



THE MICROSTRUCTURE OF A SMALL FOREIGN EXCHANGE MARKET IN A LONG-TERM PEGGED EXCHANGE RATE REGIME: BARBADOS

by

Delisle Worrell

Email: dworrell@imf.org
International Monetary Fund
700 19th Street, N.W.
Washington, D.C. 20431
Tel.: 1 (202) 623-7000
Fax: 1 (202) 623-4661

Roland Craigwell

Email: Rccraigwell@centralbank.org.bb

and

Travis Mitchell

Research Department
Central Bank of Barbados
P.O. Box 1016, Bridgetown, Barbados
Email: Tkmitchell@centralbank.org.bb
Tel.: 1 (246) 436-6870
Fax: 1 (246) 427-1431

*Presented at the 27th Annual Review Seminar
Research Department
Central Bank of Barbados
July 25-28, 2006*

**THE MICROSTRUCTURE OF A SMALL FOREIGN EXCHANGE MARKET IN A
LONG-TERM PEGGED EXCHANGE RATE REGIME: BARBADOS**

by

DeLisle Worrell
International Monetary Fund

and

Roland Craigwell and Travis Mitchell
Research Department, Central Bank of Barbados

ABSTRACT

This paper is a first analysis of daily transactions in the foreign exchange market of Barbados, a small open economy that has had an unchanged peg to the U.S. dollar for over 30 years. As a result of the credibility of the peg, we expect that capital flows will respond to differentials between U.S. and comparable Barbadian interest rates, and that these capital flows will result in uncovered interest parity between the Barbadian and the U.S. financial markets, when allowance is made for market frictions and large discrete events. Our results appear to confirm the existence of uncovered interest parity during the period of analysis.

Keywords: foreign exchange, exchange rate, interest parity

JEL categories: F31; F41

The views expressed in this Policy Discussion Paper are those of the authors and do not necessarily represent those of their institutions or the policy of their institutions.

June 2006

Introduction

The extent of financial integration in the modern world, reflected in the magnitude and pervasiveness of financial flows, has served to intensify research on the economic functioning of foreign exchange markets. In the open economy, international financial flows will ensure that interest rate parity is maintained for assets of similar maturities, or that the interest differentials exactly reflect expectations about exchange rate changes, provided there are no frictions and externalities. The overwhelming majority of studies of the foreign exchange markets have explored whether exchange markets do function in this manner, and when they do not, what seems to account for the observed excess returns to foreign exchange speculation. A variety of hypotheses have been tested, to try to explain why interest premia are typically higher than may be anticipated on the basis of expectations of exchange rate changes.¹

This literature has almost never focused exclusively on the behaviour of the foreign exchange market in regimes where the exchange rate is pegged, although some studies (for example Flood and Rose, 2001) do include pegged exchange rate markets in their sample. That may be because comparatively few countries have maintained a pegged exchange rate for such a long period, and through such vicissitudes of economic circumstance, that market expectations of exchange rate changes are virtually zero. This is a distinguishing characteristic of some currencies of smaller Caribbean countries, including the Barbadian dollar, the exchange market for which is the subject of the present study. In the absence of exchange rate uncertainty, inflows and outflows of foreign exchange should respond to interest differentials, in a way that maintains uncovered interest parity (UIP).

We test whether the flow of foreign currency transactions in Barbados is motivated by UIP between Barbadian dollar assets and equivalent assets denominated in U.S. dollars, the currency

¹ Recent comprehensive surveys of this literature include Koedijk, Lothian and Dijk (2006) and Sarno (2005). Koedijk, Lothian and Dijk attribute improvements in uncovered interest parity (UIP) tests to the use of longer time horizons, inclusion of emerging market data, improved measures of exchange rate expectations, testing with nonlinear relationships, and allowing for heterogeneous beliefs. Sarno reports studies that allow for risk aversion (participants demand risk premium); monetary policy reactions to expected exchange rate changes; risk premiums that vary with maturity of instrument; the existence of rational bubbles; markets that learn from experience; markets characterised by capital flight; information inefficiencies; the use of density forecasts instead of point forecasts; and the existence of a band of inaction where foreign bias does not invite speculative capital movements.

to which the Barbadian dollar has been pegged at an unchanged value since July 1975. Our working hypothesis is that international financial flows, reflected in daily transactions in the foreign exchange market, serve to equilibrate the Barbadian interest rate to the U.S. equivalent, apart from structural features, market frictions and imperfections, all of which can be accounted for in the estimation.

