B3 CLEARINGHOUSE RISK MANAGEMENT MANUAL

07/06/2026

TABLE OF CONTENTS

Introduction 6

Functions and Notation 10

Chapter 1 - Safeguard structure 11

1.1 Safeguard structure components 11

1.2 Collateral posted by participants 12

1.3 Settlement fund (FLI) 21

1.4 Liquidity risk management 26

1.5 Sequence of use of collateral 28

1.6 Coverage level of the safeguard structure for 30

1.6.1. Safeguard structure for credit risk 30

1.6.2. Safeguard structure for liquidity risk 31

1.7 Wrong-way risk 32

1.8 General provisions 33

Chapter 2 - Procedures for a default or operational defaulter event 36

2.1 Chain of responsibilities 36

2.2 Default by investors 41

2.3 Default by trading participants or foreign participants 45

2.4 Default by full trading participants or settlement participants 50

2.5 Default by clearing members 56

2.6 Use of collateral in case of failure to identify the defaulter participants 61

2.7 Use of the Investment Fund B3 Clearinghouse Liquidity (FILCB) 65

2.8 Operational defaulter 65

2.9 Sequence of use of collateral 65

Chapter 3 - Managing a delivery failure along the closeout process of the defaulter participant's positions 66

3.1 Managing a delivery failure of assets in the equities market 67

3.2 Executing a buy-in order – Equities market 72

3.3 Cancelling a buy-in order – Equities market 74

3.4 Reversing the buy-in – Equities market 75

3.5 Managing a delivery failure of fixed income ETF shares by the defaulter investor along the closeout process of said investor's positions 76

3.6 Executing a buy-in order – Fixed income ETF shares 81
3.7 Cancelling a buy-in order – Fixed income ETF shares 82
3.8 Reversing the buy-in – Fixed income ETF shares 84
3.9 Managing a delivery failure of assets in the government bond market 85
3.10 Executing a buy-in order – Government bond market 88
3.11 Cancelling a buy-in order – Government bond market 90
3.12 Reversing the buy-in – Government bond market 91
Chapter 4 - Intraday risk monitoring 93
4.1 Acceptance of transactions 93
4.2 Pre-trade risk monitoring 96
4.2.1 Eletronic trading of derivatives, assets in equities markets and corporate debt assets 96
4.2.2 Electronic trading of securities lending 99
4.2.3 Trading in systems operated by external system managing entities 100
4.3 Post-trade risk monitoring 102
Chapter 5 - Position limits 113
5.1 Defining the position limits 116
5.2 Determining the aggregate quantity considered for position limit adherence purposes 124
5.3 Additional margin required for position limit violation 136
5.4 Conditions for granting a waiver request in case of position limit violations 137
Chapter 6 - Collateral management 142
6.1 Eligibility criteria 143
6.2 Valuating assets accepted as collateral 162
6.3 Limits for accepting assets as collateral 163
6.4 Monitoring and meeting collateral calls 191
6.5 Procedures for posting and withdrawing collateral 194
6.6 Procedures for transferring and distributing collateral 223
6.7 Managing corporate actions associated with assets that constitute collateral 227
6.8 Monetizing collateral not linked to events of default 229
Chapter 7 - Risk calculation 231
7.1 Introduction to the CORE methodology 231
7.2 Application of the CORE methodology 231
7.3 Components of the CORE methodology 232
7.4 Closeout strategy 233
7.5 Cash flow evaluation under risk scenarios 311

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

7.6 Determining risk measures 315

7.7 Module CORE0 – Risk calculation of allocated positions under the collateralization mode by investors 322

7.8 Module CORE1 – Risk calculation for unallocated transactions 329

7.9 Module CORE2 – Risk of allocated positions collateralized by full trading participants or settlement participants 332

7.10 Instruments with different treatment in CORE 337

Appendix 1 - Assigning the amount of a participant's financial failure to the participants under its responsibility 342

