What Prompts Central Bank Intervention in the Barbadian Foreign Exchange Market?

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By Mahalia Jackman*

Abstract

The Central Bank of Barbados often intervenes – buys or sells from the foreign exchange (FX) reserves – to ensure the daily clearing of the FX market. This paper estimates an FX intervention function for Barbados using a dynamic complementary log-log model. Three general findings emerged: (i) dynamics play an important role in the Central Bank's intervention function, meaning that the probability that an intervention takes place today is conditional upon an intervention taking place at least one day prior. This most likely reflects the fact that deficits/surpluses on the FX market tend to be persistent, resulting in intervention over a consecutive number of days; (ii) there appears to be some differences in the response of Central Bank interventions to the other key variables. Particularly, seasonal fluctuations in tourism and interest rate spreads are likely to impact the probability of a sale intervention, but don't seem to affect the likelihood of a purchase intervention. Moreover, an influx of real estate flows is likely to increase the probability that a purchase intervention takes place, but might have limited impact on the marginal propensity of a sale intervention. Finally, (iii) 'oil price shocks' is the only exogenous variable which appears to impact both sale and purchase interventions.

Keywords: Foreign exchange, intervention and fixed exchange rate

JEL: F31, E58 and N26

Introduction

Intervention in the foreign exchange (FX) market occurs when a monetary authority buys or sells foreign dollars, normally against its own currency. Central banks usually intervene in order to calm disorderly market conditions, fix exchange rate misalignments, stabilise erratic short-term exchange rate fluctuations, or quell the excess demand/supply of FX. It follows that the motivation, frequency and size of interventions vary considerably across exchange rate regimes.

Under a floating regime, the size and timing of interventions are critical policy decisions. Specifically, the magnitude of the intervention is assumed to be proportional to the resulting change in the exchange rate, while the timing determines whether or not the shock is fully absorbed by market players[1]. But, in an economy with a fixed exchange rate –

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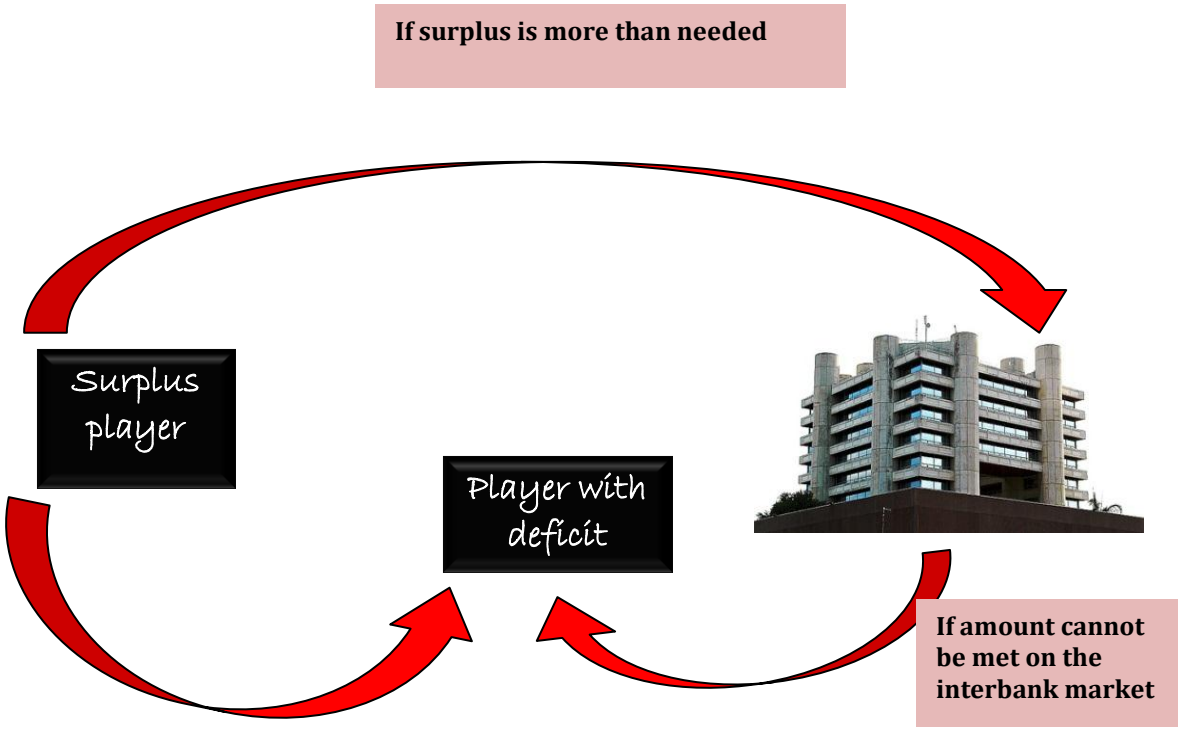
[1] *Theoretically, the more surprising the intervention, the more likely market players will be caught off guard. If intervention is unexpected, market players may not be able to fully absorb the shock and so, intervention is more effective.*

such as Barbados – it is the FX demand and supply conditions that dictate both the timing and amount of intervention. Hence, intervention in a pegged economy tends to be endogenous.

Figure 1 depicts a simplified model of the intervention process in Barbados[2]. The focus here (as well as the rest of the paper) is on the interaction between the Central Bank and authorised FX dealers. Typically, if any FX dealer has more FX than it needs, it offers to sell the surplus on the market. Dealers who are short that day, or expect to experience a shortage over the next couple of days, buy from the surplus player. If the short dealers don't need the full amount on offer, the excess surplus is sold to the Central Bank. Alternatively, if the offered amount by surplus players is insufficient, the dealers whose needs cannot be met on the interbank market are accommodated by the Central Bank. In a nutshell, the Central Bank acts as the last resort for sales and purchases of FX, and only intervenes in periods of excess deficits or surpluses.

