
informes y estudios especiales

Brazil's Derivatives Markets: Hedging, Central Bank Intervention and Regulation

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Part I

1. Introduction

This report is a study of Brazil's derivatives markets. It examines their important role in the economy, and their role in monetary policy making by the Brazilian Central Bank (BCB). The first part of the report focuses on providing an analytical description of the derivatives markets in Brazil—how they operate and how they are regulated. Of special interest is the regulatory framework that has shaped the development of the derivatives markets and continues to influence their stability and efficiency.

The second section of the report focuses on the role of derivatives markets in Brazil's financial system and overall economy. Principally concerned with macroeconomic policy, it examines how the presence of derivatives markets affects the stability and efficiency of a large, open, developing economy like Brazil's. Of special interest here is the question of whether, and to what extent, derivatives markets create pro-cyclical pressure on key variables such as the exchange rate. This section also examines how derivatives markets are used by the BCB in conducting monetary and exchange rate policy.

The subject of this report is a challenging one for usual research methods. The over-the-counter segment of the derivatives markets is not very transparent, since reporting and disclosure requirements are rather limited. Thus, thorough information on the size, volume and use of this market is difficult to obtain, though Brazil offers much more data on this market than do other countries. In order to supplement the incomplete data, the authors conducted numerous and extensive interviews with representatives of all major types of participants in the derivatives markets, as well as representatives of the key regulatory and supervisory institutions. While the report does not directly quote from these interviews, much of the description of OTC markets reflects what we learned from the interviews and is found in condensed form in the descriptive analysis.

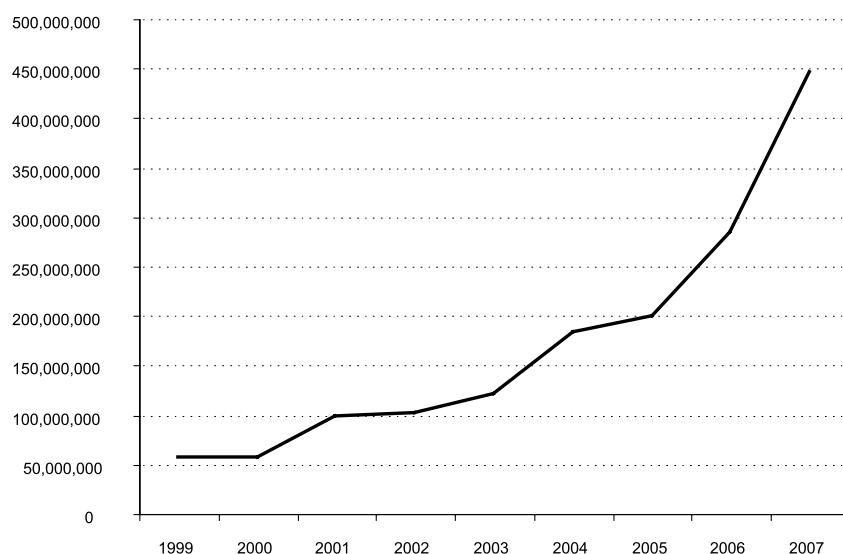
2. Size and importance

a. Overview

Derivatives markets are important for economies not simply because of their size, but more importantly, because of the various economic functions they perform in the economy.

Derivatives markets serve two important economic purposes: risk shifting and price discovery. Risk shifting, or “hedging”, consists of transferring risk from an entity that does not want to assume it, to another that is more willing or able to do so. In this process, derivatives can help to discover the price of underlying assets, commodities, events and certain types of risk. Price discovery might not otherwise occur—due to transactions costs, dispersion of the underlying item or the conglomeration of many values or risks in a single object. One of the most important price discovery functions consists of discovering the price of the underlying item (e.g., an exchange rate) over time. In Brazil, the futures traded on the BMF exchange provide price discovery for the *real*-dollar exchange rate. Also important is price discovery in relation to interest rate futures markets, which play a major role in the fixed income market by preceding the government bank market in lengthening maturities of fixed interest rate contracts.

FIGURE 1
BMF TRADING VOLUME
 (Number of contracts)



Source: BMF data.

Risk shifting is important for a variety of economic reasons. Importers and exporters hedge their foreign exchange exposure to make the local currency value of their importing costs and export revenue less volatile. Firms borrowing in foreign markets hedge the local currency value of their foreign currency debt payments. There is also a large demand for hedging fluctuating domestic interest rates. Brazil's history of high inflation and high nominal interest rates has left its credit markets with a concentration of short-term loans and debt instruments, and the derivatives markets have served as hedges against fluctuations in these short-term interest rates. Even purely domestic enterprises face risks due to commodity price fluctuations, as well as indirect impact from changes in exchange and interest rates. Also, the cost of complying with environmental and climate-change requirements can be hedged through futures and options on emission abatement permits ("carbon trading"). Lastly, some foreign investors—including hedge funds—have used derivatives markets for investment strategies such as capturing the large interest rate differential between Brazil and most developed economies, as we shall discuss in more detail below.

While the sheer size of these markets makes them a major economic factor, their size and rapid growth also reflect the significance of their economic functions in the economy. Box 1 illustrates their size, and places them in relation to some familiar economic variables, as a yardstick. For example, the sum of outstanding OTC market derivatives registered at CETIP plus the open interest at BMF is greater than the market capitalisation of listed corporations in Brazil and larger than the outstanding public debt. The amount of outstanding open interest is equivalent to 80% of GDP. Meanwhile, trading volume at the BMF is already 1.392% of GDP—not including OTC trading reported to CETIP, options traded at BOVESPA² and OTC trades with overseas entities that are not reported in Brazil.

² Bolsa de Valores de São Paulo.

BOX 1
COMPARISON: DERIVATIVES MARKET AND KEY ECONOMIC VARIABLES

(Some figures in us dollars and some in reals)

Derivatives Amounts and Trading Volumes				
CETIP ^a (end of June 2007)				
Outstanding amounts: Swaps			-	209.9 billion reals
Options	-	-	-	0.42 billion reals
NDF	-	-	-	43.4 billion reals
Total	-	-	-	253.7 billion reals
BMF ^b				
Open Interest (July 2007)				
Futures & Options	-	-	1 609 billion reals	(69% of GDP)
Trading Volume				
Futures & Options	-	-	32.34 trillion reals	(1 392% of GDP)
<i>Memo:</i>				
Total O.I. BMF + CETIP	-	-	1 863 billion reals	(80% of GDP)
Central Bank Exposure: from swap with reset	-	-	\$ 23.3 billion	
GDP figures (2006)				
GDP	-	-	2 323 trillion reals	
Traded Goods	-	-	\$ 245 billion	
Foreign Portfolio investment (first 4 months of 2007)	-	-	\$ 9 billion	
DFI (first 4 months of 2007)	-	-	\$ 18.8 billion	
	-	-	\$ 10 billion	
Financial Measures (April 2007)				
Market capitalization:	-	-	2 161 billion reals	
Public debt:	-	-	1 500 billion reals	
^a CETIP defined in Appendix 2;				
^b Brazilian Mercantile and Futures Exchange				

Source: Based on Central Bank of Brazil and IBGE.

The BMF derivatives exchange in São Paulo is the fifth largest futures exchange in the world.³ A total of 248 million contracts were traded in 2006, and daily trading volume recently reached a new record level (3.88 million contracts with a notional value of US\$ 167.2 billion on 8 June 2007). This was led by record high interest rate futures trading, which reached a new high of 3.16 million contracts. During January and February of 2007, BMF was the second fastest growing futures exchange in the world.⁴ The market in overnight interest rates here is one of the fastest growing in the world—162 million contracts in 2006, versus 121 million in 2005—ranking it twelfth in the world. The BMF maintains open-outcry or “pit” trading for many of its contracts. BMF was demutualised in 2007 and held an IPO in November of 2007.

In addition to the futures and options traded at BMF, Brazil's stock exchange (the Bovespa) offers options trading at its São Paulo location, and is the seventh largest futures and options exchange in the world, with a total of 288 million options contracts traded in 2006. Bovespa and BMF offer electronic trading.

³ According to the Futures Industry Association (FIA) and following the merger of CME and CBOT.

⁴ According to the Futures Industry Association (FIA).

Bovespa, which is dominated by stock-index and single-stock options, is authorised under current law to trade forwards, futures, call and put options on single stocks and stock indices, stock futures contracts, stock forward contracts, and warrants (non-standard options) issued according to CVM Instructions nos. 223 and 328.⁵ Most of the options traded on Bovespa are call options, and only a tiny fraction of trading volume is in put options.⁶ The volume of options trading is concentrated in single-stock options on just a few major Brazilian corporations listed on the Bovespa stock exchange.

b. Over-the-counter markets

Brazil's OTC derivatives market is similarly large and fast growing. Like other countries with established OTC derivatives markets, it is dominated by a few large dealers. In contrast to other countries, the majority of inter-dealer trading is conducted through exchange trading. Also in contrast to other countries, reporting requirements make these OTC markets relatively transparent.

CETIP data on the OTC market show that:

- In 2006, 9.6 million OTC derivatives trades were registered with CETIP, and their notional value was 4.7 trillion *reals*.⁷
- Outstanding OTC derivatives registered with CETIP as of the end of 2006 totalled 1.48 trillion *reals*.
- The trading volume of NDF (non-deliverable forwards) in the *real*-US dollar OTC market in 2006 totalled 114 billion *reals*, with over 26,000 trades reported.

⁵ CVM, the Comissao de Valores Mobiliarios, is Brazil's national securities and derivatives regulatory agency. Also included are stocks and securities issued by publicly held companies registered with the CVM, debentures (simple or convertible to stocks), commercial paper, and stock certificates.

⁶ See below for description of call and put options.

⁷ As a matter of convention here, we designate the Brazilian currency in italics as *real* or (plural) *reals*.

3. Market instruments

A good general definition of a derivative is the following:

A derivative is financial contract whose value is derived from an underlying asset or commodity price, an index, a rate or an event. Derivatives commonly go by names such as forward, future, option, and swap, and are often embedded in hybrid or structured securities.

Derivatives known as futures and options are traded on exchanges where centralised trading allows for everyone in the market to quote prices, observe all other participants' quotes and execute trades in full view of all participants. This multilateral trading environment has a levelling effect that allows everyone to have the same view of the market and the same opportunity to trade at the same prices. Exchange traded derivatives are usually cleared and settled through a central clearing house.

Derivatives known as forwards, options and swaps are typically traded over-the-counter (OTC). In contrast to exchanges, OTC market trading is bilateral. End users or "customers" contact dealers for price quotes, and execution prices are known only to the two participants.⁸ In some cases, brokers can function to facilitate multilateral dissemination of quotes and announcements of execution prices. In bilateral trading, market participants contact each other for quotes and to execute trades at prices

⁸ In some markets, brokers collect data on prices and volumes by survey, and report back to the market at the end of the day.

that remain private and are not visible to the public. However, the use of electronic bulletin boards allows some market participants to post and see price quotes—and sometimes transactions—in a multilateral fashion.

The **forward contract** is the simplest and oldest type of derivative contract. It constitutes an obligation to buy or borrow (sell or lend) a specified quantity of a specified item at a specified price at a specified future time. A forward contract on foreign currency, for example, might involve party A buying (and party B selling) *reals* for U.S. dollars at US\$ 0.4844 on 1 December 2007. A forward interest rate contract might involve party A borrowing (and party B lending) US\$ 1 million for three months (91 days) at a 5.25% annual rate beginning 1 December 2007.

Consider the case of a farmer making a forward contract to sell soy beans upon harvest. The farmer needs to plant corn in the spring (when the spot price is a given), in order to harvest in the fall (when the spot price is unknown). In order to avoid the risk of a falling price, the farmer may make a forward contract to sell 50,000 bushels of soy beans to a local grain dealer on a specific date following harvest, at a price that is fixed in advance. In this case, the farmer is said to have sold soy beans forward in order to hedge (via a short forward position) his *long* soy bean position in the field. The grain elevator may either hold the long price exposure as a speculation, or hedge the risk by entering another forward contract as a seller.

This example is a typical commodity forward contract, but the basic economics of the transaction are the same for forward contracts in securities, loans or other items. Delivery terms may vary according to the nature of the underlying cash or spot market, or may call for cash settlement (in which case the contract is known as a “non-deliverable forward”). In addition, there may be “MAC” clauses for “major adverse conditions” or “acts of god”, allowing for the early termination or abrogation of the contract.

A **foreign exchange forward** is a contract to buy/sell a certain amount of foreign currency at a specific exchange rate on a specified future date. The forward exchange rate is the price at which the parties to a contract commit themselves to exchange currency on a specified future date, and the price is usually negotiated so that the present value of the forward contract at the time it is traded is zero. This is referred to as trading “at par” or “at the market”. As a result, no money is paid at the commencement of the contract, because the market value of a par contract is zero. Even when a contract is at the market, the counterparties sometimes agree to post collateral in order to ensure each other’s fulfilment of the contract on the specified date.

Making delivery, or taking delivery, of foreign currency as a part of foreign exchange forward trading is sometimes unnecessary, expensive, inconvenient or subject to taxation or capital controls. In order to avoid the unwanted transactions costs, derivatives markets sometimes trade foreign exchange forwards that are “cash settled” in one currency.⁹ These are known as **non-deliverable forwards** (NDF). The NDF market in Brazilian *real*-US dollars has developed both in Brazil and in off-shore markets—mainly New York and London. NDF perform the same risk shifting function as normal forward contracts, but are settled by a single payment in *reals* if the contract is in Brazil, or in dollars if the trade is off-shore. The payment is equal to the *real* or dollar value of the difference between the forward contract rate and the spot exchange rate on the contract’s end date.

