Order Flow and the Real

Indirect evidence of the effectiveness of sterilized interventions

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Disclaimer

The views expressed in this work are those of the authors and do not necessarily reflect those of Banco Central or its members.

Literature

Market microstructure studies by Lyons (2001), D'Souza (2001), Evans and Lyons (2002) and Dominguez (2003)

Models of Vitale (JIE 1999) and Killeen, Lyons and Moore (JIMF 2006)

Literature

Evans and Lyons (2005), Sager and Taylor (2006) and Reitz, Schmidt and Taylor (2011)

Girardin and Lyons (2008)

Citibank data / July 1995-March 2004

evidence of ”*price damping channel*”

Marsh (JIMF 2011)

Royal Bank of Scotland data / August 2002-March 2006

Brazil: Data

SISBACEN

- complete records of dealer transactions
- January 2002 – November 2011
- (2,399 trading days)
- end-user (volume) order flow

BCB spot market interventions

- **study focuses exclusively on short-term (*i.e.* 1 day) effects**

Order Flow Data

between January 2002 – November 2011

forex dealers bought $369.4 bn from non-financial customers

and sold $99.7 bn to their financial customers

Net purchases by the CB amounted to $254.5 bn

(intervention in 56% of trading days

median (absolute) intervention: 140 mn USD

mean: 119 mn; std dev: 224 mn)

