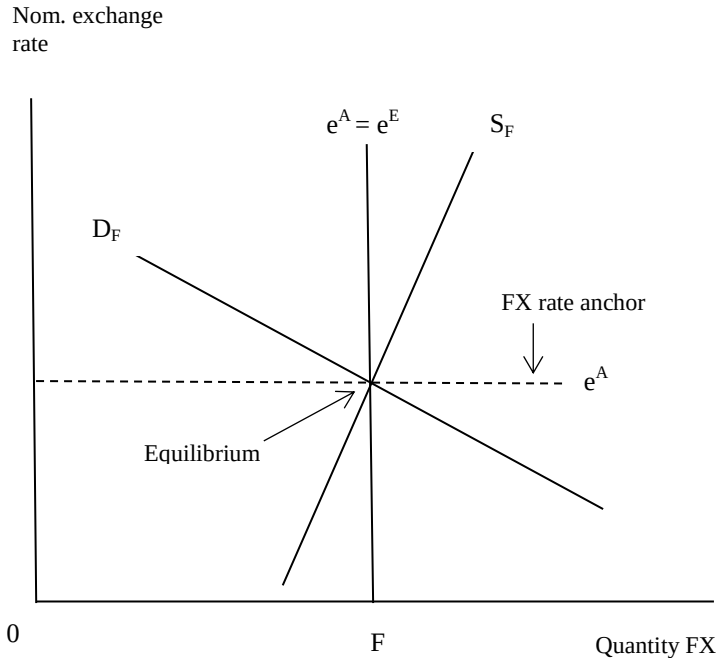
Figure 2: Estimated Shocks in Logs



3 Theoretical Motivation

Central to the analysis is the stock of foreign exchange traded in the domestic market. The stock traded can be seen as a finite quantity and therefore a proxy for the foreign exchange constraint. Changes to the stock of foreign exchange will influence economic growth by determining the kind of imports necessary to induce the growth process. The local foreign exchange market is expressed by Figure 3 (note: local currency units/US$). In equilibrium, the market's expected exchange rate (e^E) is equal to the exchange rate anchor of the central bank (e^A) at the finite traded stock or the constraint. The constraint is indicated by a vertical line (at *F*) at which point the market fully adjusts its expectation such that $e^E = e^A$. The quantity *F* also pins down the short-term supply and demand curves. Assume that the short-term demand and supply curves take the usual downward and upward slopes, respectively, although the elasticity may vary. Along the vertical line the market's expectation is fully adjusted.

Figure 3: The Foreign Exchange Market in Equilibrium



The demand and supply curves may shift and when they do the market's expectation deviates from the central bank's exchange rate anchor or target. This is not the end of the sequence of events as the shift in short-term demand or supply will influence the long-term quantity of the *F*. In other words, the *F* would also shift inward or outward after expectations have fully adjusted.

This paper explores how a change in F would influence economic growth. It is helpful to clarify how F shifts inward or outward when there is a deviation of e^E from e^A. A more precise definition of the F would further illustrate the idea of a shift in the finite quantity in the long run. The finite quantity of foreign currency available to the domestic economy is

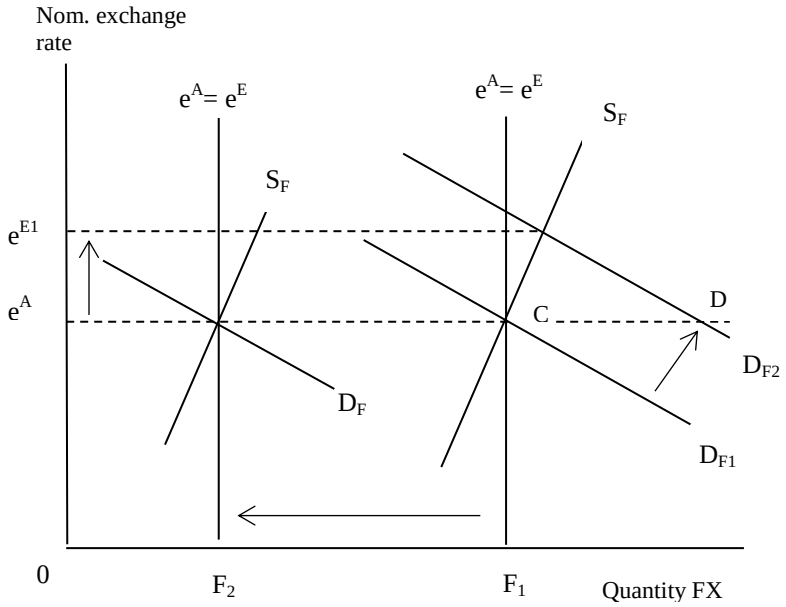
$$F = FXR - ND \quad (1)$$

Here FXR means the level of central bank's foreign exchange reserves and ND means the net demand in the market occurring at the exchange rate target[1]. If there is a positive net demand (implying $e^E > e^A$), the F declines and shifts inward. On the other hand, if there is a negative net demand in the market (implying $e^E < e^A$), the finite stock of hard currencies shifts outward.