Futures contracts are like forwards, but they are highly standardised, publicly traded and cleared through a clearing house. Whereas forwards are usually traded OTC, the futures contracts traded on organised exchanges such as the BMF or Bovespa are so standardised that they are fungible—i.e., substitutable one for another. Fungibility facilitates trading, because all traders know

⁹ Some of these costs (e.g., taxes) are unwanted, from the market operators’ point of view. From a fiscal and public point of view, however, these levies increase tax compliance.

the contents of the contracts, which are identical, and the netting of contracts bought and sold reduces margin requirements and counterparty risk. The result is greater trading volume and market liquidity. Liquidity, in turn, streamlines the way in which relevant market information is reflected in market prices—a process known as *price discovery*.

In contrast to OTC markets, futures trading—whether in exchange “pits” or on electronic trading platforms—is public and multilateral. Pit trading involves the very public statement (most often in the form of a yell or shout) of a bid or offer price, in a process known as “open outcry”. Open outcry is not only public, but also multilateral, because all market participants can *hit* a bid, *lift* an offer, or raise or lower a quote. In this environment, all market participants can observe bid, offer and execution prices, and thus know whether the prices that they are agreeing to are the best generally available market prices. In a non-transparent, OTC trading environment, this is more difficult to ascertain, and information is more likely to be incompletely disseminated.

How do futures contracts work? As an example, consider a farmer who hedges by entering into a futures contract to sell coffee at US\$ 162 per 60-kilogram bag. The standard contract size is 100 bags, and thus the notional value of the contract can be thought of as US\$ 16,200. The margin requirement for the position is, let us suppose, US\$ 1,000 in initial margin to open the position, and the maintenance margin is the same. On the first day, the price rises by US\$ 1.00, so the value of the short position loses US\$ 100 (one dollar times the 100 bags specified in the contract). The clearing house debits US\$ 100 from the farmer’s margin account, which now has a balance of US\$ 900. This new amount is below the maintenance level, and so the farmer must add funds to the account (cash or Treasury securities) until it reaches the initial margin level. If the price moves in favour of the farmer, then the clearing house credits the farmer’s margin account and the farmer is allowed to withdraw excess funds from it. This process of adjusting the margin account to daily changes in futures prices is known as marking the position to the market value, or, for short, “marking to market”.

BOX 2 THE INTERBANK DEPOSIT INTEREST RATE FUTURES

The most actively traded futures contract in Brazil is the “*DI Futures*” which is traded on the BMF. It is the futures on the overnight Certificate of Deposit interest rate. The notional value of the contract is 1,000,000 *reals*. Its value is the capitalised daily interbank deposit rate, measured from the trading day and up to the day prior to expiration. Like nearly all other contracts traded on BMF, it is settled on a cash basis in *reals*.

The DI refers to the interest rate on Interbank Deposits, and is the capitalised daily average of one-day interbank deposit rates, as calculated by CETIP between the trading day and the day preceding the expiration date of the contract.

Source: Prepared by the author.

How does the farmer, who is a short-hedger, benefit from the futures contract? Suppose that the futures price falls. The farmer closes out the position by buying a coffee contract in the days prior to expiration (otherwise the farmer would have to deliver the coffee at one of the locations designated in the contract, which is most likely less convenient than the local dealer). What is left of the farmer’s margin account? In the process of marking to market the farmer’s short position, the clearing house will have added a *net* amount (100 bags times the drop in price) to the farmer’s margin account over the holding period of the futures contract. This payment to the farmer should offset the effect of a decline in the market price of the coffee harvest. In short, this daily mark-to-market process generates a cash flow, as funds are added to or taken from the margin account. These changes, taken together, adjust the final gain or loss on the position to the initial price at which the contract was traded.

TABLE 1
AGRICULTURE FUTURES AND OPTIONS ON BMF
(Open Interest, July of 2007, notional value, x 1,000 reais)

Sugar Futures	1 619
Sugar Futures	9 965
Cotton Futures	18 842
Live cattle futures	1 021 829
call options on futures	31 228
put options on futures	21 390
Feeder cattle futures	313
Arabica coffee futures	1 227 142
call options on futures	226 256
put options on futures	325 052
Corn futures	45 950
call options on futures	94
put options on futures	458
Soybean	146 077
call options on futures	17 852
put options on futures	9 452
Alcohol	210
Ethanol	13 160
Total Agriculture	3 115 269

Source: Based on BMF.

An **option** contract gives the buyer or holder of the option (known as the “long” options position) the right to buy/sell the underlying item at a specific price during a specific time period in the future. In the case of a call option on the price of equity shares traded on the Bovespa (or, similarly, on one of the stock indices) the option holder benefits to the extent that the price of the underlying stock exceeds the option’s strike price (or “exercise price”). Thus, the call option is the cash-settled equivalent of having the right to buy the stock at the strike price when the market price exceeds the strike price. The value of exercising the option is the difference between the (higher) market price and the (lower) strike price. If the market price remains below the strike price during the period when the call option is exercisable, the option will not be worth exercising, and will expire worthless. The premium paid initially for buying options, added to the depreciation of their value over the life of the contract, makes options more expensive than futures.

The holder of a put option stands to benefit to the extent that the market price of the underlying stock falls below the strike price. Thus, the put option is an economic benefit equivalent to the right to sell the underlying stock at the strike price when the market price has fallen below it. A put option allows the holder to hedge against a fall in the market price of a foreign currency, securities or commodities. Hence, the put option functions as a sort of price insurance guaranteeing a floor or minimum price. Like an insurance policy, the price paid for the option is called a *premium*.¹⁰ The value of exercising a put option is the difference between the (higher) strike price and the (lower) market price.

¹⁰ Although the term *premium* is the same in the two cases, the economic and legal meaning is different, because an insurance policy compensates for a loss due to damages, while the option pays off whether or not there is a loss, and regardless of whether any loss is due to a specified type of damage.

While the holder of the option has the *right* to exercise the option to buy or sell at the more favourable strike price, the writer or seller of the option (holding the “short” options position) has the *obligation* to fulfil the contract if it is exercised by the option buyer. The writer of an option is thus exposed to potentially unlimited loss, while the buyer can lose no more than the premium paid for the contract.¹¹ The writer of a call option is exposed to losses from the market price’s rising above the strike price, while the writer of a put option is exposed to losses if the price of the underlying item falls below the exercise price.

The BMF also provides for trading in **flex options**. The trading of flex options on exchanges such as BMF produces options contracts that are customised (usually with regard to size, date and strike price) in a transparent, multilateral trading environment. They too are cleared and settled through a clearing house, rather than on a bilateral basis between a dealer and a customer.

OTC options traded in the OTC market have the same basic structure as those traded on exchanges. Sometimes they differ due to minor customisation in terms of size, maturity and strike price. There are also various modifications of the basic structure, some of which produce so-called “exotic” options.

One class of more complicated options, known as **barrier options**, involves knock-in or knock-out provisions. A knock-in option requires that the underlying price or interest rate rise above, or fall below, a critical threshold before the option is exercisable. For example, a knock-in call option might require that the spot price fall below a specified threshold before the option is exercisable, while a put option might require the spot price to rise above a specified threshold before the option can be exercised. A knock-out option contains a provision that prevents the option from being exercisable if the underlying price rises above, or falls below, a specified threshold. By reducing the exposure of the option writer, these barrier provisions are designed to lower the option premium and thus reduce the cost of purchasing the option.

Another class of exotic options is called **path-dependent options**. Also known as “Asian options”, these are structured so that the option holder receives the best price, or, alternatively, the average price, of the underlying asset during the exercise period. This look-back provision means that the options buyer will get the highest (or lowest) exercise price (on a call or put, respectively), and is thus not faced with the dilemma of when to lock in the benefit by exercising the option. A similar look-back structure grants the holder of the option the average price of the underlying asset over the period specified in the option. This provision, too, eliminates the dilemma of when to exercise the option.

Swaps. Swap contracts are one of the most recent innovations in derivatives contract design, unlike the more traditional forwards, futures and options. The first swap contract was designed as a foreign currency swap, and was between the World Bank and IBM in August of 1981.

The basic idea in a swap contract is that the counterparties agree to swap two different types of payment. Each payment is calculated by applying some interest rate, index, exchange rate, or the price of some underlying commodity or asset, to a notional principal. The principal is considered notional because the swap generally does not require a transfer or exchange of principal (except for foreign exchange and some foreign currency swaps). Payments are scheduled at regular intervals throughout the swap’s tenor, or lifetime. When the payments are to be made in the same currency, only the net amount of the payments is made.

For example, a “vanilla” interest rate swap is structured so that one series of payments is based on a fixed interest rate and the other on a floating, or variable, interest rate. A foreign exchange swap

¹¹ Given the nature of this discussion, it does not examine details such as commissions, exchange fees and transaction taxes.

is structured so that the opening payment buys the foreign currency at a specified exchange rate, and the closing payment sells it at a specified exchange rate. (The result is the economic equivalent of combining a spot transaction and a forward transaction). A foreign currency swap (also called a cross currency swap) is structured so that one series of payments is based on one currency's interest rate and the other on another currency's interest rate. This is the economic equivalent of exchanging loan payments in two different currencies. An equity swap has one series of payments based on a long (or short) position in a stock or on a stock index, while the other is based on an interest rate or a different equity position.

Interest rate swaps create market risk or future price exposure in connection with interest rates. This allows for either hedging of interest rate risk or speculation in the fixed income area. Payments in interest rate swap contracts are designed to match interest rate payments on bonds and loans. This allows a corporation that has borrowed through a variable interest rate loan, or a floating rate note, to swap back into a fixed interest rate position.

Foreign exchange swaps differ from interest rate swaps in that the principal is exchanged (since the payments, which must be in currency, constitute the "principal" in the transaction). A typical foreign exchange swap begins with a transaction that is indistinguishable from a spot transaction in which one currency is exchanged for another at the current spot rate. The second, or close leg, is a forward transaction at the present forward foreign exchange rate. Few foreign exchange derivatives in Brazil are structured as foreign exchange swaps. This is due to the tax and legal benefits of structuring derivatives as "cash settled" transactions, which averts the cost and inconvenience of conducting foreign currency transactions to execute the settlement of the derivatives.

A **forward rate agreement** (FRA) is a forward contract that specifies an interest rate to be paid/received on a specified loan or other debt beginning on a specific date in the future. It is a forward contract version of contracts such as the Eurodollar futures contracts traded on the Chicago Mercantile Exchange. It enables borrowers—or lenders—to determine today what they will be paying/receiving to borrow/lend in the future. It can also serve as a vehicle to speculate on interest rate movements.

The counterparties to a FRA can either take delivery (i.e., actually fulfil the debt obligation that was specified in the trading of the forward rate agreement) or cash settle the capitalised gain or loss arising from interest rate changes since negotiating the forward transaction.

Another important type of swap is the **cross currency swap** (CCS). Also known as a foreign currency swap, this is distinct from the foreign exchange swap. The CCS is designed to exchange a stream of payments in one currency for a series of payments in another. In order to hedge foreign exchange exposure arising from foreign borrowing, the stream of payments is generally chosen to match that of a bond or loan. If the payments on a US dollar loan are LIBOR plus 2.5%, then the CCS can be structured so that it receives US dollar payments equivalent to LIBOR plus 2.5% in exchange for making fixed rate payments in the local currency. In this way, a foreign loan combined with a CCS allows a local enterprise to borrow in deeper capital markets in the United States or Europe, but to make payments in local currency.¹²

Brazil has its own unique history with the CCS. Its roots are in the use of exchange rate linked debt instruments by the Brazilian Treasury (and, for a time, by the BCB) issued in order to lower the cost of borrowing for the Treasury/BCB, while providing a way for Brazilian firms to hedge exchange rate risk.¹³ The foreign exchange derivatives market was sometimes too one-sided to facilitate efforts by both long-hedgers and short-hedgers to operate in the foreign exchange derivatives market. The

¹² Dodd and Griffith-Jones (2006) discussed this practice in detail, because it is an important part of the Chilean derivatives market.

¹³ Treasury securities were NTN-D series, and the BCB securities were NBC-E.

one-sidedness was partially due to the effects of the managed crawling-peg exchange rate policy of the *Real* Plan. By issuing the NTN-D series of US dollar linked notes, the Treasury was acting as the long-*real* counterparty of last resort. This meant that the Treasury was paying a US dollar rate of interest on Brazilian debt, plus any currency depreciation, but making the payments in *reals*. The prices established in the market from trading in these securities showed the *real* interest rate equivalent of hedged lending in dollars—covered interest parity.

BOX 3 THE CUPOM CAMBIAL

Perhaps the most important derivatives contract in developing Brazil's market is the "*cupom cambial*". It is traded both as a swap in the OTC market and as a future on the BMF. The swap can be cleared through BMF or converted to a futures contract through its exchange-swaps-for-futures arrangement.

The *cupom cambial* is priced in basis points as an interest rate equal to the spread between the overnight interbank deposit interest rate and the exchange rate variation prior to maturity of the contract. As a matter of interest rate parity, the *Cupom Cambial* is the economic equivalent of the onshore US dollar interest rate. The interest rate (ID) is the interbank deposit interest rate, and is the capitalised daily average of one-day interbank deposit rates, as calculated by CETIP between the trading day and the day preceding the expiration date of the contract. The exchange rate is that determined as the closing offer price in the spot market as determined by the central bank (called the PTAX rate).

