

Exchange Rates and Market Microstructure: the Case of Guyana

By

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Outline

- Introduction

Objective of study

- Empirical features of the exchange rates in Guyana
- Econometric model and estimation procedure
- Preliminary empirical results
- Conclusion and future work

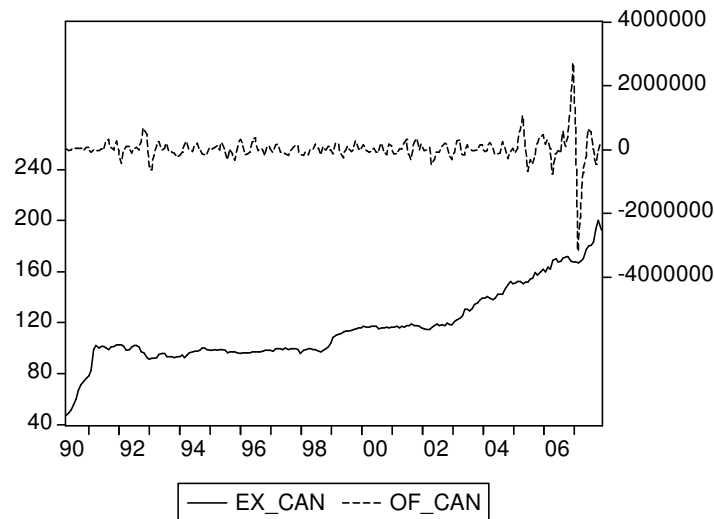
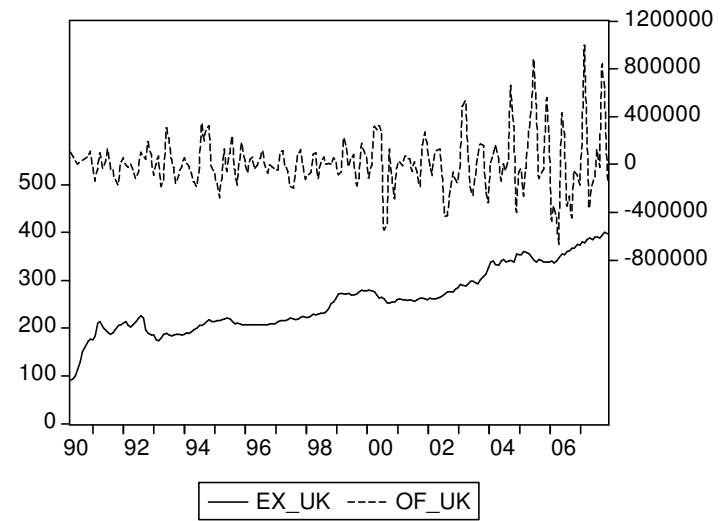
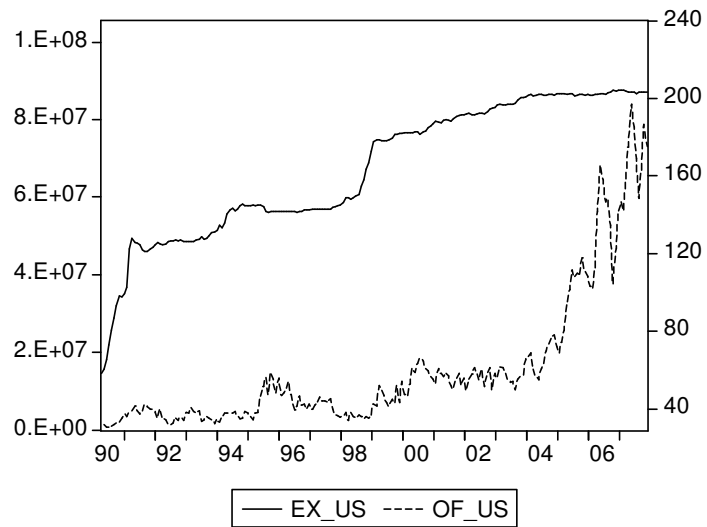
Introduction

- *Small open economy* with high imports and exports to GDP.
- Exchange rates dynamics have important implications for *stability* and *soundness* of the financial services sector (*Khemraj and Pasha, 2009*).
- *Limited* studies on Guyanese Foreign Exchange Market (GFEM).
- *No* studies on the *short-term dynamics* on exchange rates in Guyana.