A deeper understanding of the mechanism of foreign exchange markets under pegged exchange rate regimes may be of interest to a growing number of countries. In addition to a core of Francophone African countries which have maintained a peg to the old French franc, and now to the euro, and a number of small countries, mainly in the Western Hemisphere, with unchanged pegs to the dollar,² there is a small number of countries with currency board arrangements³ which can be expected to exhibit similar foreign exchange market characteristics. Also, all the recent European Union accession countries, as well as the new aspirants, plan to adopt the euro,⁴ which means that they must manage their exchange rates to converge on the euro within a qualifying period. Beyond these, there are regional groupings that maintain a virtual peg to the currency of an economically dominant neighbour, including the currencies of the South African rand zone, and the Pacific countries that are closely linked with Australia or New Zealand.

The next section provides a summary description of the institutional framework of the Barbadian foreign exchange market, and serves to explain, among other things, why we are able to infer market excess demand or supply solely on the basis of central bank transactions with commercial banks. We then move on to an explanation of the theory behind the empirical test, a description of the data and methodology, the discussion of the test results, and our conclusion.

² Aruba, The Bahamas, the Caymans, Barbados, Belize, the Eastern Caribbean Currency Union (ECCU), and the Netherlands Antilles.

³ Bosnia and Herzegovina, Brunei Darussalam, Bulgaria, Djibouti, Estonia and Lithuania.

⁴ See IMF (2005).

The Institutional Framework

On July 5, 1975, the Barbados dollar was pegged to the US dollar at a rate of Bds\$2 per U.S. dollar, and this rate has been maintained up to the time of writing. External transactions on the current account have been effectively free of restriction for this entire period. Transactions on the capital account, which are subject to the approval of the Central Bank of Barbados, have always been partially liberalised, judged by the criteria of Kaminsky and Schmukler (2003) and Quinn (1997). There are no controls on capital inflows, and inflows may be fully repatriated, with profits, once they have been registered with the Central Bank of Barbados. The regulation of capital outflows may be more liberal in practice than it is intended to be, because of the fungibility of finance. Foreign trading companies routinely export and import short-term capital by changing the mix of foreign trade credit and domestic borrowing used to finance their working capital needs (Worrell, 1998). Neither of these funding sources is subject to central bank control.

A small but growing proportion of capital transactions is with Barbados' Caricom partners. Transactions in private unlisted equities in Caricom countries were liberalised in 2005. However, central bank permission is still required for investment in regional corporate bonds and similar corporate instruments as well as for investment in securities of regional governments.

The Central Bank of Barbados ensures daily clearing of the foreign exchange market by buying and selling from its foreign exchange reserves, at the fixed exchange rate, plus a foreign currency transaction margin, which is changed very rarely. Banks may trade foreign currency freely on the interbank market, and resort to the central bank only if there is a large surplus or deficit on the interbank market. Central bank regulations prevent banks from maintaining a net spot liability position in excess of 110 percent of gross foreign short-term assets⁵; foreign currency exposures must be brought within the limit, if necessary by purchases from the central bank.⁶ There is no limit on banks' net asset positions. Banks are not required to identify the underlying trade or

⁵ The limit was reduced to 105 percent on October, 2004.

⁶ Banks report their position every Wednesday, and they are required to clear any excess liability within two business days.

capital transaction that provoke purchases and sales to the central bank, and there is no limit to the size of any purchase or sale. However, the central bank does require advance notice of large purchases for its own cash management purposes. The foreign exchange transactions that cross the central bank's books are therefore a reflection of the daily balance of supply and demand in the foreign exchange market, and we may analyse the behaviour of the market solely on the basis of central bank activity, without the need to examine all interbank transactions.

Theoretical Considerations

A majority of foreign exchange market studies begin with the UIP condition:

$$\Delta_k s_{t+k}^e = i_{t,k} - i_{t,k}^* \quad (1)$$

that is, the change over time period k (Δ_k) in the expected spot exchange rate k periods ahead (s_{t+k}^e) is exactly compensated for by the premium on the domestic interest rate ($i_{t,k}$) over the foreign interest rate ($i_{t,k}^*$).⁷ If the exchange rate has been unchanged for as long as the Barbadian rate has, the market expectation of the change in the spot rate is zero, and the domestic interest rate converges to the foreign rate.