Assume there is an increase in the demand for the finite quantity of foreign currency in the local market, possibly because of an increase in oil price (the oil importing small economy). The demand shifts outward from D_{F1} to D_{F2} (see Figure 4). The market finds the anchor less credible and anticipates a devaluation of the local currency ($e^{E1} > e^A$). In this situation there is a positive net demand or a shortage at the anchor (the distance CD). If the central bank wants to preserve the anchor it has to sell foreign exchange from its official international reserves, thereby shifting outward the supply curve unit it reaches point D (supply curve not drawn). The positive net demand and the depletion of central bank's stock of foreign reserves (FXR) implies the vertical line representing the FTS shifts inward from F_1 to F_2. The new FTS now anchors a new set of short-term demand and supply curves. The exact opposite sequence of events would occur if there is an inward shift in the demand for FX in the local market. In this case, there will be an expectation of appreciation and a negative net demand (a surplus), allowing the central bank to accumulate foreign reserves and driving outward the finite traded stock.

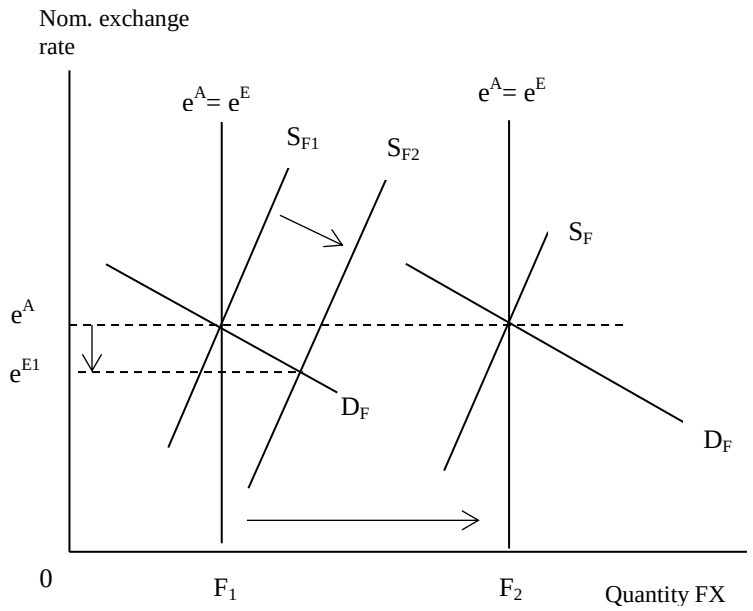
[1] Equation 1 implies interesting dynamic adjustments as the level of foreign exchange adjusts towards equilibrium. This is the work of future research.

Figure 4: Positive Demand Shock and Inward Shift of Finite Stock of FX



Another outcome could be an outward shift in the short-run supply of FX (from S_{F1} to S_{F2}). This scenario is indicated by Figure 5. It now results in a negative net demand or surplus at the anchor rate. The market expects the rate to appreciate since $e^{E1} < e^A$. The central bank has the opportunity to accumulate foreign reserves. It increases its demand and shifts out the demand curve (not drawn) to preserve the anchor. The negative net demand and central bank accumulation of FX result in an increase of the finite stock available to the economy for importing (outward shift from F_1 to F_2). A new set of short-run demand and supply curves are anchored at the higher level of finite stock of foreign exchange. The exact opposite will occur if the supply curve shifts inward, perhaps because of a fall of key export commodity prices or outflow of short-term capital owing to higher US interest rate.