Appendix 2 - Numerical examples on intraday risk monitoring 345

Appendix 3 - Numerical examples on position limits 356

Appendix 4 - Proof of the validity of the rule of thumb applicable to risk calculation in module CORE2 373

Change Log

Chapter	Change	Date	Circular Letter*
Introduction	10	06/30/2025	008/2025-VPE
Functions and notation	02	08/31/2020	109/2020-PRE
Chapter 1 - Safeguard structure	18	02/23/2026	009/2026-VNC
Chapter 2 - Procedures for a default or operational defaulter event	14	06/30/2025	008/2025-VPE
Chapter 3 - Managing a delivery failure along the closeout process of the defaulter participant's positions	05	06/30/2025	008/2025-VPE
Chapter 4 - Intraday risk monitoring	20	02/23/2026	009/2026-VNC
Chapter 5 - Position limits	15	04/27/2026	025/2026-VNC
Chapter 6 - Collateral management	36	05/11/2026	029/2026-VNC
Chapter 7 - Risk calculation	24	07/06/2026	040/2026-VNC
Appendix 1 - Assigning the amount of a participant's financial failure to the participants under its responsibility	04	06/30/2025	008/2025-VPE
Appendix 2 - Numerical examples on intraday risk monitoring	03	08/31/2020	109/2020-PRE
Appendix 3 - Numerical examples on position limits	05	06/03/2024	005/2024-VNC
Appendix 4 - Proof of the validity of the rule of thumb applicable to risk calculation in module CORE2	03	08/31/2020	006/2022-VNC

** Circular Letter by which the change was disclosed.*

Introduction

An essential precondition for the functioning of the markets managed by B3 is the certainty of **settlement**, that is, the assurance that **transactions** will be effectively settled under specified terms and time frames. By acting as a **central counterparty** for **transactions** by means of its **clearinghouse**, B3 is able to provide that precondition to the markets it manages or managed by an **external system** management entity.

With regard to the principles and rules of the Brazilian Payment System (SPB), the **clearinghouse** is designated as systemically important, being subject to the regulation and supervision of BCB, which authorizes its operation. A systemically important clearinghouse is one that clears and settles **transactions** of such magnitude that, by failing, it could pose a risk to the soundness and regular functioning of the financial system.

In order to ensure market integrity and **participants**' rights, and also mitigate risks to the continuity of activities in a safe and efficient manner, including in the event of failure of one or more **participants** in the performance of obligations resulting from their **transactions**, the **clearinghouse** counts on a proprietary risk management system and **safeguard** structure, pursuant to the provisions of CMN Resolution #4952 and BCB Resolution #304.

Upon **acceptance** of a **transaction** by the **clearinghouse**, the obligations resulting therefrom are novated, with B3 becoming the **central counterparty** to said **transaction**, that is, assuming the position of buyer to the seller and of seller to the buyer of the **transaction**. By acting as a **central counterparty**, B3 is exposed to various risks, among which the credit, market, liquidity, wrong-way, legal and operational risks stand out, as follows:

- Credit risk is the risk that a **participant** does not settle an obligation for the total amount thereof in the prescribed time frame, comprising the replacement cost and principal risks;
- Market risk is the risk of loss resulting from a price change in **assets** and contracts exceeding the amount of **collateral**;
- Liquidity risk is the risk of temporary unavailability of funds or **assets** needed to meet obligations;
- Wrong-way risk consists of the risk that the exposure to a given **participant** is highly likely to increase when the credit quality of that **participant** deteriorates;
- Legal risk is the risk of loss resulting from the unexpected application of a law or regulation, or change in the construction thereof; it also includes the risk of loss resulting from a delay in the recovery of a financial **asset** or a freezing of **positions** resulting from a legal procedure;
- Operational risk is the risk of loss arising out of deficiencies in information systems, internal controls and process execution.

When providing **central counterparty** services for the **settlement** of **transactions**, the major source of risk faced by the **clearinghouse** is the possibility of **default** or delay by **participants** in the performance of

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

obligations arising from their **transactions**. Therefore, the **clearinghouse** is exposed to credit risk, that is, the risk of loss associated with nonreceipt of the prescribed resources as originally specified.