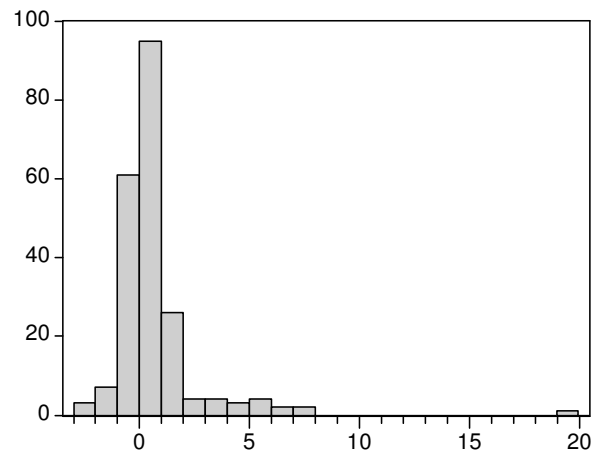
Objective

- Study employs the *portfolio shift model* proposed by Evans and Lyons (2002).
- The model links the short-term movements in exchange rates with the announcement of public information and the *order flow variable*.
- *Extensive support* in the micro-structure literature for Evans and Lyons (2001) model and order flow (see *Payne, 2003; Breedon and Vitale, 2004; Evans and Lyons, 2005; Gradojevic and Yang, 2006; and Killeen et al., 2006*).

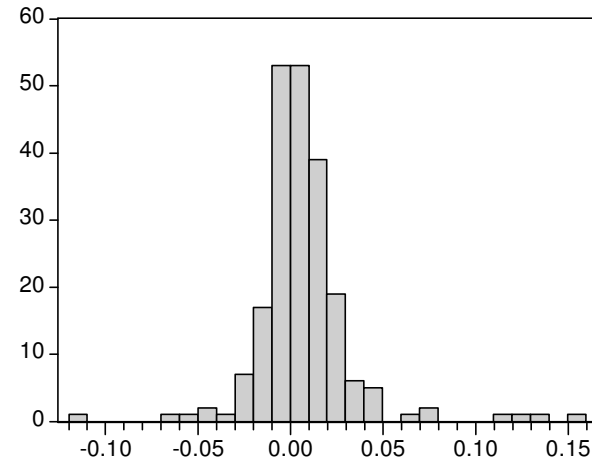
The Empirical Features Exchange Rates



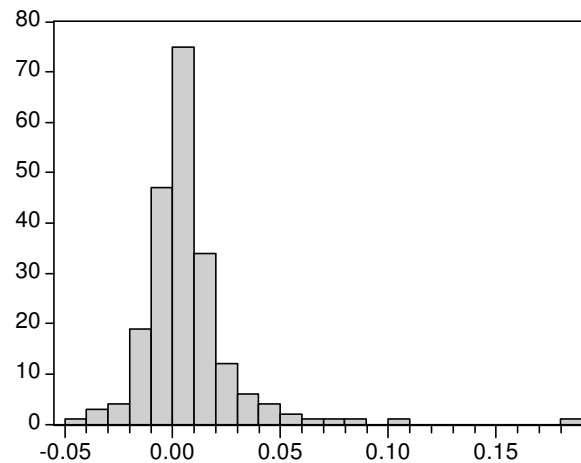
The Empirical Features Exchange Rates Cont'd



Series: R_US	
Sample 1990:05 2007:12	
Observations 212	
Mean	0.684623
Median	0.205000
Maximum	19.73000
Minimum	-2.720000
Std. Dev.	2.018762
Skewness	4.919742
Kurtosis	40.74547
Jarque-Bera	13440.23
Probability	0.000000