For example, the *cupom cambial* futures for one year out is priced at 96,327.23. This represents a discount factor of 96.32723% of the notional principal of 100,000 *reals* one year in the future. If the maturity is exactly one year, then the following equation is an approximate expression of the price (where P is the price and id is the rate differential between the local overnight interbank deposit rate and the expected depreciation on the *real*).

$$P = \frac{100,000}{(1 + i_d)}$$

Prices are quoted as an interest rate expressed as an annual rate on a 360 day basis. The notional value of the swap contract is \$50,000 US dollars (100,000 *reals* for the futures). Like nearly all other contracts traded on BM&F, it is settled on a cash basis in *reals*.

Source: Based on BMF.

The BCB ceased issuing its version of the securities (the NBC-E series) in 2002, and the Treasury began to move away from using these securities in 2003. In their place, however, the BCB created a derivatives contract called the *cupom cambial*, which replicated the risk exposure and price discovery of the dollar-linked notes, but which, as a derivative, had only notional principal and thus did not directly constitute public debt. This contract was, in essence, a cash settled CCS in which a future *real* or US dollar payment was discounted by the difference between the local *real* interest rate and changes in the *real*-US dollar exchange rate. (See Box 3 for a description of the *cupom cambial*.) The swap is traded in the OTC market following BCB announcements of quotes for swap amounts and maturities. The contracts can in turn be moved onto the BMF as futures-type contracts, and there is considerable trading in the futures market.

This market has most often been one-sided. BCB initially represented the lion's share of long-*real* open interest, and more recently it has represented almost all of the short-*real* open interest, as it attempts to dampen upward market pressure on the currency's value.

In summary, Brazil's derivatives markets include a wide array of exchange traded and OTC contracts. Appendix 3, below, contains the list of "allowable reference variables" for trading derivatives contracts, as set by Brazil's securities regulator, the CVM.

One thing conspicuously missing is credit derivatives. While trading in credit derivatives is permitted by Brazilian financial regulators, the market has yet to develop. One reason is that Brazil does not have a large or deep market in corporate bonds, and so there is far less need to hedge or speculate on the credit risk spreads embedded in these securities. Credit derivatives on bank loans are feasible, but involve greater valuation problems because there is no independent market price. Moreover, Brazilian banks are currently very liquid—heavily invested in short-term government paper—and not big lenders to the non-financial sector. The national development bank, BNDES, is a major lender to non-financial corporations and small producers, but it is set up to manage its credit risk exposure internally.

4. Structure of Brazil's derivatives markets

There are basically two ways in which derivatives are traded in Brazil. One is through organised derivatives exchanges (see discussion of BMF and Bovespa), and the other is through OTC markets. This section of our report provides an analytical description of these two types of derivatives markets and the economic significance of the differences.

a. Exchange-traded derivatives

Brazil has two important exchanges that trade in derivatives, in the form of futures and options. One is the BMF (see Box 4), which also trades foreign exchange and government securities; the other is the Bovespa (see Box 5), which not only trades options on stocks and stock indices but is also Brazil's stock exchange.¹⁴

Clearing houses are used to clear exchange-traded futures contracts. Trades from the exchange floor are reported to the clearing house, and the contracts are written anew, or *novated*, so that the clearing house becomes the counterparty to every contract. The clearing house thus assumes the credit risk of every contract traded on the exchange.

¹⁴ Bovespa lists some 400 companies, representing US\$ 1.17 trillion in market capitalisation.

BOX 4

BMF—BOLSA DE MERCADORIAS E FUTUROS^a

Key Features

Demutualised, recently reorganised as a corporation

Offers pit trading as well as electronic trading

It has the status of self regulatory organisation (SRO)

Contracts: foreign exchange, interest rates, equity index, commodities

- Futures, options on futures and flex options on US Dollar exchange rate
- Futures and swap on ID x U.S. Dollar spread (DDI or cupom cambial)
- Futures and options on futures on overnight interest rate (DI)
- Futures, options on futures and flex options on stock indices (Bovespa Index)
- Futures and options on futures for gold and other commodity
- Futures on Global Bonds and US Treasury notes
- Futures on inflation indices

Acts as a clearing house for derivatives, foreign exchange and bonds

Provides registration of OTC derivatives

Source: Based on BMF.

^a The BMF uses the English, Brazilian Mercantile and Futures Exchange.

The presence of a clearing house at the centre of market trading means that every market participant has a top-ranked (AAA) credit risk as a counterparty. Instead of having to perform a credit evaluation of every actual and potential trading partner, the futures trader has only to evaluate the creditworthiness of the clearing house, and in United States futures exchanges, the clearing houses all carry a AAA credit rating.

Clearing houses have top-ranked credit ratings because they are very well capitalised. This makes their ability to perform on, or fulfil the terms of, futures (and options) contracts all but certain. Their capital includes the paid-in capital plus the callable capital of clearing members of the exchange. In addition, the clearing house maintains emergency lines of credit with an array of banks. The clearing house also collects, and updates, the margin accounts of all those who hold positions in exchange-traded contracts on a daily basis, and even more frequently if required.

The front line defence against contract default is the use of margin accounts. Although futures contracts are highly leveraged, margins are generally sufficient to cover 98% of the largest daily price movement that has occurred in the preceding six months. The BMF used modern risk management models to set minimum market requirements. For example, the Arabica coffee contract (6,000 kilograms) has a notional value of about 16,000 *reals* and a margin requirement of 1,400 *reals*, while the DI interest rate futures contract has a 100,000-*real* notional value and a 2,000-*real* margin for the contract that matures in one year, while the US dollar futures contract has a US\$ 50,000 notional value and a 7,700-*real* margin for the front month contract. The exchange also reserves the right to make intra-day margin calls to protect the integrity of the futures (and options) market in the event of an exceptionally large price swing. If a trader fails to meet margin requirements, the exchange reserves the authority to liquidate the trader's positions.

BOX 5 BOVESPA – BRAZIL'S STOCK AND OPTIONS EXCHANGE

Key Features

- Exchange traded equity shares and bonds
- Options on single stocks
- Futures on single stocks
- Options on stock indices
- Currently organised as a mutual exchange, although likely to convert to corporate structure in near future.
- Currently an SRO, but this function will likely be subcontracted to an outside vendor after incorporation.
- Although at least 40 stock options are listed for trading, most of the derivatives volume is in a few single stock options. Only a little trading volume in options on stock indices or single stock futures.

Source: Based on BOVESPA.

Another implication of *novation* is that it allows existing positions to be offset or completely liquidated by entering into contracts from the opposite side. For example, party A has bought 10 dollar-*real* futures contracts in November. This existing long position of 10 contracts can be reduced to 2 contracts—either immediately or at any time up to the November expiration—by selling 8 contracts. The short selling of 8 contracts offsets all but 2 of the existing long positions of 10 contracts.

BOX 6 A BRIEF HISTORY OF BRAZIL'S EXCHANGES

Derivatives trading in Brazil can be traced back to 1917 when derivatives on agricultural products—mostly coffee and cotton—were traded on the Bolsa de Mercadorias de São Paulo (BMSP). During the 1970s, a number of new agricultural contracts were added to the exchange's trading floor. Gold futures, and other derivatives contracts, were later added in 1980.

About the same time, in 1979, financial futures and options on equity shares began trading at Brazil's two stock exchanges—Bolsa de Valores do Rio de Janeiro and BOVESPA in São Paulo. This was followed in 1983 by the formation of the Brazilian Futures Exchange (Bolsa Brasileira de Futuros—BBF), which traded futures and options on single stocks as well as stock indices. Further competition arose in 1986 with the formation of the Bolsa de Mercadorias e de Futuros (BMF), trading, amongst other derivatives contracts, futures on stock indices. By 1997, the three derivatives exchanges had merged to form a single futures exchange with the old initials of BMF, but with a new national name—the Brazilian Mercantile and Futures Exchange (which also took over the public securities business from BVRJ, with the rest going to BOVESPA).

Today, BOVESPA is a major stock and stock index options exchange and the BMF serves as a national clearing house for foreign currency, bonds, commodities, carbon emission credits, futures, options and OTC traded derivatives. It facilitates trading in a range of derivatives contracts that include not only futures and options, but also flex options and futures-like swaps. It offers both traditional “open outcry” in pit trading and an electronic trading platform.

Source: Prepared by the author.

b. Over-the-counter markets

In addition to the two exchanges, Brazil has large and well-established “over-the-counter” or OTC derivatives markets. OTC markets are organised around a set of dealers who form the core of the market by making bid and ask quotes and by taking the opposite side in every trade. Dealers are thus known as “market makers”. This differentiates OTC derivatives markets from organised exchanges, where trading is multilateral.

Some OTC derivatives markets have brokers who improve the flow of information in the market, helping end users to find the best prices available from the various dealers or, sometimes, from other end users. Brokers provide information on price quotes and execution prices. In some parts of the market, brokers use electronic bulletin boards, which are managed by the brokerage firms to enable their clients (i.e. the dealers but not necessarily end users) to observe the market and instantaneously post quotes to every other market participant in the broker's network.

In addition to the dealers, OTC derivatives markets include customers or end users who trade derivatives in order to hedge or speculate.

The end users are the ultimate customers in the derivatives marketplace. They trade in order to hedge existing risks, to adjust their hedges as a function of changes in the market, or to speculate. End users include a variety of firms and investors, including small and medium-sized banks (which, unlike larger banks, do not act as derivatives dealers), as well as pension fund managers and other institutional assets managers who employ derivatives to manage their portfolio risks. End users also include non-financial corporations using derivatives to hedge market risk (arising from variations in interest rates, exchange rates and commodity prices) and to structure their financing so as to lower borrowing costs. Non-financial corporations may face exchange rate volatility risks if they are importers or exporters, and if they are producers or heavy users of commodities they may face risks because of commodity price volatility. End users also include hedge funds employing derivatives in their investment strategies.

Brazil's OTC derivatives market, like others, is usually bifurcated, with an inter-dealer market where dealers trade exclusively with one another, and a customer market where end users trade with available dealers. In the inter-dealer market, dealers maintain price quotes to each other and dealers can quickly lay off the risk of buying or selling to a customer. This market is the more liquid of the two, and the bid-ask spread is smaller than the spread that dealers offer their customers. The difference in bid-ask spreads is a key way in which dealers consistently make money through trading volume.

Dealers do not trade through an automated quote-matching system, although dealers in some markets do use electronic brokers' screens that convey information on quotes and execution prices. In other words, the screen merely relays information, and dealers must trade through the broker or telephone other dealers directly in order to execute trades. (Note that some dealers also use instant messaging to request quotes, and even to accept quotes.)

Some electronic trading platforms in Brazil allow dealers to post quotes and execute trades in the spot foreign exchange market. These electronic platforms in the spot market handle a large quantity of small, and sometimes large, transactions and replicate the experience of an exchange, except that they are not open to everyone.

The second portion of the OTC market consists of bilateral trading between dealers and their customers, known as end users. Trading here is usually negotiated by telephone, although dealers may offer their customers some proprietary electronic way of observing their quotes, and of communicating buy and sell orders. However, these electronic trading screens are bilateral trading devices that involve only the dealer's own quotes. To get a more complete view of the market, customers must contact several dealers, through whose screens they can observe the fuller range of market prices.

Although electronic bulletin boards and dealers' trading facilities have recently produced substantial changes in the OTC trading process, they are not fully multilateral until participation is extended to everyone in the market. Derivatives exchanges and stock exchanges, on the other hand, are truly multilateral, allowing everyone buying and selling in the marketplace to observe the quotes and trade at the same prices. Trading between dealers and customers remains essentially a bilateral market, because only one party is posting quotes, and only the dealer and the customer know the price at which the trade actually occurs.

Nonetheless, bilateral negotiation in OTC derivatives markets is often quick and efficient. Dealers have direct phone lines to other dealers as well as to their major customers, and instant messaging provides an additional means of fast, direct communication. A market participant can telephone a dealer, request quotes, and repeat the process with another dealer in a matter of a few seconds. Thus, a quick survey of several dealers can be completed in just a few seconds, to determine the prevailing price quotes in the market. A quick series of such calls can give a dealer or an active investor a view of the market that is close to, though not entirely the same as, the view provided in a multilateral market. Of course, a cursory survey of market quotes is not as useful as seeing the prices at which all trades are actually being executed. Also, clearing in OTC markets is conducted bilaterally. Even if trades are actually brokered, the counterparties must ultimately confirm and settle trades on a bilateral principal-to-principal basis.

- **Derivatives Dealers**

There are reported to be 15 to 20 dealers in Brazil's OTC derivatives markets. In economic terms, a dealer is a market participant who is actively making price quotes and executing buys and sells at the prices quoted. Not every dealer is of the same size or is active as a dealer in every type of derivative product. Major dealers include Bradesco, Santander, ABN Amro, Etao, Unibanco, Citigroup, Deutsche Bank, HSBC, CSFB (which claims to have 15% of the customer market), USB-Pactual, BNP Paribas, JP Morgan, BBM and Banco do Brasil.

There are also derivatives dealers in external markets like New York and London. These dealers often trade in NDF contracts in order to facilitate trading without having to regularly clear payments through Brazil's imperfect spot foreign exchange market.

- **Brokers in OTC Derivatives Markets**

The brokers' role in OTC derivatives markets is to consolidate information, and to allow the major participants to trade anonymously. Dealers often want to conceal their investment strategies, and are concerned about their strategy being revealed when they conduct large sales or purchases in the market. For instance, they may be concerned that the market will move away from them as they try to execute large volumes of transactions. By trading through a broker, a dealer can maintain anonymity and benefit from a centralisation of market information by posting quotes and hitting other dealers' quotes through a broker.

