

**Payment, clearing and  
settlement systems in  
Brazil**



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## List of abbreviations

ANBIMA	Brazilian Financial and Capital Markets Association
ANBID	National Association of Investment Banks
ANDIMA	National Association of Financial Market Institutions
BCB	Central Bank of Brazil
BM&FBOVESPA	Brazilian Securities, Commodities and Futures Exchange
BRL	Brazilian Real
CETIP	OTC Clearinghouse
CIP	Interbank Payment Clearinghouse
COMPE	Cheque Clearinghouse
CMN	National Monetary Council
CVM	Securities and Exchange Commission
DOC	Credit Transfer
DVP	Delivery versus payment
ECT	Brazilian Post Office Company
GTS	Global Trading System
MEGABOLSA	BM&FBOVESPA's Stocks Trading System
PVP	Payment versus payment
RSFN	National Financial System Network
RTGS	Real-time gross settlement
RTM	Market Telecommunication Network
SELIC	Special System for Settlement and Custody
SILOC	Deferred Settlement System for Interbank Credit Orders
SITRAF	Funds Transfer System
STN	National Treasury Secretariat
STR	Reserves Transfer System
TEC	Special Credit Transfer
TECBAN	Banking Technology S.A.
TED	Electronic Funds Transfer



## Introduction

Prior to the mid-1990s, changes in the Brazilian payment, clearing and settlement systems aimed at increasing the speed of processing of financial transactions.<sup>1</sup> In the reform carried out by the Central Bank of Brazil (BCB) in 2001 and 2002, the focus shifted to risk management. In the scope of this reform, the BCB implemented an RTGS system, known as the Reserves Transfer System (STR), and also advised the National Congress in its introduction of important legal changes relating to clearing and settlement systems.<sup>2</sup> Furthermore, a new rule was introduced concerning the accounts that financial institutions hold at the BCB: since 2002, overdrafts have no longer been permitted.<sup>3</sup> Hence, a funds transfer between two settlement accounts is allowed only if there are sufficient funds on the account of the remitting institution.

As a result of these developments, Brazil now has a national payment system with the following main features: (i) all large-value funds transfers, including customers' orders, are settled in same day funds, typically a few minutes after they are initiated; (ii) securities clearing and settlement systems provide relatively short settlement cycles (for instance, real time or T+1 for government securities, depending on the settlement system chosen by the counterparties); (iii) all clearing and settlement systems settle in central bank money;<sup>4</sup> (iv) DVP is observed in all securities settlement systems; (v) a central counterparty is used for most derivatives, stocks and interbank foreign exchange transactions; (vi) almost all OTC derivatives and securities transactions must be registered in a centralised system; and (vii) straight through processing is extensively used in all payment and securities settlement systems.

As regards institutional aspects, the Payment System Law, enacted in 2001, is the main legal instrument for the Brazilian payment, clearing and settlement systems. It sets forth, inter alia, that: (i) the BCB is responsible for defining which clearing and settlement systems are systemically important;<sup>5</sup> (ii) multilateral netting of obligations in a clearing and settlement system is permitted; (iii) assets posted as collateral to clearing houses cannot be seized even by judicial order; and (iv) the Bankruptcy Law does not affect the fulfilment of a participant's obligations to a clearing and settlement system. Therefore, even in case of a participant's bankruptcy, such obligations will be brought to completion and settled in accordance with the regulations of the relevant system, and the collateral posted by the defaulting participant will be foreclosed (so that settlement is always carried out irrevocably).

The BCB is empowered by the National Monetary Council (CMN)<sup>6</sup> to regulate, authorise and oversee all Brazilian interbank clearing and settlement systems, regardless of the volume, value and type of transactions they process. CMN has also set forth principles for the Brazilian clearing and settlement systems, which are reflected in the corresponding regulation by the BCB.

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<sup>1</sup> One reason was that Brazil was then facing chronic inflation of up to 2% per month. Arrangements to help economic agents preserve their funds against inflation depended on the existence of short settlement cycles, particularly for inflation-indexed government securities.

<sup>2</sup> For further information on these legal changes, see Section 1.1.

<sup>3</sup> Since 2002 the BCB has extended to reserve account holders, free of charge, fully collateralised and unlimited intraday credit.

<sup>4</sup> Settlement in central bank money is mandatory for systemically important systems only. In practice, however, all systems settle in central bank money.

<sup>5</sup> For details see Section 1.2.

<sup>6</sup> CMN is the government body that sets currency and credit policy, among other responsibilities.

Payment services are provided mainly through the 33,500 branches of universal and commercial banks. They are also available through some 120,000 “correspondentes bancários”. These are non-financial institutions that act as banks’ agents, providing payment and banking services to people without direct access to the Brazilian banking system. Regarding payment instruments, electronic instruments have continued to replace cheques in recent years. The use of TED, a customer-initiated electronic funds transfer order, has increased steadily, reaching about 300,000 transfers a day at the end of 2009. Credit transfers via TED are settled in real time or “quasi-real time”, depending on whether they are settled via STR or SITRAF (Funds Transfer System), respectively.<sup>7</sup> As a general rule, a bank receiving a credit transfer must credit the payee’s account no more than 60 minutes after the interbank settlement has taken place. After receiving a TED order, the payer’s bank must forward it to the relevant settlement system within 30 minutes.

STR is the hub of the national payment system, since all Brazilian clearing and settlement systems settle in central bank money. In addition to STR, domestic interbank funds transfers can be settled in SITRAF or cleared in SILOC (Deferred Settlement System for Interbank Credit Orders) before final settlement in STR.<sup>8</sup> Cheques are cleared through COMPE (Cheque Clearinghouse). SITRAF, a private sector-operated RTGS-like system, has been designated as systemically important. SILOC and COMPE are multilateral netting systems that are not classified as systemically important. The FX Clearinghouse, a BM&FBOVESPA-operated multilateral netting system designated as systemically important, provides clearing services for foreign exchange transactions involving the Brazilian real (BRL) and US dollar (USD). To a large extent, STR and SITRAF share the same technological platform.

For securities transactions, the entity that provides settlement services typically also provides post-trade processing, as well as acting as a clearing house and as a central depository. BM&FBOVESPA also acts as a central counterparty for all transactions accepted in its clearing and settlement systems.<sup>9</sup> Hence, the entities providing these services are vertically integrated. In some cases, the integration also includes the trading environment.<sup>10</sup> The provision of these services, however, shows a certain degree of horizontal segmentation: SELIC (Special System for Settlement and Custody), the DVP<sup>11</sup> securities settlement system operated by the BCB, settles federal government securities. The federal government securities transactions can also be settled with multilateral netting through the Debt Securities Clearinghouse. For its part, the Equity and Corporate Bond Clearinghouse, a multilateral netting system, clears and settles mainly equity transactions, while corporate bonds are cleared and settled principally through CETIP (the OTC clearing house).

Finally, it should also be noted that (i) the Brazilian payment card industry is undergoing important changes aimed at increasing competition, especially on the acquiring side (see Sections 1.2 and 2.3 for further information); (ii) internet banking is widely used: at the end of 2009 some 35 million sight deposit accounts could be accessed remotely via internet, which accounted for some 48% of all banking transactions in terms of volume in that year; and (iii) mobile payments, although nascent in Brazil, may become an important retail payment channel in the coming years, particularly for people without direct access to the banking

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<sup>7</sup> SITRAF is an RTGS-like system. Typically, more than 97% of orders are settled in less than one minute.

<sup>8</sup> A funds transfer will be settled through a particular system depending mainly on its value, payment purpose, and the speed requested by the payer.

<sup>9</sup> In addition to the FX Clearinghouse, BM&FBOVESPA owns and operates three other clearing houses: Debit Securities Clearinghouse; Equity and Corporate Bond Clearinghouse; and Derivatives Clearinghouse.

<sup>10</sup> For further information, see Section 4.1.2.

<sup>11</sup> DVP: delivery versus payment. For a description of different DVP models, see Committee on Payment and Settlement Systems, *Delivery versus payment in securities settlement systems*, Basel, 1992.

system (given that almost 200 million mobile phones are in use and that most people have access to one).

## 1. Institutional aspects

### 1.1 The general institutional framework

The Financial System Law, enacted in 1965, regulates the Brazilian financial system. It also sets out the roles and functions of both the National Monetary Council (CMN)<sup>12</sup> and the BCB. CMN is responsible for currency and credit policy, as well as for the integrity of financial institutions and instruments. The BCB's aims encompass the stability of the Brazilian currency's purchasing power and the soundness of the financial system. The BCB is responsible for implementing CMN policy directives and also for licensing and supervising financial institutions,<sup>13</sup> as well as for issuing currency (banknotes and coins) and administering currency in circulation.<sup>14</sup> The BCB is also authorised to intervene in the management of a financial institution, put it under special administrative governance or determine its extrajudicial liquidation.

A CMN resolution of 2001 empowers the BCB to regulate, authorise and oversee all Brazilian interbank clearing and settlement systems, regardless of volume, value and the type of transaction processed. In the case of securities clearing and settlement systems, responsibility for these activities is shared with the Securities and Exchange Commission (CVM).<sup>15</sup> The resolution also sets forth core principles for the Brazilian payment system that accord with the recommendations contained in the CPSS report *Core principles for systemically important payment systems* and the CPSS/IOSCO joint reports *Recommendations for securities settlement systems* and *Recommendations for central counterparties*.

Enacted in 2001, the Payment System Law is the principal legal instrument underpinning the Brazilian clearing and settlement systems. It establishes that:

- it is the responsibility of the BCB to define which clearing and settlement systems are systemically important;<sup>16</sup>
- multilateral netting of obligations in a clearing and settlement system is permitted;
- the institution responsible for operating a systemically important clearing and settlement system must act as a central counterparty and adopt measures and safeguards that ensure the settlement of the relevant transactions;
- assets posted as collateral to clearing houses<sup>17</sup> cannot be seized even by judicial order; and

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<sup>12</sup> CMN comprises the Minister of Economy, the Minister of Planning and the President of the BCB.

<sup>13</sup> According to law, financial institutions are public or private legal entities whose main or complementary activity is the collection, intermediation, and investment of their own financial resources or those of third parties in national or foreign currency, and custody of securities.

<sup>14</sup> The BCB has the sole right to issue banknotes and coins.

<sup>15</sup> Clearing and settlement systems for government securities and bank-issued bonds are under the sole supervision of the BCB.

<sup>16</sup> See Section 1.2 (BCB oversight) for information on criteria used by the BCB to designate a clearing and settlement system as systemically important.

- the Bankruptcy Law does not override a participant's obligations to a clearing or settlement system. Thus, even in the event of a participant's bankruptcy, such obligations will be brought to completion and settled in accordance with the regulations of the relevant system, and collateral posted by the defaulting participant will be foreclosed (settlement is always carried out irrevocably).

For all transactions (funds transfers, securities, derivatives and foreign exchange), settlement finality is addressed by the BCB's provisions governing the functioning of the Brazilian clearing and settlement systems. In Brazil, all clearing and settlement systems settle in central bank money. Hence, settlement finality for all these systems is determined when the relevant financial positions are settled by STR.<sup>18</sup>

Cheques are regulated according to the general principles of the Geneva Convention.<sup>19</sup> Financial relationships between economic agents, including issues related to funds transfers, clearing and settlement of obligations, are contractual relationships. Contracts are subject to the provisions of the Civil Code, the so-called White Collar Law, which addresses crimes against the national financial system, and the Payment System Law. In addition, the Consumer Protection Law governs the relationship between financial institutions and their customers.

## 1.2 The role of the central bank

### ***Oversight***

A CMN resolution states that the BCB has the responsibility for promoting the soundness, normal functioning and improvement of the Brazilian payment system. The BCB is also responsible for authorising and overseeing clearing and settlement systems, including those that settle securities, foreign exchange and derivatives transactions.<sup>20</sup> Additionally, the Payment System Law mandates to the BCB the task of defining which clearing and settlement systems are systemically important.

The BCB, in its capacity of regulating the functioning of clearing and settlement systems, has ruled that:

- systemically important clearing systems must settle their net positions directly in accounts held at the BCB;
- all systems clearing and settling securities and other financial assets, including foreign currency and financial derivatives, are considered as systemically important, as well as funds transfer and cheque clearing and settlement systems with average daily turnover higher than 4% of the STR average daily turnover, or that, in the

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<sup>17</sup> In Brazil, a central counterparty is always the entity operating the relevant securities clearing and settlement system. Therefore, this provision is also applicable in case of a central counterparty.

<sup>18</sup> In the case of SITRAF, an RTGS-like system whose settlement accounts are funded with central bank money pre-deposits (see Section 3.2.2.4 for details), finality occurs intraday.

<sup>19</sup> Cheque Law, enacted in 1985.

<sup>20</sup> Systems that settle securities are under the joint supervision of BCB and CVM (systems settling government securities and bank-issued securities, however, are overseen by the BCB exclusively). In any case, aspects related to systemic risk are assessed solely by the BCB.

BCB's judgment, have the potential to pose a risk to the smooth functioning of the national payment system;<sup>21</sup>

- the maximum settlement lag should be: (i) at end of day for systemically important funds transfer systems; (ii) one business day for spot transactions with securities (except stocks); and (iii) three business days for transactions with stocks carried out on stock exchanges. The settlement deadline in any other situation is established by the BCB, which examines each particular case; and
- clearing houses should maintain net worth consonant with their risk exposure, with a minimum of BRL 30 million for systems considered systemically important and BRL 5 million for systems that are not considered systemically important.<sup>22</sup>

### ***Provision of settlement services***

The BCB operates both the funds transfer system STR (see Section 3.2.1) and the government securities settlement system SELIC (see Section 4.4.1). No retail payment system is operated by the BCB. In Brazil, a bank that takes sight deposits from the public is legally disbarred from holding a sight deposit account at another bank. Therefore, except for payments made in cash or those between customers of the same bank, all payments are settled in central bank money. Furthermore, as established by the Federal Constitution, the BCB is the exclusive depository of National Treasury funds. To ensure the smooth operation of the national payment system, the BCB extends fully collateralised and unlimited intraday credit, free of charge, to holders of reserve accounts.

### ***Cooperation with other institutions***

The BCB and CVM share responsibility for the oversight of securities settlement systems. Additionally, the BCB has cooperated with certain competition and consumer authorities – the Ministry of Justice's Secretariat of Economic Law and the Ministry of Finance's Secretariat for Economic Monitoring<sup>23</sup> – to increase competition in the Brazilian payment card industry.