Figure 1: FX Intervention in Barbados



This then raises the question – "what are the causes of FX deficits/surpluses in the Barbados FX market?" In this paper, the author seeks to unravel some of the factors that force Central Bank involvement in the Barbados FX market. The study employs daily data, and in so doing, better captures the frequency and pattern of FX intervention with respect

[2] *FX interventions in Barbados are not sterilised.*

to balancing demand and supply in the market. The disadvantage of this approach is the vanishing relationship between interventions and some "economic fundamentals" which are usually measured on a monthly or quarterly basis (see Almekinders and Eijfinfer, 1994).

The rest of this paper is organised as follows: in Section 1, an analysis of the features of central bank intervention is presented. Section 2 evaluates some factors believed to be driving intervention, while section 3 presents and evaluates a quantitative model of FX intervention for Barbados. Finally, some concluding remarks are offered in section 4.

1. Features of FX Interventions in Barbados

1.1. Measuring FX Interventions

A popular proxy of intervention is the change in the stock of international reserves. However, the use of this variable for Barbados can be very misleading, since changes in reserves often reflect, *inter alia*, withdrawals/inflows of funds from multilateral organisations (for instance, the Caribbean Development Bank or the Inter-American Development Bank), government repayments and inflows from government loans. Thus, official intervention in this paper is defined as the total foreign currencies traded by the Central Bank on the interbank FX market.

But, even this approach has its shortcomings. Specifically, FX dealers in Barbados are currently subjected to two surrender requirements (see Worrell et al, 2011):

I. FX dealers in Barbados are required to sell 25 percent of the proceeds of foreign currency loans undertaken on behalf of private sector customers and 100 percent of the proceeds of government related loans to the Central Bank (effective 2005).
II. Dealers are required to sell 5 percent of their gross purchases of FX from their customers to the Central Bank (effective 2011).

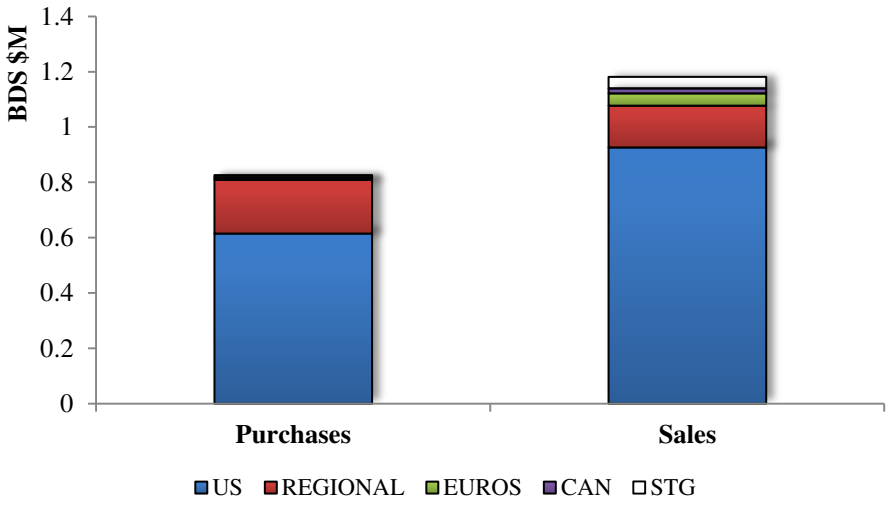
In this study, the author excludes purchases relating to these FX policies from the definition of "buy interventions" as they may not necessarily reflect intervention driven by supply/demand conditions, i.e. a sale to the Central Bank due to a surplus of FX on the market. Thus defined, the remainder of this section focuses on the prominent features of FX interventions over the period 2003-2011.

1.2. Size, Frequency and Structure of FX Interventions in Barbados

Daily FX interventions carried out by the Central Bank are mostly denoted in US dollars (See figure 2) – which can be expected given that the aim is to defend the BDS$2 to US$1 peg. Trailing behind are trades of regional currencies, i.e. transactions in Belize, Eastern Caribbean, Guyanese, Jamaican or Trinidad and Tobago dollars. A close look at the data

reveals that the majority of transactions in regional currencies are related to trade in goods. Indeed, the majority of Barbados' visible trade is with CARICOM countries. Intra-regional financial and capital transactions also occur, but are not quite as common; and most of these tend to take place in US dollars. Finally, there are occasional sales of Canadian dollars (CAN), Sterling pounds (STG) and Euros, which tend to be largely related to the importation of goods and proceeds of property sales. As shown in Figure 2, purchases of these currencies are rare, accounting for less than 3 percent of daily FX transactions on average.

Figure 1: Intervention by Currency – Daily Average: 2003-2011



Source: Central Bank of Barbados

Table 1 describes the empirical distribution of the intervention data over the sample period. The table highlights that Central Bank FX interventions are heavily skewed, and exhibit larger kurtosis than the normal distribution. In fact, the Jarque-Bera statistic unambiguously rejects the null hypothesis of normality for both sale and purchase interventions.

There seems to be a preponderance of days of zero activity. Out of 2,348 trading days, sale interventions take on a zero value in 260 business days. The case of purchase interventions is even more dramatic, registering 495 days with no activity. The dollar amounts of FX interventions tend to be small, at least in comparison to the more advanced economies (see for instance Kim and Sheen, 2002; Frenkel and Stadtman, 2001); the average sale intervention for the full sample being $1.2 million and the average purchase value is just $0.8 million. Moreover, on nearly 70 percent of active days, the intensity of sale interventions are less than $1 million, while about 67 percent of purchase interventions stood in the modest range of $0 to $1 million. Nonetheless, there are episodes of large scale interventions, with the largest sale and purchase interventions to date valued at $34 million and $96.4 million, respectively.