Figure 1
BCB's Spot USD Purchases

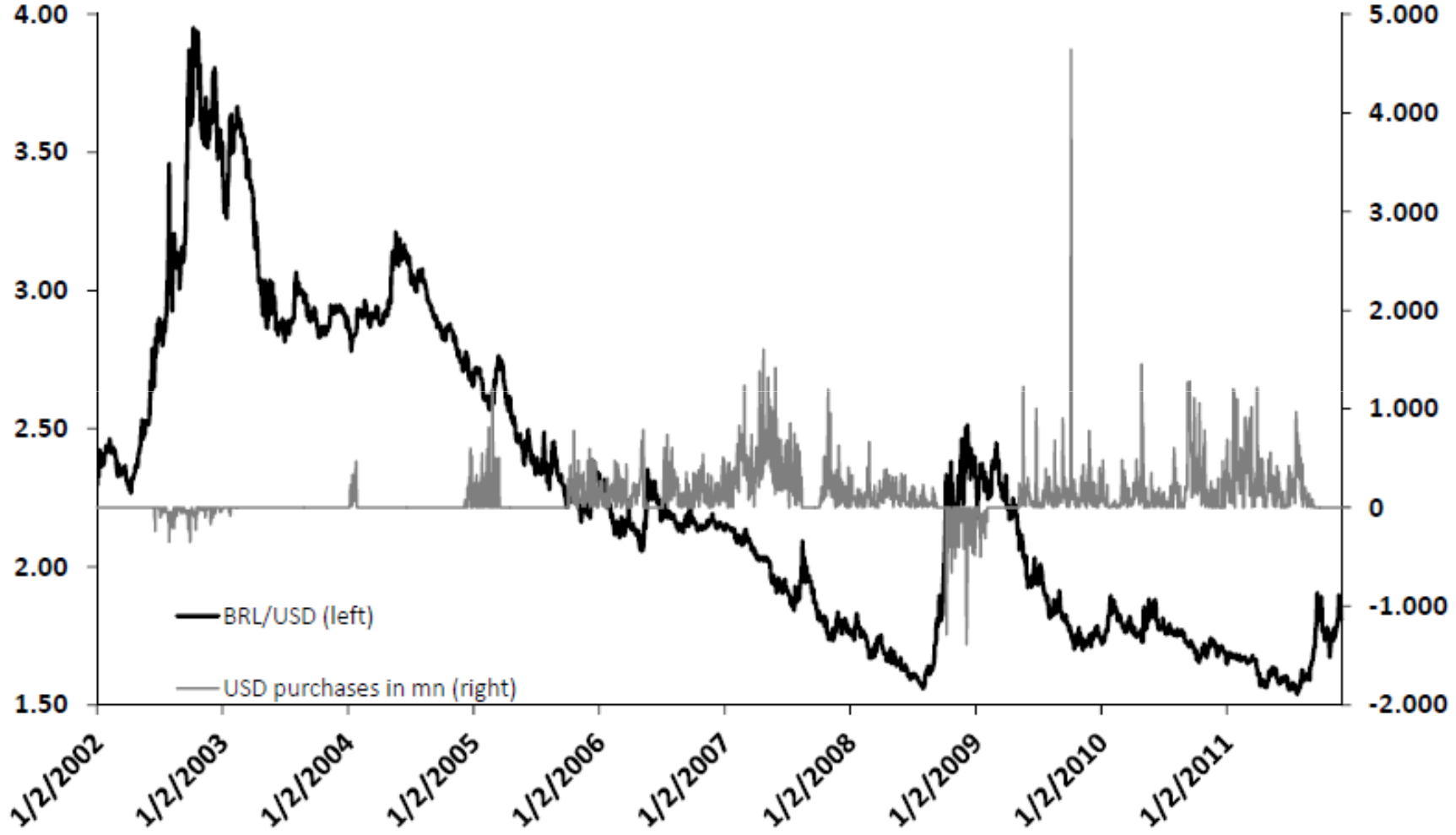

Table 2
End-user order flow and the Real

change in the BRL/USD rate

	I	II	III	IV	V	VI	VII
aggregate order flow	0.000446**		0.000245**				
t-statistic	8.04		5.30				
financial customer order flow		0.000237**		0.000039		0.000134*	0.000140**
t-statistic		4.00		1.04		2.85	2.72
non-financial customer order flow		0.001172**			0.000638**	0.000690**	0.000773**
t-statistic		7.26			4.88	5.91	5.20
lag of financial customer order flow							-0.000017
t-statistic							0.43
lag of non-financial customer order flow							-0.000264**
t-statistic							2.68
lag of BRL/USD change							-0.058271†
t-statistic							1.93
d (SELIC - Fed Funds)			-0.245740	-0.260233	-0.204053	-0.203840	-0.209274
t-statistic			1.32	1.37	1.11	1.11	1.08
d (EMBI)			1.954465**	1.975973**	1.914981**	1.91156**	1.929457**
t-statistic			10.19	10.31	10.01	9.98	10.41
d (VIX)			0.182750**	0.193366**	0.173661**	0.170146**	0.166596**
t-statistic			8.49	9.03	7.97	7.81	7.62
d (CRB)			-0.273625**	-0.290163**	-0.252787**	-0.248361**	-0.270934**
t-statistic			4.51	4.79	4.29	4.21	4.70
no. of observations	2399	2399	2242	2242	2242	2242	2164
R2	0.0441	0.1010	0.3792	0.3667	0.3949	0.3983	0.4094
Adjusted R2	0.0438	0.1002	0.3779	0.3653	0.3935	0.3967	0.4069
Log-likelihood	-3722.8	-3649.3	-3015.7	-3038.2	-2987.0	-2980.7	-2869.5
F / chi2	110.74	134.59	273.21	258.91	291.89	246.60	165.89
Durbin-Watson	2.054	2.059	2.166	2.171	2.154	2.151	2.066

Note: t-statistic based on Newey-West standard errors. †, * and ** denote statistical significance at the 10%, 5% and 1% confidence levels, respectively.
The sample covers data from 01/02/2002 to 11/30/2011.

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Table 3
End-user order flow and the Real - days without intervention