No event of **default** occurring, the **clearinghouse** has no direct exposure to market and liquidity risks, because it does not hold net long or net short **positions** in **assets** or contracts admitted to **registration** in its systems. In a **default** event, that is, should one or more **clearing members** fail to make the **payment** or the **delivery** of the **assets** or **commodities** due as the result of their **transactions**, the **clearinghouse** becomes directly exposed to market and liquidity risks. Should a **default** occur, the **clearinghouse** will trigger its **safeguard** mechanisms to ensure the proper **settlement** of **transactions** in the prescribed manner and time frames.

This manual describes the risk management model adopted by the **clearinghouse**, meaning the risk management rules, procedures and criteria associated with the **transactions** to which it acts as **central counterparty**. Its risk management model consists of several elements, among which the following stand out: (i) **chain of responsibilities** in the **settlement** process; (ii) **safeguard** structure; (iii) risk monitoring; (iv) **collateral** management process; and (v) risk calculation model.

The **chain of responsibilities** in the **settlement** process is a set of responsibility relations between the different classes of **participants** and B3 in the performance of obligations arising out of the **transactions** accepted by the **clearinghouse**, that is, in the **settlement** of such **transactions**.

The **safeguard** structure organizes the mechanisms established for the purpose of mitigating losses associated with **default** events, that is, associated with any failure to meet obligations during the **transaction settlement** process, pursuant to the **chain of responsibilities**. Chapter 1 and appendix 1 deal with the B3 **safeguards**, whereas chapter 2 presents the **chain of responsibilities** and procedures applicable by B3 in the event of **default** by **participants** or in an **operational defaulter** situation. Chapter 3 describes the procedure for managing a **delivery failure** along the closeout process of the **positions** held by the **defaulter**.

Risk monitoring covers control of the use of the **operational limits** assigned to the **participants**; analysis of the pre-trade risk limits assigned by **trading participants**, **foreign participants**, **full trading participants** or **settlement participants** to **investors**; monitoring of intraday risk (through which the risk of each **participant** and the relevant impact on **safeguards** are assessed during trading and **transaction registration** hours); and acceptance of **derivatives transactions** executed in the **organized OTC market** managed by B3. Risk monitoring is the subject matter of both chapter 4 and appendix 2 of this manual, whereas **position** limit criteria are dealt with in both chapter 5 and appendix 3.

The **collateral** management process comprises the rules and procedures associated with movement, custody, valuation and liquidation of **collateral**, as detailed in chapter 6 of this manual.

The risk calculation model defines how to quantify severe but plausible potential losses in the event of **default** by one or more **participants**, as well as the impact of such an event on the B3 **safeguards**. The risk calculation model, including parameters, is defined by the B3 Central Counterparty Risk Internal Committee, which is responsible for ensuring constant review of the calculation model, which is presented in chapter 6.

The content of this manual applies (i) to the financial, commodity and equities **derivatives** markets, to the **securities lending** market and to the cash markets equities and corporate debt managed by B3, covering the **transactions** executed in **exchange-traded markets** as well as in **organized OTC markets** using the “fully collateralized” and “partially collateralized” **registration** modes and (ii) the **securities lending** markets and cash equities markets operated by the **external system** managing entities.

This manual is supplemented by:

- The B3 access rules and manual;
- The **clearinghouse** rules and operating procedures manual;
- The **B3 central depository** rules and operating procedures manual;
- The B3 glossary;
- The specifications of the contracts subject to **acceptance**, **clearing**, **settlement** and counterparty risk management by the **clearinghouse**; and
- Circular letters and external communications published by B3 and in force.