Table 1: Empirical Distribution of Interventions – January 2003 to December 2011

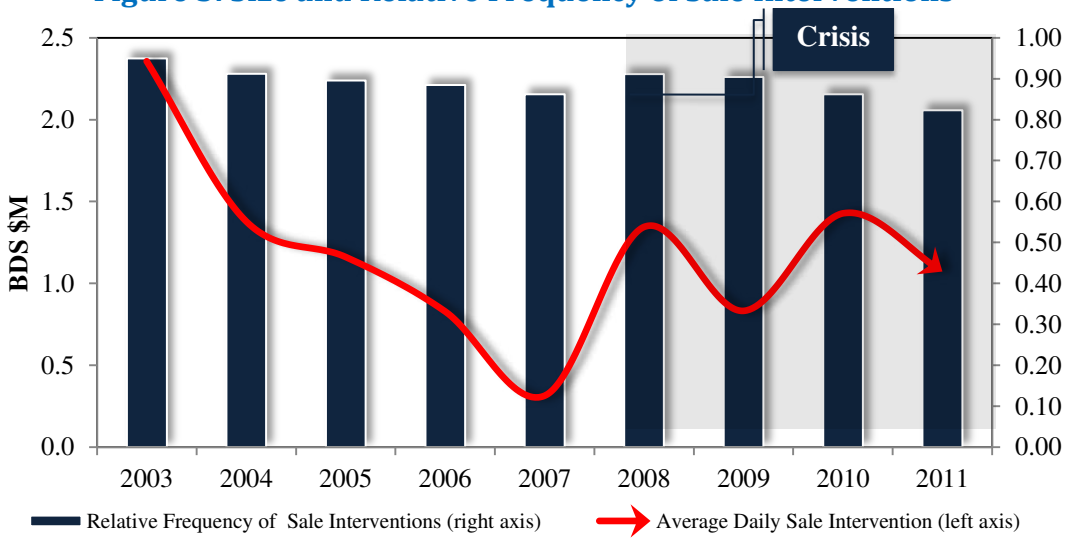
Sale Interventions			Purchase Interventions		
Intervention Value (BDS $M)	*Frequency*	*Cumulative (%)*	*Intervention Value (BDS $M)*	*Frequency*	*Cumulative (%)*
0	260	11.1	0	495	21.1
(0.0 – 0.5]	1489	74.5	(0.0 – 0.5]	1381	79.9
(0.5 – 1.0]	150	80.9	(0.5 – 1.0]	182	87.6
(1.0 – 1.5]	71	83.9	(1.0 – 1.5]	52	89.9
(1.5 – 2.0]	49	86.0	(1.5 – 2.0]	36	91.4
(2.0 – 2.5]	44	87.9	(2.0 – 2.5]	42	93.2
(2.5 – 3.0]	36	89.4	(2.5 – 3.0]	37	94.8
(3.0 – 3.5]	33	90.8	(3.0 – 3.5]	18	95.5
(3.5 – 4.0]	20	91.7	(3.5 – 4.0]	6	95.8
(4.0 – 4.5]	16	92.3	(4.0 – 4.5]	12	96.3
(4.5 – 5.0]	14	92.9	(4.5 – 5.0]	3	96.4
> 5.0	166	100.0	> 5.0	84	100.0
	Sales		*Purchases*		
Mean	$1.2M		$0.8M		
Maximum	$34.0M		$96.4M		
Jarque-Bera (p-value)	73179.02 [0.0]		8401276 [0.0]		
Skewness	4.5		13.9		
Kurtosis	28.8		294.7		

Source: Central Bank of Barbados and author's calculations

Interestingly, the intervention size and frequency was not uniform over the sample period. This is shown in Figures 3 and 4, which plot the average daily intervention value and the relative frequency of interventions (defined as percentage of trading days with intervention activity). Between 2003 and 2007, both the frequency and size of sale interventions were on a downward trajectory, with the frequency of sales intervention moving from 0.95 in 2004 to 0.86 in 2007. The size of daily sales (on average) also fell, moving from $2.4 million to a low of $0.3 million. But, it should be noted that the year 2007 is a large outlier here. Specifically, the observed decline in FX obtained from the Central Bank may have been due to the influx of foreign flows in relation to Cricket World Cup 2007 as well as the inflows due to the purchase of local BS&T shares by Neal & Massy. As shown in Figure 4, this led to resurgence in sales of FX to the Central Bank. In fact, over the time period, 2007 is the only year in which the difference between average daily purchases and sales was positive.