change in the BRL/USD rate

	I	II	III	IV	V	VI
aggregate order flow	0.000980**		0.000502**			
t-statistic	9.93		6.02			
financial customer order flow		0.000656**		0.000031		0.000134**
t-statistic		6.51		0.40		4.17
non-financial customer order flow		0.001913**			0.000823**	0.000690**
t-statistic		13.98			7.50	8.62
d (SELIC - Fed Funds)			-0.160819	-0.146620	-0.085814	-0.203840
t-statistic			1.17	1.05	0.63	0.79
d (EMBI)			1.965433**	2.051464**	1.913973**	1.91156**
t-statistic			14.18	14.61	13.81	13.69
d (VIX)			0.209695**	0.228150**	0.206335**	0.170146**
t-statistic			11.45	12.40	11.39	10.85
d (CRB)			-0.392843**	-0.419636**	-0.377004**	-0.248361**
t-statistic			6.15	6.47	5.95	5.80
no. of observations	1054	1054	991	991	991	991
R2	0.0857	0.1573	0.4107	0.3892	0.4220	0.4321
Adjusted R2	0.0848	0.1557	0.4078	0.3861	0.4191	0.4286
Log-likelihood	-1672.8	-1629.8	-1354.3	-1372.1	-1344.7	-1336.0
F / chi2	98.56	98.10	137.32	125.52	143.86	124.78
Durbin-Watson	1.951	1.864	2.086	2.066	2.002	2.025

Note: †, * and ** denote statistical significance at the 10%, 5% and 1% confidence levels, respectively.
The sample covers data from 01/02/2002 to 11/30/2011.

Table 4
End-user order flow and the Real - days with BCB intervention in the spot market

change in the BRL/USD rate

	I	II	III	IV	V	VI
aggregate order flow	0.000310**		0.000182**			
t-statistic	6.76		4.60			
financial customer order flow		0.000146**		0.000035		0.000085*
t-statistic		2.98		0.81		2.03
non-financial customer order flow		0.000894**			0.000546**	0.000570**
t-statistic		10.70			7.37	7.61
d (SELIC - Fed Funds)			-0.418761†	-0.484185*	-0.417045†	-0.390613†
t-statistic			1.78	2.04	1.80	1.68
d (EMBI)			1.905864**	1.909108**	1.879140**	1.881504**
t-statistic			18.96	18.83	18.92	18.97
d (VIX)			0.161656**	0.170470**	0.152212**	0.149922**
t-statistic			12.16	12.86	11.52	11.32
d (CRB)			-0.180452**	-0.195918**	-0.161178**	-0.157537**
t-statistic			3.65	3.94	3.29	3.22
no. of observations	1345	1345	1251	1251	1251	1251
R2	0.0329	0.0799	0.3665	0.3560	0.3827	0.3847
Adjusted R2	0.0321	0.0785	0.3639	0.3535	0.3802	0.3817
Log-likelihood	-2026.3	-1992.8	-1642.3	-1652.5	-1626.1	-1624.1
F / chi2	45.63	58.27	144.05	137.67	154.34	129.62
Durbin-Watson	2.035	2.044	2.084	2.094	2.090	2.084

Note: †, * and ** denote statistical significance at the 10%, 5% and 1% confidence levels, respectively.
The sample covers data from 01/02/2002 to 11/30/2011.