- **Customers (End Users) in Derivatives Markets**

Customers, or end users, are those parties trading derivatives for hedging or speculation, but not with the expectation of immediately reversing the transaction to capture the bid-ask spread in the market. They are not market makers, even though some active participants such as pension funds and hedge funds provide a great deal of liquidity to the markets.

Other, unidentified, customers include hedge funds employing derivatives markets for a variety of reasons. There are also likely to be some high net-wealth individuals with access to the markets. Hedge funds are believed to play a significant role in Brazil's OTC derivatives markets, but the particulars remain unknown because of the markets' limited transparency. As discussed below, they are believed to be engaged in investment strategies such as the carry-trade for capturing the interest rate differential between the *real* and other currencies.

5. Key features and special innovations

In several important ways, Brazil's derivatives markets are similar to those in many other countries. In other ways, however, Brazil's markets are innovative, with special features that make them unique and can serve other developing countries as a model for "best practices".

The following section spells out some of the important but conventional features, identifying, for each, one or more special aspects of the way in which Brazilian derivatives markets have developed.

a. Exchange- and OTC-traded derivatives

As mentioned above, Brazil, like many countries, has both exchange-traded and OTC derivatives markets. And as in many other countries, derivatives are traded on exchanges both electronically and through open-outcry or "pit" trading, though the traditional pit trading, as in most of the world, is rapidly being replaced by electronic trading.

In contrast to most countries, the exchange-traded derivatives market in Brazil is a site of inter-dealer trading, providing dealers with low-cost, liquid trading that they use to lay off trades with customers or generally adjust their positions according to their risk management strategies. Derivatives dealers use the exchange for market-making activities in futures, options and swaps on interest rates, foreign exchange, equity indices and commodities. In turn, they provide their customers derivative instruments in the OTC market. There are relatively few dealer-to-dealer transactions in this OTC market.

Unlike all other countries with OTC derivatives markets, Brazil has reporting requirements for OTC transactions. Every transaction must be reported to one of two central registration and confirmation organisations—the BMF or CETIP—in order to be considered legal and enforceable. These reporting requirements naturally include exchange-traded and exchange-cleared instruments as well. Only OTC trades with overseas counterparties escape the reporting system, since they are booked off-shore.

As a result of these reporting requirements, the OTC markets in Brazil are the most transparent in the world. All market participants, as well as others throughout the economy, can obtain aggregated data about these markets. And market surveillance authorities, including the BCB and the securities commission, have access to all of the information reported. This strengthens their ability to detect and deter manipulation, as well as monitor the build-up of large positions that might pose systemic threats to the financial system.

b. A market dominated by interest rate and foreign exchange derivatives

Like most other countries, the vast majority of derivatives trading in Brazil is in various interest rate and foreign exchange derivatives. Brazilian markets also offer an array of equity derivatives, including stock index futures and options, single stock options and single stock futures. As in most countries except Korea, where stock index options trading on the Kospi 200 index is “off the charts”, equity derivatives trading constitutes the second or third largest share of the market in Brazil.

Also as in most other countries, commodity derivatives markets in Brazil are substantially smaller than derivatives markets for financial rates, indices and prices. And as in many countries, this has occurred despite the fact that commodity derivatives trading is what first established these markets. Agriculture commodities futures and options are the only derivatives that are not cash-settled in Brazil, involving, instead, physical delivery of the underlying reference item against the contract.

In contrast to most countries, however, many of Brazil's fixed income securities and foreign exchange derivatives markets are much more highly developed than the underlying cash markets. The interest rate futures market in Brazil regularly lists and trades contracts with a longer maturity than the cash market for government securities. BMF lists and trades interest rate futures with maturities of 15 years, although open interest and trading volume declines sharply after six years. This leading role can be attributed to several factors, including high credit rating, liquid markets, lower trading costs, innovative management and leverage.

Similarly, the Brazilian futures market for foreign exchange-related futures is superior to the foreign exchange cash markets in terms of price discovery, liquidity and trading efficiency. Some analysts also attribute at least the initial larger development of these derivatives markets to capital controls on the cash markets. One factor contributing to this development is the existence of some remaining limitations on legal convertibility of the currency in the spot market, and another is the relatively higher taxes on cash market transactions.

c. A wide array of contracts, including carbon emissions

Like derivatives markets in most other countries, Brazil's offer a wide variety of contracts—not only on interest rates, foreign exchange rates, equity prices, commodity prices listed on exchanges or traded OTC, but also on exchange-traded ethanol and carbon emissions derivatives.

The array of derivatives products offered on markets, although wide, is limited by government regulation. Even largely unregulated OTC markets in the United States cannot trade derivatives using agricultural products as reference assets. And even regulated futures exchanges cannot list and trade contracts that reference onions as the underlying commodity.¹⁵

In Brazil, the national regulatory entity (CVM) determines what reference items can be used to write and trade derivatives contracts. (The list is provided in Appendix 3, below.) Credit derivatives may be traded, but insurance regulations prohibit insurance companies from trading these instruments, thus eliminating a critical share of the market in these products. As mentioned above, the small size of Brazil's corporate bond market limits the scope for credit derivatives markets. As a result, they have not become established in Brazil.¹⁶

While it might first seem that regulations restricting the range of derivatives could lead to stagnation or impede innovation, several important innovations in contract design are to be found in Brazil's derivatives markets.

One notable special innovation is a standardised swap contract that is traded like a futures contract on the BMF exchange. The contract grew out of a design for a government security that was linked to the *real*-dollar exchange rate. When that structured feature of the securities was later allowed to be stripped and sold separately, the foundation was laid for an identical OTC cross-currency swap. The next innovation was the design of a futures style contract that could be priced as the discounted value of a certain future US dollar value versus a capitalised amount of *real* interest payments on the *real* value of the principal on the trading date. The effect of this pricing structure had the effect of taking the very steep *real* yield curve out of the forward curve for *real*-dollar and making it a more effective tool in hedging against exchange rate fluctuations.

BOX 7 THE CASADA

The *casada* is in some ways a forward, and in some ways a swap, but it is definitely traded like a futures contract. The contracts are standardised so as to be fungible; purchases and sales are netted into a single long or short position, and the gains and losses on the contract are credited or deducted daily from margin accounts.

Source: Prepared by the author.

Another important innovation solved the problem of the basis risk between the cash-settled foreign exchange futures contract and the noisy exchange rate in the cash or spot market. This basis risk became an economically important issue as the price discovery shifted to the futures market, while investors and international traders came to need the actual foreign currency to effect certain transactions—thus leaving the currency hedge less effective.

The solution was a design with variable maturities and a structure like a cross-currency swap of the US dollar against the local overnight interest rate (not entirely unlike the *cupom cambial*). The price is the present value of the capitalised *real* interest payments against a value of the dollar on the front month futures contract. This swap is known as the “*casado*”.

¹⁵ The Commodity Futures Modernisation Act of 2000, which largely deregulated the OTC market, made it clear that derivatives on agricultural commodities could not be traded OTC. The special “protection” for the onion market dates back to the 1980s, when a widespread failure of the onion crop caused severe disturbances in the onion futures market.

¹⁶ There is nonetheless a great volume of trading in off-shore credit derivatives markets on Brazilian sovereign debt credit risk.

d. Clearing house and Central Counterparty

Like derivatives exchanges in other countries, Brazil's have a clearing house. Transactions are reported to the clearing house, and the contracts are then rewritten *de novo* so that the clearing house becomes the central counterparty for every market participant. The standardisation of futures and options contracts allows the positions to be netted into a single long or short position reflected in the new contract with the clearing house. By placing itself between all market participants in the clearing process, the clearing house offers every investor a counterparty with a AAA credit rating. At the same time, the clearing house serves to concentrate the credit risk in the system in a single organisation.

By offering every market participant a high credit rating as a counterparty, the clearing house broadens potential participation in the market. It also enhances the ability of small and large entities alike to trade on an equal footing, and takes credit risk out of the pricing of derivatives, as there is negligible risk of any one investor on either side defaulting on the contract.

Moreover, like derivatives market in at least some other countries, the exchange clearing house is playing a role in clearing OTC-traded derivatives. Aside from being good business for the clearing house, this activity takes some of the large and growing counterparty credit risk out of the OTC market and concentrates it in the clearing house, where it can better be managed, and where it is subject to regulatory oversight.¹⁷ For example, the London Clearing House began clearing OTC derivatives about 10 years ago, and the clearing houses at some United States derivatives exchanges offer an Exchange-Futures-for-Swaps facility that allows OTC participants to move their transaction into the clearing house and onto the exchange.

Brazil's BMF clearing house offers some features that are not found everywhere else. It employs a straight-through process for posting collateral (i.e. margin), so that investors post collateral directly with the clearing house, rather than with their broker or clearing broker. The clearing house also has a multi-tiered capitalisation to enhance its creditworthiness. It has five levels of credit protection, beginning with customer margin. If that collateral is insufficient, the firm that brokered the trade is responsible. Next in line of responsibility is the clearing member to whom the broker is tied, followed by the Special Fund of Clearing Members. Last is BMF itself.

Another special feature of the BMF clearing house is its risk management modelling. While sophisticated modelling is common at such financial institutions, the BMF is exemplary in going beyond VAR approaches, which rely heavily on recent levels of volatility, to develop its own approach. The BMF clearing house method employs a longer-range viewpoint for volatility measures, and also includes scenario and worst-case analyses in order to address potential "fat-tail" events that might not show up in the analysis of data.

An additional feature that the BMF offers its customers is the opportunity to use portfolio margining to economise on the use of collateral. While there are examples of cross-margining at exchanges elsewhere, the BMF method is sophisticated and produces more efficient results. (Over-margining can unnecessarily reduce participation in the exchange-traded derivatives market and push trading into the OTC markets, where there is little or no collateral).

Another exemplary feature of the BMF clearing house is its role in the Brazilian economy's overall payment and settlements system. It clears spot or cash market transactions in foreign exchange, securities and derivatives. Its role in clearing securities facilitates the posting of collateral on derivatives positions (as well as repo transactions). Moreover, it has its own bank to facilitate its

¹⁷ The most recent BIS survey of global derivatives markets reports that the gross market value of outstanding OTC derivatives worldwide exceeds US\$ 11,000 billion.

access to the real time gross settlements payments system, and to enable it to offer segregated bank accounts and make immediate payments between customers, brokers and the clearing house.

e. Collateral in the OTC derivatives markets

Like most countries, Brazil has no direct regulatory requirements for the use of collateral in the OTC trading of derivatives contracts. Except for those voluntarily cleared through BMF, OTC contracts are cleared bilaterally, which creates credit risk for each bilateral counterparty. Counterparty credit risk created through derivatives trading is unlike other types of credit risk exposure because of the potential for the derivatives exposure to grow dramatically as a result of changes in market prices. An exposure of US\$ 10 million has the potential to double or triple due to changes in interest rates or exchange rates. In contrast, a US\$ 10 million exposure from a loan will not grow unless the lender decides to lend more.

The use of high quality liquid assets as collateral can greatly reduce this credit risk, as well as the exposure—both current and potential—created by derivatives trading. Prompt adjustment of collateral, just as margin is adjusted on an exchange, would go a long way toward reducing this credit exposure.

In the absence of collateral, the counterparties treat the exposure like any other credit exposure, and try to keep it within prudent limits. The costs and limitations involved in keeping track of each counterparty's credit make this credit risk management practice problematic from a prudential perspective.

Brazil's OTC derivatives markets are like those in other developed and developing countries in that they operate with no collateral requirement or standards, and thus often end up operating without collateral. The implementation of rules along Basel II lines will have an impact on the use of collateral, since derivatives dealers will have to construct risk assessment models that account for the possibility of one or more counterparties defaulting on derivatives contracts as a result of significant market price movements. That potential credit risk will generate a capital charge unless the dealer can get its customers to post collateral to mitigate the credit exposure. Already, some major dealers are increasing their use of collateral. However, the use of collateral depends on how the major financial institutions discipline themselves in the context of Basel II, and whether they will bow to market pressure and cater to customers.

The effectiveness of collateral in this context will also depend on how well banks can get their customers to participate. At present, the banks acting as OTC derivatives dealers are unable to get end users such as non-financial corporations to use collateral. Competition between dealers for customers limits the extent to which banks can pressure their customers to agree to such a practice. As a result, there is virtually no use of collateral in the OTC marketplace. This is a case where regulatory policy can improve upon market outcomes, to make financial markets more stable and efficient.

6. Tax, legal and regulatory framework

Several key policy measures shape Brazil's derivatives markets. They fall in the categories of tax, legal and regulatory frameworks. We describe these measures below, and discuss how they impact the derivatives market.

a. Tax features

There are a few tax provisions that directly affect derivatives trading. Some are the result of the broader tax system, which is designed to address tax compliance problems by taxing revenues instead of income, and bank account payments instead of value added. There are also fees, such as those often charged by market regulators to cover the costs of market surveillance and enforcement, as well as income tax-like provisions.

- The revenue tax called “PIS-COFINS” (from PIS, or *Contribuição ao Programa de Integração Social*, and COFINS, or *Contribuição para o Financiamento da Previdência Social*) is essentially a tax on revenues or cash flows. It does not allow for adjustments from netting. While this affects all derivatives trading, it has the effect of taxing OTC derivatives transactions more heavily than exchange-traded derivatives, where *de novo* netting reduces the amount of cash flow transactions. As a result, it creates a bias towards exchange trading.
- Transaction or debit tax (CPMF or *Contribuição Provisória sobre Movimentação Financeira*) is a charge of 0.38% applied to all bank deposits and payments. It applies only to the profit or

loss payments on exchange-traded contracts, not to the notional amount. This has the effect of taxing OTC derivatives more heavily, thus moving trading volume onto the exchanges.