The mechanism that drives this convergence is the inflow and outflow of finance, reflected in the foreign exchange market. The market equilibrium identity may be expressed as:

$$INT_t = CA_t + \Delta K_t \quad (2)$$

where INT_t is the amount of central bank intervention on the foreign exchange market, CA_t is the net current account surplus/deficit, and ΔK_t is the net change in inflows/outflows on the capital and financial account.⁸ As explained in the previous section, the Central Bank of Barbados does not intervene actively in the foreign exchange market, but simply buys or sells from a stock of foreign exchange in response to market needs:

$$NPFX_t = CA_t + \Delta K_t \quad (3)$$

where $NPFX_t$ is the central bank's net purchase of foreign exchange.

⁷ See Sarno and Taylor (2002), Chapter 2.

⁸ Sarno and Taylor, 2001.

Changes in the current account, driven by real exchange rate changes or fiscally-induced changes in aggregate demand, appear as persistent net demand or supply ($NPFX_t$) over many days, causing an accumulation or decrease in the foreign exchange reserves of the central bank. Because of such pressures, we expect the net demand on account of current transactions to exhibit autoregressive behaviour. Equation (3) can therefore be written as:

$$NPFX_t = f(NPFX_{t-i}) + \Delta K_t, \quad i = 1, 2, \dots \quad (4)$$

This autoregressive behaviour, together with the relatively high frequency of our data, influences our approach to the estimation technique, as explained below.

Among the factors that determine ΔK_t , and therefore $NPFX_t$, is the size of the interest differential ($i_{t,k} - i^*_{t,k}$) and the speed with which financial flows react to the emergence of any interest differential. At a daily frequency it is this change in net demand on the financial account (ΔK_t) that determines the observed fluctuations in $NPFX_t$, apart from large discrete payments, such as debt operations (foreign borrowing, debt service) by government and large corporations, or payments for energy or large capital equipment or bulk supplies. This gives us the following:

$$NPFX_t = f\{NPFX_{t-i}, (i_{t,k} - i^*_{t,k}), Spayment_t, Tseason_t, h_t\} \quad (5)$$

where $Spayment$ is a discrete variable indicating large payments, with the threshold taken to be BDS\$10 million. $Tseason$ is a discrete variable to differentiate between the high and low periods of the tourist season where the peak period runs from December 15 to April 14. The variable h , which measures the volatility of net demand for foreign exchange and which is described in the next section, may be interpreted as a reflection of the effects of transactions and information costs, or other frictions in the foreign exchange market. Because of these costs, small daily changes in the net demand and supply of foreign exchange may be accumulated as net foreign currency balances of commercial banks, and would not be reflected in net purchases with the central bank on the transactions day. This would produce a pattern of no net purchases, followed by a relatively large net purchase because of accumulated net demand, and would result in relatively high volatility. We expect positive signs for $(i_{t,k} - i^*_{t,k})$ and $Tseason$, while $Spayment$ should be negatively signed. The signs on the coefficients of h and $NPFX_{t-i}$ are ambiguous *a priori*.

Data, Methodology and Results

This paper uses daily data spanning the period January 1998 to December 2004 and, except for the international interest rate, whose source is the U.S. Bureau of Public Debt (www.publicdebt.treasury.gov), all data are taken from the Central Bank of Barbados data files. The value of foreign exchange transactions conducted by the Central Bank of Barbados on a daily basis is quite low, and activity is mainly for the sale and purchase of U.S. dollars. On three-quarters or more of all business days, the total purchase or sale by the central bank was less than BDS\$ 1 million, which is only about 10 percent of the daily average of foreign currency credits in the balance of payments (Table 1). U.S. dollar transactions dominate, with mean values for purchases and sales that are about twice those for regional currencies combined, and a range of values which dwarfs that for regional currencies (Table 2 and Figure 1).

The (unconditional) distribution of net purchases of U.S. dollars is very heavily skewed, with most observations clustered between a net sale of BDS\$10 million, and a net purchase of a similar amount. The fluctuations in day-to-day values occur in bursts of increasing and decreasing amplitude, appearing as cycles of increasing followed by decreasing volatility (Figure 2). An examination of the correlogram for net purchases of U.S. dollars suggests autocorrelations of up to 7 lagged observations, but their associated probabilities are quite low, especially after the first and second lag. The pattern of regional net purchases is also heavily skewed, and there appears to be some volatility persistence, though the episodes of increasing and diminishing volatility are less evident from an inspection of the series (Figure 3). Autocorrelation falls away quickly after the first lag. The distribution of total net purchases (i.e. all currencies) mirrors very closely that of the U.S., with respect to amplitude, skewness, and pattern of fluctuations, though the mean is a net sale, rather than a net purchase (Figure 4).