Figure 5: Positive Supply Shock and Outward Shift of Finite Traded Stock of FX



4 Empirical Strategy

The graphical illustrations allow us to motivate a general time-series growth model as follows

$$g_{Yt} = f(\varepsilon_{Ft}, g_{Pt}, g_{Kt}) \quad (2)$$

In this model g_{Yt} represents the growth of GDP over time and ε_{Ft} is the shock to foreign exchange constraint (the main variable in which we are interested). Based on the growth literature surveyed, we control for population growth rate (g_{Pt}) and the rate of growth of physical capital (g_{Kt}). Time series data spanning the period 1970 – 2014 are employed to estimate the effect of foreign exchange shocks on economic growth in the following small very open economies: The Bahamas, Barbados, Guyana, Jamaica, St. Lucia, Belize, Mauritius, Grenada, Fiji and Trinidad and Tobago. The sources of the data are in the appendix A. Our methodology is twofold; step 1 is the estimation of an autoregressive (AR) model to extract the shock component from the foreign exchange reserve. Step 2 will be the estimation of an autoregressive distributed lag (ARDL) model to capture the effect of the foreign exchange shock on economic growth.

Why the ARDL model? ARDL modelling approach has become popular recently.[2] It was selected because its flexibility and ability to be applied to variables that have different orders of integration i.e. a combination of I (0) and I (1) variables (Pesaran & Pesaran, 1997)[3]. It also has great small sample properties. By means of a simple linear transformation, a dynamic error correction model (ECM) can be derived from this ARDL model (Banerjee, Dolado, Galbraith, & Hendry, 1993). This dynamic ECM incorporates short-run dynamics with long-run equilibrium while maintaining long-run information.

Stage 1 of the empirical strategy involves estimating an autoregressive model with a deterministic time trend as follows

$$\log(F_t) = \alpha_0 + \alpha_1 \log(F_{t-1}) + \gamma t + \varepsilon_{Ft} \qquad (3)$$

Where α_0 is the constant, α_1 is the parameter of the model, t is a trend and ε is a random shock term. For each economy a linear trend was sufficient to model the long-term feature of international reserves. Unfortunately we could not obtain data on the net demand in the foreign exchange market for each country; therefore, the central bank's stock of international reserves (including gold) is used as the proxy. The residual of this model is then used as a proxy for the foreign exchange shock. This proxy is good enough to reflect the shifts occurring in the local foreign currency market. For example, the central bank is able to accumulate foreign reserves when there are positive shocks occurring in the local market. The opposite occurs when there are negative shocks impacting on the local market.

Stage 2 involves estimating an ARDL model expressed in generalized form (equation 2). For the purpose of this time-series study, a production function that is augmented with several shift variables is employed, as emphasized by Barro and Sala-i-Martin (2004) and Bhaskara Rao

[2] For early discussions on the ARDL modelling approach see Charemza and Deadman (1992). This approach, which is now widely used in empirical studies, has been popularized by Pesaran and Pesaran (1997), Pesaran and Smith (1998) and Pesaran and Shin ((1999).

[3] It is required that all variable be of the same order of cointegration for the use of other techniques like Johansen (1991), Johansen (1995) and the Johansen and Juselius (1990). On this account, the ARDL approach is proven to be superior.

(2010).[4] In extending the endogenous growth theory[5], Barro (1991) and Barro (1999) have examined the significance of control variables. To assess the empirical effect of foreign exchange shocks on economic growth, an Autoregressive Distributed Lag (ARDL) taking the following unrestricted structure is estimated:

$$g_{Yt} = \varphi_0 + \sum_{i=1}^{l} \varphi_i g_{Yt-i} + \sum_{i=0}^{m} \beta_i \varepsilon_{Ft-i} + \sum_{i=0}^{n} \theta_i g_{P-i} + \sum_{i=0}^{k} \lambda_i g_{K-i} + v_t \quad (4)$$

Where φ, β, θ and λ are parameters to be estimated. The dependent variable, g_{yt}, is the growth rate of real GDP, ε_{Ft} is foreign exchange shock (residual from the estimated AR model), g_{Kt} is the growth rate of the capital stock (measured as gross fixed capital formation) and g_{Lt} is population growth rate[6]. The ARDL equation above suggests that the growth rate of GDP depends on a series of lagged values of itself and lagged values for the other independent variables. Moreover, equation 4 represents an ARDL for stationary variables. The issue of the stationarity of each variable is discussed in the next section.