- A regulatory fee to pay the costs of CVM is a capital market user fee based on the market capitalisation of the firm as well as the volume of transactions in its publicly traded securities.
- Since some options premiums are taxed like fixed income instruments, they are sometimes structured like “collars” or synthetic futures to reduce the amount of the premium for tax arbitrage reasons, and thereby reduce tax liability.
- OTC trades in NDF can be rolled over without causing a tax liability on the gains, while similar trading on BMF generates a tax liability, because the gains are taxed contemporaneously. This does not encourage greater exchange trading.
- Brazilian residents can trade derivatives with non-residents and be exempt from income tax if the transaction is intended to hedge cash flows denominated in a foreign currency or foreign interest rate (see #2012).

b. Legal provisions

There are two key legal provisions that directly shape derivatives trading.

- Bankruptcy laws do not provide a legal basis for the netting of derivatives contracts. This promotes the use of exchange-traded derivatives by dealers and the most active market participants, because they effectively net when the clearing house assumes the role of counterparty and rewrites the net amount of the contracts *de novo*. Thus, the gross obligation to the clearing house reflects the net buying and selling of contracts. This automatically nets positions, and it puts a AAA rated counterparty on the other end of the remaining positions.
- The law requires reporting of derivatives transactions as a condition for their legal enforceability.

c. Regulatory provisions

The following are some key regulatory provisions:

- Exchange as well as OTC trades must be reported to BMF or CETIP in order to ensure legal certainty. This leads to greater market transparency and surveillance capability in the OTC markets.
- Surveillance authority is provided through the BCB, CVM and the exchanges.
- Imperfect currency convertibility encourages the use of cash-settled foreign exchange derivatives, and helps to move the price discovery of exchange rates into the futures market. Also, the cash settlement of derivatives helps to protect against market manipulation and can reduce transactions costs.
- Regulatory restrictions on “reference” items used for derivatives contracts are determined by the CVM. These apply to banks and other financial institutions and are enforced by the CVM and BCB. (see Appendix and Rule #2873).

- The hurdles posed by regulation of cash securities transactions, securities lending and repurchase agreements have led to increased use of derivatives as a means of sidestepping regulatory obstacles.
- There are no collateral requirements for OTC derivatives markets. The utter lack of collateral in OTC markets is in sharp contrast to the sophisticated risk management practices in exchange-traded markets.
- Pension funds are required to employ only standardised derivatives contracts. This allows market prices to be used as verification when reporting exposures, as well as gains and losses on positions. Pension funds are also required to use derivatives with a central counterparty (thus promoting the use of a clearing house for exchange and OTC derivatives).
- CVM sets price limits on daily trading in exchange-traded derivatives, thereby setting rules to encourage orderly market activity. This prevents destabilising price movements and discourages excess price movements by giving market participants time to properly digest new market information.
- Speculative position limits are orderly market rules designed to reduce systemic risk and deter market manipulation by limiting the market share of any single investor.
- CVM has the power to designate certain organisations as self-regulatory organisations, delegating them the authority to perform certain regulatory functions. BMF, for example, has the status of a self-regulatory organisation.
- Capital requirements are set and enforced by the BCB.
- Foreign exchange exposure is limited to 60% of capital. (This was reduced to 30% during the crisis, from August to September of 2002).
- The BCB provides VAR models, options pricing models and other technical research to many banks that have no research departments of their own. This raises the standard of risk management in the banking sector, but it also results in many banks' having the same VAR model, which leads to greater correlation (pro-cyclicality) in the banking sector.
- Insurance companies are prohibited from trading credit derivatives, thus hampering the development of a credit derivatives market. While a regulatory framework is in place to accommodate these instruments, regulations prohibit the participation of insurance companies in this market.
- "Certificates" issued to retail investors have characteristics of derivatives or structured securities, but without the usual protections accompanying securities transactions (raising concerns about "suitability" and pricing).
- Accounting rules assume that derivatives are speculative. A derivative may be treated as a hedge to some existing risk, and it is very difficult to show that it is a hedge to another derivative.
- Hedge funds are regulated by CVM. They are "open"—not closed—funds, and report their net asset values daily (which, like the value of mutual funds, may be found in newspapers). They are organised as partnerships, with full liability among investors. Hedge fund regulation in Brazil treats hedge funds as true investment advisors. They do not have fiduciary ownership of funds. Instead, banks hold the accounts and monitor their use, and hedge fund managers are authorised to make transactions decisions with those funds. This provides greater safeguards against embezzlement.

Part II

7. Derivatives markets in an open, developing economy

This section examines the implications of derivatives markets for several key macroeconomic problems, and the impact of the markets on traditional macroeconomic policy tools.

a. High inflation and exchange rate volatility

A struggle with very high rates of inflation has played an important role in Brazil's macroeconomic history. This is crucial for understanding both macroeconomic policy and the development of the derivatives markets. Between 1981 and 1994, the annual inflation rate exceeded 100% in all years except one. The rate accelerated in the early 1990s before peaking in 1993 at an annual rate of over 2,700%. This promoted the use of various indexing mechanisms as a means of mitigating the impact of high inflation on the economy. It also encouraged companies to manage risks associated with real interest rate fluctuation, and this led to the development of Brazil's market in interest rate and exchange rate derivatives.

The set of policies known as the *Real* Plan included a short-lived fiscal adjustment and monetary reform, and to the use of the exchange rate as a nominal anchor (a managed crawling peg). The *Real* Plan was successful in reducing inflation, which declined to 15% in 1995 and 9% in 1996,¹⁸ while the *real* exchange rate appreciated (see chart below).

¹⁸ Inflation measured as the percentage change in the General Price Index, as calculated by the Getulio Vargas Institute.

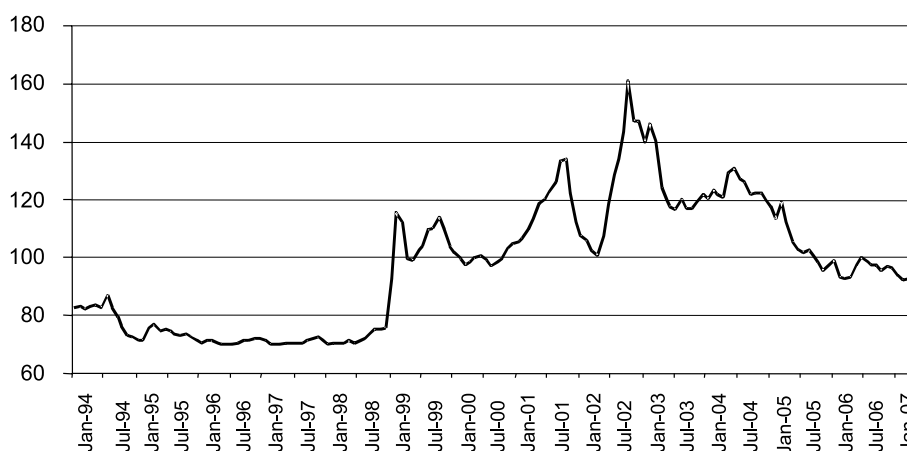
The high real interest rates and lack of long-term lending in domestic credit markets, combined with lower foreign exchange rate volatility, encouraged a shift into lower cost foreign borrowing by the private sector.¹⁹ Private sector foreign indebtedness grew by 211% between 1994 and 1998, reaching US\$ 130 billion by the end of 1998.

Concerned about risk exposure from large amounts of foreign currency denominated debt, the economic authorities stepped in to provide a foreign currency hedge as a way of reducing foreign currency mismatches on private sector balance sheets, and to safeguard the administered exchange rate regime. The initial tool was through US dollar linked Treasury notes (NTN-D) denominated and payable in local currency according to changes in the *real*-dollar exchange rate. Later, the BCB issued similar notes (NBC-E), and the increasing issuance of securities linked to foreign exchange accelerated in 1997 and 1998, as the Asian crisis, followed by the Russian crisis, exploded on global financial markets. By December 1998, the outstanding stock of exchange rate linked notes reached 21% of domestic public debt, as compared to 9% in December 1996.²⁰ Later, BCB ceased issuing these securities, carrying out their policy interventions instead with similarly structured derivative instruments (Bevilaqua and Azevedo, 2005).

Meanwhile, trading volume in foreign exchange futures contracts had grown very rapidly. Average daily trading volume in foreign exchange futures contracts rose from US\$ 590 million in July 1994 to US\$ 13.3 billion in November 1997.²¹

One consequence of this growth was that the price discovery of the *real*-dollar exchange rate moved from the spot market to the futures market.²²

FIGURE 2
THE REAL-DOLLAR REAL EXCHANGE RATE.
BRAZIL: REAL EXCHANGE RATE, 1994-2007
(2000 index = 100)



Source: ECLAC, based on Central Bank of Brazil.

¹⁹ The borrowing costs were not necessarily lower on a risk-adjusted basis, if risk of devaluation was considered.

²⁰ Data from Central Bank of Brazil.

²¹ Measured in notional value. Data from BMF.

²² This view appears in Franco (2000), and was also stated many times in interviews.

b. Derivatives and exchange rate regimes

The Russian debt payment moratorium caused deep financial turbulence in other emerging markets, including Brazil, and had a larger impact on Brazil than did the 1997 East Asian financial crises. The fact that Russia had defaulted led to different investors' radically reassessing the risks of investing in developing economies. In these circumstances of increased risk aversion among international investors, Brazil was seen as especially vulnerable in view of its exchange rate (which was seen as overvalued), large and growing current account deficit, deteriorating fiscal position and short maturity of its public debt. It was arguable that the lessons of the Mexican crisis—showing that the costs of currency appreciation increase slowly but explode suddenly—were to some extent ignored by the Brazilian economic authorities (Cardoso, 2000).

However, Brazil was also deeply affected by the fact that it represented roughly 40% of emerging market portfolios, and was impacted by specific hedging strategies used by investors suffering losses in Russia and elsewhere. A new unanticipated channel for contagion—relatively unexamined in the literature—was the Brady bonds. Goldfajn and Gupta (2003) adduce econometric evidence that the most likely location of contagion from Russia to Brazil was short-selling in offshore Brady markets. An interesting parallel can be drawn with Hong Kong, where short-selling in the stock exchange by off-shore speculators was used as an instrument to attack the currency during the East Asian financial crisis.

Goldfajn and Gupta (2003) also show that foreign investors' withdrawals from Brazil played a major role during the Russian crisis, and that these were not reversed. This was in contrast with the Asian crisis, when foreign investors' withdrawals from Brazil were smaller, and were reversed a few months later.

Important regulatory points can be made drawing on this Brazilian experience. Though United States securities law includes restrictions on repeated use of short-selling by a broker, by limiting the price ("tick") at which the second short sale of a security can be made (the "tick rule"), this could not be applied off-shore, as no reference price is fixed to any exchange. Similarly, margins on short sales also tend not to apply to offshore trading. As Franco highlights, this creates a specific *regulatory asymmetry* between domestic and offshore markets, and the asymmetry amplified contagion from the Russian crisis.

Further, the aggregate short-selling of Brazilian bonds seemed very high relative to amounts of bonds available. Indeed, a number of actors—including large international banks—were reportedly *selling short bonds that they did not have*. Brazilian investment banks complained that when they attempted to follow provisions approved under International Securities Market Association Rules to force delivery—which would imply short sellers having to buy the bonds to cover their positions—these large international banks threatened that if they did this, *their credit lines would be cut*. It can be argued that another regulatory asymmetry arises here, as a large market maker (an international bank) is favoured over a small player (a national bank) that challenges a short sale which jeopardises market integrity.

Gustavo Franco correctly argues the need to regulate transactions in secondary markets, where these transactions are subject to manipulation and unfair practices. Such regulation would be complementary to regulation of hedge funds. This should be done globally—whether such activity occurs offshore or onshore.

c. The 1999 crisis

It is noteworthy that in late 1998 there was again some pressure on derivatives future markets, with the notional value of open-interest reaching a stock of US\$ 36 billion. The BCB again played a crucial role by intervening on the long side of the *real*.

Between August and December 1998, Brazilian foreign exchange reserves fell sharply, as short-term capital flows reversed. (The largest monthly decline of reserves—US\$ 21.5 billion—occurred in September 1998.) In spite of huge increases in interest rates, promises of a new fiscal package and a large US\$ 41 billion loan from the IMF, pressure on the currency continued. Indeed, large rises in interest rates increased fiscal deficits and raised fears of a sovereign default.

In January 1999, the *real* was floated. Although the previous exchange rate management policy had failed, Brazil's macroeconomic performance during 1999 was better than expected and significantly less severe than in other emerging countries hit by currency crises. Inflation did not rise much, and certainly did not spiral out of control as many had feared. Rather than falling, GDP grew by 0.8% in 1999, before regaining higher growth rates (though still very low, averaging only 1.8% over the 1999-2003 period).

Several factors explain why the 1999 crisis was not more disruptive of growth.²³ One important reason was that the private sector, and especially the non-financial corporate sector, had hedged its dollar liabilities by purchasing dollar linked securities and by taking short *real* positions in the futures markets. This hedging had been facilitated by the issuance of dollar linked securities and similar derivatives trades by the Brazilian Treasury and BCB prior to the crisis. Although the prior provision of US dollar linked securities and derivative instruments had not been enough to prevent the collapse of the peg, the outstanding stock of these instruments implied that there were only mild balance sheet effects in the private sector, and practically no bankruptcies, even though the depreciation of the *real* was severe—30% between December 1998 and March 1999.