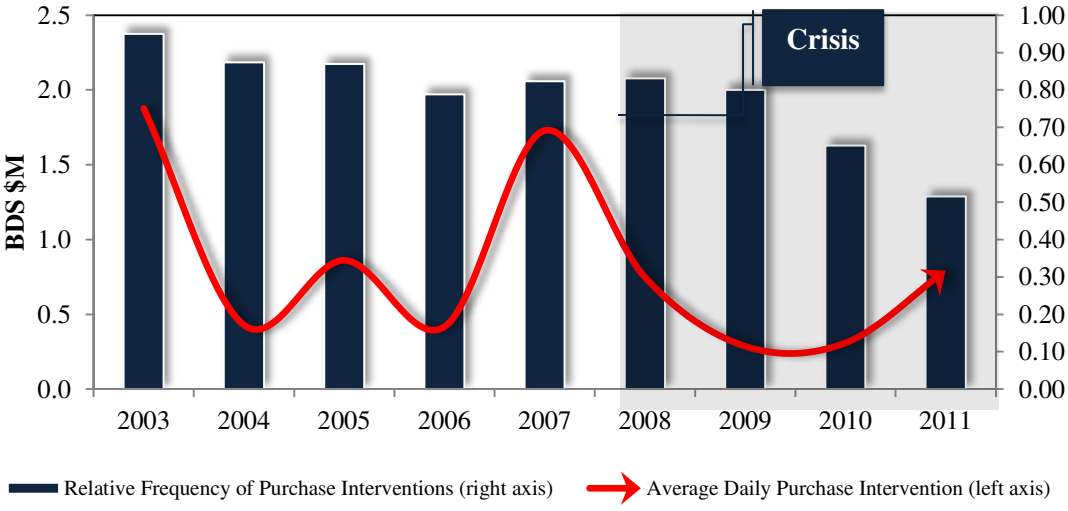
Beyond 2007, i.e. since the onset of the crisis, both the size and frequency of purchase interventions (net of the surrender requirements) have been on the decline. This was somewhat expected, as some of the key features of the crisis were declining travel receipts and diminished capital and financial inflows. However, in 2011, the average daily purchase intervention rebounded, as there was an influx of flows relating to the sale of Barbados Light and Power shares to Emera. At the same time, the size of sale interventions rose, returning to 2004-2006 levels. Interestingly, the percentage of days with activity remained low, as Central Bank mainly received large discrete demands for FX.

Figure 3: Size and Relative Frequency of Sale Interventions



Source: Central Bank of Barbados and author's calculations

Figure 4: Size and Relative Frequency of Purchase Interventions



Source: Central Bank of Barbados and author's calculations

2. Factors Influencing FX Intervention in Barbados

As mentioned in the introduction, in a fixed rate regime, it is the supply and demand conditions on the FX market that prompt central bank intervention. Thus, the Central Bank ensures the daily clearing of the market by buying and selling from its international reserves. This section examines some of the factors that may prompt intervention.

The market clearing condition may be written as:

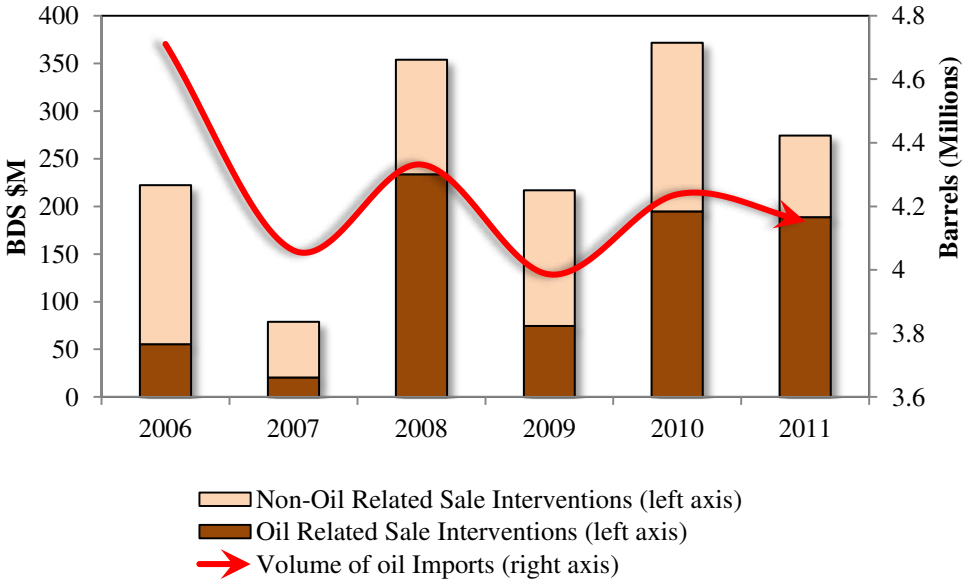
$$Intervention_t = CA_t + \Delta K_t \quad (1)$$

where *Intervention* denotes the foreign currency flows generating from central bank intervention in the market, CA represents flows generated by current account transactions and ΔK is the net flow demand for domestic currency through the capital and financial account of the balance of payments.

Traditionally, the current account is assumed to be a function of measures of price competitiveness such as the real exchange rate (Sarno & Taylor, 2001). But Barbados accounts for such a small volume of trade in its import and export markets that it has very little influence in determining the prices of the products it trades (Witter, Briguglio, & Bhuglah, 2002) – in other words, Barbados can be described as a price taker. Limited price control and small shares imply that the balance on the current account tends to be externally determined. At present, the current account balance is determined by the price of international oil and tourism flows.