We are particularly interested in the long-run coefficient of each variable. The long-run effects (*LR*) of an ARDL model with stationary variables are expressed as:

$$LR_{\varepsilon_F} = \sum_{i=0}^{m} \beta_i / (1 - \sum_{i=1}^{l} \varphi_i) \quad (5)$$

$$LR_{g_P} = \sum_{i=0}^{n} \theta_i / (1 - \sum_{i=1}^{l} \varphi_i) \quad (6)$$

$$LR_{g_K} = \sum_{i=0}^{k} \lambda_i / (1 - \sum_{i=1}^{l} \varphi_i) \quad (7)$$

Equations 6, 7 and 8 show the long-run effect of foreign exchange shocks, population growth and capital growth, respectively. In the empirical model, the long-term effect exists if we can establish that the calculated F-statistic is greater than the upper bound of the critical value (the bounds test). If the computed F-statistic is below the lower bound of the critical value, the null hypothesis of no long-term relationship cannot be rejected. And if the calculated F-statistic is

[4] Mankiw (1992) also examined the significance of control variables.

[5] The endogenous growth theory postulates that growth is primarily the result endogenous forces. Policies that promote competition, openness and change in innovation will promote growth. See Jones (1995a) and Jones (1995b), Romer (1986), Romer (1990), Lucas (1988), Grossman and Helpman (1991a) for the various strands of the theory for which the SR may depend.

[6] Population growth rate was used as the better proxy for labor because it captures the effect of the underground economy (which plays a significant role in these economies). Employment rate doesn't account for the underground economy.

within the upper and lower bounds, the test is inconclusive. The optimal model will be selected by using the Akaike Information Criteria (AIC) and Schwartz Criteria (SC)[7]. Given the established theories of economic growth we expect the foreign exchange shock and growth of physical capital to have a positive long-run effect on economic growth, while the effect of population growth on economic growth can be either positive or negative.

5 Empirical Findings and Analysis

We start by estimating the general model and testing each variable for stationarity using the Augmented Dickey Fuller test.[8] All the variables were I (0) with the exception of the population growth variable for a few countries which was I (1). The Phillips-Perron and the Kwiatkowski-Phillips-Schmidt-Shin tests are employed to verify the aforementioned results. The detailed results of the ADF tests are presented in appendix B. However, the non-stationary population growth rate does not make conceptual sense. It implies a shock to the population growth moves away permanently from a long-term equilibrium. Since population explosions have not been reported by any of economies under study, we treat the population growth as a stationary variable. The population growth is the proxy for the growth of the labor force. Labor market data is nonexistent, thus requiring this proxy. The ARDL Bound Testing Approach to cointegration is then implemented only for robustness to examine the long-run relationship among the variables for the ten countries. Given the stationary nature of each variable it is not necessary to test for co-integration, but we do so as an added robustness check. This implies a model such as equation 4 can be estimated. An appropriate lag order is required for the bounds testing approach to be applied. The lag length that minimizes the AIC was selected.

We estimated the ARDL F-statistic to examine whether cointegration exists among the variables for each country. The results confirmed that cointegration exists among the variables for each country. For most countries, the results are significant at the 1% and 2.5 % levels, except the

[7] The best model will furnish the lowest the AIC and SC values.

[8] See Dickey and Fuller (1979) and Fuller (1976)

Bahamas which was significant at the 10% level. The results and critical values are presented in the Tables 1 and 2.

Table 1: Bounds Testing Results

Bounds Test	
Country	F- Statistic
Bahamas	4.053****
Barbados	7.196*
Belize	7.696*
Fiji	24.786*
Grenada	7.541*
Guyana	19.836*
Jamaica	8.977*
Maritius	7.089*
St. Lucia	5.565**
Trinidad and Tobago	5.575**

Note: *, ** , ***and **** denote significant at 1%, 2.5%, 5% and 10% levels respectively.

Table 2: Bounds Test Critical Values

Critical Value Bounds		
Significance	I (0) Bound	I (1) Bound
10%	2.72	3.77
5%	3.23	4.35
2.50%	3.69	4.89
1%	4.29	5.61

Table 3 presents the long-run ARDL model in which GDP growth is the dependent variable and capital growth, population growth and foreign exchange shock are independent variables. These estimates come from first estimating a short-term model as given by equation 4 – from which the long-term coefficients are calculated. The best lag length is obtained by the AIC method. Table 3 presents the chosen short-run model from which the long-term coefficients are calculated. Our primary interest is in the long-run coefficient for the foreign exchange shock variable and its effect on economic growth. The long-run coefficients can be inconsistent in the presence of

serial correlation. We therefore employed the Lagrange multiplier (LM) test to examine whether serial correlation exists. No evidence of serial correlation was found among the variables for each country. The results are presented in the Appendix C.