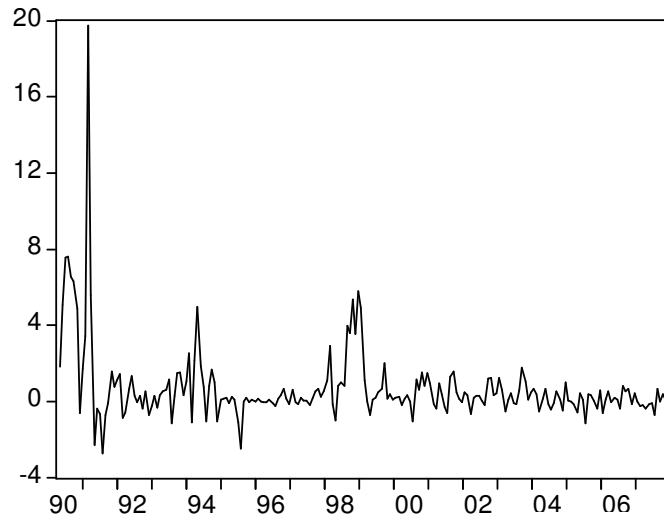


Series: R_UK	
Sample 1990:05 2007:12	
Observations 212	
Mean	0.006946
Median	0.003630
Maximum	0.157254
Minimum	-0.118083
Std. Dev.	0.026732
Skewness	1.618540
Kurtosis	13.97708
Jarque-Bera	1156.945
Probability	0.000000

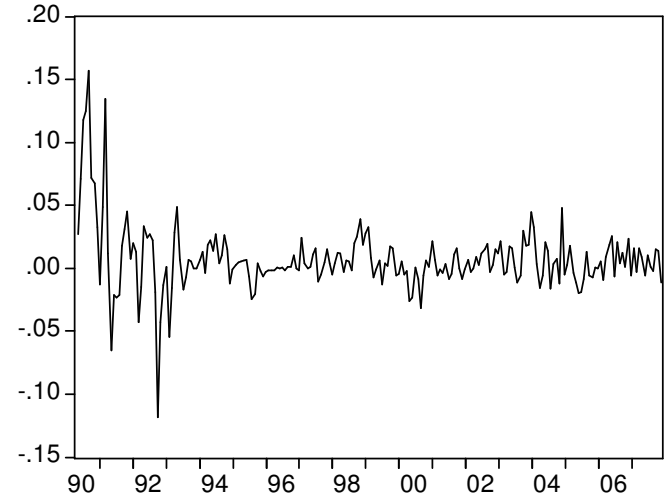


Series: R_CAN	
Sample 1990:05 2007:12	
Observations 212	
Mean	0.006623
Median	0.003181
Maximum	0.180216
Minimum	-0.040661
Std. Dev.	0.021836
Skewness	3.273043
Kurtosis	23.56446
Jarque-Bera	4114.111
Probability	0.000000

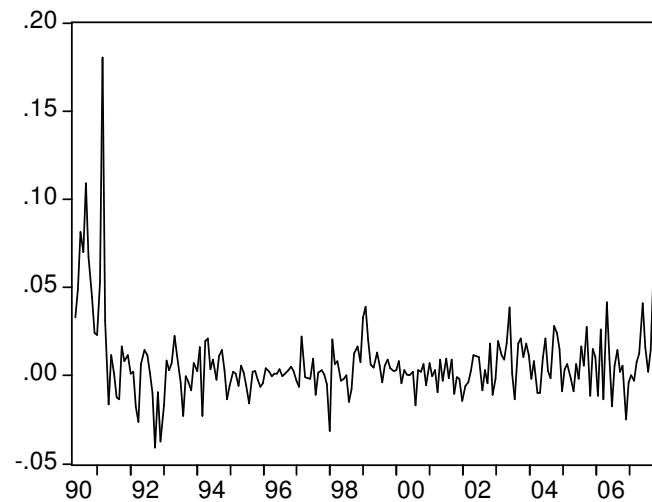
The Empirical Features Exchange Rates Cont'd



— R_US



— R_UK



— R_CAN

Econometric Model and Estimation Procedure

General Specification of Evans and Lyons (2001) model:

$$\Delta P_t = \Delta m_t + \gamma \Delta x_t + \varepsilon_t \quad \text{Eq. 1}$$