Due mainly to the infrequency of foreign exchange activity on a daily basis (there was no net purchase on 17 percent of all transaction days in the sample), a 10 day moving average of the data was undertaken for estimation purposes. Table 3 gives the summary statistics of this transformed daily data; it exhibits similar characteristics as for the raw data: skewness, leptokurtosis, non-normality and autoregressiveness. The series for the interest rate differential

between Barbados and the U.S. treasury bills has similar characteristics. In addition, judging by the familiar ADF unit root test the variables appear to be I(0) stationary. Consequently, we decided to use the GARCH-M representation to test Equation (5). The daily net purchases of U.S. dollars, the total of all daily net purchases of regional currencies, and the total of all daily net purchase of foreign currencies are the three dependent variables used in three separate versions of the test equation, to explore the effects of interest parity conditions, economic shocks and volatility on the observed mean values of the variables, as well as to test for the persistence of volatility in the variances.

A general GARCH-M model for a set of observations Y_t ($t = 1, 2, \dots, T$) is:

$$Y_t \mid \Phi_{t-1} = g(X; \theta) + \mu_t \quad (6)$$

$$\mu_t = \varepsilon_t - \sum_j^q \gamma_j \varepsilon_{t-j} \quad (7)$$

$$\varepsilon_t \mid \Phi_{t-1} \approx \Omega(0, h_t) \quad (8)$$

$$h_t = f(\varepsilon_{t-j}, h_{t-j}) + \zeta'Z \quad (9)$$

This general model has three components: a mean process (g), equivalent to Equation (5) above, where the variable h is an element of X ; a variance process (f); and the error distribution (Ω). This system of equations may be estimated by computing the mean-variance combination for each distribution, starting at the same initial parameters for each combination, and comparing likelihoods, parameter constraints, and other characteristics of the resulting matrices. The problem with this approach is that the distributions, in general, are not nested.

An alternative strategy, employed in this paper, is to start by comparing the unconditional distributions (standardised on their means) with commonly used distributions such as the normal and t distributions, using the quantile plots found in the econometric software package EVIEWS. This provides a first sense of the nature of the distribution. We then consider the conditional mean derived using Equation (5), using an equation specification that ensures that the residuals are "white noise". Next, we test the distribution of the residuals against normal, t , and other commonly used distributions, in order to determine the nature of the conditional distribution. For that mean and conditional distribution, we set the maximum GARCH lag, check for congruency, and sequentially reduce the variance and mean. (This is an example of the general-to-specific

approach.) Within each class of distribution, the usual likelihood ratio tests may be performed. One may also do a second round of checks to investigate the robustness of the specification, estimating the parsimonious GARCH-M model with the alternative distributions and comparing the results, using the quantile plots. However, we must bear in mind that the reduced (parsimonious) model will most probably reflect the initial parametric choice of the distribution, and subjective evaluation is needed to bring all of these factors together, including the interpretation of parameters. Note, for the GARCH-M model, the parameter restriction for h_t to be covariance stationary is that the sum of the coefficients on the variables in the function f above be less than one. (Bollerslev (1986) also assumes that the individual coefficients in f need to be nonnegative but it has been shown that this latter restriction, while sufficient for the variance to be positive, is not necessary (Bollerslev, Chou and Kroner, 1992)).

Based on this strategy we estimated Equation (5) as a GARCH-M process, first with net purchases of all currencies as the dependent variable, then with the U.S dollar and the subtotal of regional currencies (see Table 4). In all cases the estimation procedure revealed a significant GARCH-M (1,1) process with the errors following a generalized error distribution. The R-squared for the models of net purchases of all currencies and the U.S. dollar are reasonably high and all variables are statistically significant at the conventional 5% level and have the signs expected a priori.

The results suggest that transactions and “market frictions” are the prime motivation for foreign exchange market activity. During the peak season for tourism foreign exchange volume appears to be significantly higher than during the off-season, with an estimated elasticity that is **3.86** above the mean value of net purchases of foreign exchange in all currencies. Exceptional receipts and payments also have a strong impact, with an estimated elasticity of **1.79** at the mean values. Changes in the interest rate spread between Barbados and U.S. treasury bills lagged two periods appear to be associated with changes in net foreign exchange purchases with an estimated elasticity of **0.63**, suggesting that the changes in interest differentials have been sufficiently large during the observation period to provoke increased foreign exchange inflows or outflows on that account. The positive sign on the “market frictions” variable implies that higher volatility is

associated with larger net purchases of foreign exchange. However, the persistence of estimated volatility in the foreign currency market is unexpectedly weak.