Regarding to the general business risk (which refers to the potential deterioration of B3's condition from a business standpoint, leading to losses as a result of adverse reputational effects, poor execution of business strategy, ineffective response to competition, losses in other business lines, or other factors), B3 maintains liquid resources to enable the continuity of operations in the event of general business losses. The amount of these resources takes into account the risk profile and the time needed for recovery and corresponds to at least six (6) months of B3's operating expenses, an amount determined on the basis of the annual budget or budget revised throughout the year. The funds are segregated by management, backed by B3's share capital and cannot be used to cover **participant default** or other financial risks.

The terms in bold type, both in the singular and plural forms, as well as the acronyms used in this manual are subject to the definitions and meanings contained in the B3 glossary of terms and acronyms, which is independent from other rules and regulations issued by B3. The terms commonly used in the financial and capital markets, as well as legal, economic and accounting terms, and any other technical terms used in this manual and not included in the B3 glossary of terms and acronyms have the meanings generally accepted in Brazil.

The values of parameters utilized in the calculation criteria and methodologies presented in this manual are available on the B3 website (www.b3.com.br).

All the times shown in this manual are Brasilia time.

In the event of ambiguity between the provisions contained in this risk management manual and other regulations issued by B3 not related to **clearinghouse** risk management, the most specific regulation shall prevail, considering the matter that is the subject of the ambiguity. If the regulations and the matter are related to the **clearinghouse**, the **clearinghouse** rulebook shall prevail; or, in the event of ambiguity between this risk

management manual and the operating procedures manual, this manual shall prevail for matters relating to the **clearinghouse** risk management.

This manual is approved by B3's Joint Board of Officers and, as applicable, by the competent regulatory bodies, under the terms of the regulations issued by them.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Functions and Notation

Throughout this manual, the following functions are used:

$\min(\cdot)$: the minimum value function, $\min(x,y)=\begin{cases} x \ if \ x \le y \\ y \ if \ x > y \end{cases}$

$\max(\cdot)$: the maximum value function, $\max(x,y)=\begin{cases} y \ if \ x \le y \\ x \ if \ x > y \end{cases}$

$abs(\cdot)$: the absolute value function, or module function, $abs(x)=|x|=\begin{cases} -x \ if \ x < 0 \\ x \ if \ x \ge 0 \end{cases}$

$\sum_{i=1}^{n} a_i$: the sum function, $\sum_{i=1}^{n} a_i = a_1 + a_2 + \cdots + a_{n-1} + a_n$

$\prod_{i=1}^{n} a_i$: the product function, $\prod_{i=1}^{n} a_i = a_1 \times a_2 \times \cdots \times a_{n-1} \times a_n$

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Chapter 1 - Safeguard structure

The **safeguard** structure that supports the **central counterparty** (CCP) function performed by B3 offers mechanisms to mitigate the credit risk inherent in that function.

1.1 Safeguard structure components

The **clearinghouse safeguards** comprise, under the terms and for the purposes provided for in Law #10214, of March 27, 2001, the following **collateral**:

(i) **Collateral** posted and held by **investors** to cover losses associated with their **positions**, including **assets** allocated as **coverage**;

(ii) **Collateral** posted by third parties for **investors** and **full trading participants** and **settlement participants**, pursuant to chapter 6 (**Collateral** management) of this manual;

(iii) **Collateral** posted by **full trading participants** and **settlement participants** to cover losses associated with **investor transactions** in the cash market;

(iv) **Collateral** posted by **trading participants**, **foreign participants**, **full trading participants**, **settlement participants** and **clearing members** to cover the intraday risk arising out of **transactions** registered under their responsibility;

(v) **Collateral** posted by **controlling guarantors** to fulfill the obligations of the **participants** controlled by them;

(vi) **Collateral** posted by **guarantee issuing banks** to increase issuance limits, pursuant to chapter 6 (**Collateral** management) hereof;

(vii) The **settlement fund**, which is made up of B3, **full trading participants, settlement participants** and **clearing member** funds and **assets** ; and

(viii) B3´s own resources earmarked exclusively to the clearinghouse.