The exact specification:

$$p_t = \beta_1 \Delta(i_t - i_t^*) + \beta_2 \Delta x_t + \varepsilon_t \quad \text{Eq. 2}$$

where: Δp_t is the rate of change of the log of the buying rate; Δx_t represents order flow which is defined as the net of buyer-initiated and seller initiated orders; the $\Delta(i_t - i_t^*)$ the rate of change in the interest rate differential; and ε_t is the error term that independent and identically distributed (*i.i.d.*)

Econometric Model and Estimation Procedure Cont'd

- The model is estimated with *OLS*
- *GARCH techniques* also used to account for ARCH effect.
- GARCH (1,1), EGARCH (1,1) and GJR-GARCH (1,1)
- Alternative specification which *incorporates risk (measured by GARCH-based volatilities)*.
- The *two-stage procedure* is employed to estimate the extended model (*see Bollerslev and Melvin, 1994*).

Data Issues

- Monthly data from March 2001 to December 2007.
- Two primary sources: (a) the Statistical Bulletin of the Bank of Guyana; and (b) International Financial Statistics of the International Monetary Fund.
- Variables:
 - Δp_t = the change in the log of spot rate proxied by the nominal buying rate.
 - $\Delta(it - it^*)$ = the change in the absolute interest rate differential. This variable is measured by taking the difference between the local 91-day Treasury bill and similar instruments in the United States, Canada and United Kingdom.
 - Δx_t = the change in the order flow. We define order flow as the difference between the value of signed sales and purchases.
 - $RISK_t$ = represents risk and is measured by the conditional variance of the nominal buying rate which is generated by the various GARCH (1,1) models described in section 3.

Preliminary Findings

<i>Specification</i>	$\Delta(i_t - i_t^*)$	Δx_t	$i_{t-1} - i_{t-1}^*$	R^2	Diagnostic Tests			
					<i>LM Test</i>	<i>Whites Test</i>	<i>JB Test</i>	<i>ARCH Test</i>
Panel A: Guyana Dollar/ US Dollar								
I	0.0007 [0.414]	0.0002 [2.056]*		0.10	69.181	2.105	6071.33	15.17
II		0.0002 [2.061]*		0.11	69.996	1.771	6023.26	15.62
III	0.0007 [0.430]			0.11	69.252	0.329	6049.14	15.250
IV		0.0003 [1.890]**	0.0008 [2.278]*	0.10	66.137	20.696	4424.31	6.401
V			0.0008 [2.283]*	0.10	66.343	20.618	4400.77	6.455
Panel B: Guyana Dollar/ Canadian Dollar								
I	0.0002 [0.070]	0.0058 [1.327]		0.07	51.75	3.77	3884.81	6.41
II		0.0059 [1.314]		0.07	49.75	1.18	3911.93	6.45
III	0.0003 [0.109]			0.07	51.27	2.35	3892.17	6.29
IV		0.0062 [1.208]	0.0006 [1.731]**	0.03	49.75	6.95	3384.74	3.11
V			0.0006 [1.733]**	0.02	49.23	6.26	3400.57	3.05
Panel C: Guyana Dollar/ Pound Sterling								
I	0.0015 [0.465]	0.0041 [0.432]		0.07	63.17	2.18	601.35	42.62
II		0.0043 [0.444]		0.07	62.90	1.43	598.99	43.56
III	0.0015 [0.546]			0.07	63.21	0.88	601.58	42.57
IV		0.0048 [0.482]	0.0008 [1.519]***	0.01	63.584	16.534	463.43	33.46
V			0.0008 [1.524]***	0.01	64.480	15.183	478.68	34.00