For net purchases of regional currencies Equation (5) is modified to exclude the interest rate differential. The overwhelming proportion of transactions in regional currencies are trade and services related, and do not include financial and capital transactions that might be sensitive to interest differentials. Such intra-regional financial and capital transfers as do occur normally take place in U.S. dollars. With this exclusion, the results suggest that the lagged regional currency and special payments are statistically significant and the R-squared is just as high as for the two preceding models. The significance of the coefficient on special payments reflects bulk expenditures for trade and services rather than debt service, the main factor in the case of U.S. dollar transactions. Because most tourists to Barbados originate from the U.S., U.K and Canada the insignificance of the coefficient of tourism activity on net purchases of regional currency is not unexpected. As in the total and U.S. markets, there is a low persistence in estimated volatility in the regional foreign currency market.

Conclusions and Next Steps

We have developed a model of the behaviour of the foreign exchange market under Barbados' pegged exchange rate, which shows that changes in the differential between U.S. and local interest rates had a significant effect on the foreign exchange market, during the period of observation, supporting the hypothesis that inflows and outflows of foreign currencies respond to interest differentials, in a way that is consistent with the UIP condition. The estimates also reveal significant variation in foreign exchange market activity between the "high" and "low" seasons for tourism, and significant impact of large discrete payments, mainly for debt service. However, the market exhibits weak persistence in the estimated volatility of daily foreign exchange transactions. It may be that the influence of large discrete transactions, which by their nature exhibit no persistence, is even greater than our estimates reveal.

Further empirical work needs to be done, to uncover the underlying pattern of volatility persistence which appears to be present from inspection of the raw data, but which our estimates have failed to detect. Possible directions for follow-up investigation include the use of longer time series, refinement of the transactions variables (tourist season and exceptional payments), and estimation procedures that allow for the possibility of discontinuities, asymmetries and nonlinearities in the reaction of foreign exchange to interest differentials.

References

- Bollerslev, Tim, 1986, "Generalised Autoregressive Conditional Heteroscedasticity," *Journal of Econometrics*, 31, pages 307-27.
- Bollerslev, Tim, Ray Chou and Kenneth Kroner, 1992, "ARCH Modelling in Finance," *Journal of Finance*, 52.
- Flood, Robert and Andrew Rose, 2001, "Uncovered Interest Parity in Crisis: The Interest Rate Defense in the 1990s," Centre for Economic Policy Research (CEPR) Discussion Paper No. 2943, September.
- IMF, 2005, "Adopting the euro in Central Europe - Challenges of next steps in European integration," Occasional Paper No. 234, April.
- Kaminsky, Graciela and Sergio Schmukler, 2003, "Short-Run Pain, Long Run Gain: The Effects of Financial Liberalization," NBER Working Paper, June.
- Koedijk, Kees, James Lothian and Mathijs van Dijk, 2006, "Foreign exchange markets: Overview of the special issue," *Journal of International Money and Finance*, 25:1, February, pages 1-6.
- Quinn, Dennis, 1997, "Correlates of Changes in International Financial Regulation," *American Political Science Review*, 91:3, pages 531-51.
- Sarno, Lucio, 2005, "Towards a Solution to the Puzzles in Exchange Rate Economics: Where Do We Stand?" *Canadian Journal of Economics*, Vol. 38, No. 3, pages. 673-708.
- Sarno, Lucio and Mark P. Taylor, 2002, *The Economics Of Exchange Rates*, Cambridge University Press.
- Sarno, Lucio and Mark Taylor, 2001, "Official Intervention in the Foreign Exchange Market: Is It Effective and, If So, How Does It Work?" *Journal of Economic Literature*, XXXIX:3, September, 439-69.
- Worrell, DeLisle, 1998, "Capital Market Integration: Capital Controls And Exchange Rate Stability," *Social and Economic Studies*, 47: 2&3, June/September.