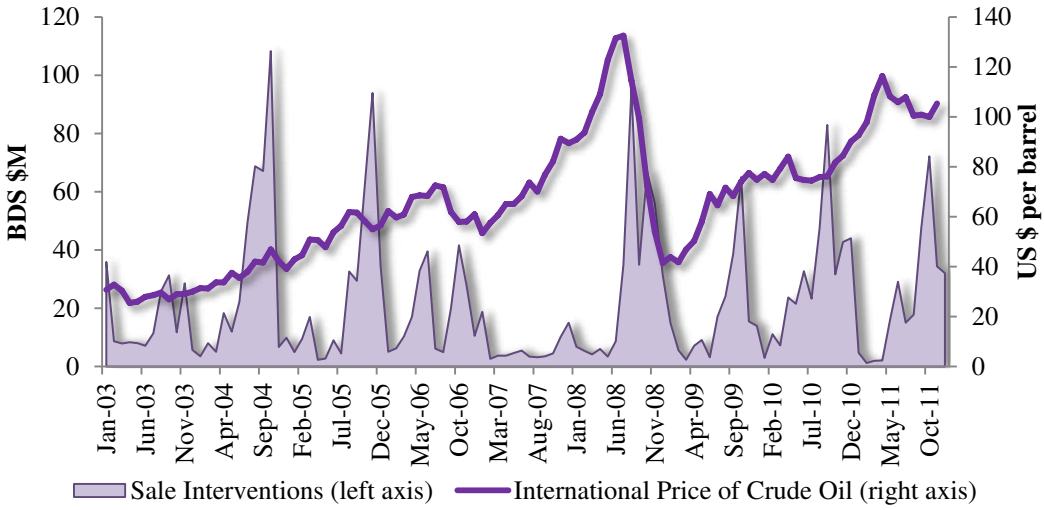
Barbados, like several other Caribbean states, is a net importer of oil. As noted by Moore (2011), oil-related imports currently account for over 20 percent of total imports, and so, stands as the largest component of imports. As a price taker, the escalating price of oil in recent years has inflated the country's import bill, and by extension, led to a significant deterioration in the external current account. As a result, the Central Bank has had to intervene to provide FX to cover oil-related payments. It is estimated that between 2006 and 2011, nearly 50 percent of Central Bank FX sales were for oil related imports. Given that the volume of oil imports has generally been on the decline since 2006 (See figure 5), it seems as though this development was driven by hikes in the international price of oil. Based on Figure 6, there seems to be some correlation between shocks to the price of oil and sale interventions.

Figure 5: Volume of Oil Imports and Sale Interventions



Source: Central Bank of Barbados

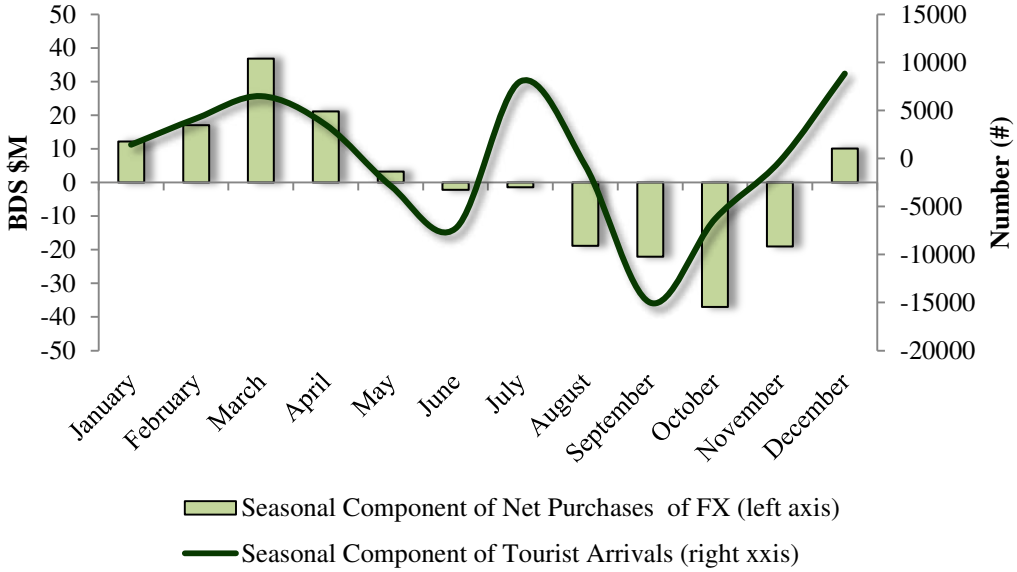
Figure 6: International Oil Prices and Sale Interventions



Source: Central Bank of Barbados and the International Monetary Fund

On the export side, tourism receipts are the country's main source of external finance, accounting for nearly 50 percent of total foreign exchange earnings. In fact, recent work by Lorde et al., (2010) suggests that current account deficits in Barbados would be unsustainable without tourism receipts. Given the island's high dependence on tourism, it is not surprising that the buoyancy of FX intervention in Barbados is highly seasonal and generally moves in tandem with the seasonal fluctuations in tourist arrivals (See figure 7)[3].

Figure 7: Seasonal Fluctuations in Net Purchases of FX and Tourist Arrivals



Source: Central Bank of Barbados and author's calculations

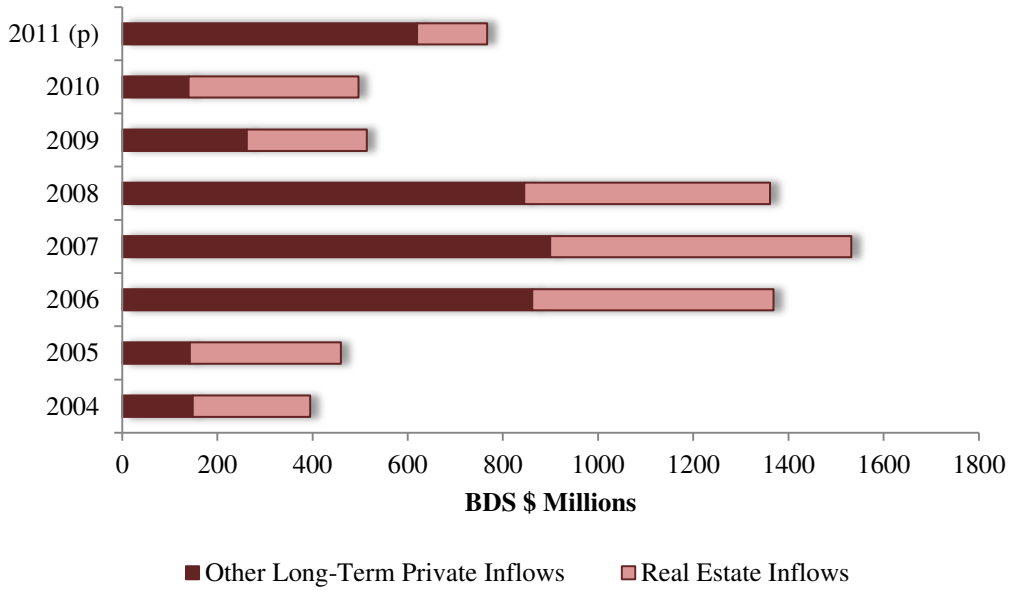
[3] The seasonal components presented in Figure 7 were extracted using the univariate structural time series model of Harvey (1989).