The minimum amount a **participant** must deposit as **collateral** with the **clearinghouse** to make up its **safeguards** is called required **collateral**. Since the amount of required **collateral** may be reduced as **assets** are deposited for **coverage**, whose purpose, by definition, is to meet **delivery** obligations, such **assets** are considered **collateral** posted by **investors**.

The **clearinghouse** also has **safeguards**, comprised under the terms and for the purposes provided for in Law #10214, of March 27, 2001, aimed specifically at covering liquidity risk, which consist of (i) collateralized and uncollateralized liquidity assistance facilities; (ii) the Investment Fund B3 Clearinghouse Liquidity (*FILCB*, in the Portuguese acronym); and (iii) a portion of the B3 capital formally and exclusively earmarked for the **clearinghouse**.

The following sections present the characteristics of the components of the B3 **safeguard** structure, with the calculation methodology detailed in chapter 7 (Risk calculation) of this manual.

1.2 Collateral posted by participants

1.2.1 Margin

The first three elements of the **safeguard** structure comprise **collateral** posted by **investors** and intermediaries (**full trading participants** and **settlement participants**), in order to cover the risk of open **positions**. The minimum amount to be deposited by any **participant** is called required **margin**.

Securities lending transactions, **transactions** executed in the **derivatives market** and cash market **transactions** generated from options exercises must be collateralized by the relevant **investor**. Cash market **transactions** may be collateralized (i) by the **investor** or (ii) by the **full trading participant** or by the **settlement participant**, at the discretion of the relevant **participant** and upon authorization of the **clearinghouse**.

The collateralization mode for cash market **transactions**—by the **investor** or by the **full trading participant** or **settlement participant**—is a feature of the **account** where **transactions** are allocated, and it must be designated to the **clearinghouse** by the **full trading participant** or **settlement participant** in the system of the B3 Participant Registration Center. Such designation in the Participant Registration Center system allows the **clearinghouse** to properly group the **transactions** for **margin** calculation purposes, since different calculation methods apply to the **transactions** collateralized by the **investor** and to those collateralized by the **full trading participant** or **settlement participant**, as described below.

The adoption of the collateralization mode by the **full trading participant** or **settlement participant** might be subject to criteria and limits established by B3, at its sole discretion, based on the financial and operating characteristics of **participants**, the characteristics of **assets**, the volume of **transactions**, among others.

1.2.1.1 Margin calculation

Margin is calculated according to the CORE (*CloseOut Risk Evaluation*) methodology based on scenarios for primitive risk factors. Said scenarios are defined in order to ensure a confidence level for the margin model of at least ninety-nine percent (99%).

The calculation methods for the **investor**'s (CORE0 method) and the **full trading participant**'s or **settlement participant**'s (CORE1 and CORE2 methods) required **margin** and **margin** calls are described below in a simplified form. Calculation details and scenario generation are described in chapter 7 (Risk calculation) of this manual.

(a) Calculation of the investors' required margin

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The **margin** required of any **investor** corresponds to the risk of the relevant **investor**'s **portfolio** excluding cash market **transactions** subject to collateralization by the **full trading participant** or **settlement participant**.

The risk of an **investor**'s **portfolio** is defined as the greatest potential closeout cost for the **positions** included therein, meaning the worst negative financial result (financial loss) arising from the closeout process, considering a set of risk scenarios Φ, but not considering deposited **collateral**.

The **investor**'s residual risk is defined as the worst financial loss arising from the **position** closeout process, given a set of risk scenarios Φ and deposited **collateral**. Therefore, residual risk corresponds to **collateral** deficit, indicating that deposited **collateral** is not sufficient to cover the losses resulting from the closeout process.