The hedging limited the impact on banks' loan portfolios, as well as on their funding cost from foreign liabilities. It thus helped avoid generalised financial distress or a credit crunch. This, in turn, protected economic growth more generally, although, as pointed out above, growth was mediocre. On the negative side, the fact that the public sector had to bear most of the cost led to an increase of *public debt*, estimated at 7% of GDP during 1999. This was almost entirely due to the effect of the devaluation of the foreign exchange-linked public debt and other public securities (Bevilaqua and Azevedo, 2005). To some extent, it could be argued that this was an implicit "rescue" agreed in advance.

Brazil faced external shocks again in 2001, beginning with financial contagion associated with the crisis in Argentina and increased risk aversion following the terrorist attacks on September 11, 2001. These shocks intensified pressure on the currency and increased demand for hedging in the private sector. The greater demand for foreign currency led to pressures on the *real*, which fell 28% between January and October 2001. One of the BCB responses was to provide a hedge through net placements of US dollar linked securities to mitigate the effects of increased demand for foreign exchange hedging on banks and non-financial corporations. Again, largely due to these transactions and the devaluation, net public debt increased that year by nearly 4%, reaching 53% of GDP.

d. The 2002 Crisis

During 2002, the exchange rate came under intense pressure. One factor was a global rise in risk aversion following the Enron bankruptcy and the Argentine crisis and default. Another was the international financial markets' over-reaction to the prospects of an electoral triumph by Lula and the Workers' Party. This pushed up credit spreads on Brazilian Treasury debt and fostered expectations of currency depreciation. The spread between Brazilian dollar denominated bonds and equivalent United States Treasury bonds increased from 700 basis points to 2,400 in roughly three months. At the same time, the exchange rate depreciated approximately 40% between May and October 2002.

²³ As Gottschalk (2004) points out, one of these factors is that the Central Bank floated the currency when reserves were still relatively high. Another is that the financial system had been strengthened in the years after the Mexican crisis.

The confidence crisis in the financial markets did not provoke a deeper crisis, partly because of a major IMF loan (the largest in IMF history), which provided the BCB with foreign exchange reserves. The loan was negotiated by the outgoing Cardoso Administration, but its conditions had been pre-accepted by all of the presidential candidates. Furthermore, the leading candidate (who was to become president) began sending clear signals that he was ready to adopt the fiscal stance required to stabilise debt dynamics. Even though this played a valuable role in preventing the crisis, the tight fiscal stance and tight monetary policy contributed to very slow growth in the following years. Thus, as in 1999, Brazil managed to prevent a major crisis, but the policies implemented entailed mediocre growth.

Economic authorities also faced other difficult decisions. For example, mutual funds had not been implementing existing mark-to-market rules, and reported net asset values were in excess of the market value of securities. If more sophisticated investors pulled their funds out first, it would leave the smaller and less experienced investors holding the losses of the early leavers. Amidst the heavy pressure on the exchange rate, the BCB forced the funds to implement existing mark-to-market rules, resulting in their recognising losses on their balance sheets due to increased discounts on long-term public securities. Larger recognised losses led to withdrawals, which accentuated macroeconomic problems in the short term. This policy decision was later criticised widely.

As regards derivatives, BCB could not carry out futures operations after 1999 (see also section I), since this was explicitly prohibited by the IMF agreement.²⁴ Indeed, the Fiscal Responsibility Law that followed in 2000 further prevented the BCB from engaging in such transactions. In 2002, before the sharp depreciation, the BCB reintroduced the use of FX derivatives through a different mechanism. It started to replace Treasury US dollar linked notes with FX swaps. According to Bevilaquia and Azevedo (2005), the new FX swaps were seen as having lower credit risk, as they were traded and settled at the BMF and offered daily margin adjustments. In these swaps, the BCB pays dollar variation plus local onshore US dollar interest rates, and receives cumulative one-day interest rates on interbank certificates of deposit (CDI rate) over the contract period. It thus acts as a long *real* position for those betting against the currency.

These notional amounts of swap contracts exceeded 10% of total internal public debt. By the end of 2002, exchange rate swaps reached a total of US\$ 20 billion. They continued to grow in the first half of 2003, peaking at US\$ 40 billion.²⁵ This coincided with a decline in US dollar linked bonds, which fell sharply in 2002—by almost US\$ 12 billion—with increased perception of the credit risk of public debt, especially US dollar linked debt.

The modality whereby the government and BCB bore the exchange rate risk was changing, but the level of the hedge that they provided the private sector was rising. It is interesting that the price of the exchange rate swap contracts steadily supplied by the BCB declined, raising yield, which in the second half of 2002 fluctuated between 30% and 40% per year while being protected from devaluation. As a result, banks with access to foreign credit lines could earn these **high yields without exchange rate risk**. This led to major opportunities for profits, which the banks gladly seized, leading to an inflow of short-term capital. Again, the government and BCB were providing very costly free insurance to the banks.

Both the intervention in spot markets and intervention through the derivatives market did help the *real* recover. As a result—again, though costly to the BCB and raising the public debt, while permitting private banks extremely high profits—intervention reduced inflationary pressures and other negative effects that would have occurred in their absence with a weaker *real*.

²⁴ Interview material.

²⁵ These amounts in *reals* were converted into dollars at the closing exchange rate for the month.

We shall return, below, to evaluating the costs and benefits of foreign exchange intervention. However, let us finish this section with an interesting distinction made by Giavazzi, Goldfajn and Herrera (2005). When the private sector wishes to reduce its exposure to exchange rate risk in a developing economy, as was the case in Brazil in 2001 and 2002, economic authorities can limit depreciation by issuing dollar debt or currency swaps in the derivatives markets. If there is *overshooting* (as in Brazil, when financial markets over-estimated the risk of default, beyond what the fundamentals showed), there seems to be a stronger case for intervention. Though it is very hard to assess the counter-factual, there is a strong case for arguing that the situation would have been worse had this intervention not occurred. This is not the same as the situation of a shock that is deemed permanent, where BCB intervention reflects a decision to smooth the shock, postponing depreciation now for depreciation later. In such a scenario, the case for intervention would seem weaker. Of course, this distinction is problematic, since, as events unfold, economic authorities cannot easily discern whether a shock is permanent or temporary.

e. 2004 to present—Dealing with appreciation

In 2004, the Brazilian economy again avoided a deep crisis. By the end of 2003, the EMBI spread had fallen to 450bp, 100bp less than it was in February 2002, before the crisis started. The exchange rate had recovered, and Brazil's credit rating was raised from B to B+. This was due to less risk aversion by international investors, and to sharply improved market perceptions of Brazil, as a result of factors such as tightening of fiscal and monetary policy. Indeed, multi-year fiscal surplus targets were raised, and structural reforms of social security were announced, signalling a commitment to a declining path of public debt/GDP, while interest rates were increased. These measures did entail—as mentioned above—very poor growth in 2002 and 2003 (1.9% and 0.5%, respectively). The increase in unemployment was another negative.

Between 2004 and 2006, the *real* appreciated significantly. It strengthened by 8% in 2004, 12% in 2005 and 9% in 2006, in spite of the fact that the Brazilian BCB and Treasury bought US\$ 90.1 billion (see Table 2 below). It is interesting to note that the private sector surplus in the Balance of Payments (a) was large and growing rapidly, due to both trade surpluses and, since 2005, to net capital inflows; and (b) was present for the 2004-2006 period as a whole.

TABLE 2
BALANCE OF PAYMENTS: PUBLIC INTERVENTIONS
AND PRIVATE SECTOR FLOWS
(US\$ billions)

	2004	2005	2006	Total
Interventions by BCB ^a	-5.3	-21.5	-34.3	
Interventions by Treasury	-7.4	-9.3	-12.3	
Total BCB and Treasury interventions	-12.7	-30.8	-46.6	-90.1
Financial gap of private sector ^b	10.4	32.0	44.8	87.2

Source: Prates, Farhi & Marcal (2006), based on Brazilian Central Bank data calculations performed in collaboration with BCB staff.

^a Includes both current and financial Treasury transactions.

^b Calculations of the financial gap of the private sector, excluding interventions by the Treasury.

The key point is that the excess supply of foreign exchange generated by the private sector—on both the current and financial account of the balance of payments—was absorbed by government demand (both BCB and Treasury) for foreign exchange.²⁶ As discussed above, this appreciation of the *real* can, to a great extent, be explained by derivatives transactions. Especially when derivatives are used for speculative purposes (e.g., investing in the Brazilian *real* to benefit from differential interest rates between the *real* and other currencies, such as the Japanese yen or Chilean peso), they can offer far larger profits to market actors than can transactions in the spot market, since they are highly leveraged. As we learned in interviews, there is significant speculative demand for *reals*—for example, in Asia, where investors can borrow currencies (especially the yen) at low interest rates, and invest via derivatives in the high interest rate *real*. Furthermore, European banks reportedly play a major role in this market, even though many transactions are channelled through New York. Reportedly, the market in *reals* outside Brazil is larger than in Brazil. Investors also do regional plays, for example by borrowing Chilean pesos and investing via derivatives in *reals* on a smaller scale, as discussed in Dodd and Griffith-Jones (2006).

As mentioned, derivatives linked to the exchange rate can be traded in Brazil, either in BMF (an organised market that became larger and more liquid with the decision in 2000 to allow foreign investors unrestricted participation) or on the OTC market (either in Brazil or off-shore, where mostly non-deliverable forward instruments are used). Because of *lack of transparency* in these latter transactions, it is difficult to estimate their scale. During interviews (with both economic authorities and private actors) different estimates were ventured as to the scale of this off-shore NDF market, though there was consensus that it was large and growing (with the highest estimate, by one bank expert, being US\$ 100 billion). A study by Prates et al. (2006) gives estimates of US\$ 75 billion in open NDF positions at the end of 2005.

Indeed, lack of transparency in off-shore NDF markets is, internationally, a major problem. Without such essential knowledge, it is difficult for economic authorities to evaluate trends and design economic policies for influencing variables such as the exchange rate and/or regulations to promote systemic financial stability. The lack of transparency is also problematic for private actors, especially those wishing to make long-term commitments to trade and investment, who may, therefore, be interested in the likely future level, as well as the volatility, of the exchange rate.

As regards transactions on the BMF, these were both very large and rapidly growing in the 2003-2006 period (see Table 2). The volumes were much larger than the spot market, which, for foreign exchange, reached around US\$ 12 billion. The exchange rate derivatives grew especially rapidly between September 2004 and September 2005, with BCB increasing the interest rate as country risk was falling, which encouraged foreign and domestic institutional investors to buy *real* derivatives both in Brazil and off-shore. It is interesting that foreign institutional investors dominated the purchase of interest rate derivatives, expecting that interest rates could not stay at such high levels (Prates et al., 2006).

However, banks play a key role in the derivatives market, both in (a) selling dollar futures to hedge their foreign-loans and spot positions; and (b) buying interest rate futures contracts (called DI, as discussed above) to benefit from high interest rates.

The selling of US dollar forwards by foreign institutional investors—especially hedge funds and investment banks—pushed the *real* up on the futures market, which remained stronger than the spot market. This reportedly led to arbitrage transactions.

²⁶ This was reflected both in increased reserves and in a sharp reduction of US dollar linked instruments in domestic public debt, which fell from a peak of 40% of the stock of domestic public debt in September 2002 to 10% in December 2004.

As pointed out above, off-shore transactions, which are not registered at BMF, contributed to the appreciation of the *real*.²⁷ Such off-shore transactions were conducted mostly by foreign investors. These actors took long *real* positions in the NDF forward market; the reverse swaps transactions that the BCB carries out—which involve buying dollars in the futures markets and selling DI—contribute to increasing liquidity for foreign investors, and thus make effective their bets on appreciation of the *real*. This is the *reverse* of the swaps offered by the BCB during periods of depreciation, when institutional and other private actors demanded US dollars. Over time, the detailed nature of intervention by the BCB has reportedly changed. Market participants have called its interventions since the second half of 2006 “more clever”, as BCB has begun intervening on a daily basis and has changed amounts (as opposed to previously, when it purchased fixed amounts).

The carry trade described above is a new problem for emerging market economies, like Brazil, Chile and Turkey, and a new challenge for both regulators and macroeconomic policy makers.

Of course, demand and supply of *real* futures, especially domestically, is not limited to institutional investors. When there is pressure for the *real* to depreciate, only importers hedge, as they did until 2004. Since pressure for appreciation began in 2005, it is the exporters who have hedged. This increasing trend of hedging among exporters in recent years was underlined in interviews.

We can therefore conclude that the strong appreciation of the *real* in the 2004-2006 period is not due simply to improved fundamentals, as reflected in the current account surplus and “normal” capital flows, but is also influenced by so-called “virtual transactions” (Prates et al., 2006), more generally known as carry trade, which take place through both the Brazilian onshore and offshore derivatives markets. A large portion of these transactions are carried out by short-term investors who do not expect a devaluation of the *real*, and want to benefit from the high interest rate differential between the *real* and many other currencies, a situation associated with tight monetary policy in Brazil. This appreciation beyond what is attributable to fundamentals occurs despite the Brazilian BCB interventions in both the spot and derivatives market.

It is interesting to note that even in the case of companies hedging foreign exchange risk associated with trade (which is valuable from a micro-perspective), the hedging may have pro-cyclical effects on the exchange rate. In the face of depreciation pressures, as mentioned above, hedging will be primarily by importers, in anticipation of demand, and this accentuates the pressure for depreciation. When there is appreciation pressure, exporters will tend to hedge, anticipating supply, thus accentuating the pressure toward appreciation.