Table 1a. Foreign Exchange Market Volumes

Values (BDS\$000)	Purchases (% of transaction days)	Sales (% of transaction days)	Net Purchases¹ (% of transaction days)
Zero	na	na	17
Up to 200	40	41	43
Up to 500	65	66	58
Up to 1000	78	76	68
Up to 2000	87	85	81

Table 1b Goods and Services 2004 (BDS\$000)

	Year	Avg daily	1% of Avg Daily
Credits	3437400	9418	94
Debits	4110400	11261	113
Total	7547800	20679	207

Source: Central Bank of Barbados

Note: ¹ Absolute value

Table 2. Transactions by Currency Group (BDS\$M)

	US	Non-US	Regional	Other
<i>Purchases</i>				
Mean	782.3	322.7	286.5	36.2
Median	0	197.5	181	0
Maximum	170281	7254	7254	3454
Minimum	-10539	0	0	-53
Std. Dev.	4779.2	465.1	419.1	200.2
<i>Sales</i>				
Mean	747.9	395.5	310.6	84.9
Median	0	211.5	168	0
Maximum	33396	8696	7862	4931
Minimum	0	0	0	0
Std. Dev.	2513.8	657.9	568.0	305.3

Source: Central Bank of Barbados

Table 3: Summary Statistics of Transformed Data

	Net purchases_tot	Net purchases_us	Net purchases_rstot	Tbillsbread
Mean	-38.52098	34.19131	-24.50328	1.811297
Median	0.000000	0.000000	0.000000	2.330000
Maximum	17494.80	17791.80	1168.900	14.43500
Minimum	-6442.900	-6288.800	-815.7000	-21.41000
Std. Dev.	2040.892	2002.561	221.9387	8.321946
Skewness	3.656756	4.077359	0.053110	-0.598501
Kurtosis	33.83405	38.74606	7.619959	2.968206
Jarque-Bera Probability	65023.63 0.000000	87042.12 0.000000	1382.756 0.000000	92.84015 0.000000
Sum	-59861.60	53133.30	-38078.10	2814.755
Sum Sq. Dev.	6.47E+09	6.23E+09	76495791	107552.7

Table 4: GARCH-M Estimation Results

VARIABLES	Net Purchases of Currencies (NPFX)		
	ALL	US	Regional
C_{mean}	-640.05 (-74.63)	-600.54 (-307.22)	3.94 (1.46)
h	0.90 (74.65)	0.89 (307.12)	-0.04 (1.48)
$NPFX_{t-1}$	0.99 (10688.98)	0.99 (438266.3)	0.95 (389.58)
T Bill Spread	0.009 (162.66)	0.003 (435.33)	
T Season	0.22 (62.98)	0.01 (43.28)	-0.04 (-0.22)
S Payment	-28.19 (-14.24)	-22.20 (-45.89)	-17.25 (-3.67)
C_{var}	535341.4 (91200.1)	524509.1 (507874.0)	7621.09 (8.63)
\mathcal{E}_{t-1}^2	0.14 (44.73)	0.23 (130.66)	0.15 (2.41)
h_{t-1}	-0.06 (2236.62)	-0.16 (37867.79)	-0.08 (2.29)
R^2	0.86	0.84	0.84
DW	1.95	1.98	1.96
Log Likelihood	-10692.50	-9497.29	-8452.62
Akaike Info Criterion	13.79	12.25	10.89