The BCB also participates in the COMPE Group and the National Payment System Management Committee. The former deals with cheque clearing issues while the latter is an informal consultative group on the payment system comprising representatives from clearing and settlement systems, and bankers' associations. The BCB also coordinates technical groups related to the National Financial System Network (RSFN), a privately owned telecommunications network that is mainly used to access STR and SITRAF.

## **1.3 The role of other public and private entities**

### ***1.3.1 Financial intermediaries providing payment services***

The institutions that provide payment services are universal banks, commercial banks, savings banks, cooperative banks and credit unions. All are authorised and supervised by the BCB. These institutions offer sight deposit accounts, which are the main type of

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<sup>21</sup> To evaluate this potential, the BCB uses a methodology that aims to measure the possibility of contagion among participants of a clearing and settlement system in case of a participant default. The relevant methodology is publicly disclosed.

<sup>22</sup> USD 1.00 = BRL 1.7412 at end-2009.

<sup>23</sup> This joint work was carried out under the umbrella of a 2006 technical cooperation memorandum.

accounts used by firms and households to make payments.<sup>24</sup> At the end of 2009, there were some 1,500 institutions of this type, with 33,500 branches, and 134 million sight deposit accounts.

### **1.3.2 Other payment service providers**

In addition to the aforementioned financial intermediaries, “correspondentes bancários” – some 120,000 at the end of 2009 – play an important part in providing payment services. These are non-financial institutions that act as agents for banks<sup>25</sup> by offering banking and payment services to customers with no direct access to the Brazilian banking system. ECT, the Brazilian Post Office, is an important correspondente bancário that provides payment services in many municipalities without bank branches.

Payment card companies also play an important role in the national payment system. The main international brands operating in Brazil are Visa, MasterCard and American Express. Hipercard and *Cheque Eletrônico* are the main domestic brands. Visa and MasterCard, which are organised as four-party schemes, provide both credit and debit cards. American Express and Hipercard, both three-party schemes, offer credit cards only. For its part, *Cheque Eletrônico* offers debit cards only. On the acquiring side of the payment card market, the main participants are the Brazilian Company for Means of Payment (Cielo) and Redecard S.A. (Redecard), which are domestic companies controlled by Brazilian banks. They operate the two largest POS networks in Brazil, accounting for more than 90% of payment card transactions.

Both the debit card scheme *Cheque Eletrônico* and the shared ATM network *Banco24Horas* are operated by Banking Technology S.A. (TECBAN), which is owned by a consortium of Brazilian banks. For its part, Telefônica S.A. is a telephone network operator that provides Oi Paggo, the most widely used mobile-based payment service.

### **1.3.3 Clearing and settlement service providers**

The table below summarises information on the Brazilian clearing and settlement service providers.

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<sup>24</sup> Payments can generally also be made directly from savings accounts (about 91 million accounts at end-2009). However, this typically excludes the use of cheques and debit cards, which are only offered on sight deposit accounts.

<sup>25</sup> Typically, correspondentes bancários are post offices, lottery vendors, supermarkets, drugstores and other small retail outlets.

Table 1

**Providers of clearing and settlement services**

<b>Entity</b>	<b>Form of constitution</b>	<b>Ownership</b>	<b>Systems operated</b>	<b>Main items cleared/settled</b>	<b>Section</b>
CIP – Interbank Payment Clearinghouse	Non-profit civil association	Domestic banks	SITRAF	Credit transfers	3.2.2
			SILOC	Credit transfers; interbank payments related to some card schemes	3.3.2
Banco do Brasil	For-profit company	Federal government and several domestic and foreign investors	COMPE	Cheques	3.3.1
CETIP S.A. – Organised OTC Market for Securities and Derivatives	For-profit company	Several domestic and foreign investors	OTC Clearinghouse	Corporate bonds and OTC derivatives	4.3.1
BM&FBOVESPA	For-profit company	Several domestic and foreign investors	FX Clearinghouse	Interbank foreign exchange transactions	3.2.3
			Equity and Corporate Bond Clearinghouse	Equities and corporate bonds	4.3.2.1
			Debt Securities Clearinghouse	Government securities	4.3.2.2
			Derivatives Clearinghouse	Mainly exchange-traded derivatives	4.3.2.3

**1.3.4 Main bodies related to securities and derivatives markets****1.3.4.1 Securities and Exchange Commission (CVM)**

CVM, which was created by the Securities Market Law in 1976, is an independent regulatory body with nationwide authority over securities and derivatives markets. Besides regulating and enforcing the related laws and its own rules, CVM is empowered to investigate and to sanction market participants, including exchanges, OTC market operators, issuers, intermediaries, custodians, central depositories, asset managers and investment funds. Together with the BCB, CVM authorises and oversees securities settlement systems (systems settling either government securities or bank-issued securities are authorised and overseen by the BCB exclusively).

The institution is run by a board of five members, all appointed by the President of Brazil and approved by the Federal Senate for alternate five-year terms. CVM is a member of international organisations such as the International Organization of Securities Commissions,

the Emerging Markets Committee Advisory Board, and the Council of Securities Regulators of the Americas.

#### *1.3.4.2 Brazilian Financial and Capital Markets Association (ANBIMA)*

Founded in October 2009, ANBIMA was created by the merger of the former National Association of Investment Banks (ANBID) and the former National Association of Financial Market Institutions (ANDIMA). The new entity represents more than 300 members including universal, commercial and investment banks, asset managers, securities brokers and dealers, and investment advisers.

Since 1998, ANBIMA (previously ANDIMA and ANBID) has created and instituted codes of regulation and best practice by which market participants themselves set regulatory standards. In addition to raising operational standards, self-regulation aims to instil transparency into the Brazilian financial and capital markets. To carry out this activity, the entity counts on several market committees, most of which consist of external members, thus ensuring independence.

ANBIMA (previously ANDIMA) implemented the SELIC system in 1979, in cooperation with the BCB. It also played an important part in the implementation of the CETIP system in 1986. Furthermore, ANBIMA operates the Market Telecommunication Network (RTM), which interconnects hundreds of financial institutions and data providers via a dedicated high-speed optical fibre network for data, voice and image.

#### *1.3.4.3 BM&FBOVESPA Group*

The Brazilian Securities, Commodities and Futures Exchange (BM&FBOVESPA) is the only stock and derivatives exchange in Brazil. It was created in 2008 by the merger between the former São Paulo Stock Exchange, founded in 1890, and BMF&F S.A., the former Brazilian Mercantile & Futures Exchange, founded in 1986. BM&FBOVESPA provides a fully electronic trading environment through order-driven systems that give direct market access to both retail and institutional investors, including co-location facilities.<sup>26</sup> It offers a complete set of financial and commodities products in the cash, futures and options markets.

BM&FBOVESPA also operates the FX Clearinghouse, the Equity and Corporate Bond Clearinghouse, the Debt Securities Clearinghouse and the Derivatives Clearinghouse (see Sections 3.2.3, 4.3.2.1, 4.3.2.2 and 4.3.2.3, respectively, for further information). Furthermore, it acts as a central counterparty for all these clearing houses, and also as a central depository for stocks and some corporate bonds.

The BM&FBOVESPA Settlement Bank and the BM&FBOVESPA Supervision of Markets (BSM) are subsidiaries of BM&FBOVESPA. The former provides custody and settlement services to all exchange participants. The latter is the self-regulatory organisation for the BM&FBOVESPA markets.

BSM is also responsible for managing the Investor Indemnification Mechanism to which investors can make claims for the reimbursement of losses from fraud, bad order execution or other cases of participant misconduct. The BSM's self-regulation committee comprises eight members, five of whom are external to BM&FBOVESPA Group.

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<sup>26</sup> Co-location is a direct connection to the exchange whereby customer orders can be entered into the trading systems without using the technological infrastructure of brokerage houses. These orders are generated through a software application installed on a computer that is hosted in premises made available by BM&FBOVESPA.

#### 1.3.4.4 CETIP S.A. – Organised OTC Market for Securities and Derivatives

In addition to providing depository, clearing and settlement services related mainly to corporate bonds, bank-issued securities and derivatives (see Section 4.3.1), this entity also provides the CETIPNET electronic trading platform.

As a self-regulated institution, CETIP supervises participants to ensure compliance with laws and regulations. Self-regulation is conducted by means of an independent structure, with management autonomy, that is also responsible for supervision in markets served by CETIP.

## 2. Payment instruments used by non-banks<sup>27</sup>

### 2.1 Cash payments

Cash payments are used in everyday purchases and other small-value transactions. They account for 77% of payments made by individuals, according to a 2007 BCB survey. At the end of 2009, the total amount of currency in circulation was about BRL 131.9 billion, of which approximately BRL 128.5 billion was in banknotes and BRL 3.4 billion in coins. Banknotes are issued in six denominations (BRL 2, 5, 10, 20, 50 and 100),<sup>28</sup> and coins in six denominations (BRL 0.01, 0.05, 0.10, 0.25, 0.50 and 1).<sup>29</sup> Both banknotes and coins are legal tender in Brazil, but the acceptance of coins as a payment instrument is mandatory only up to 100 units of each denomination. From 2005 to 2009, currency held by the public accounted for an average 39.8% of the M1 monetary aggregate, as shown in the table below.

Table 2

#### Share of currency held by the public in the M1 monetary aggregate (end of year)

Year	Currency held by the public (BRL billions)	M1 (BRL billions)	in % of M1
2005	58.3	144.8	40.3
2006	68.9	174.4	39.5
2007	82.3	231.4	35.6
2008	92.1	223.4	41.2
2009	105.5	248.1	42.5
<b>Average</b>			<b>39.8</b>

<sup>27</sup> All economic agents excluding institutions accepting sight deposits.

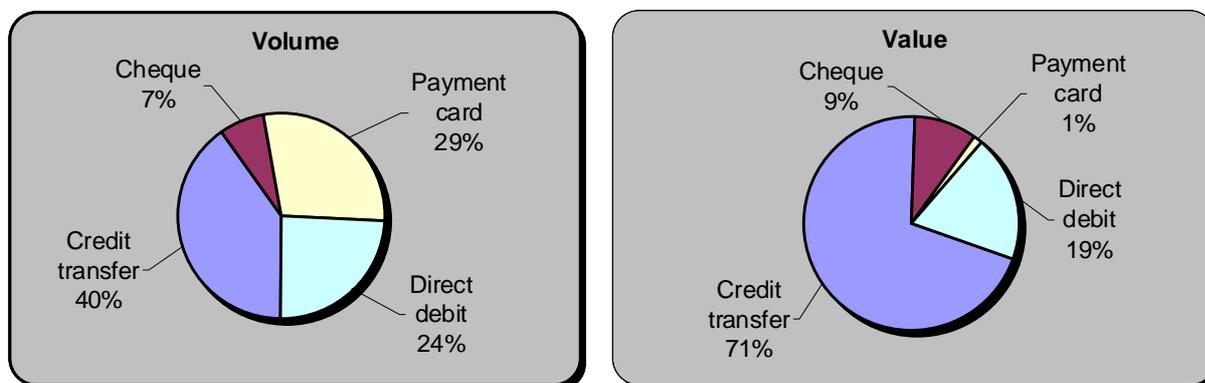
<sup>28</sup> Until a few years ago, BRL 1 banknotes were also issued (some remain in circulation and continue to be legal tender).

<sup>29</sup> The BCB has the sole right to issue banknotes and coins.

## 2.2 Non-cash payments

Non-cash payments are made mainly by means of credit transfers, payment cards, direct debits and cheques. The following chart shows the share of each payment instrument in 2009.

Chart 1  
Use of payment instruments in 2009<sup>1</sup>



<sup>1</sup> Payment cards do not include retailer cards.

### 2.2.1 Cheques

Cheques continue to be an important payment instrument in Brazil,<sup>30</sup> although their use has declined in recent years owing to substitution by payment cards and credit transfers. Cheques are standardised in format and carry magnetic ink character recognition (MICR) encoding so that basic data can be read automatically. A cheque can only be presented on a sight deposit account. Typically, cheques are still physically presented to the drawee bank, although they can be truncated where previously agreed between banks.

The interbank settlement of a cheque occurs on T+1, with the exact process varying according to the cheque's value.<sup>31</sup> The payer's and payee's accounts are respectively debited and credited as follows:

- the payer's account is debited on the night of T in the case of "over-the-limit" cheques,<sup>32</sup> or on the night of T+1 in the case of "below-the-limit" cheques; and
- the payee's account is credited on the night of T+1 in the case of "over-the-limit" cheques, or on the night of T+2 in the case of "below-the-limit" cheques.

In 2009, approximately 1.8 billion cheques were written, amounting to some BRL 2.5 trillion (an average of about BRL 1,400 per cheque), against 2.5 billion cheques in 2005, amounting to BRL 2.2 trillion.

<sup>30</sup> The practice of post-dating cheques as a means of postponing payment, as may be agreed between the payer and payee, is customary but not supported by the Cheque Law.

<sup>31</sup> As of 18 February 2005, cheques whose values are equal to or larger than a reference value (currently BRL 250,000) are settled bilaterally among banks, without netting, through STR. Cheques with lower values are settled by multilateral netting in a specific clearing system (COMPE).

<sup>32</sup> Cheques with a value equal to or larger than a reference value (currently BRL 299.99). Conversely, "below-the-limit" cheques are those having a value below this reference value.

### 2.2.2 Credit transfers

In Brazil, interbank credit transfers that can be ordered by non-banks include *Electronic Funds Transfer (TED)*, *Credit Transfer (DOC)*, *Special Credit Transfer (TEC)* and those related to “bloquetos de cobrança”.<sup>33</sup> These credit transfers are non-paper-based, and differ in terms of (i) settlement cycle and, as a consequence, the value date for the beneficiary; (ii) the value of the transfer;<sup>34</sup> and (iii) the nature of the beneficiary’s account (in the case of TEC, the beneficiary’s account is typically a salary account).

In the case of both TED and TEC, the beneficiary’s account receives same day value (in the case of TED, typically a few minutes after the transfer is initiated by the payer). In the case of DOC, funds are made available in the beneficiary’s account on the morning of the following day (T+1), while in the case of bloquetos de cobrança the availability of funds in the beneficiary’s account will depend on the terms of the agreement between the beneficiary and its financial institution. For intrabank credit transfers, the remitter’s account is debited and the receiver’s account simultaneously credited at the moment the transfer is initiated.

A credit transfer can be initiated either by the remitter through an electronic channel (ie ATM terminals, personal computers and mobile phones),<sup>35</sup> or by a bank cashier on behalf of the remitter. In 2009, some 7.2 billion credit transfers were made, amounting to about BRL 18.6 trillion (an average of BRL 2,600 per transaction). From 2005 to 2009, the volume of credit transfers increased by about 50%, or 10.7% per annum. Over the same period, the use of TED, which is settled in real time or “quasi-real time” depending on whether it is settled in STR or SITRAF, has steadily increased, posting average annual growth rates of 15.4%.