²⁷ Interview material and Prates et al. (2006).

8. Central Bank Intervention

So far, we have described BCB intervention in the derivatives market in some detail. This intervention, over time, has ranged from great to moderate to small—at times attempting to avoid depreciation, at others aiming to curb excessive appreciation. The results, too, have varied, being clearly positive on some—but not all—occasions.

There is considerable literature on whether or not the interventions have been useful. One criticism is that intervention is only effective in periods when there is low volatility in the nominal exchange rate and can do little more than smooth these fluctuations (Calvo, 1997). BCB intervention is not effective in periods of high exchange rate volatility, according to Novaes and Olivera (2004), who provide econometric evidence from the January 1999 to April 2003 period suggesting that in periods of high volatility such intervention is ineffective. They argue that intervention is ineffective irrespective of whether it is in the spot or the derivatives market. This view is in sharp contrast with that expressed by former Governor of the BCB Gustavo Franco (2000).

The econometric evidence presented in the Novaes and Oliveira (2004) paper does seem to have an element of circularity (intervention fails when there is a crisis) and, perhaps more importantly, underplays the fact that there is no counter-factual: Would the crisis have been deeper without BCB intervention? Would negative effects on banks' stability have been more serious? Would mismatches on corporate balance sheets have been higher and therefore led to more bankruptcies, with greater impact on financial institutions and negative consequences for the overall economy?

In another study, Oliveira and Novaes (2005) focus on the distribution of the benefits of BCB intervention between financial institutions and the non-financial corporate sector. Their econometric analysis draws on a database of 74,000 foreign exchange swaps. They present robust results showing that in periods of high volatility—as, for example, in the first half of 1999, when the currency was allowed to float (and the *real* fell significantly) and in the second half of 2002, when there was a large depreciation—the very substantial BCB interventions in the derivatives markets were used by financial institutions to decrease *their* existing short dollar foreign exchange positions. As a result, only part of the intervention led to hedging of currency risk by non-financial firms. As discussed below in the section on regulatory proposals, excessive risk taking by banks, implicitly “abusing” the BCB interventions, could be restricted by changing the regulation that allows net currency exposure of banks’ capital to be as high as 60%.

These interventions, though expensive for the BCB, can be useful for reducing corporate foreign exchange mismatches and, therefore, vulnerabilities in periods of stress. However, in periods of crisis, according to this study, even though the volume of BCB interventions increased, financial institutions used this only to reduce their own foreign exchange exposure. This has negative implications if one considers that banks may have excessively increased their mismatches—and thus generated large profits—relying on the assumption that they would be “bailed out” by later BCB interventions, a typical case of moral hazard. Nonetheless, there is a positive side, in that the systemic risk of the financial system was reduced, thus helping to avoid a developmentally costly banking crisis. Indeed, as explained above, intervention in the derivatives markets, in particular, may help alleviate the conflict between defence of the exchange rate and the stability of the financial system in countries like Brazil. When there are periods of expected devaluation, causing capital outflows, there is a risk that this will create serious liquidity problems for the banking system. In its role as lender of last resort, the BCB may wish to provide liquidity to banks—important, for example, when the interbank market dries up and there is selling of bank assets. As Blejer and Schumacher (2000) argue, it is difficult for the BCB to discriminate between banks with legitimate liquidity problems and those that want to borrow for speculative purposes. The BCB may find it more effective to intervene in the derivatives market, which avoids further pressure on the foreign exchange spot market.

A third empirical paper (Oliveira and Novaes, 2006) has an interesting finding. Using the same database, it shows in some detail that in periods of high exchange rate volatility, such as 2002, the demand for foreign exchange derivatives on the part of non-financial corporations is closely associated with speculative motives, because they are traded in order to *increase their foreign exchange risk*. This evidence is interesting, in that it shows econometrically that corporations use derivatives both to *hedge* their foreign exchange exposure, which is valuable, as well as to *speculate*.

Among the companies that hedge, the empirical evidence shows that all have dollar-denominated debt and that 36% are invested in public utilities—implying that their revenues are in *reals*.²⁸ Also interesting is the fact that larger firms and multinationals, facing smaller transaction costs and less information asymmetry, tend to hedge more. The firms that used derivatives most for speculative purposes in 2002 were those with export revenues. The explanation for this is that they regularly follow foreign exchange markets, and their close contact with dealers can keep them informed of likely trends. However, in previous years (1999 to 2001, when periods of exchange rate volatility were shorter and volatility lower), export revenues did not explain firms’ propensity to speculate. Overall, the proportion of companies speculating was also significantly **smaller** in the earlier periods. Thus, the evidence shows that speculation by corporations intensified in 2002. Indeed, by 2002, according to this evidence, *almost half* of corporations demanding FX derivatives were doing so for speculative

²⁸ This is similar to the Chilean case. See Dodd and Griffith-Jones (2006).

reasons. This led Oliveira and Novaes (2006) to question the advisability of the BCB offering foreign exchange instruments that feed speculative demand, as occurred in 2002.

Thus, the critique of BCB intervention through derivatives, in the Oliveira and Novaes papers, is on three levels, arguing that: (1) this intervention is ineffective in modifying expected depreciation in periods of crisis; (2) in periods of crisis, it benefits only the financial sector; and (3) in periods of high and prolonged volatility (2002), the actions of some corporations add to speculative pressures.

As we have discussed, matters are not so clear cut. BCB intervention in Brazil smoothed exchange rate volatility in less turbulent periods (as the authors, cited above, show), and though it failed to prevent depreciation in times of crisis, it may have reduced the level of depreciation, and certainly moderated negative effects on banks and non-financial corporations.

Though BCB intervention may feed speculative demand, it also reduces systemic risk for the banking system, thereby helping to avoid developmentally and fiscally costly crises due to currency mismatches. This suggests one factor explaining why the 1999 and 2002 crises did not lead to large declines in output in Brazil, unlike currency crises in other emerging economies. Such interventions help corporations hedge, thus diminishing bankruptcies and preventing defaults on banking debt. On the other hand, they were expensive from a fiscal point of view, due to the losses on derivatives positions as well as exchange rate linked government securities. On this point, Mussi (2006) estimates that the BCB suffered losses of 7.6 billion *reals* in January 1999 (which at the pre-devaluation exchange rate was equivalent to US\$ 7 billion). He also estimates that in September 2002, at the height of the credibility crisis, the BCB suffered losses of 12 billion *reals* (equivalent at the time to over US\$ 3 billion). Economic authorities in each country need to weigh the costs and benefits of such intervention. It seems important to stress that both need to be broadly defined, so as to include overall economic goals.

Central Bank Intervention can also play a positive role in periods of excessive appreciation accelerated by speculation through the derivatives markets. Indeed, there is much literature and empirical evidence arguing that a competitive exchange rate is a very important policy tool (e.g., Rodrik, 2006; Ocampo, 2007). Furthermore, there is an important body of literature arguing that exchange rate is one of the key variables determining growth, and that one of the reasons for East Asia's impressive growth record (compared, for example, with Latin America's) is their greater commitment to defending competitive exchange rates, even in periods of strong pressure for appreciation. Given such evidence, and the fact that derivatives appear to make central Bank Intervention less effective in emerging countries like Brazil, there seems to be a strong case for regulating derivatives not only from a (clearly important) prudential perspective, but also to help make room for more effective central Bank Intervention in the foreign exchange market, when this is desirable from a macroeconomic and broader growth perspective. This position seems more constructive than one simply underlining that derivatives markets make effective central Bank Intervention more difficult, and using that fact to discourage central banks from intervening.

Our position is that there may be a case for measures to regulate derivatives markets, e.g., through capital and collateral requirements. Another possibility is to employ variable position limits on derivatives, and to do so in a counter-cyclical way (see next section). This would make it possible to maintain the important micro-economic benefits of derivatives, while limiting their negative pro-cyclical effects. It would make central Bank Intervention—when desirable—more effective.

As regards the modality of intervention, intervention via the derivatives markets can also play a positive role, even though may reduce the transparency of central bank accounts and increase the risk of losses for the central bank. However, such interventions by the central bank do have some merit, and certain interventions are distinctly advantageous, e.g., the 2006 intervention by the Mexican Central Bank through a mechanism called the “at-the-money” put option, in which, when there is an

inflow of foreign capital, the put buyers exercise the option and deliver the reserve foreign currency to the central bank. This enables the central bank to accumulate reserves when the foreign currency weakens, preventing the negative signalling effect of open central Bank Intervention. If, later, there is pressure on the local currency to depreciate, the central bank can use the accumulated reserves to provide the additional liquidity demanded by the market.

Further research seems necessary on the costs and benefits of central Bank Intervention, the best modality for this and the most effective way to regulate derivatives markets, so as to keep open a broader policy space for central banks to influence the exchange rate. This needs to be done without stifling the development of derivatives markets in ways that prevent them from fulfilling their useful functions. While we hope to have provided, here, additional elements for this complex and new discussion, further analysis is required.

9. Regulatory proposals

The goal of financial policy is to make derivatives markets sound, safe and efficient, and to ensure that their role in the financial system and in the overall economy is productive, rather than a source of instability. Stable and efficient markets must be built on prudential standards and be free of fraud, manipulation and predatory practices. A well-structured market will provide efficient price discovery and low cost risk management, and will help capital markets to raise capital.

a. Registration and reporting requirements

Registration requirements serve to ensure that all financial institutions meet minimum standards, and that regulatory authorities have a census of all relevant financial institutions, while facilitating the identification of illegitimate businesses and making it possible to stop illegal activity. Minimum standards for firms should include a sound business plan, good management practices, fulfilment of capital requirements, and certification of key employees as competent and trustworthy.

Key individuals, such as a financial institution's representative agents and "appropriate persons", as well as independent brokers, agents and investment advisors, should be registered or licensed. The registration of individuals sets minimum standards for people who have fiduciary responsibility for firms or customer accounts, and this is critical to the process of preventing and prosecuting fraud. In many cases, registration should require applicants to pass an examination for competence. Registration allows regulatory authorities to conduct

background checks on individuals acting as brokers, agents or salespeople who have fiduciary responsibility over the firm's or their customers' accounts. Background checks should look for past criminal conduct, and individuals convicted of fraud should not be allowed to act as brokers or hold other positions of responsibility (as front-line representatives of financial institutions).

Reporting requirements should apply to all derivatives dealers and major market participants (this is effectively the case in most of Brazil's OTC derivatives market because of reporting requirements). These entities should also be required to keep proper records for five or more years.

Especially important are large trader reports. The information acquired by the regulatory authority through such reporting requirements can be important in carrying out market surveillance. The public interest is best protected when regulatory authorities have sufficient information to police malfeasance and help prevent market disruptions caused by fraud and manipulation. Up-to-date financial information on firms and markets should also give the government an early warning on firms that are in jeopardy as a result of taking large losses.

Well informed investors are the key to establishing efficient financial markets, and reporting requirements are essential to provide them with the market information they need. Businesses, individually, have incentives to hoard information or to report selectively. Reporting requirements assure markets that corporations will provide all appropriate information under uniform rules, so that the public has the potential to make rational, fully informed investment decisions. In order to bring off-balance sheet activities into the same light as balance sheet activities, derivatives activities should be reported by notional value (long and short), maturity, instrument and collateral arrangements. This helps investors to determine whether firms were under- or over-hedged, and whether they were primarily acting in a producer or wholesaler role.

b. Capital and collateral requirements

There should be minimum capital requirements for all derivatives dealers, and minimum collateral requirements for derivatives transactions. Especially important is the use of capital requirements to limit the amount of foreign currency exposure (e.g., currency mismatch) at financial institutions. Brazil's current policy of limiting that exposure to 60% of capital probably permits too much exposure.

Collateral requirements for financial transactions function much like capital requirements for financial institutions. Both provide a buffer against financial failure, and both provide incentives to economise on risk-taking by raising the cost of holding open positions. Collateral requirements must apply to all transactions, not just to some institutions, so that they govern the entire marketplace. Adequate use of collateral will reduce the need for capital by reducing the collateral-adjusted exposure to counterparty credit risk. These prudential measures help prevent liquidity or solvency problems at one firm from causing performance problems that impact other transactions and firms. In so doing, they reduce the externalities of risk-taking by requiring capital in proportion to risk exposure, and by minimising the likelihood of default on transactions, thereby reducing the market's vulnerability to a freeze-up.

c. Orderly market rules

This set of regulatory measures is designed to improve the efficiency and stability of the marketplace by protecting it from abuse and by preventing disruptive events—or at least reducing their likelihood.

First, strictly prohibit fraud and manipulation in financial markets. Create market surveillance and enforcement authorities, make violations punishable by civil and criminal penalties, and adopt “know thy customer” and “truth in lending” rules for dealers.

Second, foster market liquidity by requiring dealers to maintain binding bid and ask quotes throughout the trading day. In dangerous situations, dealers sometimes withdraw from the market, leaving them illiquid, and this lack of liquidity occurs precisely during times of market stress when liquidity is needed most. Without such safeguards, a sudden loss of market liquidity can turn a disruption into a crisis.

Third, employ “circuit breakers” and price limits for trading on OTC derivatives markets, in order to protect financial systems from disruptions and short-term volatility. These features are regularly used—and the practice is widely approved—on securities exchanges and futures and options exchanges, but are lacking in OTC markets.

Fourth, encourage the establishment of a clearing house. Clearing houses are an effective means of improving efficiency and stability in derivatives markets. They greatly reduce the credit risk and trading risk inherent in making trades and holding positions. By acting as the counterparty to every trade, they offer everyone AAA credit rating for credit exposure arising from derivatives positions.