Table 3: Long Run Coefficients

Dependent Variable: GDP Growth Rate

Country	Foreign exchange shock	Growth of capital stock	Growth of population	Selected Model short-run model	Time Period
Bahamas	3.489, (1.589)	0.298, (3.660)*	2.465, (1.784)***	ARDL(4, 0, 2, 0)	1970 - 2014
Barbados	5.775, (1.527)	0.116, (7.050)*	-10.095, (-1.133)	ARDL(1, 2, 0, 1)	1970 - 2014
Belize	15.534, (12.646)*	0.114, (6.970)*	3.558, (2.775)*	ARDL(1, 4, 0, 2)	1976 - 2014
Fiji	14.530, (4.918)*	0.019, (0.798)	-0.708, (-1.170)	ARDL(1, 4, 0, 0)	1970 - 2014
Grenada	0.620, (0.226)	0.159, (4.230)*	1.789, (1.510)	ARDL(2, 2, 2, 4)	1977 - 2015
Guyana	6.586, (1.999)**	0.121, (5.602)*	-1.318, (-1.548)	ARDL(1, 3, 1, 3)	1970 - 2014
Jamaica	-2.565, (2.261)**	0.211, (6.044)*	-1.953, (-1.797)***	ARDL(2, 0, 0, 0)	1970 - 2014
Maritius	0.692, (0.653)	0.089, (2.848)*	0.480, (0.453)	ARDL(2, 2, 2, 0)	1970 - 2014
St. Lucia	8.383, (1.391)	0.298, (6.917)*	10.245, (8.053)*	ARDL(4, 4, 4, 4)	1980 - 2014
Trinidad and Tobago	6.770, (2.658)*	0.068, (0.978)	-4.295, (-4.656)*	ARDL(1, 0, 4, 3)	1970 - 2014

Note: *, ** and *** denote significant at 1%, 5% and 10% levels respectively. () - t-stats

The results indicate that with the exception of Jamaica, foreign exchange shock has a positive effect on economic growth. This result is generally in tandem with our hypothesized expectation, which was mentioned previously. The coefficients for Belize, Fiji, Guyana, Jamaica and Trinidad and Tobago were statistically significant, while the others are not. With the exception of Jamaica, all other long-run FX shock coefficients were economically. Economic significance is achieved when the coefficients are consistent with the theoretical framework – in other words, the estimated coefficient is consistent with the hypothesized coefficient sign. The result for Jamaica raises the question of whether the constrained stock of foreign exchange is utilized in growth-promoting activities.

The coefficients for the capital growth (K) variable have the correct signs as hypothesized. All of the coefficients are statistically significant with the exception of that for Fiji and Trinidad and Tobago. Nevertheless, all of the coefficients are economically significant. Intuitively, growth of the capital stock positively influences economic growth. The results are somewhat mixed for the effect of population growth on economic growth. The results for five countries indicate that

population growth negatively affects growth while the results for the other five suggested otherwise. This may reflect different degree of success in mobilizing human capital.

6 Conclusion and Policy Implications

This paper presented a theoretical model connecting shocks to the domestic foreign exchange market and economic growth. The research utilizes time-series ARDL models to estimate the effect of FX shocks on economic growth for the following small very open economies: The Bahamas, Barbados, Guyana, Jamaica, St. Lucia, Belize, Mauritius, Grenada, Fiji and Trinidad and Tobago. Our findings add a new dimension to the literature on foreign exchange and economic growth, making it the first to examine the effects of foreign exchange shocks on growth. The analysis is motivated by a theoretical model showing how the level of foreign exchange in the system shift when the market's expectation of the exchange rate is misaligned with the monetary authority's target rate of exchange. The individual time-series models also help to determine the dynamic structure of each economy.

The empirical test results show that favorable shocks on foreign exchange has permanent positive effects on economic growth in nine of the ten small very open economies examined, with the only exception being Jamaica. The result for Jamaica raises the question of utilization of the scarce stock of foreign currency for growth-promoting economic activities. Other results indicate that favorable growth in the capital stock has permanent positive effects on economic growth. The effect of population growth on economic growth, on the other hand, is country specific.