Various systems are used for the interbank settlement of credit transfers: STR or SITRAF, at the discretion of the sending bank, for TED; SILOC for DOC, TEC and most bloquetos de cobrança (those with a value larger than BRL 5,000 are settled bilaterally through STR).

### 2.2.3 Credit cards

Although credit cards were introduced to Brazil as early as 1956, they became an important payment instrument only in the 1990s. Their widespread adoption has been accelerated by the elimination of certain restrictions, such as the ban on paying for fuel purchases with a credit card, and the abolition of the “private label” requirement that, until 1996, prevented an issuing bank from operating more than one brand.

In Brazil, credit card holders pay no interest if they pay the invoice in full on the next due date. On average, cardholders are given a grace period of 28 days. Visa, MasterCard, American Express and Hipercard<sup>36</sup> are the main brands issued and accepted in Brazil.<sup>37</sup>

The number of credit cards increased from 67.5 million in 2005 (an average of one card per 2.7 Brazilians) to 152.3 million in 2009 (an average of one card per 1.3 Brazilians), representing an increase of 125.6% over the period or an annual average growth rate of 22.6%. In 2009, around 2.8 billion credit card transactions were made, amounting to about

<sup>33</sup> *Bloquetos de cobrança* are bar-coded payment slips that allow bills to be paid in any bank. The related funds transfers are usually electronic.

<sup>34</sup> By agreement among the Brazilian banks, TED is used for transfers larger than BRL 3,000, but those related to stock exchange transactions do not observe this minimum value. DOC and TEC are only used for transfers lower than BRL 5,000.

<sup>35</sup> Internet banking and ATM terminals are widely used in Brazil. Together, they accounted for some 78% of all banking transactions in 2009.

<sup>36</sup> Hipercard is a domestic brand.

<sup>37</sup> Visa and MasterCard are organised as four-party schemes, while American Express and Hipercard are three-party schemes.

BRL 254.1 billion (an average value of BRL 92 per transaction). From 2005 to 2009, credit card transactions increased by about 85.0% (an annual growth rate of 16.6%).

Various different approaches are used for interbank settlement, as there is no central clearing system for all payment cards. MasterCard, for instance, settles participating banks' net positions through SILOC, while banks participating in the Visa scheme settle obligations arising from card payments in SITRAF. As for three-party schemes, the respective licensed bank receives payments from the cardholders mainly via SILOC, while payments to merchants usually involve intrabank payments (retailers participating in a three-party scheme typically hold an account at the relevant licensed bank).

#### **2.2.4 Debit cards**

Debit cards are typically issued as bank cards. Most include credit and cash withdrawal functions too.<sup>38</sup> The debit card brands issued in Brazil are Visa Electron, MasterCard Maestro and the domestic Cheque Eletrônico brand. In a debit card transaction, the payer's account is usually debited at purchase, while the merchant's account is typically credited on T+1 or T+2 depending on the agreement between the merchant and the respective acquirer.

In 2009, around 2.3 billion debit card payments were made, amounting to a total of about BRL 121.5 billion, with an average value of BRL 53 per transaction. From 2005 to 2009, the number of debit cards increased from 163.9 million (an average of 0.9 cards per capita) to 221.5 million (1.6 cards per capita), which is equivalent to a growth rate of about 35.1% (or 7.8% annually). In the same period, debit card payments increased by around 102.5% in terms of volume (or 19.3% annually).

For interbank settlement, MasterCard and Visa use the approaches described at the end of Section 2.2.3. The net positions of banks participating in the Cheque Eletrônico scheme are settled through SILOC.

#### **2.2.5 Retailer cards**

Mainly issued by large retailers, retailer cards can be used only at the shops of the sponsoring group, ie as in-store credit cards. Typically, cardholders can settle their outstanding balances 1–2 months after a purchase or pay it down in instalments generally without paying interest. As remote payment methods are not available for the settlement of retailer card debt, cardholders have to make payment at the shop by means of cash, cheque or debit card.

The number of retailer cards rose from 97.5 million in 2005 to 196.5 million in 2009, equivalent to an increase of 101.1% over the period (or 19.1% annually). In 2009, around 1.1 billion retailer card transactions were made, amounting to some BRL 59.5 billion (an average value of some BRL 54 per transaction). From 2005 to 2009, retailer card transactions increased by about 98.3% in terms of volume (or 18.7% annually).

#### **2.2.6 Direct debits**

Direct debits are normally used for recurring payments such as utility bills (ie water, electricity and telephone). For such payments, the payer preauthorises his bank to accept funds transfers initiated by the payee. A few days before the payment is due the payee sends the invoice to the payer to be checked. If there are no objections the payer's account is automatically debited on the due date and the payee's account credited. The authorisation is usually valid indefinitely; direct debits therefore continue to be automatically executed until cancelled.

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<sup>38</sup> The same payment card can be used as debit card or credit card.

Most direct debits are met via intrabank payments. Interbank direct debits are cleared by TECBAN and settled through SILOC. In 2009, around 4.3 billion direct debit transactions were made, amounting to about BRL 5,081.5 billion.

### 2.3 Recent developments

In 2009, the Brazilian banks together with CIP implemented the so-called Authorised Direct Debit (DDA). Despite its name, the service basically allows *bloquetos de cobrança*<sup>39</sup> to be electronically presented to the debtors. Payment can be made either via direct debit or an individual credit transfer. The new process is likely to increase the use of interbank direct debits in Brazil, as direct debits are currently used mainly for intrabank payments.

Meanwhile, the Brazilian payment card industry is undergoing important changes aimed at improving competition among its participants, especially on the acquiring side. These changes are driven mainly by the joint work of the BCB with competition and consumer authorities. One such innovation is the abolition of an exclusivity clause which prevented merchants from entering into a relationship with more than one acquirer per payment card scheme. Today, merchants can use a single POS terminal to capture transactions from any payment card brand.

Internet banking is widely used: at the end of 2009 some 35 million sight deposit accounts could be accessed remotely via internet. In that year, this access channel accounted for some 48% of all banking transactions. For their part, mobile payments, now at a nascent stage, are likely to become an important retail payment channel in coming years, especially for people without direct access to the banking system (some 200 million mobile phones are in use in Brazil and most people have access to one). Currently, Oi Paggo, operated by Telefônica S.A., is the best-known mobile payment scheme.

## 3. Payment systems (funds transfer systems)

### 3.1 General overview

STR is the designated hub of the Brazilian payment system for the following reasons:

- all banks are legally obliged to deposit available funds in accounts held at the BCB; and
- BCB rules specify that:
  - the net positions of systemically important clearing systems must be settled in central bank money;<sup>40</sup>
  - all funds transfers between accounts held at the BCB must be made through STR.

The following diagram shows the links between STR and all other Brazilian clearing and settlement systems.

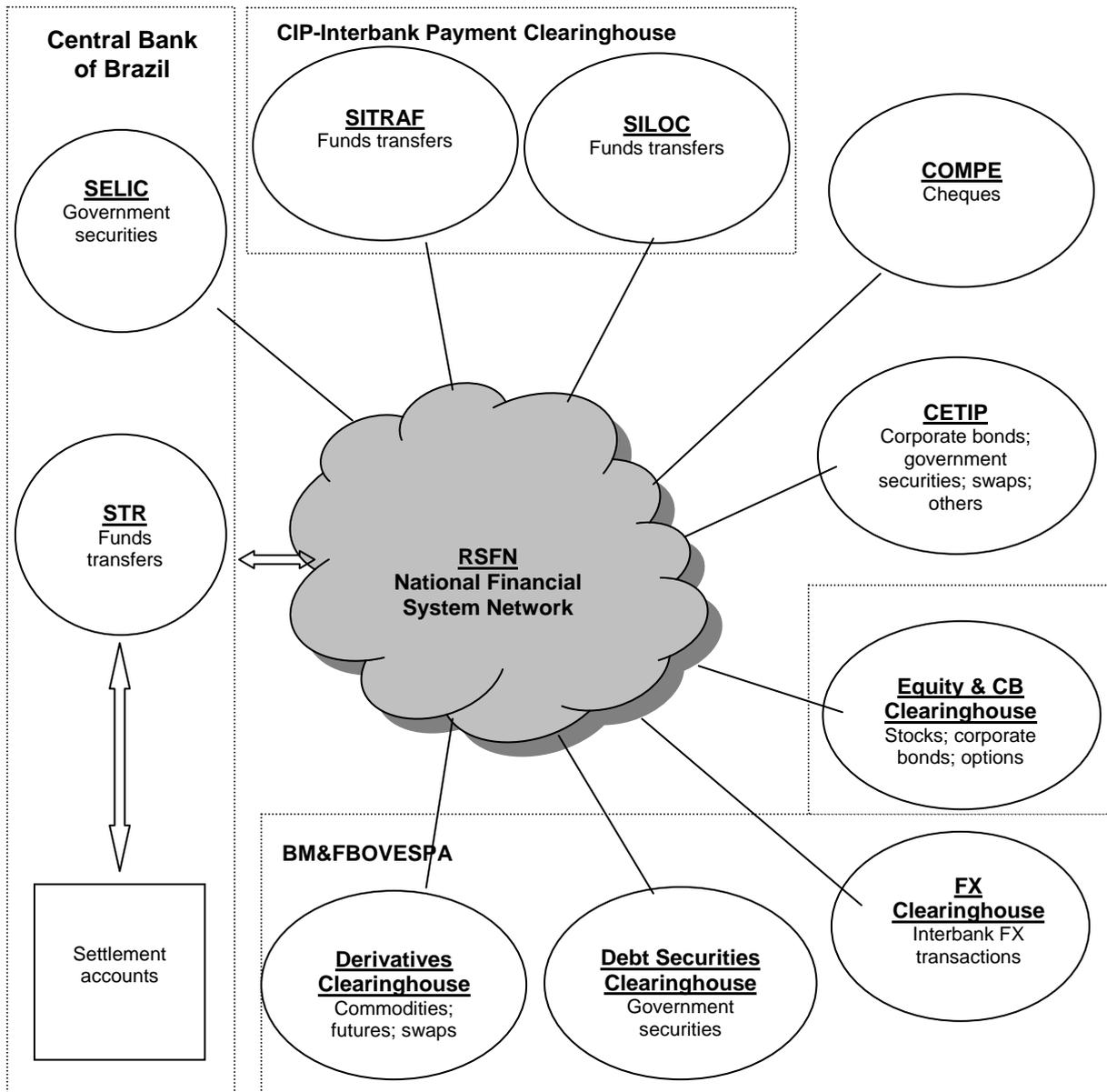
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<sup>39</sup> See footnote 33.

<sup>40</sup> In practice, all non-systemically important clearing and settlement systems also settle in central bank money, even though this is not mandatory.

Diagram 1

Overview of the Brazilian clearing and settlement systems



In addition to STR, domestic interbank funds transfers can also be settled by means of SITRAF, or they can be cleared by SILOC before final settlement in STR.<sup>41</sup> Cheques are cleared through COMPE. SITRAF is a hybrid (RTGS-like) settlement system that is considered systemically important and, like STR, allows intraday funds transfers. SILOC and COMPE are non-systemically important multilateral netting systems. For its part, the FX Clearinghouse, which is designated as systemically important, provides clearing services for foreign exchange transactions involving BRL and USD. To a large extent, STR and SITRAF share the same technological platform.

<sup>41</sup> Funds transfers are settled through a particular system (STR, SITRAF or SILOC) mainly on the basis of their value, the purpose of the payment and the speed requested by the remitter.

As a general rule, the bank receiving a credit transfer (TED, TEC or DOC) must credit the payee's account no more than 60 minutes after the interbank settlement has taken place. A further rule applies to TED: after receiving an order, the payer's bank must forward it to the settlement system (STR or SITRAF) within 30 minutes.<sup>42</sup>

The smooth functioning of the national payment system depends particularly on the following factors:

- by means of repo transactions with Brazilian government securities, the BCB extends, free of charge, fully collateralised and unlimited intraday credit to banks holding reserve accounts;
- end-of-day balances are used to verify banks' compliance with reserve requirements. Thus, in the course of a business day, these balances serve as a source of liquidity to settle obligations in STR;
- should a gridlock arise, the BCB can activate the STR's optimisation routines in order to improve system liquidity and settlement efficiency.

Payments clearing and settlement systems are regulated and overseen by the BCB according to principles set by the CMN. Systemically important clearing and settlement systems, as designated by the BCB, must offer settlement certainty and maintain minimum standards of availability<sup>43</sup> and capital.

The clearing and settlement systems are regulated by the Payment System Law. In addition, the legislation mentioned in Section 1.1 regulates payment instruments and the relationship between customers and payment service providers as well as the finality and irrevocability of settlement.

## 3.2 Large-value payment systems

### 3.2.1 Reserves Transfer System (STR)

#### 3.2.1.1 Institutional framework

STR, whose regulations are publicly disclosed, is owned and operated by the BCB.<sup>44</sup>

#### 3.2.1.2 Participation

Participation in STR is mandatory for banks that hold reserve accounts at the BCB<sup>45</sup> and for entities that operate systemically important clearing and settlement systems. Institutions that are permitted rather than obliged to participate in STR include non-banks, such as credit unions and brokerage houses, and entities operating non-systemically important clearing and settlement systems. The National Treasury Secretariat (STN) also participates in the system, since STR settles funds transfers related to the collection of income taxes and payments for

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<sup>42</sup> The rule is applicable to funds transfer orders that are settled on the same day.

<sup>43</sup> Availability for a given clearing and settlement system is measured by the availability index for the last 12 months, which is the ratio comparing the total time the system actually was available for participants' access with the total time that it should have been available.

<sup>44</sup> The system went live on 22 April 2002.

<sup>45</sup> Reserve accounts are mandatory for commercial banks, universal banks with a commercial bank portfolio and savings banks, but optional for investment banks and foreign exchange banks. The reserve accounts are used as settlement accounts for funds transfers settled through STR.

the federal government. In December 2009, STR had 138 participants (135 banks and three clearing house operators), in addition to the BCB and STN.<sup>46</sup>

### 3.2.1.3 Types of transactions

STR participants can execute funds transfers of unlimited value on their own or a customer's behalf for credit to the account of another participant or its customer. The system plays a central part in settling monetary policy operations, interbank transactions that support the money, capital and foreign exchange markets, and the netting payments of clearing houses. STR accepts credit orders only.<sup>47</sup>

Cheques with a value exceeding the so-called VLB-Cheque,<sup>48</sup> a reference value currently set by the BCB at BRL 250,000, are also settled through STR, as well as payments relating to *bloquetos de cobrança*<sup>49</sup> that exceed the "VLB-Cobrança" (set by the BCB at BRL 5,000). In both cases, settlement is made between banks on a bilateral gross basis.