Clearing houses also reduce operational risks in trading by providing trade confirmation services, and by acting as arbitrator in disputes regarding trades or the settlement of trades, avoiding the delay and cost of court proceedings. By performing these critical services, clearing houses mitigate several problems. First, they reduce the number of disputed trades, because trades are confirmed daily and any dispute can be mediated with the clearing house as a third party. Secondly, they reduce the number of incomplete settlements, or “fails”, by increasing participants’ ability to economise on the payments and securities needed to make delivery. Thirdly, they improve market liquidity by creating a high standard for credit rating on exposure in the market.

These regulations are as important as the derivatives markets they are designed to govern. The suggested measures will promote the use of these markets for risk management, while discouraging their misuse. Markets that are deeper and more liquid, and that are governed by orderly market rules, are more efficient in their price setting activities than those characterised by episodes of illiquidity, disruption and distortion. Establishing a more solid foundation for these markets will help prevent, or at least diminish, their role in financial disruptions and pro-cyclical economic activities.

10. Conclusions

This study identifies some important features of Brazil's derivatives markets and outlines how they have been shaped by the regulatory framework. It thereby serves as policy advice to other countries grappling with the question of how to properly regulate these relatively new but increasingly important financial transactions. The key features and their related policy measures include the following:

- Improved transparency and greatly improved surveillance of OTC derivatives markets are achieved through regulation requiring that all such transactions be reported to designated regulatory authorities.
- Many financial institutions participating in the derivatives markets use modern risk management models to monitor their risk exposures. Brazil's central bank has been helpful in constructing such models and providing them free of charge to financial institutions. This is especially helpful to smaller financial institutions that have fewer resources for research departments.
- The inter-dealer market in derivatives transactions in Brazil is conducted through the BMF instead of through OTC transactions. The consequence is to greatly reduce the interdependence of major financial institutions through inter-locking derivatives transactions and credit exposures, with netted derivatives positions offering AAA-rated credit exposure through the exchange clearing house.

This study also provides a macroeconomic policy analysis of the key questions that derivatives markets pose for developing economies' financial systems. One important question is whether the presence and significant use of derivatives markets, especially in exchange rate and interest rate derivatives, affects the stability of capital flows and exchange rate. Another important question is whether the central bank can, or should, use derivatives markets for exchange rate policy interventions.

The conclusions regarding the first policy question include the following:²⁹

- Derivatives markets can facilitate international capital flows if they offer a dependable means of hedging unwanted aspects of risky investments, such as currency risk or interest rate risk.
- Derivatives markets have some pro-cyclical consequences. This arises in part from firms' waiting until the economic situation begins to deteriorate before engaging in hedging strategies, then selling in order to short-hedge. In this way, a decline in the local currency can generate a spurt of short-selling in the derivatives market to hedge against further declines, and the additional selling further lowers the value of the currency on foreign exchange markets. Foreign investors conducting "carry" transactions can also add to pro-cyclical movements, since they buy when the currency appreciates and unwind by selling when the currency weakens.
- Given substantial evidence that a stable and competitive exchange rate is one of the key variables determining growth, and given that derivatives seem to make central Bank Intervention in the foreign exchange market less effective, there is a strong case that regulation of derivatives should be conducted not only from a (clearly important) prudential perspective, but also to keep open space for more effective central Bank Intervention, when this is desirable from a broader macro-economic and growth perspective.
- Hedging international capital investments through derivatives markets may offset capital outflows, but this result does not necessarily occur. If the local derivatives market is "two-sided", so that both long and short positions can be risk managed without offsetting cross-border transactions—as is the case in Brazil and, to a great extent, in Chile—there will not be offsetting capital outflows. Similarly, central Bank Intervention in the foreign exchange derivatives markets can end up accommodating more speculative activity that would otherwise generate capital flows or, in a balanced market, be met with interest in investing in the opposite position.
- Derivatives markets are used for speculation as well as hedging. Insofar as they are used for hedging, there usually is a clear economic benefit (quite clearly so at the microeconomic level, and also at the macroeconomic level when the markets do not operate pro-cyclically). The potential negative economic consequences of speculation depend largely on how it is conducted and whether it creates significant amounts of systemic risk, as well as whether large losses due to market risk or credit risk are likely to impact the overall economy.

In regard to the question of central Bank Intervention, including intervention through derivatives markets:

²⁹ The authors addressed this question in an earlier study of Chile's derivatives markets (Dodd and Griffith-Jones 2006), and find that the answers are similar, though with some modifications, for Brazil.

- Central Bank Interventions can be effective, but have limitations. It is difficult for intervention to successfully reverse a trend over a long period. However, it can slow trends in the medium term, and smooth short-term fluctuations. For example, central Bank Interventions in Brazil during late 2006 and early 2007 slowed the appreciation of the *real* and dampened the impact of large transactions crossing the spot currency market.
- Central banks can be highly effective in providing hedging opportunities to financial and non-financial firms, thus protecting the economy from large exchange rate fluctuations. When they do so, central banks must take steps to avoid creating greater speculative opportunities, so as to reduce the cost and increase the effectiveness of their interventions. Such steps include changes in capital requirements (e.g., more restrictive limits on foreign exchange exposure as a percentage of capital) and collateral (margin) requirements on outstanding foreign exchange positions.

Annexes

Annex 1

Regulations and Regulatory Statutes

- #2689 provides for registration of foreign investors (who pay less taxes than are levied on other financial dealings), helps them invest in BMF and Bovespa, and establishes a foreign investor trading vehicle for trading on BMF.
- #2873 creates regulatory restrictions on the use of “reference” items for derivatives contracts. It applies to banks and other financial institutions, and is enforced by the central bank. It also requires all swaps and “non-standard options” between financial institutions to be “registered” with an exchange or with “other market organisers”, such as CETIP.
- #6385 creates the CVM.
- #2690 transfers jurisdiction from BCB to CVM for...
- #2012 followed by #3312, governs how non-financial corporations access foreign markets for hedging purposes.
- #10 214 (21 March 2001—executive law later passed as statute) was modelled on the Canadian experience and was designed to restructure the Brazilian payments system and make transactions final. It established the use of clearing houses, channelling 100% of cash foreign currency trading through them.
- #3 057 (31 August 2001) was a BCB circular extending 10.214.
- #2 882 created the National Monetary Policy Council.
- #6024 is the 1974 bankruptcy law under which creditors, workers and governments are given top priority, while investors are given lower priority.

Regulation #2933 and Regulation Circular #3106 constitute the framework for credit derivatives transactions in Brazil.

Annex 2

Regulatory Authorities

Brazilian Central Bank

- Intervention in foreign exchange derivatives markets
- Regulatory authority focussing on stability and prudential regulatory issues
- Certification authority over clearing houses

CVM (Brazilian Securities Commission)

- Focused on “conduct” of financial markets, less on systemic issues
- Primary regulatory agency for Bovespa and BMF
- Responsible for setting reporting requirements, price limits, position limits, approval authority over exchange rules, and surveillance
- Operates principally in the area of information, rather than in the form of prudential regulatory measures
- Surveillance—observes all positions and compares against position limits
- No enforcement division, though market regulatory divisions have enforcement personnel
- Funded by fees on market activities
- Authority over SROs

BCM Banking Superintendent

CETIP (Central de Títulos Privados, or Office of Securities Custody and Financial Settlement)

- Mostly for dealer-to-customer OTC derivatives trades
- Created and governed by laws 4.595 (1964), 6.385 (1976), 4.728 (1965) and 10.214 (2001)
- CETIP was created by a decision of CMN (the National Monetary Council) on 1 August 1984

CETIP functions as depository of corporate bonds, state and municipal government securities and securities that represent the National Treasury's special responsibilities. As a depository, the entity processes the issuing, redemption and custody of securities, as well as interests payment. All securities are transferred by book entries, and transactions are carried out in the over-the-counter market.

Settlements are T or T+1, depending on the instrument and time of execution. Multilateral netting is normally used in the case of primary market operations (CETIP does not act as central counterparty). Bilateral netting and real-time gross settlement are used, as well, for derivatives operations and securities traded at secondary market, respectively. Delivery versus payment (DVP) is always used in securities operations, and final settlement occurs in settlement accounts held at the central bank.

CETIP maintains two processing centres (the secondary centre works in hot standby). In contingency cases, operation can be resumed from the secondary centre in less than one hour. To register operations, the RTM (Rede de Telecomunicações do Mercado, or Market Telecommunication Network) is used, while RSFN is used for the flow of messages related to the settlement phase. In all cases, straight-through processing is used.

SRO—SRO proposes and CVM disposes.

- BMF
- Bovespa—plans to outsource regulatory functions after demutualisation

SPC Pension Fund regulatory entity

SUSEP Insurance company regulator

Annex 3

Allowable reference variables for derivatives instruments in Brazil

- 1.1 **PRE:** The fixed rate.
- 1.2 **DI1:** The Average One-Day Interbank Deposit (ID) Rate, disclosed by the Office of Securities Custody and Cash Settlement (CETIP).
- 1.3 **DOL:** The exchange rate of Brazilian Reals per US Dollar on the free rate foreign exchange market, disclosed by the Central Bank of Brazil (BACEN).
- 1.4 **TR:** The Reference Rate, disclosed by the Central Bank of Brazil (BACEN).
- 1.5 **IGP:** A price index. The opening of new positions in swap combinations using this variable was suspended by Circular Letter 044/2002-DG of April 2, 2002, which introduced variables IGM, IGD, IPC, INP, and IAP.
- 1.6 **OZ1:** The price of gold traded on the BMF spot market.
- 1.7 **SEL:** The Daily Average Financing Rate for Federal Bonds established at SELIC (Special System for Settlement and Custody)—the SELIC Rate—calculated and disclosed by the Central Bank of Brazil (BACEN).
- 1.8 **TBF:** The Basic Financial Rate, disclosed by the Central Bank of Brazil (BACEN).
- 1.9 **ANB:** The average rate for time deposits, disclosed by the National Association of Investment Banks (ANBID).
- 1.10 **IND:** The São Paulo Stock Exchange Index (Bovespa Index or Ibovespa).
- 1.11 **TJL:** The Long-Term Interest Rate (TJLP), disclosed by the National Monetary Council (CMN).
- 1.12 **SB1:** A stock basket (Stock Basket 1), composed of stocks traded at the São Paulo Stock Exchange (BOVESPA), selected from among those authorised by BMF.
- 1.13 **SB2:** A stock basket (Stock Basket 2), composed of stocks traded at the São Paulo Stock Exchange (BOVESPA), selected from among those authorised by BMF.
- 1.14 **REU:** The exchange rate of Brazilian *reals* per euro.
- 1.15 **IDM:** The General Market Price Index (IGP-M), calculated by the Brazilian Institute of Economics (IBRE), of the Getulio Vargas Foundation (FGV).
- 1.16 **IGD:** The General Domestic Product Index (IGP-DI), calculated by the Brazilian Institute of Economics (IBRE), of the Getulio Vargas Foundation (FGV).
- 1.17 **IPC:** The Consumer Price Index (IPC), calculated by the Economic Research Institute Foundation (FIPE), of the University of São Paulo (USP).
- 1.18 **INP:** The National Consumer Price Index (INPC), calculated by the Brazilian Institute of Geography and Statistics (IBGE).
- 1.19 **IAP:** The Extended Consumer Price Index (IPCA), calculated by the Brazilian Institute of Geography and Statistics (IBGE).
- 1.20 **JPY:** The exchange rate of Brazilian *reals* per Japanese yen.
- 1.21 **IBR:** The Brazil Index-50 (IBrX-50).

Annex 4 Interviews

Claudia Getschko	Abn Amro	Fabio Coelho	Brazilian Central Bank
Rosemeire Qurnieri	ABN AMRO	Ivan Luis	Brazilian Central Bank
Claudio Guimaraes	Banco do Brasil	Ariosto Carvalho	Brazilian Central Bank
Marcia Canejo	Banco do Brasil	Jorge Sant'Ana	CETIP
Pedro Matta	Banco do Brasil	Marcelo Fleury	CETIP
Otavio Yazbek	BMF	Fabio Vieira Hull	CETIP
Luis Vicente	BMF	Ilan Goldfajn	CIANO
Isney Rodrigues	BMF	Marcelo Mendes	CIANO
Alexandre Lintz	BNP Parisas	Marcos Carreira	Crédit Suisse
Francisco Oliveira	BNP Parisas	Eduardo Busato	CVM
Lucy Pamboukdjian	Bovespa	Waldir Nobre	CVM
Andre Demarco	Bovespa	Aline Menezes	CVM - Rio
Wagner Anacleto	Bovespa	Arminio Fraga	Gavea
L Pambouk	Bovespa	Andre Brandao	HSBC
Paulo Vieira	Brazil Central Bank	Francis Ortega	HSBC
Clarence Joseph	Brazil Central Bank	Francisco Turra	Integral Trust
Ronaldo Dantas	Brazil Central Bank	Rodolfo Fischer	Itau
Amaro Gomes	Brazil Central Bank	Luiz Figueiredo	Maua
Aduardo Nogueira	Brazil Central Bank	Fernando Novaes	PUC
Luciana Moura	Brazil Central Bank	Gustavo Franco	Rio Bravo
Fernando Nascimento	Brazil Central Bank	Sergio Blatyta	Santander
Joao Mauricio	Brazil Central Bank	Andre Portilho	UBS Pactual
Beatriz Florido	Brazil Central Bank	Fabio Okumura	Unibanco

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