Let M be the number of scenarios belonging to set Φ and let Φ_i be the *i*-th scenario belonging to Φ, i = 1, 2, …, M. Denote by $Result\left(p,\Phi_i\right)$ the financial result of the closeout process of the **investor**'s **position** (p) under scenario Φ_i without considering deposited **collateral** (g), and by $Result\left(p+g,\Phi_i\right)$ the financial result considering deposited **collateral**, as shown on the following table:

Scenario belonging to Φ	Result of the position closeout process under scenario Φ_i	
	Without considering deposited collateral	Considering deposited collateral
Φ_1	$Result\left(p,\Phi_1\right)$	$Result\left(p+g,\Phi_1\right)$
Φ_2	$Result\left(p,\Phi_2\right)$	$Result\left(p+g,\Phi_2\right)$
⋮	⋮	⋮
Φ_M	$Result\left(p,\Phi_M\right)$	$Result\left(p+g,\Phi_M\right)$

Table 1.1 - Potential financial results from the closeout process of an **investor**'s **positions**

Using the above notation, the **investor**'s risk and residual risk are expressed by:

$$Risk = -\min\left[Result\left(p,\Phi_1\right),\ Result\left(p,\Phi_2\right),\ \ldots,\ Result\left(p,\Phi_M\right),\ 0\right] \quad (1.1)$$

$$ResidRisk = -\min\left[Result\left(p+g,\Phi_1\right),\ Result\left(p+g,\Phi_2\right),\ \ldots,\ Result\left(p+g,\Phi_M\right),\ 0\right] \quad (1.2)$$

And the values for the **investor**'s required cash **margin** and **margin** call are expressed by:

$$Required\ Margin = Risk \tag{1.3}$$

$$Margin\ Call = Resid\ Risk \tag{1.4}$$

Considering the measures provided by module CORE0 of the CORE methodology, the **investor**'s **margin** call is expressed by:

$$Margin\ Call = Risk_{Resid}^{CORE0} = -\min\left[Balance_{C}^{CORE0} , 0 \right] \tag{1.5}$$

(b) Calculation of the full trading participants' and settlement participants' required margin

The **margin** to be required of the **full trading participant** or **settlement participant** refers to the risk of the following **transactions** executed in the cash market and **positions** arising therefrom:

(i) **Transactions** pending **allocation** to **investors**; and

(ii) Cash market **transactions** allocated to **investors** who/which act under the collateralization mode by the **full trading participant** or **settlement participant**, except for those generated from options exercises; failure **positions**; and buy-in **positions** registered to the **investor** that failed to make delivery of the **asset**, as part of the **delivery failure** managing process.

The collateralization mode by the **full trading participant** or **settlement participant** is not allowed for proprietary **transactions** of **trading participants**, **foreign participants**, **full trading participants**, **settlement participants** and **clearing members** (meaning the **transactions** allocated to the **accounts** they hold in the capacity of **investors**) and also for the **transactions** executed by **investors** belonging to the same **financial conglomerate** of said **participants**.

Subject to the power of rejection by the **clearinghouse**, the **investor** and relevant **full trading participant** or **settlement participant** are allowed to use both collateralization modes, meaning that one portion of the **investor**'s cash market **transactions** can be collateralized by the **investor** and the other portion can be collateralized by the relevant **full trading participant** or **settlement participant**. To that end, two accounts must be established—one configured to the collateralization mode by the **investor** and the other configured to the collateralization mode by the **full trading participant** or **settlement participant**—with the correct **allocation** of **transactions** between the two accounts being incumbent on the **investor** and **full trading participant** or **settlement participant**. Such structure enables the netting of the risk of **positions** in **derivative** contracts (which must be collateralized by the **investor**) with the risk of cash market **transactions** that have been executed in order to meet delivery obligations in the **settlement** of those contracts.

The **margin** required of **full trading participant** or **settlement participant** P corresponds to the risk of **transactions** still unallocated and of cash market **transactions** allocated and subject

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

to collateralization by **participant** P. As in the calculation of **margin** required of the **investor**, the risk is defined as the worst financial result, if negative, of the closeout process, given the different scenarios for set Φ, without taking into account **collateral** posted by **participant** P and/or **clearing member** CM. Unallocated **transactions** are those that are included in transitory **accounts** (such as brokerage, capture, master, admincon, fintermo, intermediate and market maker **accounts**).