### 3.2.1.4 Operation of the system and settlement procedures

STR is a real-time gross settlement system. Technical access to the system can be made through either the National Financial System Network (RSFN)<sup>50</sup> or the internet.<sup>51</sup> RSFN has a proprietary messaging protocol based on the XML message standard format. For access via internet, the STR-Web application is used. Typically, banks, clearing houses and the National Treasury Secretariat use RSFN as the primary access channel with internet as a backup. Non-bank financial institutions can use either RSFN or the internet as their primary access channel. Diagram 2 shows the STR's general technical framework.

Participants can choose between four different priority levels for a funds transfer order. The highest is reserved for funds transfer orders for withdrawals and deposits made by banks at the BCB, and for the settlement of clearing house net positions. Transfer orders that do not specify a priority are classified by STR at the lowest level.

A funds transfer order is submitted for settlement as soon as it is received by the system, but it is queued if (i) the remitter has insufficient funds on its settlement account, or (ii) other queued funds transfer orders from the same participant carry an equal or higher priority level. Queuing is not applicable to funds transfer orders related to SELIC (Section 4.4.1) or to orders sent by entities that operate clearing and settlement systems. In these cases, STR immediately rejects the order if funds are insufficient.

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<sup>46</sup> In practice, non-bank financial institutions began to participate in STR in the second quarter of 2010.

<sup>47</sup> All funds transfers must be individually authorised by the holder of the account to be debited.

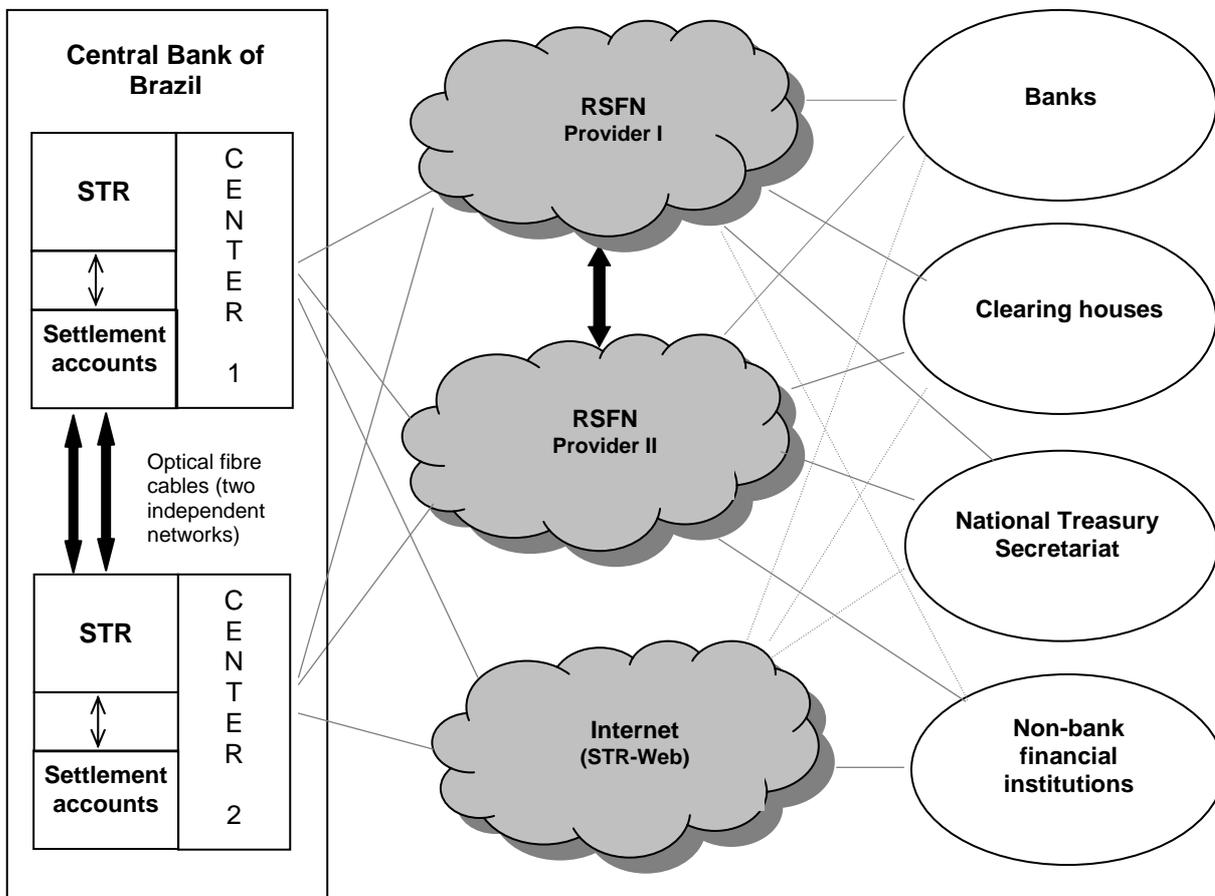
<sup>48</sup> VLB is the Portuguese abbreviation for "Reference value for gross settlement".

<sup>49</sup> See footnote 33.

<sup>50</sup> RSFN is the financial system network that carries message flow through the Brazilian payment system. It is used by financial institutions mainly to access STR and SITRAF. From an operational standpoint, RSFN is underpinned by two independent telecommunication networks. Each operates as a backup service for the other, and both networks meet stringent security, availability and reliability criteria set by the BCB.

<sup>51</sup> Telephone access is also possible as a contingency measure.

Diagram 2  
STR technical framework

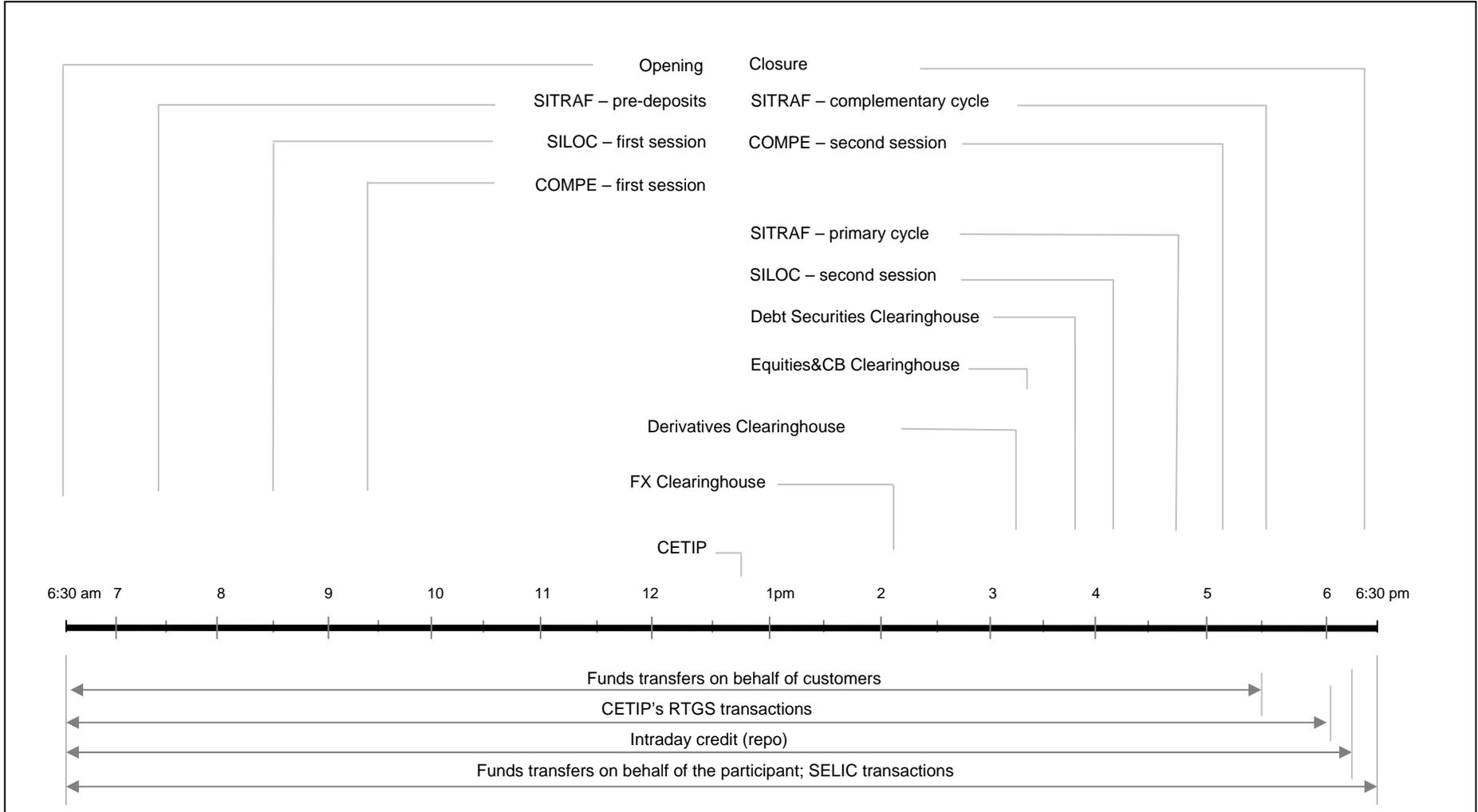


Queued orders are arranged in the following order: (i) by participant; (ii) by preference level; and – in case of equal priority level – (iii) in order of when they were entered into STR. In general, a queued order cannot be settled before a preceding one, ie the settlement occurs on a FIFO (first in first out) basis. In order to avoid gridlock situations in the payments flow, the BCB can activate, if and when it judges necessary, a routine to optimise the settlement process. Settlement is considered final, ie irrevocable and unconditional, at the moment the funds are credited to the relevant settlement account. The receiving participant is notified of the transfer immediately on settlement.

STR is open for settlement of transactions on business days from 06:30 to 18:30 (Brasilia time),<sup>52</sup> but funds transfers on behalf of customers are only permitted until 17:30. The STR settlement schedule, with the main events, is shown in the following chart.

<sup>52</sup> Participants can access the system until 23:59 for transaction-related information including their settlement account balances. The cutoff time for funds transfer orders for settlement on a future date will soon be extended to 23:59.

Chart 2  
STR schedule (Brasília time)



### 3.2.1.5 Risk management

The basic rules of the system, as listed below, prevent credit or liquidity risk arising between the sending bank and the receiving bank: (i) once a funds transfer order is debited to the sending bank's account and credited to the receiving bank's account, settlement is final, ie unconditional and irrevocable; (ii) a funds transfer order is released by the system only if the remitting bank has sufficient funds in its settlement account; and (iii) the receiving bank is notified of any funds transfer order only after it is settled by the system, so that it cannot count on liquidity related to funds transfers that are not yet settled.

To increase participants' liquidity and, hence, avoid a gridlock situation, the BCB uses repo transactions to extend, free of charge, unlimited intraday credit to institutions holding reserve accounts. Participating banks use this facility frequently, as shown in the table below.

Table 3  
**Use of Central Bank of Brazil intraday credit (daily average)**

Year	Total value (BRL billions)	Number of transactions <sup>1</sup>
2005	56.4	486
2006	66.6	531
2007	64.0	476
2008	47.2	389
2009	48.0	294

<sup>1</sup> Rounded number.

Operational risks are mitigated through the use of two operational centres (the secondary centre operating in hot standby mode), a dual telecommunications network and existing contingency access channels. As a systemically important settlement system, the STR's technical infrastructure is designed to achieve an availability index of 99.8%. Operations can be recovered, if disrupted, in no more than 30 minutes.

### 3.2.1.6 Pricing

The STR pricing policy aims at full cost recovery, ie fees are charged to cover all costs, both fixed and variable. Fees are typically charged per transaction; participants pay neither a sign-up nor an annual fee. For a typical funds transfer order, the remitting participant pays from BRL 0.11 to BRL 0.88 depending on when the order is sent to the system (earlier orders are subject to lower fees), while the receiving participant always pays BRL 0.44 per order. For participants using the internet as their main access channel, a monthly charge is also payable (BRL 500, BRL 2,000 or BRL 4,000, depending on the participant's monthly volume of funds transfer orders).

### 3.2.1.7 Major ongoing and future projects

All non-bank financial institutions were granted direct access at the end of 2009. Some new participants, mainly credit unions and brokerage houses, started participating in the system from the second quarter of 2010.

The following new facilities are currently being implemented: (i) automated liquidity saving mechanisms; and (ii) the capability for funds transfer orders to be scheduled for settlement at a specific future date and/or time.

### **3.2.2 Funds Transfer System (SITRAF)**

#### *3.2.2.1 Institutional framework*

SITRAF is owned and operated by CIP (see Section 1.3.3),<sup>53</sup> and overseen solely by the BCB. It complies with the BCB's rules for Brazilian clearing and settlement systems.

#### *3.2.2.2 Participation*

Direct participation is open to all institutions holding a settlement account at the BCB. The system had 89 participants as at December 2009.

#### *3.2.2.3 Types of transactions*

SITRAF settles mainly TED transfers and other funds transfer orders issued by banks' customers for same day settlement. They are typically entered into the system to be settled in "quasi-real time" (typically, more than 97% of all funds transfer orders are released by the system in less than one minute). A future-dated order that has already been entered into the system is first stored and is submitted to the settlement process at the start of the value day.

#### *3.2.2.4 Operation of the system and settlement procedures*

SITRAF is a hybrid (RTGS-like) settlement system with a continuous net settlement process. Participants exchange electronic payment messages via RSFN. The system is supported by two data processing centres (primary and backup) in Rio de Janeiro (the backup centre working in hot standby mode). Funds transfer orders can be processed at a rate of some 133,000 per hour.

Transfers can be settled on a gross basis, in bilaterally netted batches or in multilaterally netted batches (see diagram below for the processing flow).