The analysis thus far has focused on how factors driving the current account influence FX intervention. But, what about ΔK? At the daily frequency, the change in net demand for capital inflows is the main driver of fluctuations in a central bank's net purchase of foreign currencies. In the absence of sufficient capital inflows, the deficit on the external current account can only be financed through intervention, whereas an abundance of capital flows creates a surplus of FX in the system that ordinarily would be purchased by the central bank.

In general, a model of ΔK can be derived within the framework of speculative dynamics (Sarno & Taylor, 2001). Under these models, the net demand for foreign currency should be related to factors such as the differential between domestic and foreign interest rates. Indeed, work by Worrell et al (2008) and Craigwell et al (2011) suggest that once allowance is made for market frictions and large discrete events, net purchases of FX by the Central Bank responded to interest differentials in a way that was consistent with the uncovered interest parity condition – i.e. net purchases of FX were positively related to the interest rate spread[4].

Another factor influencing ΔK, but less likely to be influenced by the interest rate spread dynamics, is real estate flows. As can be seen in Figure 8, these flows make up a significant portion of long-term private capital inflows, and should, by extension, influence central bank intervention (See figure 9).

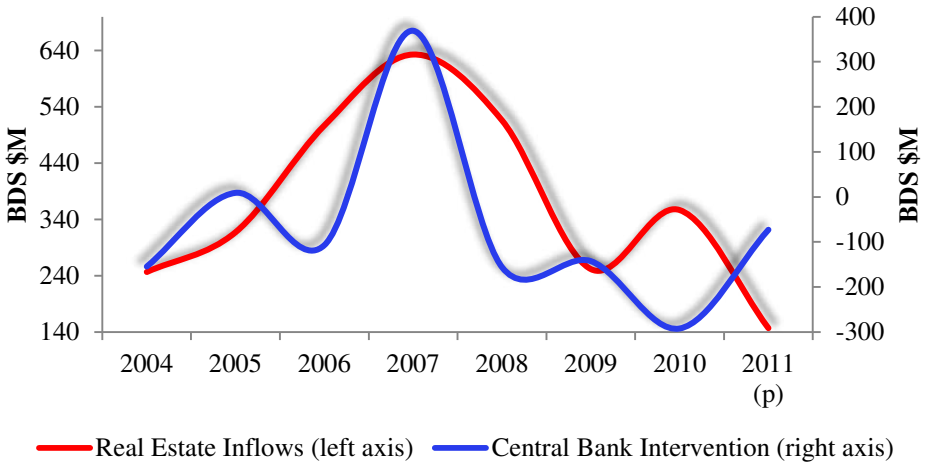
Figure 8: Long-Term Private Capital Inflows



Source: Central Bank of Barbados

[4] *These studies define the interest rate spread as the difference between the Barbados 3-month Treasury bill rate and that of the US.*

Figure 9: Real Estate Flows and Central Bank Intervention



Source: Central Bank of Barbados

3. Modelling FX Intervention in Barbados

In this section, a quantitative model of FX intervention is given. Based on the analysis presented in Section 2, the author assumes that FX intervention in Barbados can be modelled as a function of oil price shocks, tourism, interest rate spreads and real estate inflows. But, as noted by Jackman (2012), deficits/surpluses on the Barbados FX market tend to be persistent, i.e. once an intervention is carried out, another intervention is likely to take place in the following day. Thus, some autoregressive terms are also included in the model.

Purchase and sale interventions are modelled individually. Separate models of purchase and sale interventions allow us to better capture the region of inaction and the potential asymmetric response of purchase and sale interventions to the dependent variables (Herrera & Özbay, 2005). The estimated model takes the following form:

$$I_t^{purchase} = \gamma_0 + \delta_i(L) I_t^{purchase} + \gamma X_t + \upsilon_t \quad (2)$$

$$I_t^{sale} = \beta_0 + \alpha_i(L) I_t^{sale} + \beta X_t + \varepsilon_t \quad (3)$$

The variable $I_t^{purchase}$ represents a purchase of foreign currency by the Central Bank (exclusive of purchases made in relation to the surrender requirements); I_t^{sale} represents a sale of foreign currency, L is the lag operator and $[\upsilon_t, \varepsilon_t]$ are error terms. X_t is a matrix of control variables such that $X_t = \left(T_t, i_t^{spread}, K_t^{real\ estate}, \sigma_t^{oil}\right)$ where T is the tourism variable, i^{spread} is the interest differential between Barbados and the US; $K^{real\ estate}$ represents real estate flows; and, σ_t^{oil} represents oil price shocks.

3.1. Estimation Technique

The econometric modelling of daily intervention series has been widely discussed in the academic literature. As shown in Table 1, the data can be described as a 'zero-inflated process' – i.e. several observations have a zero value. To overcome this problem, studies often consider intervention to be generated from a mixture of three probability distributions with non-overlapping sample distributions (Kim & Sheen, 2002), i.e. three types of events – positive intervention, negative intervention and zero intervention. This then implies that estimations based on simple OLS regression techniques may be severely biased.