Notes: Numbers in parentheses are z – statistics

Figure1

Mean Values, Purchases and Sales

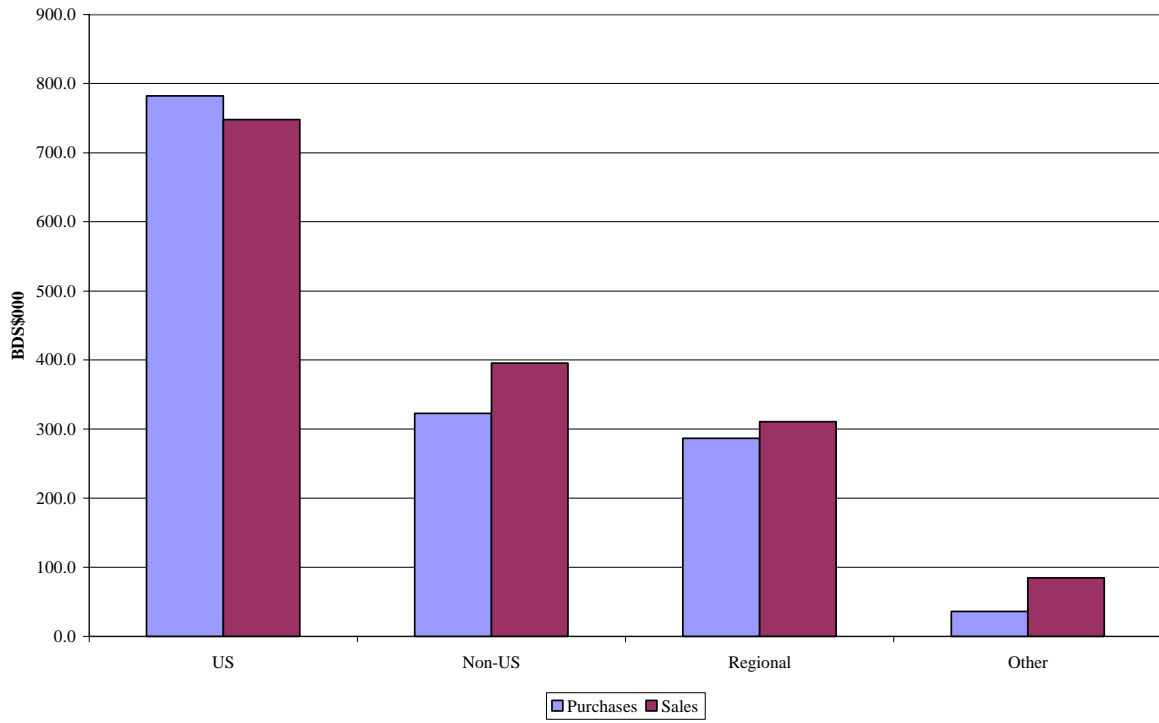
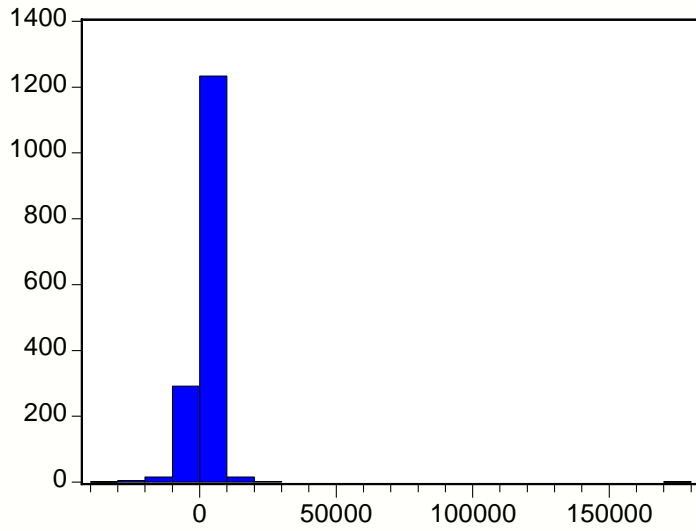


Figure 2

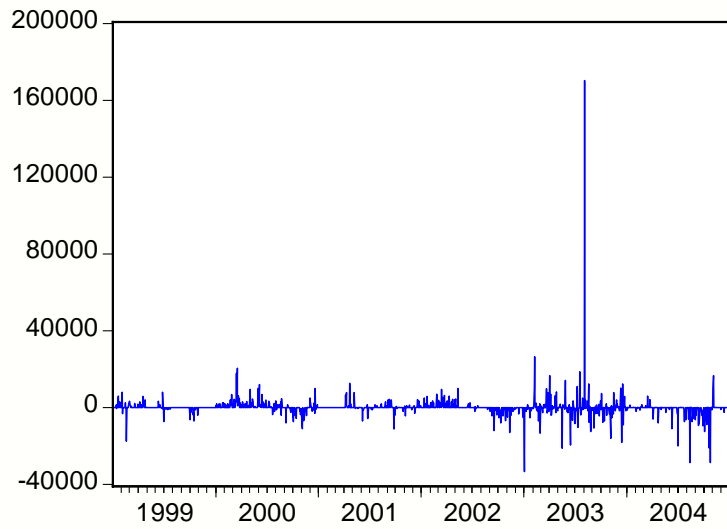
Net Purchases US\$, Distribution
BDS\$000



Series: NETPURCHASES_US
Sample 1/05/1999 12/31/2004
Observations 1564

Mean	34.36573
Median	0.000000
Maximum	170281.0
Minimum	-33393.00
Std. Dev.	5380.719
Skewness	19.90002
Kurtosis	645.6342