At the start of each operational cycle, between 06:35 and 07:30 (Brasilia time), each participant makes an initial deposit (pre-deposit) in the SITRAF settlement account at the BCB.<sup>54</sup> Within the SITRAF environment, the initial deposit is credited to each participant's settlement account, where the balance will increase with each inpayment and fall with each outward payment. Participants can top up their SITRAF account at any time during the processing cycle, ie they can transfer funds from their accounts in the STR environment to those in the SITRAF environment. If participants have excess liquidity on account with SITRAF, they can transfer funds to their STR accounts between 10:00 and 16:30.<sup>55</sup>

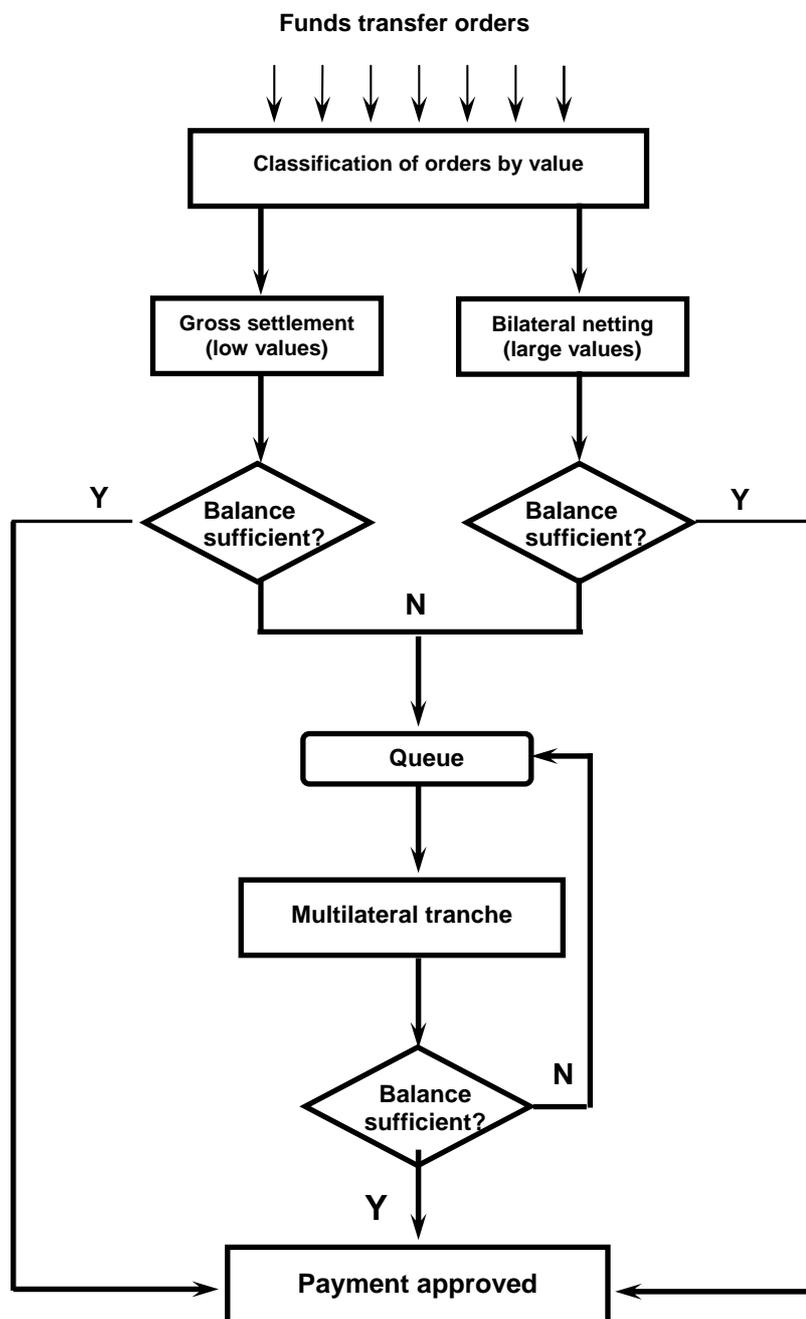
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<sup>53</sup> The system started operation on 6 December 2002.

<sup>54</sup> The value of the initial deposit for each participant is calculated according to its transaction volume over a set period.

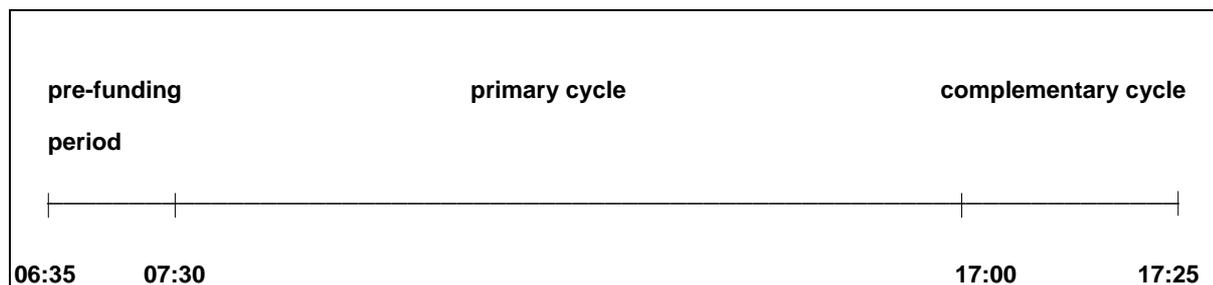
<sup>55</sup> The right to move liquidity between SITRAF and STR settlement accounts (and vice versa) is known as the "liquidity bridge".

Diagram 3

**SITRAF processing flow**

Interbank funds transfer orders can be submitted from 07:30 to 17:00. Each daily settlement cycle comprises a primary and a complementary cycle, as shown below.

Chart 3  
SITRAF schedule



During the primary cycle, funds transfer orders are settled based on the balance of each participant settlement account in the SITRAF environment. All accounts must always have a balance of at least zero. In order to avoid a potential concentration of liquidity during the primary cycle, the system's regulations stipulate that no account can have a balance higher than  $n$  times the amount of the participant's initial pre-deposit. This parameter is established by CIP based on statistical analysis to optimise the payments flow.<sup>56</sup> This upper limit is removed for the last 10 minutes of the primary cycle.

In the complementary cycle, participants with pending funds transfer orders must deposit the necessary funds in the SITRAF settlement account at the BCB by a preset deadline (17:20). The remaining funds transfer orders are then processed and released. At the end of the complementary cycle (17:25), CIP transfers the participants' remaining balances on their SITRAF accounts to their settlement accounts at the BCB.

### 3.2.2.5 Risk management

For an RTGS-like system, the following rules prevent credit and liquidity risks from arising at the system level (ie directly between participants): (i) once a funds transfer order is debited to the remitting bank's account and credited to the receiving bank's account, settlement is final;<sup>57</sup> (ii) a funds transfer order is released by the system only if the remitting bank has sufficient funds on its settlement account; and (iii) the receiving bank is notified of any funds transfer order only after it is settled, so that it cannot count on liquidity related to funds transfers that are not yet settled.

As a systemically important settlement system, SITRAF's technical infrastructure is designed to achieve an availability index of 99.8%. Operations can be recovered, if disrupted, in no more than 30 minutes.

### 3.2.2.6 Pricing

Fees are charged on a full cost recovery basis. For each funds transfer order, fees are charged to both the remitting and the receiving banks, the tariff depending on when the funds transfer is settled (for the remitting bank, the fee ranges from BRL 0.05 to BRL 0.40; for the receiving bank, from BRL 0.27 to BRL 0.40, as at December 2009).

<sup>56</sup> If it breaches its limit, a participant is barred from receiving new incoming transfers. The purpose of this rule is to prevent participants from postponing their payouts.

<sup>57</sup> Even though the participants' final positions are settled in central bank money only at the end of the relevant settlement cycle, SITRAF is deemed to be able to offer intraday finality by both its participants and the BCB, its supervisor, on the basis of the system's robust processes, which are underpinned by the use of pre-deposits on account with the central bank.

### 3.2.2.7 Major ongoing and future projects

Currently no important changes are in hand or at the planning stage.

## 3.2.3 **BM&FBOVESPA – Foreign Exchange Clearinghouse**

### 3.2.3.1 Institutional framework

The Foreign Exchange Clearinghouse is owned and operated by BM&FBOVESPA (see Section 1.3.4.3), which also acts as a central counterparty for all transactions accepted for settlement.<sup>58</sup> It is overseen by the BCB and complies with the BCB's rules for all Brazilian clearing and settlement systems.

### 3.2.3.2 Participation

Banks and brokers authorised by the BCB to operate in the interbank foreign exchange market can participate in the clearing house if they meet the managerial, financial and operational minimum requirements set out in its regulations. To act as a settling agent (direct participant), the participant must hold a settlement account at the BCB (70 direct participants in December 2009).

### 3.2.3.3 Types of transactions

The system settles interbank foreign exchange transactions executed over the counter<sup>59</sup> or through the BM&FBOVESPA-operated electronic trading platform (Global Trading System). So far, only transactions involving BRL and USD are settled through the system. Transactions can be settled on T, T+1 or T+2, as the counterparties choose.<sup>60</sup> The vast majority of transactions, however, settle on T+2.

### 3.2.3.4 Operation of the system and settlement procedures

The FX Clearinghouse is a multilateral net settlement system. There is one settlement session per business day, which starts at 10:45 and ends at 14:05 (Brasilia time). At the beginning of the settlement session, the clearing house informs participants about their net positions to be settled on that day in domestic and foreign currency.

By 13.05, each participant must transfer to the clearing house the net amount of the currency it is selling. The BRL transfers are made to the clearing house's account at the BCB via STR. The USD transfers are made to the clearing house's account at the correspondent bank designated for this purpose.<sup>61, 62</sup> At the end of the settlement session, the clearing house transfers to each direct participant the net amount of the currency it is buying. These transfers are made via STR for BRL, while for USD transfers the clearing house's

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<sup>58</sup> The system started operation on 22 April 2002.

<sup>59</sup> OTC FX transactions can be settled either directly between the counterparties or through the FX Clearinghouse. In the former case, PVP is not observed. More than 90% of daily trades are settled through the FX Clearinghouse.

<sup>60</sup> Same day settlement requires a transaction to be entered into the system by 10:15.

<sup>61</sup> The FX Clearinghouse uses four correspondent banks in the United States (Citibank, Bank of America, Standard Chartered and Wachovia).

<sup>62</sup> If both the clearing house and the participant hold accounts at the same correspondent bank, funds transfers can be made between accounts of that correspondent bank. Where transfers involve different banks, they must be made through the Federal Reserve's Fedwire funds transfer system.

correspondent banks typically use Fedwire (or, where applicable, USD transfers on the books of a correspondent bank).<sup>63</sup>

### 3.2.3.5 Risk management

BM&FBOVESPA does not take on principal risk since all trades are settled on the PVP (payment versus payment) principle, ie a final transfer of one currency occurs only if a final transfer of the other currency takes place. For this purpose, the clearing house monitors and coordinates the settlement process for both legs of each transaction.

The clearing house also sets limits on the participants' open positions to limit its own exposure to settlement risks. Limits are set with reference to the participant's financial strength and transaction volumes.

Participants must deposit collateral – mainly Brazilian government securities – to cover foreign exchange rate volatility (replacement cost risk). To further diversify its risks, the clearing house uses four correspondent banks in the United States.

Acceptance of a transaction for settlement is subject to an automated risk evaluation process that takes into account each participant's net position, their position limits, available collateral and the acceptability of the contracted foreign exchange rate vis-à-vis the market rate.<sup>64</sup> If a transaction is executed at an out-of-market price, additional collateral will be required before it can be accepted for settlement. Assets posted as collateral are marked to market daily.

In the case of a default, the defaulting participant does not receive the amount of currency that it contracted to buy. Instead, the clearing house uses this amount to complete the transaction by purchasing the currency that the defaulting participant failed to deliver to its counterparty. This currency purchase is made via an outright transaction or a repurchase agreement, as the clearing house treats the participant, respectively, as an actual defaulter or as a defaulter for operational reasons only.

In the first case, the participant is excluded from the system and the related collateral is foreclosed immediately. In the second case, the participant discharges its debt to the clearing house – including any related replacement cost – by the stipulated deadline, allowing a reversion to the repurchase agreement so that the participant can receive the amount of currency it originally contracted for. If the debt is not discharged, the following procedures apply: (i) the participant is deemed to be in default and is excluded from the system; (ii) the collateral it posted is foreclosed; and (iii) the repurchase agreement is converted into an outright transaction.

To mitigate liquidity risk, the clearing house relies on committed facilities from a panel of domestic and international banks. Regardless of the kind of replacement transaction (outright or repurchase agreement), the clearing house purchases the currency to be delivered to the non-defaulting participant from the panel bank that offers the best terms.

The clearing house forecloses on collateral posted by the defaulter in an amount sufficient to cover any movement in the exchange rate. In any event, the non-defaulting participant receives the agreed amount of currency on the due date. If necessary, the clearing house can draw on its committed facilities in domestic or foreign currency to meet the defaulter's obligations.

In addition, the clearing house maintains a settlement fund and a loss-sharing mechanism to guarantee the completion of transactions in case of a participant default. The settlement fund consists of contributions made by participants when they join the system. Contributions vary

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<sup>63</sup> SWIFT messages are used to order the USD funds transfers to the clearing house's correspondent banks.

<sup>64</sup> To gauge the acceptability of the exchange rate in a trade, the clearing house takes the exchange rate of the most recent transaction and applies a percentage fluctuation band, which is typically set at 2%.

in amount from BRL 1 million to BRL 3 million, depending on the participant's position limit. The loss-sharing mechanism provides for all participants that have transactions to be settled on the day of the default to share the resulting losses, whether or not they carried out transactions with the defaulting participant.

As a systemically important settlement system, the FX Clearinghouse's technical infrastructure is designed to achieve an availability index of 99.8%. Operations can be recovered, if disrupted, in no more than 30 minutes.

#### 3.2.3.6 Pricing

Fees are based on the daily USD amount traded by each participant, as follows:

- up to USD 40 million: BRL 5.00 per BRL 1 million traded;
- from USD 40 million to USD 80 million: BRL 4.50 per BRL 1 million traded;
- from USD 80 million to USD 120 million: BRL 4.00 per BRL 1 million traded;
- from USD 120 million to USD 160 million: BRL 3.50 per BRL 1 million traded;
- above USD 160 million: BRL 3.00 per BRL 1 million traded.

#### 3.2.3.7 Major ongoing and future projects

BM&FBOVESPA is considering a possible integration of the four clearing houses it operates. A working group is studying the relevant opportunities and challenges.<sup>65</sup> At present, each clearing house has different settlement sessions and risk management procedures, as well as maintaining separate settlement funds. Integration would therefore bring efficiency gains, the extent of which would depend on both the degree of integration and the number of clearing houses involved.

### 3.3 Retail payment systems

#### 3.3.1 Cheque Clearinghouse (COMPE)

##### 3.3.1.1 Institutional framework

COMPE is operated by Banco do Brasil (see Section 1.3.3). The system is overseen by the BCB and complies with the BCB's rules for Brazilian clearing and settlement systems.