Figure 2
β vs. magnitude of intervention

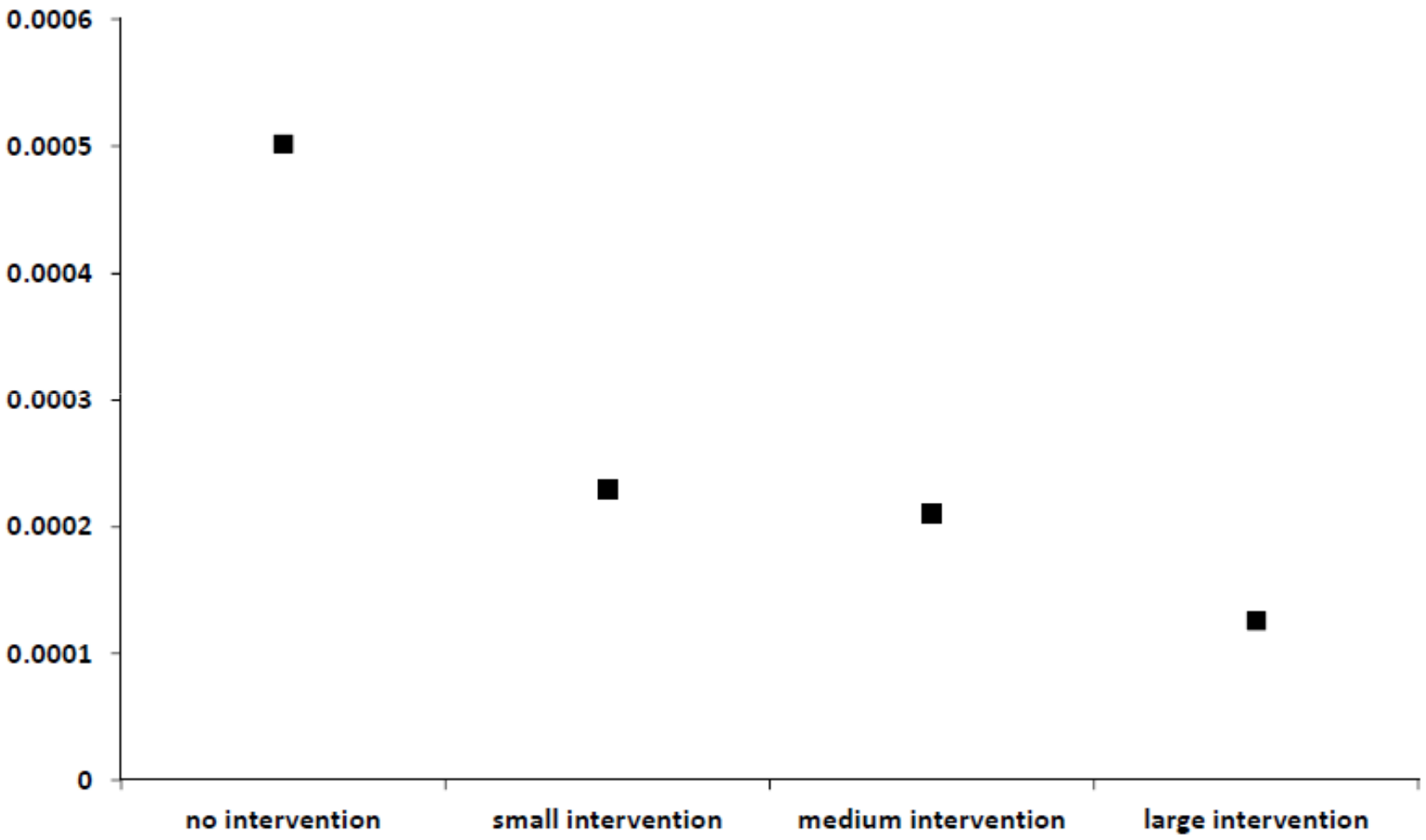

Figure 3
Intervention propensity scores

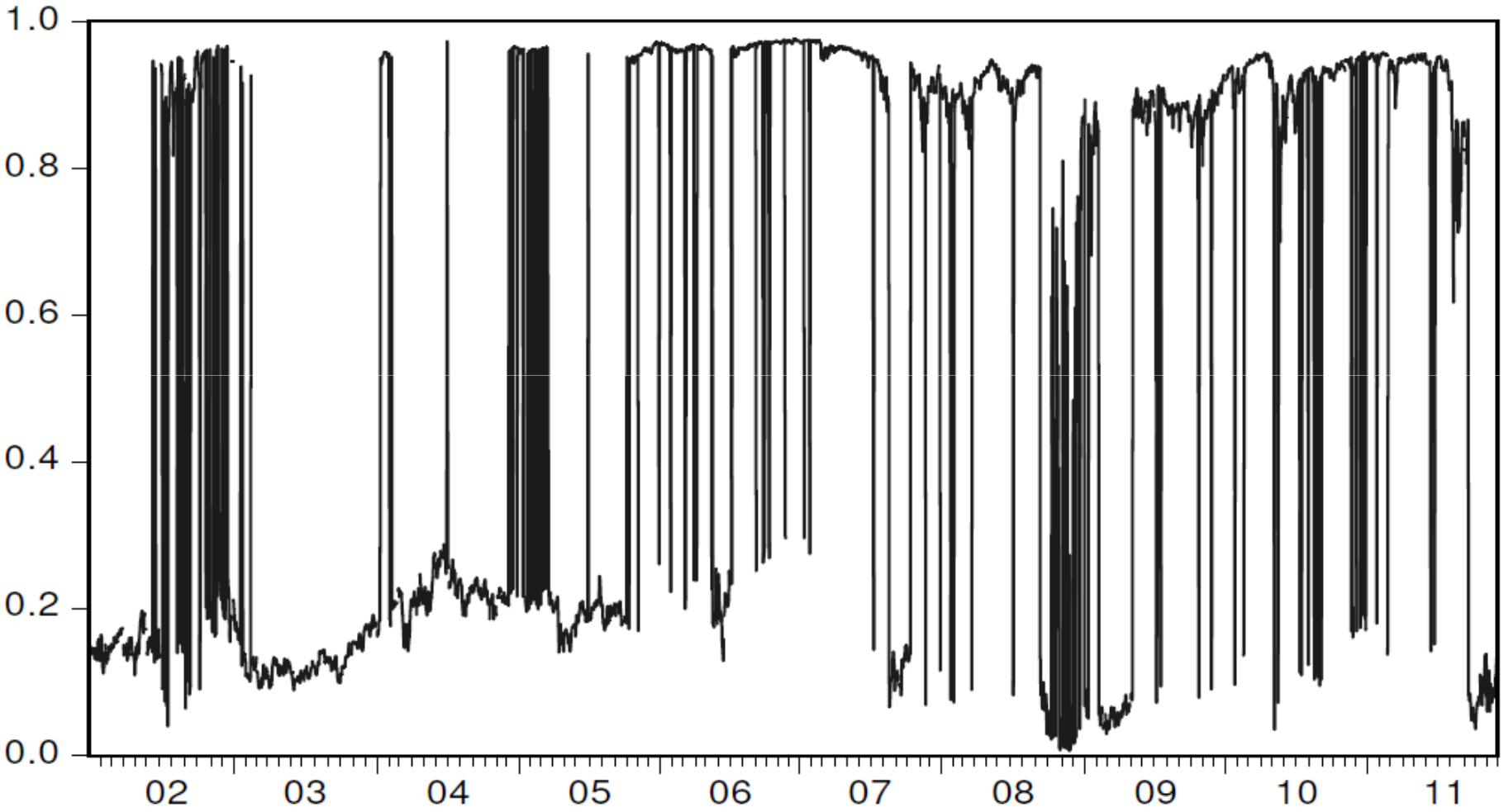

Table 5
End-user order flow and the Real - by propensity score

change in the BRL/USD rate

	p-score ≤ 0.50		p-score > 0.50	
	no interv	interv	no interv	interv
aggregate order flow	0.000439**	0.000290	0.000931**	0.000185**
t-statistic	5.03	1.07	3.32	4.74
d (SELIC - Fed Funds)	-0.158915	-0.812735	-0.002150	-0.382107
t-statistic	1.15	0.73	0.00	1.61
d (EMBI)	2.300060**	1.431931**	1.144967**	1.972191**
t-statistic	14.13	3.72	3.49	18.97
d (VIX)	0.195489**	0.190553**	0.205395**	0.153246**
t-statistic	9.75	5.01	3.99	10.33
d (CRB)	-0.373591**	-0.173732	-0.390010†	-0.186156*
t-statistic	5.57	0.91	1.85	3.62
no. of observations	896	104	95	1147
R2	0.4098	0.3967	0.4900	0.3589
Adjusted R2	0.4065	0.3659	0.4613	0.3561
Log-likelihood	-1206.2	-171.7	-138.1	-144.9

Note: †, * and ** denote statistical significance at the 10%, 5% and 1% confidence levels, respectively.
The sample covers data from 01/02/2002 to 11/30/2011.

Concluding Remarks

relatively small interventions do seem to induce considerable changes in private pricing behavior

(the ”*price damping channel”*)

effects of non-financial customer flows on the exchange rate are stronger than those deriving from financial customers

(large number of observations diminishes risk of multicollinearity / ”micronumerosity”)

some studies may have failed to find effect due to problem of reverse causality that plagues analysis of discretionary intervention regimes