Preliminary Findings

<i>Specification</i>	$\Delta(i_t - i_t^*)$	Δx_t	$i_{t-1} - i_{t-1}^*$	R^2	SIC	Diagnostic Tests		
						LL	$JB Test$	$ARCH Test$
Panel A: Guyana Dollar/ US Dollar								
I	0.0004 [0.8737]	0.0001 [0.9347]		0.11	6.940	661.932	134.742	0.012
II		0.0001 [1.0438]		0.11	6.960	661.250	155.009	0.003
III	0.0004 1.1798			0.11	6.959	661.168	125.325	0.008
IV		0.0001 1.0254	0.0000 0.89081	0.09	6.935	661.534	159.046	0.004
V			0.0000 0.7847	0.10	6.953	660.589	148.424	0.001
Panel B: Guyana Dollar/ Canadian Dollar								
I	0.0006 1.1286	0.0009 0.291751		0.07	5.77	465.44	57.86	0.03
II		0.000763 0.255376		0.07	5.80	465.13	57.49	0.06
III	0.0006 0.493508			0.08	5.80	465.40	60.54	0.03
IV		0.0026 1.093261	0.0003 [4.9764]*	0.00	5.82	469.47	22.85	0.06
V			0.0003 [5.1223]*	0.00	5.84	468.92	25.63	0.07
Panel C: Guyana Dollar/ Pound Sterling								
I	0.0039 [3.0605]*	0.0008 0.170607		0.07	5.16	407.53	57.01	0.06
II		0.0031 0.542284		0.07	5.160	404.804	48.800	4.705
III	0.0039 1.3567			0.07	5.195	407.516	56.485	0.064
IV		0.0030 0.533491	0.0001 0.690384	0.04	5.117	398.909	44.658	5.074
V			0.0001 0.6828	0.04	5.163	405.053	49.153	5.030

Preliminary Findings

Specification	$\alpha(i_t - i_t^*)$	αx_t	$i_{t-1} - i_{t-1}^*$	R^2	LM Test	Diagnostic Tests		
						Whites Test	JB Test	ARCH Test
Panel A: Guyana Dollar/ US Dollar								
I	0.0009 [2.6669]	0.0001 [1.2520]		0.11	6.841	655.292	139.23	0.063
II		0.0000 0.9082		0.11	6.836	652.269	157.293	0.021
III	0.0008 [2.4594]*			0.11	6.862	654.706	130.564	0.156
IV		0.0000 0.628204	0.0001 [1.691]**	0.08	6.814	652.789	207.113	0.246
V			0.0002 [3.1388]*	0.03	6.818	650.569	142.765	1.895
Panel B: Guyana Dollar/ Canadian Dollar								
I	0.0010 [1.8225]**	0.0035 1.052998		0.08	5.71	463.36	105.59	0.05
II		0.000536 0.118875		0.07	5.69	459.22	293.47	0.19
III	0.0013 1.062751			0.08	5.70	459.99	260.73	0.13
IV		0.0025 1.038365	0.0003 [4.1706]*	0.01	5.79	470.05	11.08	0.01
V			0.0003 [4.2128]*	0.00	5.821	469.554	15.569	0.018
Panel C: Guyana Dollar/ Pound Sterling								
I	0.0029 [1.644]**	0.0043 0.927178		0.07	5.154	409.355	27.911	1.494
II		0.0045 0.946496		0.07	5.168	407.926	19.266	2.669
III	0.0028 [1.7826]**			0.07	5.183	409.098	35.276	1.370
IV		0.0009 0.1770	0.0005 [4.5627]*	0.00	5.212	408.578	1.823	3.605
V			0.0005 [4.4187]*	0.00	5.244	413.779	1.833	3.913

Preliminary Findings

<i>Specification</i>	$\Delta(i_t - i_t^*)$	Δx_t	$i_{t-1} - i_{t-1}^*$	R^2	Diagnostic Tests			
					<i>LM Test</i>	<i>Whites Test</i>	<i>JB Test</i>	<i>ARCH Test</i>
Panel A: Guyana Dollar/ US Dollar								
I	0.0005 [1.1171]*	0.0001 [0.8724]		0.11	6.936	664.231	124.610	0.420
II		0.0001 1.0167		-0.106278	6.953	663.144	141.669	0.240
III	-0.0005 -1.364971			-0.108767	-6.956	663.505	119.064	0.422
IV		0.0001 [0.9647]	0.0001 [2.3484]*	0.07	6.940	664.614	137.113	0.582
V			0.0001 [2.1896]*	0.08	6.957	663.557	133.078	0.582
Panel B: Guyana Dollar/ Canadian Dollar								
I	0.0006 0.8136	0.0011 0.342988		0.07	5.74	465.51	64.09	0.03
II		0.001097 0.341384		0.07	5.77	465.29	64.41	0.04
III	0.0006 0.434444			0.07	5.77	465.44	66.43	0.03
IV		0.0026 1.044957	0.0003 [4.1610]*	0.00	5.79	469.49	23.82	0.04
V			0.0003 [4.1734]*	0.00	5.81	468.94	27.12	0.05
Panel C: Guyana Dollar/ Pound Sterling								
I	0.0036 [2.6235]*	0.0005 0.112024		0.07	5.137	408.03	73.57	0.10
II		0.0025 0.516861		0.07	5.166	407.80	14.09	5.77
III	0.0036 1.3937			0.07	5.169	408.03	73.96	0.10
IV		0.0044 0.596545	0.0004 [9.9352]*	0.01	5.222	409.35	4.814	2.158
V			0.0005 [3.5501]*	0.00	5.202	410.54	3.474	4.841