With respect to foreign exchange, the policy implication is clear for economies with an exchange rate target and a currency that is not convertible in the global arena. Policy has to operate mainly on the demand for foreign exchange since the supply is largely controlled by global events and severe weather occurrences that disrupt export capacity. A policy that shifts outward the demand for foreign currency – everything else constant – which causes the market to expect devaluation will result in a decline of the stock of foreign currency available to the economy. This is the case of a self-induced negative foreign exchange shock that our empirical results indicate is likely to have a negative effect on economic growth. Such a situation could occur from excessive

government current expenditure – such as large civil service salary increases – by government. Most times, however, there is an increase in the demand for foreign exchange because of an increase in the price of a key import such as oil. The negative shock is therefore imposed exogenously on the economy. Second, a policy that shifts inward the demand for foreign exchange – ceteris paribus – would cause the market to view the exchange rate hard peg or general target more credibly. One policy that accounts for such a positive FX shock would be a comprehensive renewable energy strategy that reduces the demand for fuel. Caribbean and island-based economies have substantial scope for implementing renewable energy growth strategies.

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Appendix A: Sources of Data

1. GDP Growth, gross fixed capital formation, and total reserves (inclusive of gold) data are from the World Bank's World Development Indicators database. Website: http://data.worldbank.org/data-catalog/world-development-indicators
2. Population growth data are from the UNCTAD database. Website: http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx
3. Gross Fixed Capital Formation data for Barbados, Jamaica, and the Bahamas are from UNSTAT database. Website: http://unstats.un.org/unsd/snaama/selCountry.asp

Appendix B: Augmented Dickey-Fuller Test Results

Country	GDP Growth Rate	Foreign Exchange Shock	Growth Rate of the Capital Stock	Population Growth Rate
Bahamas	(-4.620), **0.0005***	(-5.400), **0.0001***	(-5.402), **0.0000***	(-4.354), **0.0073***
	Level with Intercept	Level with Intercept	Level with Intercept	1st Difference with Trend and Intercept
Barbados	(-3.674), **0.0093***	(-3.420), **0.0157***	(-7.675), **0.0000***	(-3.900), **0.0045***
	Level with Intercept	Level with Intercept	Level with Intercept	Level with Intercept
Belize	(-3.196), **0.0282****	(-4.690), **0.0005***	(-5.019), **0.0002***	(-4.358), **0.0017***
	Level with Intercept	Level with Intercept	Level with Intercept	1st Difference with Intercept
Fiji	(-7.948), **0.0000***	(-7.761), **0.0000***	(-7.278), **0.0000***	(-5.456), **0.0001***
	Level with Intercept	Level with Intercept	Level with Intercept	1st Difference with Intercept
Grenada	(-5.497), **0.0001***	(-2.752), **0.0774****	(-6.511), **0.0000***	(-9.519), **0.0000***
	Level with Intercept	Level with Intercept	Level with Intercept	Level with Intercept
Guyana	(-3.689), **0.0077***	(-6.276), **0.0000***	(-4.948), **0.0002***	(-3.691), **0.0079***
	Level with Intercept	Level with Intercept	Level with Intercept	Level with Intercept
Jamaica	(-5.900), **0.0000***	(-7.342), **0.0000***	(-5.494), **0.0000***	(-4.342), **0.0015***
	Level with Intercept	Level with Intercept	Level with Intercept	1st Difference with Intercept
Maritius	(-6.095), **0.0000***	(-5.235), **0.0001***	(-2.592), **0.1025*****	(-3.541), **0.0481***
	Level with Intercept	Level with Intercept	Level with Intercept	Level with Trend and Intercept
St. Lucia	(-3.609), **0.0112***	(-6.582), **0.0000***	(-4.689), **0.0007***	(-3.673), 0.0414*
	Level with Intercept	Level with Intercept	Level with Intercept	Level with Trend and Intercept
Trinidad and Tobago	(-2.940), **0.0490****	(-5.005), **0.0002***	(-7.223), **0.0000***	(-6.177), **0.0001***
	Level with Intercept	Level with Intercept	Level with Intercept	Level with Trend and Intercept

Note: *, ** and *** denote significant at 1%, 5% and 10% levels respectively. () - t-stats, P-values in **Bold**

Appendix C: Breusch-Godfrey Serial Correlation Test Results

Serial correlation results		
Country	F-Statistic	Prob. F-Stat
Bahamas	1.033	0.408
Barbados	0.120	0.974
Belize	0.489	0.743
Fiji	1.590	0.206
Grenada	0.719	0.591
Guyana	1.084	0.386
Jamaica	0.577	0.682
Maritius	1.851	0.147
St. Lucia	0.260	0.894
Trinidad and Tobago	0.476	0.753
Null of no serial correlation cannot be rejected for any country.		