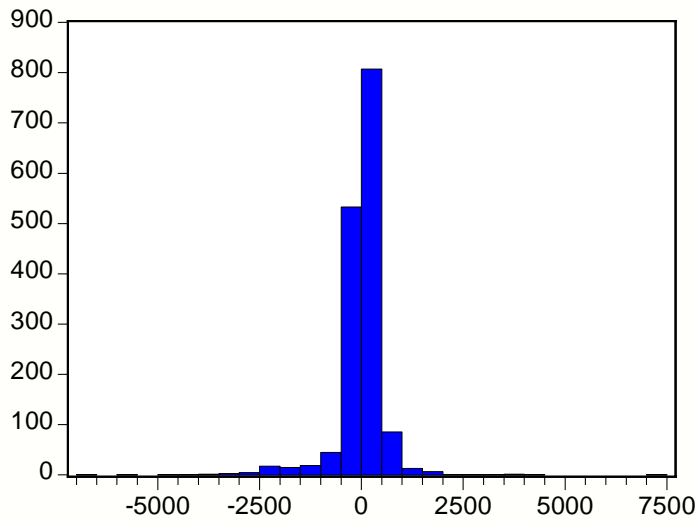
Jarque-Bera	27015671
Probability	0.000000



— NETPURCHASES_US

Figure 3

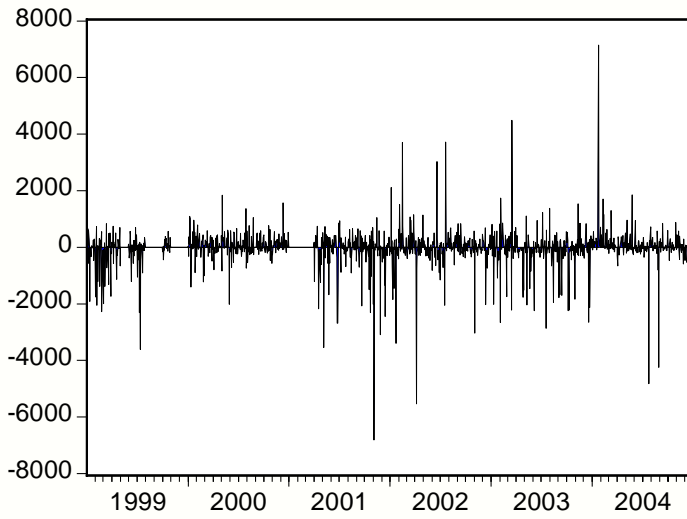
Regional Net purchases Distribution, BDS\$000



Series: NETPURCHAES_RSTOT
Sample 1/05/1999 12/31/2004
Observations 1564

Mean -24.26279
Median 0.000000
Maximum 7146.000
Minimum -6819.000
Std. Dev. 637.9442
Skewness -1.315804
Kurtosis 35.19944

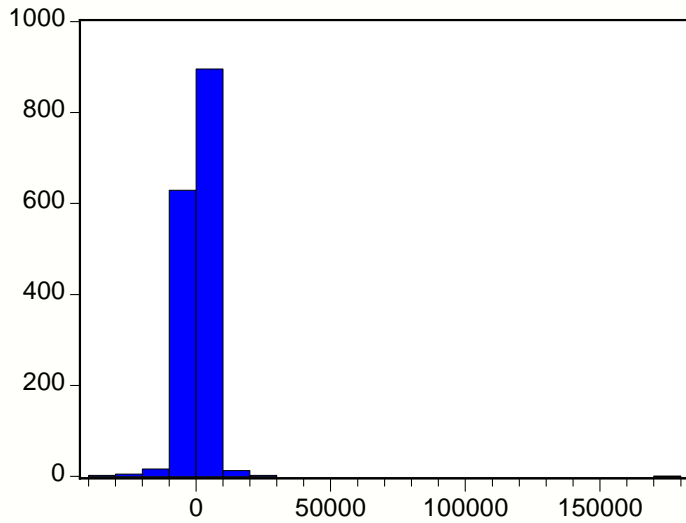
Jarque-Bera 68016.37
Probability 0.000000



NETPURCHAES_RSTOT

Figure 4 Total Net Purchases Distribution

Net Purchases, All Currencies, BDS\$ 000



Series: NETPURCHASES_TOT	
Sample 1/05/1999 12/31/2004	
Observations 1564	
Mean	-38.85422
Median	0.000000
Maximum	170227.0
Minimum	-33836.00
Std. Dev.	5446.755
Skewness	19.13529
Kurtosis	615.3430
Jarque-Bera	24530599
Probability	0.000000

Net Purchases, All currencies, BDS\$ 000