To address this, some authors generate a binary choice dependent variable corresponding to the intervention/no intervention outcomes of sale and purchase interventions, and then model the probability of each type of intervention using either probit or logit models (see for instance Ballie and Osterber, 1997; Frankel and Stadtman, 2001; Kim and Sheen, 2002). Following this approach, the variable $I_t^{purchase}$ takes the value of one if there is a purchase of foreign currency– and zero otherwise – and I_t^{sale} is a dummy variable that takes the value of one if there is a sale of foreign currency, and zero otherwise.

But, an issue with using probit/logit estimation is that their density functions are assumed to be symmetric about zero. However, as discussed in Section 1, the intervention data is heavily skewed. Thus, use of probit/logit models may represent a misspecification and can lead to biased inferences about the marginal effect of changes in any of the independent variables. As such, this paper utilises a complementary log-log model. Unlike the probit and logit models, the log-log function allows for asymmetry, and is derived from the assumption that the error distribution (or distribution of the latent variable) follows a standard extreme value distribution. Thus, the model is useful in cases where the probability of an event is very small or very large, as is the case of the intervention variables.

3.2. Data Description

The foreign exchange intervention information used in this paper is the total currencies (i.e. U.S. dollars, Canadian dollars, sterling pounds, Euros and regional currencies) traded with FX dealers. As in Worrell et al (2008) and Craigwell et al (2011), the tourism variable is a discrete variable used to differentiate between the peak period of tourism and the low period; the interest rate spread is defined as the difference between the Barbados 3-month Treasury Bill rate and that of the US. The volatility of oil prices is used as a proxy for oil price shocks. In general, a GARCH (1, 1) model with a general error distribution gave the best approximation of the conditional volatility of oil prices. Data on the US Treasury Bill rate is taken from the US Department of the Treasury, while observations on oil prices are obtained from the US Energy Information Administration; all other information is taken from Central Bank data files. The frequency of the data is daily, spanning the period January, 2003 to December, 2011.

3.3. Estimated Results

Maximum likelihood estimates of the dynamic complementary log-log models are presented in Tables 2 (purchase interventions) and 3 (sale interventions).

Table 2: Determinants of Purchase Interventions

	Observed Coefficient	Average Marginal Effect	Robust Standard Errors	P-Value
$I_t^{purchase}(-1)$	0.336	0.107	0.065	0.000
$I_t^{purchase}(-2)$	0.271	0.086	0.065	0.000
T_t	0.011	0.004	0.052	0.828
i_t^{spread}	0.384	0.122	0.275	0.162
$K_t^{real\ estate}$	2.51e^{-08}	7.93 e^{-09}	1.05 e^{-08}	0.017
σ_t^{oil}	-0.012	-0.004	0.007	0.096

Table 3: Determinants of Sale Interventions

	Observed Coefficient	Average Marginal Effect	Robust Standard Errors	P-Value
$I_t^{sale}(-1)$	0.281	0.065	0.084	0.001
T_t	-0.113	-0.027	0.054	0.037
i_t^{spread}	-0.087	-0.021	0.021	0.000
$K_t^{real\ estate}$	-6.62e^{-08}	-1.56e^{-10}	6.74e^{-09}	0.922
σ_t^{oil}	0.021	0.005	0.009	0.013

From these results, three general observations can be made:

I. *Dynamics play an important role in the Central Bank of Barbados' FX intervention function*. Lags of the dependent variable in both purchase and sale equations are positive and statistically significant, implying that the probability that an intervention takes place today is conditional upon an intervention taking place at least one day prior. Ito and Yabu (2007) associate the dynamic correlation of interventions with the presence of political costs associated with the process of designing an optimal intervention policy. This usually occurs if a central bank has to negotiate interventions with a third party. Once an agreement is reached, interventions can be carried out over a number of days. Herrera and Özbay (2005) posit that temporal correlation can also arise if the objective of the central bank is to minimise an intertemporal loss function that is non-time separable – i.e., if the central bank wants to minimise the impact of current disorder in the FX market, but also past realisations of distortions. But, as mentioned in the introduction, the Central Bank (or any other party for that matter) does not determine the timing or amount of intervention– it is the market that dictates FX intervention. Thus, these aforementioned theories are not fully applicable to Barbados. Rather, the apparent positive autocorrelation in the FX intervention function most likely reflects the fact that deficits/surpluses

on either the capital or current account tend to persist over a number of days. These pressures tend to be exerted on the peg over a consecutive number of days leading to some persistence in interventions. Interestingly, purchase interventions tend to be more persistent than sale interventions – for the purchase intervention specification, a lag length of two is found to be most useful, while one lag is sufficient for the sale intervention estimation.

II. *There are differences in the response of Central Bank purchase and sale interventions to FX supply and demand conditions – highlighting the importance of modelling "buy" and "sell" interventions separately.* Interestingly, the estimated results seem to suggest that seasonal fluctuations in tourism do not systematically influence purchase interventions (at least at the conventional levels of testing), but affects sale interventions. Specifically, during the peak tourist season, the Central Bank is less likely to conduct a sale intervention than during the off-peak season. This hints that the influx of tourists in specific months reduces FX dealers' dependence on Central Bank and points to the importance of tourism receipts in achieving external balance and maintaining adequate reserves. A similar story emerges for interest rate spreads – higher interest rate spreads may reduce the probability of sale intervention, but has no impact on the marginal propensity of a purchase intervention. Finally, the coefficient on the real estate variable is positive and significant in the purchase intervention specification – signalling that an influx of real estate flows could increase the likelihood of the Central Bank purchasing FX from the interbank market – but has a limited impact on sale interventions.