##### 3.3.1.2 Participation

Participation is mandatory for banking institutions taking sight deposits, and optional for other financial institutions (132 participants in December 2009).

##### 3.3.1.3 Types of transactions

COMPE clears interbank positions arising from cheques with a value lower than BRL 250,000.<sup>66</sup>

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<sup>65</sup> The working group comprises representatives of different market segments and includes BMF&BOVESPA's own members. Both the BCB and CVM act as observers.

<sup>66</sup> Cheques for amounts of BRL 250,000 or more are settled bilaterally through STR.

#### 3.3.1.4 Operation of the system and settlement procedures

COMPE is a multilateral netting system. Interbank settlement in STR always takes place on T+1, in the morning session or in the afternoon session depending on the value of the cleared cheques. Although cheques are still physically exchanged between banks in Brazil,<sup>67, 68</sup> interbank settlement is fully electronic. Cheque information is converted into electronic data via magnetic ink character recognition (MICR) and then sent to the COMPE operational centres over a proprietary data network. The primary processing centre is located in Brasilia, with a secondary one, working in hot standby mode, in Rio de Janeiro.

Two settlement sessions are carried out daily. For each, a single nationwide multilateral net position is computed for each participant. These net positions are settled through STR on the participants' settlement accounts at the BCB. In the morning session (starting at 09:00), the system settles cheques with a value larger than a reference value (currently BRL 299.99 for so-called "over-the-limit" cheques). Data are sent simultaneously to the primary and secondary processing centres on the previous night, ie on the night of the day the cheques were collected. Cheques with a value lower than the reference value ("below-the-limit" cheques) are settled in the afternoon session (starting at 17:15). These data are sent to the system on the morning of the settlement date.<sup>69</sup>

#### 3.3.1.5 Risk management

There is no mechanism to guarantee the settlement of cheques. A defaulting participant is excluded from the session and related positions are unwound.

#### 3.3.1.6 Pricing

Fees are levied to cover all costs arising from the clearing process (BRL 7.72 per 1,000 documents). In addition, participants share the costs of physically exchanging cheques according to their individual clearing volumes.

#### 3.3.1.7 Major ongoing and future projects

Cheque truncation is the most important project now in progress. At present, cheques are still physically exchanged, generating significant costs in view of COMPE's short settlement cycles and Brazil's vast distances. While this project was initiated some time ago, progress has only recently been made with its implementation.

### 3.3.2 Deferred Settlement System for Interbank Credit Orders (SILOC)

#### 3.3.2.1 Institutional framework

SILOC is owned and operated by CIP (see Section 1.3.3).<sup>70</sup> It is overseen by the BCB and it complies with the BCB's rules for all Brazilian clearing and settlement systems.

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<sup>67</sup> Cheque truncation is already permitted within the scope of bilateral agreements.

<sup>68</sup> The physical exchange of cheques is managed through a national clearing house, 15 regional clearing houses, and 10 local clearing houses (as at December 2009).

<sup>69</sup> Physical exchange of cheques takes place as follows: "over-the-limit" cheques on the night of the day they are collected (T); "below-the-limit" cheques on the morning of the next day (T+1).

<sup>70</sup> The system started operation on 18 February 2004.

### 3.3.2.2 Participation

The system is open to all financial institutions with a settlement account at the BCB (120 participants in December 2009).

### 3.3.2.3 Types of transactions

SILOC clears interbank positions arising from customer small-value funds transfer orders, ie DOC, TEC and funds transfers relating to bloquetos de cobrança<sup>71</sup> with a value of less than BRL 5,000. The system also clears transactions carried out through TECBAN's shared ATM network ("Banco24Horas") and domestic payments arising from payment card transactions.<sup>72</sup>

### 3.3.2.4 Operation of the system and settlement procedures

SILOC is a multilateral netting system. There is no physical exchange of documents, and a single nationwide net position is computed per participant for each settlement session. Typically, transaction data are sent electronically to the system on the night of the day they are initiated by customers.<sup>73</sup> Net positions are settled through STR on participants' accounts at the BCB, on the same day for TEC, and on T+1 for DOCs, bloquetos de cobrança and transactions from TECBAN's shared network.

Two settlement sessions are carried out daily, one in the morning and the other in the afternoon. SILOC sends electronic files to participants to inform them about their net positions for the morning session before 05:10, and before 15:05 for the afternoon session. In the first session, which ends at 08:20, interbank positions arising from the previous day's transactions are settled. In the second session, ending at 16:10, it is mainly returned items that are settled, ie transactions presented in the morning session that had to be returned to the sending bank.

### 3.3.2.5 Risk management

There is no mechanism to guarantee the settlement of funds transfer orders processed by the system. A defaulting participant is excluded from the relevant session and related positions are unwound.

### 3.3.2.6 Pricing

As in the case of SITRAF, SILOC aims at the full recovery of costs. As of February 2010, a flat fee (typically BRL 0.01905) is charged per processed transaction (BRL 0.35 for returns).

### 3.3.2.7 Major ongoing and future projects

According to the system operator, the following main projects are being assessed (July 2010): (i) implementation of a new facility to control collateral posted by banks participating in payment card schemes; (ii) possible participation in the International Payments Framework (IPF);<sup>74</sup> (iii) enlargement of the scope of the DDA (Direct Debit Authorisation) project so as to

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<sup>71</sup> See footnote 33.

<sup>72</sup> Currently, MasterCard (both credit and debit cards) and TECBAN's debit cards ("Cheque Eletrônico").

<sup>73</sup> In the case of DOC, TEC and bloquetos de cobrança, data are sent to the entity to which the initial clearing processing is outsourced.

<sup>74</sup> <http://internationalpaymentsframework.org>.

include utility bills;<sup>75</sup> (iv) clearing and settlement of mobile phone payments; and (v) provision of settlement services to Visa and other payment card schemes.

## **4. Systems for post-trade processing, clearing and securities settlement**

### **4.1 General overview**

#### **4.1.1 Regulatory framework**

As set forth by the Securities and Derivatives Market Law, CMN (see Section 1.1) regulates the securities and derivatives markets, and CVM (see Section 1.3.4.1) supervises all related activities and services. By a CMN resolution, securities clearing and settlement systems are under the joint supervision of the BCB and CVM, but the former is solely responsible for assessing aspects relating to systemic risk.

The capital market is also subject to self-regulation in the form of rules established by ANBIMA (1.3.4.2), BSM (1.3.4.3) and CETIP (1.3.4.4).

#### **4.1.2 Infrastructure**

##### *Trading*

Federal government bonds are traded by telephone (in the traditional OTC market) or on a BM&FBOVESPA-operated electronic trading platform (SISBEX).<sup>76</sup> In this market, repurchase agreements predominate over outright transactions. Traditional OTC is also the main trading method for corporate bonds, state government bonds, non-standard derivatives and most securities relating to the National Treasury's special responsibilities. Some of the National Treasury's securities can also be traded at organised OTC markets operated by CETIP and BM&FBOVESPA. All OTC derivatives and securities transactions in which at least one trading party is a financial institution must by law be registered in a system authorised by the BCB or CVM.

Stocks, standardised derivatives and commodities are traded at BM&FBOVESPA, the only Brazilian stock and derivatives exchange. Two electronic trading platforms are used: MEGABOLSA<sup>77</sup> for equities and equity derivatives; and Global Trading System (GTS) for commodities and other derivatives.

The following table provides further information on the trading and registration of securities and derivatives transactions.

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<sup>75</sup> As already mentioned (Section 2.3), DDA is currently applied only to bloquetos de cobrança, while utility bills are paid mainly by means of intrabank direct debits.

<sup>76</sup> Transactions are registered in SELIC or SISBEX respectively for settlement on a real-time gross basis or with multilateral netting.

<sup>77</sup> MEGABOLSA is a local version of the NSC (*Nouveau Système de Cotation*) trading platform developed by the former Paris Bourse in the early 1990s.

Table 4  
**Securities and derivatives market profile**

Market segment	Equities and equity derivatives	Derivatives	Corporate bonds	Government bonds
Main types of securities	Common and preferred shares; exchange-traded funds; closed-end funds; rights and receipts; BDRs; futures, forwards and options on equities	Futures, options and swaps on interest rates, stock indexes, price indexes, FX rates and actuals	Debentures, commercial paper, asset-backed securities, REITs (real estate investment trusts), and mortgage-backed securities	Fixed rate bonds, inflation-indexed bonds, floating interest rate bonds, foreign exchange-indexed bonds
Numbering system	ISIN	ISIN	ISIN	ISIN
Exchanges	BM&FBOVESPA	BM&FBOVESPA	BM&FBOVESPA	BM&FBOVESPA
Registration entity/system (OTC market)	BM&FBOVESPA	BM&FBOVESPA CETIP	SOMAFIX, BOVESPA-FIX  CETIP (CETIPNET)	SELIC  SISBEX  CETIP (CETIPNET)

Source: Best Brazil – Market Profile.

#### *Post-trade, clearing and settlement services*

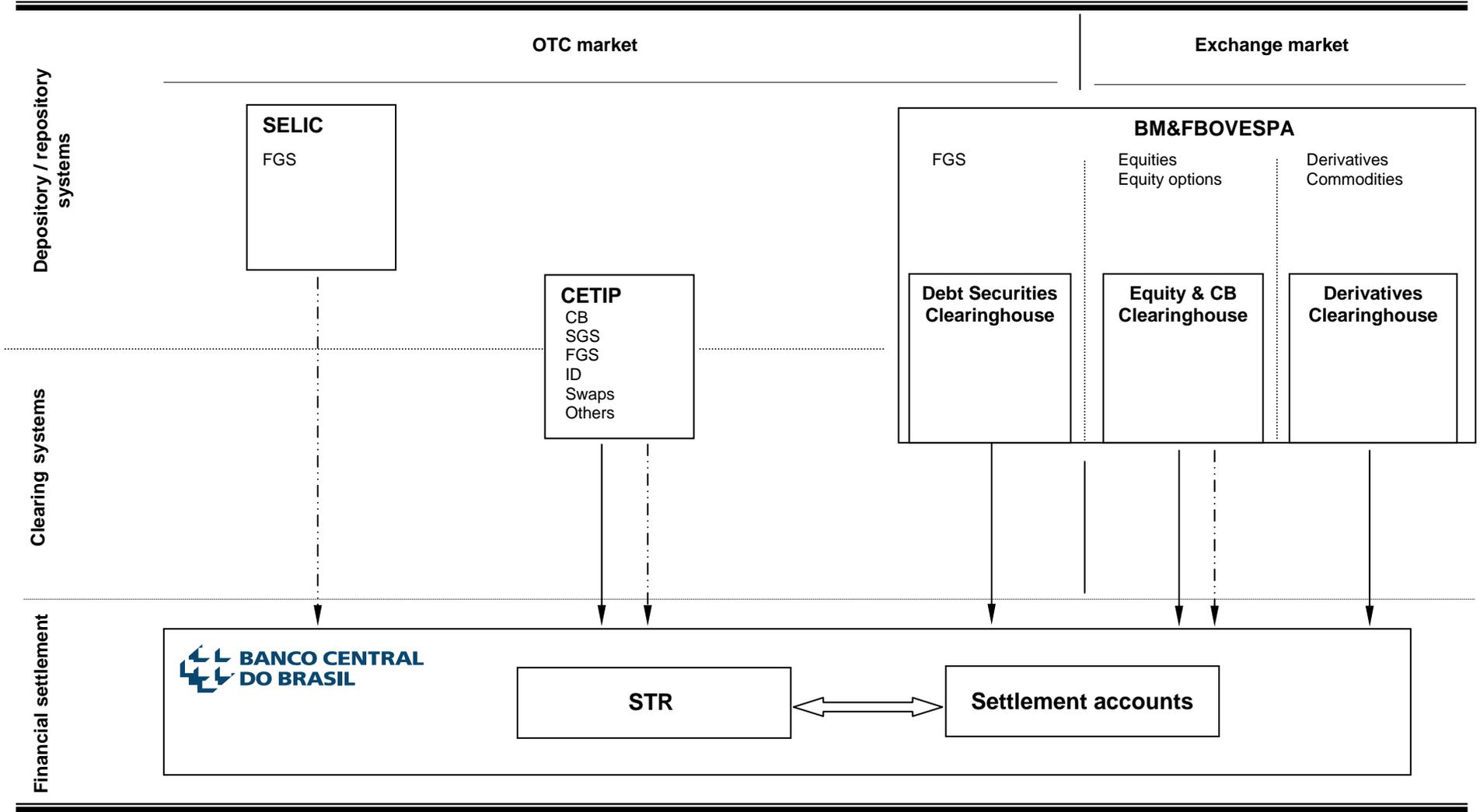
In Brazil, the entity that provides securities settlement services usually also provides all post-trade processing, acting both as a clearing house and as a central depository. In the case of BM&FBOVESPA, it also acts as a central counterparty. Hence, the entities providing these services are vertically integrated. In some cases, the integration extends to the trading environment. At the same time, a certain degree of horizontal segmentation exists. SELIC, the BCB-operated DVP1 securities settlement system,<sup>78</sup> settles federal government securities. These securities can also be settled with multilateral netting through the Debt Securities Clearinghouse. For its part, the Equity and Corporate Bond Clearinghouse clears and settles mainly equity transactions, while corporate bonds are primarily cleared and settled through CETIP. Apart from the Equity and Corporate Bond Clearinghouse and the Debt Securities Clearinghouse, BM&FBOVESPA also operates a derivatives settlement system. Diagram 4 provides an overview of the Brazilian clearing and settlement infrastructure for securities and derivatives transactions.

Broadly speaking, DVP is observed in all securities settlement systems, and almost all securities are dematerialised. As required by BCB regulations, all securities and derivatives settlement systems must meet a minimum availability index of 99.8%, and must be capable of recovering their activities, after operational disruption, in no more than two hours.<sup>79</sup>

<sup>78</sup> For a description of different DVP models, see the CPSS report, *Delivery versus payment in securities settlement systems*, 1992.

<sup>79</sup> These requirements also apply to systemically important funds transfer settlement systems (RTGS systems must be capable of recovering activities in less than 30 minutes).

Overview of the securities and derivatives market



FGS – federal government securities

CB – corporate bonds

SGS – state government securities

ID – interbank deposits

↓ DNS

↓ RTGS

With a view to reflecting the vertical integration of post-trade services in all Brazilian securities and derivatives clearing and settlement systems, they are described in the following order: Section 4.3, which deals with central counterparties and clearing systems, includes CETIP, Equity and Corporate Bond Clearinghouse, Debt Securities Clearinghouse and Derivatives Clearinghouse, even though the first two of these systems could also be described in the section on securities settlement systems/central depositories; Section 4.4, which deals with securities settlement systems, includes SELIC.