The **margin** call corresponds to **collateral** deficit when the amount of deposited **collateral** is compared to the risk of unallocated **transactions** and of **transactions** allocated under the collateralization mode by **participant** P, with **collateral** also evaluated under the various scenarios for set Φ, with the smallest value being taken to determine the **margin** call amount.

Under the above definitions and considering the notation introduced in the previous section for the set of scenarios Φ, let $Result_{NA}\left(p,\Phi_i\right)$ and $Result_{A,P}\left(p',\Phi_i\right)$ be, under scenarios Φ_i and without considering **collateral** posted by the **participant** P and/or **clearing member** CM, the financial results of the closeout processes, respectively, for:

- The unallocated **transactions** (or the **positions** resulting therefrom), which are denoted by p; and
- The **transactions** (or the **positions** resulting therefrom) subject to collateralization by the **full trading participant** or **settlement participant** and allocated to a subgroup of **investors** (the size of which is based on the assumption of simultaneous defaults), which **transactions** are denoted by p'.

The outcomes and amounts of **collateral** posted by **participant** P and/or **clearing member** CM, under each scenario $Coll\left(\Phi_i\right)$, are shown on the following table:

Scenario belonging to Φ	**Result of the position closeout process under scenario** Φ_i		**Deposited collateral posted by** P and/or CM
	Unallocated transactions	**Allocated transactions collateralized by participant** P	
Φ_1	$Result_{NA}\left(p,\Phi_1\right)$	$Result_{A,P}\left(p',\Phi_1\right)$	$Coll\left(\Phi_1\right)$
Φ_2	$Result_{NA}\left(p,\Phi_2\right)$	$Result_{A,P}\left(p',\Phi_2\right)$	$Coll\left(\Phi_2\right)$
$\vdots$	$\vdots$	$\vdots$	$\vdots$
Φ_M	$Result_{NA}\left(p,\Phi_M\right)$	$Result_{A,P}\left(p',\Phi_M\right)$	$Coll\left(\Phi_M\right)$

Table 1.2 - Potential **transaction** closeout results and **collateral** amounts

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Using the above notation, the risk of unallocated **transactions** and the risk of allocated **transactions** subject to collateralization by **participant** P are expressed by the following equations:

$$Risk_{Unalloc\ trans} = -\min\left[Result_{Unalloc}\left(p,\Phi_1\right)\ ,\ Result_{Unalloc}\left(p,\Phi_2\right)\ ,\ \ldots\ ,\ Result_{Unalloc}\left(p,\Phi_M\right),\ 0\right] \quad (1.6)$$

$$Risk_{Alloc\ trans\ coll\ P} = -\min\left[Result_{A,P}\left(p',\Phi_1\right)\ ,\ Result_{A,P}\left(p',\Phi_2\right)\ ,\ \ldots\ ,\ Result_{A,P}\left(p',\Phi_M\right),\ 0\right] \quad (1.7)$$

Thus, the required **margin** and **margin** call are expressed by the following equations:

$$Required\ Margin = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} \quad (1.8)$$

$$Margin\ Call = -\min\left(Coll_{CM,P} - Risk_{Alloc\ trans\ coll\ P} - Risk_{Unalloc\ trans}\ ,\ 0\right)$$

$$Coll_{CM,P} = \min\left[Coll\left(\Phi_1\right)\ ,\ Coll\left(\Phi_2\right)\ ,\ \ldots\ ,\ Coll\left(p,\Phi_M\right)\right] \quad (1.9)$$

Considering the measures provided by modules CORE1 and CORE2 of the CORE methodology, the risk of unallocated **transactions** is given by metric $Risk^{CORE1}_{A,\ No\ Coll}$ and the risk of allocated **transactions** subject to collateralization by **participant** P is given by metric $Risk^{CORE2}_{P,\ No\ Coll}$.