Preliminary Findings Cont'd

<i>Specification</i>	$\Delta(i_t - i_t^*)$	Δx_t	$i_{t-1} - i_{t-1}^*$	R^2	<i>SIC</i>	<i>Diagnostic Tests</i>		
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V			0.0000 0.7847	0.10	6.953	660.589	148.424	0.001
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I	0.0006 1.1286	0.0009 0.291751		0.07	5.77	465.44	57.86	0.03
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IV		0.0026 1.093261	0.0003 [4.9764]*	0.00	5.82	469.47	22.85	0.06
V			0.0003 [5.1223]*	0.00	5.84	468.92	25.63	0.07
Panel C: Guyana Dollar/ Pound Sterling								
I	0.0039 [3.0605]*	0.0008 0.170607		0.07	5.16	407.53	57.01	0.06
II		0.0031 0.542284		0.07	5.160	404.804	48.800	4.705
III	0.0039 1.3567			0.07	5.195	407.516	56.485	0.064
IV		0.0030 0.533491	0.0001 0.690384	0.04	5.117	398.909	44.658	5.074
V			0.0001	0.04	5.163	405.053	49.153	5.030

Preliminary Findings Cont'd

<i>Specification</i>	$\Delta(i_t - i_t^*)$	Δx_t	$i_{t-1} - i_{t-1}^*$	VOL_t	R^2	Diagnostic Tests		
						<i>LM Test</i>	<i>Whites Test</i>	<i>JB Test</i>
Panel A: Guyana Dollar/ US Dollar								
I	0.0012 [1.1359]	0.0003 [1.9478]*	0.0028 [0.7219]	3.2040 [1.9025]*	0.18			
II	0.0019 [1.4479]**	0.0003 [1.9468]*	0.0029 [0.6985]	0.1152 [5.3118]*	0.05			
III	0.0012 [1.1140]	0.0003 [1.9549]**	0.0028 [0.7200]	2.7508 [1.9034]**	0.18			
Panel B: Guyana Dollar/ Canadian Dollar								
I	0.0021 [0.9503]	0.0049 [1.3306]	0.0028 [1.1351]	3.4780 [1.7848]*	0.09			
II	0.0021 [1.0204]	0.0049 [1.3150]	0.0026 [1.0772]	4.9501 [1.9541]**	0.08			
III	0.0022 [0.9870]	0.0048 [1.3018]	0.0030 [1.2060]	3.4265 [1.7988]**	0.10			
Panel C: Guyana Dollar/ Pound Sterling								
I	0.0022 [0.8818]	0.0057 [0.6204]	0.0010 [0.2415]	9.0418 [2.4517]*	0.22			
II	0.0016 [0.6786]	0.0057 [0.6053]	0.0015 [0.3705]	8.7174 [2.6166]*	0.24			
III	0.002 [0.7875]	0.006 [0.6068]	0.001 [0.3481]	7.571 [2.3664]*	0.21			

Conclusion and Future Work

- *Inconclusive* evidence with respect to the importance of *order flow*.
- The original Evans and Lyons (2001) has *poor explanatory powers* and fails standard diagnostic test (*serial correlation, heteroskedasticity, etc.*).
- Future work will:
 - (i) consider *other variants* of the Evans and Lyons (2001) model.
 - (ii) examine the two main *segments* (banks and non-banks) of the market.

Thank You