III. *The impact of oil price shocks is significant and wide-spread*. An interesting observation is that oil price volatility is the only exogenous variable which is statistically significant in both estimations. As shown in Table 3, greater oil price volatility increases the possibility of a sale intervention, which is in line with Figure 6. At the same time, the shock reduces the chance of a purchase intervention. From this, oil prices can be said to have the greatest impact on FX intervention as it affects both "buy" and "sell" interventions; on both ends, hikes in oil prices result in a loss in reserves. Against this backdrop, the recent push to create a green economy and reduce the dependence on fossil fuels seems to be justified. In 2011, the Government outlined a renewable energy programme and discussed several initiatives to encourage the use of energy efficient machinery and processes. More than this, there are plans on stream to retrofit all state-owned buildings to make them more energy efficient. These efforts are forecasted to bring down the cumulative cost of oil imports by about 25 percent and total electricity cost by US$200 million over the next 20 years. The shift from fossil fuels to renewable forms of energy could be very beneficial. Specifically, it can help shield Barbados – to some extent – against future hikes in oil prices. As such, this should significantly reduce the import bill and by extension, limit international reserve losses.

The estimated model can be used to form expectations for Central Bank intervention in Barbados. Specifically, if the estimated model holds true, what are the implications for Central Bank intervention in 2012? Table 4 below summarises projections for oil prices, tourism receipts, interest rate spreads and real estate inflows.

Table 4: Expectations for Oil Prices, Tourism Receipts, Interest Rate Spreads and Real Estate Inflows

	2012[forecast]	Source
Average Price of Crude Oil	**Increase**	IMF World Economic Outlook (April, 2012)
Tourism Receipts	**Increase**	World Travel and Tourism Council Database (as at April 2012)
Interest Rate Spread	**Largely Unchanged**	Author's Expectations
Real Estate Inflows	**Steady Inflows**	Key market players

According to the April 2012 edition of the IMF's World Economic Outlook, the average price of crude oil is forecasted to increase from US$104.01 in 2011 to US$114.70 in 2012, largely based on geopolitical risks, which are unlikely to subside soon. As shown in Section 2, positive oil price shocks were a leading cause of sale interventions between 2008 and 2011. Based on the evidence presented in Tables 3 and 4, if oil prices continue to rise, one would then expect that the probability of oil-related sale interventions will also increase, and that purchase interventions might be negatively affected.

Projections for travel receipts are a bit more favourable. As at April, 2012, estimates from the World Travel and Tourism Council (WTTC) indicated that visitor exports for Barbados could rise. While the econometric model only looked at how seasonal fluctuations in tourism affect sale interventions, it can be inferred that in general, a rise in tourist expenditure significantly reduces sale interventions. So, with an uptick in tourist expenditure, there may be less dependence on the Central Bank by authorised dealers to meet their FX needs.

The forecast for interest spreads is a bit more complex. However, the author expects that the accommodative monetary stance held by the Federal Reserve and the Central Bank in 2011 should continue in 2012 – specifically, no significant changes in interest spread are currently expected. Thus, the estimated impact of interest rates spreads on sale interventions in 2012 should be marginal. Finally, based largely on discussions with key real estate agents in the countries, the outlook for real estate inflows to Barbados is stable – which increases the likelihood of purchase interventions this year.

4. Concluding Remarks

The FX market in Barbados can be described as a "small, fixed price market". As such, the Central Bank does not determine the timing or the amount of intervention, but simply intervenes to ensure the daily clearing of the market. This paper evaluates FX intervention in Barbados. It applies a dynamic complementary log-log model to determine the factors which prompt central bank intervention in the Barbados FX market.

Results indicate that past interventions are very useful in predicting current intervention, which the author attributes to the fact that imbalances in the FX market tend to persist over a number of days. Also, it is found that modelling "sell" and "buy" interventions individually allows us to make useful interpretations that have not (to the best of the author's knowledge) been made before for Barbados – i.e. the potential asymmetric response of purchase and sale interventions to the independent variables. Specifically, the empirical evidence suggests that seasonal fluctuations in tourism and interest rate spreads influence the probability of a sale intervention, but don't seem to affect the likelihood of a purchase intervention. Moreover, real estate flows tend to increase the probability that a purchase intervention takes place, but has a limited impact on the marginal propensity of a sale intervention. This may suggest that studies based on "net" behaviour can conceal differences in intervention behaviour.

The paper also looked at the implications of the model for Central Bank intervention in 2012. Based on the estimated model, oil-related FX interventions should increase in this year, as oil prices are currently forecasted to continue to rise in 2012 (see IMF's World Economic Outlook released in April, 2012). Current expectations are that interest rate spreads should remain relatively unchanged. Hence, changes in sale interventions brought about by movements in the interest rate spread should be negligible. While the model only looked at how seasonal fluctuations impact FX interventions, it can be inferred that the amount of tourism receipts received in Barbados significantly impacts on sales interventions. As at April 2012, the WTTC projects a rise in tourism receipts for Barbados. This could bring about some ease in sale interventions. Finally, current forecasts are that real estate related inflows should be stable in 2012, and this should increase the chances of a purchase intervention. However, it should be noted that these predictions for intervention are more indicative than conclusive as they are largely conditional on (1) the accuracy of the model[5]; and (2) the projections for oil prices, tourism receipts, interest rate spreads and real estate flow materialising[6].

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[5] *A model, being an approximation of a certain reality, will always have some degree of misspecification or inaccuracy. The question then is how serious the misspecification or inaccuracy.*

[6] *The classic truism applies here:* even the best forecasts fail.

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