## **4.2 Post-trade processing systems**

There is a high degree of vertical integration in all post-trade services for securities and derivatives transactions, including clearing<sup>80</sup> and settlement services. Thus, the relevant systems are described at the end of Section 4.1.2.

## **4.3 Central counterparties and clearing systems**

### **4.3.1 OTC Clearinghouse (CETIP)**

#### *4.3.1.1 Institutional framework*

The OTC Clearinghouse is operated by CETIP (see Section 1.3.4.4). The system is jointly overseen by BCB and CVM (see Section 1.3.4.1). The latter also regulates the securities and derivatives markets.

#### *4.3.1.2 Participation*

Access to the system is open to any institution authorised to operate by the BCB or CVM. The system comprises 9,109 direct participants for securities-leg settlement purposes, of which 119 are direct participants in STR for funds-leg settlement purposes (December 2009).

#### *4.3.1.3 Types of transactions cleared*

CETIP processes mainly transactions involving corporate bonds,<sup>81</sup> state and municipal government securities, securities relating to the National Treasury's special responsibilities,<sup>82</sup> and also OTC derivatives.<sup>83</sup>

#### *4.3.1.4 Operation of the system*

In addition to its role as a clearing house, CETIP is also a central depository for some securities that are traded over-the-counter. Both DVP1 and DVP3 are used for settlement, depending on the type of transaction processed. As a central depository, CETIP maintains

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<sup>80</sup> The term "clearing" refers to all the processes that take place between trading and settlement.

<sup>81</sup> Certificates of Banking Deposit – CDB, Receipts of Banking Deposit – RDB, Interbank Deposits – DI, Bills of Exchange – LC, Mortgage Bills – LH, debentures, commercial paper, among others.

<sup>82</sup> The obligations are mainly related to state companies, the Salary Variation Compensation Fund (FCVS), the Agricultural Activity Guarantee Program (PROAGRO), and the Agricultural Debt Securities (TDA).

<sup>83</sup> Cash flow swaps, commodities forwards, non-deliverable currency forwards, exchange rate options and others.

accounts at the level of final investors, except in the case of government-issued securities and bank-issued securities, where omnibus accounts are used.<sup>84</sup>

Both counterparties to a transaction enter the related data into the system (dual-entry principle), and the system matches the two entries. To submit transactions, participants use the Market Telecommunication Network (RTM), while RSFN is used for the flow of messages related to the settlement of the funds leg. Straight through processing is always used.

Depending on the type of transaction and the time it is carried out, settlement occurs on T or T+1. Multilateral netting of the funds leg is typically used in the case of primary market transactions, including payment of principal, interest and other corporate actions. On the other hand, bilateral netting of the funds leg is applied for derivatives transactions, and real-time gross settlement is used for the funds leg of securities traded in the secondary market. In all cases, the settlement of the funds leg is via STR except where the same settlement bank is used for both counterparties to a transaction.

#### 4.3.1.5 Risk management

There is no central counterparty for CETIP transactions, so that each participant has to manage the counterparty risk, which is mitigated by the application of DVP to all transactions. Therefore, if a settlement bank does not confirm the payment of a clearing member obligation, participants' multilateral net positions will be recalculated with the exclusion of transactions cleared through the defaulting participant. As a consequence, the transactions relating to the defaulting participant can then be settled bilaterally only, through the RTGS mode. In the event of default by a settlement bank, the system allows for transfer of the multilateral net positions it would have settled to another settlement bank,<sup>85</sup> provided that the related settlement session has not yet ended.

#### 4.3.1.6 Links to other systems

CETIP is linked to STR and SELIC, respectively for settlement of transactions' funds legs and for collateral management purposes.

#### 4.3.1.7 Pricing

CETIP charges fees to its participants according to the service provided (issuance of securities, custody account holding, services related to electronic trading platforms, settlement of transactions etc). For settlement services, the following fees are charged: (i) a monthly fee based on the monthly number of transactions the participant carries out, which varies from BRL 438.97 (up to 45 transactions) to BRL 17,354.75 (more than 3,500 transactions); (ii) a transaction fee, which varies depending on the settlement method and when the transaction is entered into the system (for instance, in the case of multilateral netting or gross settlement, the fee ranges from BRL 0.56 to BRL 1.21 per transaction); and (iii) a funds-leg settlement fee, which corresponds to a percentage of the value of each secondary market transaction (0.0001% or 0.000025% depending on whether settlement is made through STR or on the books of a bank, subject to a minimum and a maximum value).

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<sup>84</sup> The use of individual investor accounts is required by CVM for all securities under its supervision. This means all securities except for government-issued securities and bank-issued securities. The latter are under the jurisdiction of the BCB, which allows the use of omnibus accounts.

<sup>85</sup> Each non-bank participant has previously informed the system about its primary and secondary settlement banks.

#### 4.3.1.8 Major ongoing and future projects

CETIP plans a new collateral management service based on the one offered by Clearstream.<sup>86</sup> The initial focus will be collateral for OTC derivatives trades entered into the system (bilateral guarantee).

### 4.3.2 **BM&FBOVESPA – Brazilian Securities, Commodities and Futures Exchange**

In addition to the Foreign Exchange Clearinghouse (see Section 3.2.3), BM&FBOVESPA owns and operates the clearing houses described in this section. For all of them, it acts as a central counterparty for all transactions accepted for settlement purposes (except where settlement occurs in real time). As for BM&FBOVESPA itself, see Section 1.3.4.3 for further information.

#### 4.3.2.1 Equity and Corporate Bond Clearinghouse (former CBLC)

##### 4.3.2.1.1 Institutional aspects

The Equity and Corporate Bond Clearinghouse is jointly overseen by BCB and CVM (see Section 1.3.4.1). The latter also regulates the securities and derivatives markets.

##### 4.3.2.1.2 Participation

Banks, brokers and dealers can participate in the system as clearing members, which are classified into three categories: self-clearing members; full clearing members; and specific agents. The first category submits only its own trades and those of its customers. Full clearing members additionally submit transactions conducted by other brokers and special customers, such as mutual funds, pension funds, insurance companies etc, while specific agents also submit some transactions involving corporate bonds.

Besides being BCB-authorized financial institutions, all clearing members must fulfil certain operational and financial requirements. The system comprises 64 clearing members (December 2009).

##### 4.3.2.1.3 Types of assets and products cleared

The system clears transactions involving stocks (spot market and derivatives market – options, forwards and futures) and corporate bonds (currently only outright transactions in the spot market). The clearing house also operates a securities lending facility, offering three types of contracts: (i) fixed-term contracts; (ii) contracts where the borrower has the option to return the securities prior to maturity; (iii) contracts where either the lender or the borrower has the option to terminate the transaction prior to maturity (in this case, if the lender calls back the lent securities, the borrower has four days to deliver).

##### 4.3.2.1.4 Operation of the system

In addition to being a clearing house, the system is also a central depository for both stocks and some OTC-traded debt securities. Settlement is typically on a DVP3 basis. However, the system's regulations allow for settlement to be carried out on a real-time transaction-by-transaction basis for some transactions, such as those relating to IPOs. As a depository, the system maintains individual custody accounts for every final investor. The settlement cycle depends on the market and the timing of the transaction, as shown in the following table.

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<sup>86</sup> For details of Clearstream, please refer to the corresponding section in the forthcoming second volume of this publication.

Table 5

**Equity and Corporate Bond Clearinghouse –  
Settlement cycle by type of security and transaction**

Market	Type of transaction	Settlement date
Corporate bonds	Spot	T for transactions entered into the system up to 13:00 and T+1 for others
Stocks	Spot	T+3
	Forwards	(T+n)+3 (third day following the maturity date)
	Futures <sup>1</sup>	(T+n)+3
	Options <sup>2</sup>	T+1

<sup>1</sup> Variation margin is settled on T+1. <sup>2</sup> Date for premium payment (in case of exercise, the normal settlement cycle of the spot market is observed).

All trades carried out through BM&FBOVESPA's trading systems are submitted to the system for settlement as soon as they are executed, which assures a high degree of straight through processing. The clearing house effects novation of each contract in real time, immediately after capturing the transaction from the trading system. At this moment, BM&FBOVESPA becomes the central counterparty for those transactions.

A single settlement session is carried out daily and, in each session, the clearing house computes a net cash position for each clearing member. All related funds transfers are made in STR. A clearing member can hold an account at the BCB or can settle its positions through a settlement bank appointed for this purpose. A clearing member with a net debtor position must transfer the funds to the clearing house's settlement account at the BCB by 15:00. Some minutes later (at 15:25), DVP occurs with the simultaneous and final transfer of both securities and funds.

#### 4.3.2.1.5 Risk management

The system has a principal-to-principal relationship only with clearing members, which are responsible for meeting obligations if a broker associated with them should default. In turn, brokers are responsible for the obligations of their clients, should one of them fail to meet its obligations. As a rule, all clearing members must deposit collateral to cover their open positions. Based on the collateral posted by the clearing members, the clearing house determines the respective position limits. Each clearing member distributes this limit to their associated brokers and each broker, in turn, sets limits for its customers. At each level, the limit can be divided among different markets. The collateral is marked to market daily.

The clearing house calculates in real time the risk each clearing member poses to the system in each settlement cycle, taking into account the cash equity and equity derivatives transactions on the clearing member's book that are not yet settled. For this purpose, it uses the RiskWatch<sup>87</sup> system, applying a 95% confidence level and data for the last 252 business days (historical scenario).

With respect to derivatives and securities lending transactions, the system calls up margin from each original counterparty of a contract in order to cover the related risk exposure.

<sup>87</sup> RiskWatch, a product of Algorithmics Incorporated, Canada, has been adapted for the Brazilian market.

Clearing members also contribute to the system's settlement fund, a mutualised mechanism to cover risks not covered by margin calls. Contributions are set by the RiskWatch system, which is used to calculate participants' exposure daily by stress testing their portfolios (open positions in the derivatives market and securities lending programme). The settlement fund is sufficient to cover the potential failure of the two clearing members with the largest exposures.

If a delivery failure occurs,<sup>88</sup> the clearing house automatically assigns the failed position to the securities lending facility for potential borrowing. If the relevant securities are available for borrowing, the clearing house opens a borrowing transaction in the name of the failing clearing member. If the securities are not available, the clearing house keeps the delivery outstanding and charges the failing clearing member a penalty fee, giving it until T+4 to cover the failed delivery. If the clearing member again fails to meet its obligation, a buy-in procedure is started.

In the case of a payment default, the clearing house typically uses standby credit lines from a panel of banks. These credit lines, which allow the clearing house to borrow against the assets involved in the failures, are large enough to cover the two largest debt positions. Additionally, the clearing house can use the following remedies in the order indicated:

- execution of margins posted by the defaulting participant;
- the contribution made by the defaulting participant to the settlement fund;
- the contributions made by other clearing members to the settlement fund (loss-sharing mechanism); and
- the clearing house's own funds.

#### *4.3.2.1.6 Links to other systems*

The system is linked to SELIC, CETIP, Euroclear and the Depository Trust & Clearing Corporation (DTCC) for collateral management purposes, and to STR for funds leg settlement of all related clearing members' obligations.

#### *4.3.2.1.7 Pricing*

A specific fee is charged for clearing and settlement services (for instance, 0.0006% on the value of the transaction in the case of spot, options and forward markets).<sup>89</sup>

#### *4.3.2.1.8 Major ongoing and future projects*

A possible integration with other BM&FBOVESPA-operated clearing houses is the main project under consideration (see Section 3.2.3.7 for further information).

### *4.3.2.2 Debt Securities Clearinghouse*

#### *4.3.2.2.1 Institutional framework*

The system is jointly overseen by the BCB and CVM (see Section 1.3.4.1). The latter also regulates the securities and derivatives markets.

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<sup>88</sup> The securities must be delivered by 10:00 on T+3.

<sup>89</sup> Other fees are charged for trading and registration (the latter does not apply to the spot market).

#### 4.3.2.2.2 Participation

The following participants are eligible for a principal-to-principal relationship with the clearing house, thereby posting collateral directly:

- clearing members, which are banks and brokers that clear transactions on their own behalf or for customers;
- centralised settlement participants, which are typically investment funds, pension funds and insurance companies, which clear their own transactions only.

The clearing house comprises 51 clearing members and 390 centralised settlement participants (as at December 2009).

#### 4.3.2.2.3 Types of assets and products cleared

The system clears federal government securities traded on either SISBEX or traditional OTC markets – outright transactions (spot and forward markets) and also repurchase agreements.<sup>90</sup> Spot transactions can be settled on the same day (T), if they are traded and entered into the system by 11:00. Forward transactions are settled on the future date contracted between the original counterparties, which can be up to T+23 (T+1 is most common). For repurchase agreements, the front leg is typically settled on the same day, and the back leg on T+1 (the settlement of the back leg can be as long as T+66).<sup>91</sup> Short sales are allowed only where they involve securities offered by the securities lending programmes provided by either SELIC or BM&FBOVESPA itself.

#### 4.3.2.2.4 Operation of the system

Multilateral netting and DVP3 are used for all transactions accepted for settlement purposes. OTC trades must be submitted to SISBEX by one of the counterparties, subject to confirmation by the other counterparty (dual-entry principle). Trades are only accepted if their prices are within predetermined price ranges. OTC transactions are automatically reported to the clearing house together with those directly traded through SISBEX.

The clearing house daily calculates the multilateral net balances of all direct participants. No later than 13:30 in each settlement session, the clearing house advises participants of the net positions in securities and in cash that they must deliver by 14:30. Debt securities positions and debt funds positions are covered by means of transfers to the clearing house accounts at SELIC and STR, respectively, and the clearing house in turn transfers the securities to net buyers, and funds to net sellers, by 15:30.

#### 4.3.2.2.5 Risk management

All participants are subject to position limits, which are based on the posted collateral and assets traded. These limits are monitored in real time, and all assets are marked to market at least once a day. To manage its risk exposure, the clearing house uses a portfolio risk methodology (stress testing). The methodology is similar to that used by the Derivatives Clearinghouse.

In the event of a delivery failure, the clearing house can apply the following measures in the order indicated: (i) an automatic borrowing transaction by the clearing house on behalf of the

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<sup>90</sup> Counterparties can choose to settle a transaction involving federal government securities through either the Debt Securities Clearinghouse or SELIC. However, the securities leg will always be settled via SELIC (the Debt Securities Clearinghouse uses delayed net settlement, while SELIC employs real-time gross settlement).

<sup>91</sup> Two types of contracts are permitted: (i) repos in which a specific security is named; and (ii) general collateral repos, where the security is identified only at the end of the trading day.

defaulter to obtain the securities for delivery to the non-defaulting participant; (ii) purchase of these securities on behalf of the defaulter; (iii) replacement of these securities with equivalent ones, subject to the non-defaulting participant's approval; and (iv) payment of the equivalent cash amount to the non-defaulting participant. In any case, the defaulting participant must pay the replacement costs. Collateral is foreclosed in the event of non-payment.

A settlement fund can be used to cover the obligations of a defaulting participant.<sup>92</sup> It can also be used to cover losses sustained by third parties owing to operational failures, whether they are caused by a direct participant or by BM&FBOVESPA itself.

To mitigate liquidity risk in case of a payment failure, the clearing house can draw on standby credit lines from a banking panel to meet obligations due by the end of the relevant settlement session.

#### *4.3.2.2.6 Links to other systems*

The system is linked to STR for settlement of direct participants' net funds positions. It is also linked to SELIC for settlement of participants' net securities positions and also for collateral management purposes.

#### *4.3.2.2.7 Pricing*

Typically, the clearing house charges a total fee of BRL 0.15 per BRL 1 million traded per day.

#### *4.3.2.2.8 Major ongoing and future projects*

A possible integration with other BM&FBOVESPA-operated clearing houses is the main project under consideration (see Section 3.2.3.7 for further information).

### *4.3.2.3 Derivatives Clearinghouse*

#### *4.3.2.3.1 Institutional framework*

The system is owned and operated by BM&FBOVESPA. It is jointly overseen by BCB and CVM (see section 1.3.4.1). The latter also regulates the securities and derivatives markets.

#### *4.3.2.3.2 Participation*

Banks and brokers complying with the requirements set out in the system's regulations – including a minimum capital requirement and proof of managerial, organisational and operational capability – can act as clearing members,<sup>93</sup> or as direct settlement participants.<sup>94</sup> To settle their positions, non-bank participants must have a contractual relationship with an institution holding an account at the BCB, ie with a settlement bank. The clearing house comprises 81 clearing members and 29 direct settlement participants (as at December 2009).

#### *4.3.2.3.3 Types of assets and products cleared*

The clearing house settles spot, forwards, futures, options (both standard and exotic) and swaps contracts, whether they are traded at BM&FBOVESPA or over the counter. The

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<sup>92</sup> The settlement fund is financed solely by BM&FBOVESPA.

<sup>93</sup> A participant clearing its own transactions as well as transactions carried out by its customers.

<sup>94</sup> A participant clearing its own transactions only, or transactions relating to some special investors as defined in the system's regulations (a large foreign investor, for instance).

financial derivatives contracts are mainly related to interest rates, foreign exchange rates, inflation indices and stock indices. Commodity derivatives contracts are related mainly to sugar, ethanol, livestock, coffee, corn and soybeans.

#### 4.3.2.3.4 Operation of the system

The Derivatives Clearinghouse is a T+1 multilateral netting system.<sup>95</sup> All trades carried out via the Global Trading System are captured immediately after trade execution and no confirmation procedure is required. These trades are therefore submitted for clearing as soon as they are executed. OTC contracts must be entered into the system by a participant and confirmed by the counterparty. Where a contract is entered into the system without identifying its original (final) counterparties, these counterparties must be notified to the system by the related participants by the end of that trading day (this procedure is known as “allocation of trades”).

As the seller to all buyers and the buyer to all sellers, the clearing house carries out multilateral netting of all financial rights and obligations into a single cash-consolidated position, thus reducing participants’ liquidity requirements and optimising collateral. Participants with net debt positions make the payments owed to the clearing house (pay in) by 14:50 of each settlement day, and the clearing house makes payments (pays out) to participants with net credit positions by 15:25. All related funds transfers are made via STR. If a participant is not a banking institution, these funds transfers (pay-ins and pay-outs) are carried out through a settlement bank. If this settlement bank fails to meet a participant’s obligation, the related payment can be carried out through another settlement bank,<sup>96</sup> provided that the settlement session is still open. A secondary settlement bank is also used if, for any reason, the relevant primary settlement bank is unable to receive these payments.

The settlement process observes the following rules:

- delivery of commodities is made on a net traded quantity basis, where applicable; and
- payments related to physically delivered commodities and net financial positions on contracts that are exclusively cash-settled are incorporated into the participants’ multilateral net positions.

A participant is deemed to be in default according to the system’s rules if it fails to (i) meet a financial obligation towards the system; (ii) deliver a commodity at the specified time; (iii) deliver a commodity in accordance with the contracted specifications.

#### 4.3.2.3.5 Risk management

The clearing house’s risk coverage model combines the “defaulter pays” with the “survivors pay” principles. “Defaulter pays” is the main protection mechanism, with all original counterparties required to deposit collateral in proportion to the risk of their open positions. Participants, ie clearing members and direct settlement participants, are also required to post collateral to cover the risk related to trades that have not yet been allocated to the original counterparties. DVP is observed for spot market transactions. In the derivatives market, the clearing house makes daily margin calls, marking to market open positions and collateral. Appropriate haircuts are applied.

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<sup>95</sup> Counterparties to OTC contracts, which are also accepted for netting purposes, can choose whether BM&FBOVESPA will act as a central counterparty for the transaction.

<sup>96</sup> Based on prudential criteria, the clearing house can specify to a participant which secondary settlement bank should be used in the event of a primary settlement bank’s default. In practice, however, the secondary bank for most participants is the bank owned and operated by BM&FBOVESPA itself (Bank BM&FBOVESPA).

The clearing house sets an intraday risk limit for each participant's open position based on the collateral posted. The clearing house's risk exposure vis-à-vis each participant is reviewed every 15 minutes during a trading session. Should a participant breach its intraday risk limit, the clearing house requires it to post additional collateral on the same day, ie it makes an intraday margin call. Additional collateral may also be required on the same day from an original counterparty. This can occur if the collateral posted is not sufficient to cover the risk arising from trades allocated to an original counterparty in the course of a trading day.

Thus, a two-phase risk monitoring process is used: (i) relating to trades that are carried out during a given trading day but are not yet allocated to the original counterparties. In this case, the clearing house's exposure is reviewed every 15 minutes, taking into account the participants' intraday risk limit (on posted collateral); and (ii) for all open trades executed up to the previous day (for which the original counterparties have already been identified). In this case, the clearing house's risk exposure is reviewed against the original counterparties instead of against the participants themselves.

To assess its risk exposure, the clearing house:

- decomposes the contracts into their risk factors;
- considers a set of stress scenarios for each risk factor;
- calculates the risk arising from participants' portfolios under different sets of scenarios;
- chooses the worst combination.

As collateral, the clearing house accepts cash deposits, highly liquid assets such as federal Brazilian government securities, stocks, certificates of deposit, and certificates of gold deposited in custody at BM&FBOVESPA. In the case of default, ie where a participant or an original counterparty fails to meet an obligation relating to an open position, the clearing house will foreclose on collateral in the following order:

- collateral deposited by the defaulting party;
- collateral deposited by third parties on behalf of the defaulter;
- collateral deposited by brokerage houses that intermediated the trades related to the defaulter, in cases involving commodities;
- collateral deposited by the participant, where the defaulter is an original counterparty and the collateral it posted is not sufficient to cover the relevant debt.

After foreclosing on collateral, the clearing house can, as necessary, look to other resources in the following order: (i) the Clearing Member Fund, which is financed by participants; (ii) the Special Clearing Fund, which is financed by BM&FBOVESPA itself; and (iii) in the case of commodity-related contracts, if still necessary, the Agricultural Market Trading Fund, which is again financed by BM&FBOVESPA itself. Participants contribute between BRL 2 million and BRL 4 million to the Clearing Member Fund, depending on the trades that they are authorised to clear. (Additional contributions are due if the clearing member clears transactions relating to other trading participants). All clearing members are jointly liable for the default of any other clearing member up to the value of their share in the Clearing Member Fund.

As in the case of the other systems operated by BM&FBOVESPA, the Derivatives Clearinghouse maintains standby facilities from a panel of banks to mitigate liquidity risk.

#### 4.3.2.3.6 Links to other systems

The system is linked to STR for settlement of net financial positions, and to SELIC and CETIP for collateral management.<sup>97</sup>

#### 4.3.2.3.7 Pricing

Fee scales depend on the market segment (forwards, futures, options on actuals, options on futures, and spot), as well as access method and commodity type (where applicable), among other criteria.<sup>98</sup>

#### 4.3.2.3.8 Major ongoing and future projects

A possible integration with other BM&FBOVESPA-operated clearing houses is the main project under consideration (see Section 3.2.3.7 for further information).

### 4.4 Securities settlement systems

CETIP and the Equity and Corporate Bond Clearinghouse are described as clearing houses, although, as vertically integrated post-trade infrastructure providers, they are also central depositories and securities settlement systems.

#### 4.4.1 Special System for Settlement and Custody (SELIC)

##### 4.4.1.1 Institutional aspects

The system is jointly operated by the BCB and ANBIMA (see Section 1.3.4.2). The former also regulates and oversees the system.

##### 4.4.1.2 Participation

Besides the National Treasury and the BCB, commercial banks, universal banks, investment banks, savings banks, dealers and brokers, clearing and settlement system operators, mutual investment funds and many other institutions hold custody accounts in SELIC. For funds leg settlement, they are classified as settling participants if they hold settlement accounts at the BCB, or as non-settling participants if they do not. A non-settling participant may be either an independent or a subordinated participant. The former enters its transactions directly into the system, while the latter enters its transactions via its contracted settling participant.

Non-settling participants settle their obligations through their accounts with settling participants.<sup>99</sup> The system comprises 7,656 participants, of which 133 are settling participants, 131 are independent non-settling participants, and 7,392 are subordinated non-settling participants (as at July 2010).

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<sup>97</sup> BM&FBOVESPA and the Chicago Mercantile Exchange Group have established a strategic partnership which includes a commercial agreement, a cross-investment programme and other initiatives. The commercial agreement underpins an order-routing system that allows CME to provide access to BM&FBOVESPA products via its GLOBEX electronic trading platform. For its part, BM&FBOVESPA can provide access to CME products through its electronic trading platform (GTS).

<sup>98</sup> For further information, please see [www.bmf.com.br/bmfbovespa/pages/boletim2/Custos/Tarifacao2.asp](http://www.bmf.com.br/bmfbovespa/pages/boletim2/Custos/Tarifacao2.asp).

<sup>99</sup> Each non-settling participant can use the services of more than one settling participant.

#### 4.4.1.3 Types of transactions

SELIC only settles OTC transactions that involve securities issued by the National Treasury,<sup>100</sup> whether traded in outright or repurchase operations, including those carried out by the BCB for monetary policy purposes.<sup>101</sup>

#### 4.4.1.4 Operation of the system

SELIC, a DVP1 securities settlement system, is the system used by the BCB as a central depository for securities issued by the National Treasury. The system is also used by the BCB to carry out government securities auctions on behalf of the National Treasury. Omnibus accounts are used for custody services, ie securities are registered in SELIC exclusively in the name of system participants (final investor accounts are maintained at the level of custodian institutions, outside the SELIC system).

Settling participants submit their transactions through RSFN, following standards and procedures set out in the relevant network manuals. Non-settling participants use different networks, according to the procedures specified in the system's regulations. The system is open from 06:30 to 18:30 (Brasilia time). All transactions are entered into the system on the dual-entry principle, ie both participants involved with the settlement of a transaction enter the details into the system and the two entries are then matched.

Since SELIC is a DVP1 settlement system, the settlement of each transaction always depends on the availability of the traded securities in the seller's custody account, and of funds in the settling participant's STR account. If the balance of securities on the seller's custody account is insufficient, the transaction will be held as pending for no longer than 60 minutes or until 18:30, whichever is the sooner (on expiry of this waiting period, the transaction is deleted from the system).<sup>102</sup> For each transaction, the system blocks the related securities and, at the same time, instructs STR to settle the funds leg. When STR settles the funds leg, SELIC transfers the securities to the buyer's account.

#### 4.4.1.5 Risk management

There is no principal risk in transactions submitted to SELIC for settlement, as SELIC is a DVP1 securities settlement system. As mentioned above, securities are blocked at SELIC at the moment when the related funds leg is submitted to STR for settlement. If the buying participant has insufficient funds, the transaction is promptly rejected by STR and, therefore, by SELIC too. In such a case, the relevant securities revert to their previous status, ie they are free for use in another transaction.

However, as in any similar system, the liquidity risk and replacement cost risk faced by participants are not addressed at system level. A securities borrowing and lending programme is available to mitigate the risk of a participant failing to meet its securities delivery obligations.

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<sup>100</sup> These securities include: fixed rate bonds; inflation-indexed bonds; floating interest rate bonds; and foreign exchange-indexed bonds. Their maturities vary from six months up to 40 years.

<sup>101</sup> The system's regulations permit some "chain transactions". These are used mainly for liquidity-saving purposes (in October 2010, for instance, such transactions accounted for 6% of the daily total value of transactions processed in the system). Although their settlement is processed on a gross basis, the availability of securities and funds is checked by the relevant system, ie SELIC for the securities leg and STR for the funds leg, taking into account the entire transaction chain. When checking the availability of funds and securities, the relevant system will settle all transactions at the same time, provided that all relevant accounts (securities and funds) have a positive balance at the end of the process.

<sup>102</sup> Transactions involving the sale of securities carried out on the same day as they were acquired in a primary auction are not subject to the restriction.

#### *4.4.1.6 Links to other systems*

For collateral management purposes, SELIC is linked to CETIP and all BM&FBOVESPA-operated clearing houses. In the case of the BM&FBOVESPA – Debt Securities Clearinghouse, the link is also used to settle the relevant final positions of securities. SELIC is also linked to STR for settling the funds leg of each transaction.

#### *4.4.1.7 Pricing*

The SELIC pricing policy aims at recovering operational costs. Only a custody fee is charged, ie there is no specific per transaction settlement fee. The custody fee is charged as a percentage of the value of securities deposited in each custody account and ranges from 0.00015% (values larger than BRL 10 billion) to 0.00035% (values up to BRL 5 billion).

#### *4.4.1.8 Major ongoing and future projects*

New features added in November 2010 include a system for electronic securities auctions, a new graphic interface, and a modified access policy for custody accounts (custody account holding was extended to several non-bank financial institutions).

### **4.5 Use of securities infrastructure by the central bank**

All BCB's monetary policy operations involving government securities, as well as intraday credit operations, are carried out through SELIC. All such transactions are settled in real time. BCB also uses SELIC to carry out primary auctions on behalf of the National Treasury.