(c) Consolidation of portfolios of the same investor for margin calculation purposes

For risk and **margin** calculation purposes, it is possible to consolidate the portfolios of the same **investor** registered in separate **accounts** under the responsibility of the same **trading participant** or **foreign participant**, of the same **full trading participant** or **settlement participant**, and of the same **clearing member**. To that end, the **full trading participant** or **settlement participant** must establish the **margin** consolidation **links** through the B3 **participant registration** system, by indicating the **accounts** subject to consolidation and the destination **account** (which will contain the consolidated portfolio for **margin** calculation purposes). Whenever **accounts** with different collateralization modes for cash market **transactions** are designated, the collateralization mode of the destination **account** will be considered for **margin** calculation purposes.

At its sole discretion and in order to provide an accurate risk measurement, the **clearinghouse** may determine the consolidation of said accounts, in which case the **full trading participant** or **settlement participant** must designate the destination **account** in the B3 **participant registration** system.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

For the purposes of the foregoing paragraphs, **investors** are identified by their respective Corporate Taxpayer (or CNPJ) numbers or Individual Taxpayer (or CPF) numbers, or by the CVM code defined for nonresident **investors**, as the case may be.

1.2.2 Collateral for intraday risk coverage purposes

Collateral intended to cover the intraday risk is required by the **clearinghouse** of **full trading participants**, **settlement participant**s and **clearing members**, pursuant to the criteria described in chapter 4 (Intraday risk monitoring) of this manual.

Collateral for intraday risk coverage purposes is required of the **trading participant** and the **foreign participant** by the relevant **full trading participant**, according to the criteria established by the latter.

1.2.3 Collateral posted by controlling guarantors

Collateral posted by a **controlling guarantors** for compliance with the economic and financial requirements are determined in accordance with B3's access manual.

1.2.4 Collateral posted by guarantee issuing banks

Collateral posted by a **guarantee issuing bank** with the purpose of increasing issuance limits is determined in accordance with the criteria set forth in chapter 6 (**Collateral** management) of this manual.

1.2.5 Using investors' collateral

An **investor**'s **collateral** can be used:

(i) By the **trading participant** or **foreign participant**, in order to ensure performance of the obligations assumed by the **investor** before said **trading participant**, in the prescribed time and manner; and/or

(ii) By the **full trading participant**, in order to ensure performance of the obligations assumed before said **full trading participant**, in the prescribed time and manner, by:

  (a) The **investor**; or

  (b) The relevant **trading participant** or **foreign participant**, involving the **investor**'s **transactions**, in case:

    (b1) The funds transferred by the **investor** to the **trading participant** or **foreign participant** are not transferred by the **trading participant** or **foreign participant** to the **full trading participant**, in the prescribed time and manner; or

    (b2) The funds owed by the **investor** to the **trading participant** or **foreign participant** are not transferred to the latter, and as a result the funds owed by the **trading**

participant or **foreign participant** to the **full trading participant** are not transferred to the latter, in the prescribed time and manner; and/or

(iii) By the **settlement participant**, in order to ensure performance of the obligations assumed by the **investor** before said **settlement participant**, in the prescribed time and manner; and/or

(iv) By the **clearing member**, in order to ensure performance of the obligations assumed by the relevant **full trading participant** or **settlement participant** before said **clearing member**, involving the **investor**'s **transactions**, in case:

(a) The funds transferred by the **investor** are not transferred to said **clearing member** through the chain of the **participants** involved, in the prescribed time and manner; or

(b) The funds owed by the **investor** to the **trading participant**, **foreign participant**,**full trading participant**, or **settlement participant** are not transferred to any such **participant**, and as a result the funds owed to the **clearing member** are not transferred to said **clearing member**, in the prescribed time and manner; and/or

(v) By the **clearinghouse**, in order to ensure performance of the obligations assumed by the relevant **clearing member** before the **clearinghouse**, involving the **investor**'s **transactions**, in case:

(a) The funds transferred by said **investor** are not transferred to the **clearinghouse** through the chain of **participants** involved, in the prescribed time and manner; or

(b) The funds owed by the **investor** to the **trading participant**, **foreign participant**, **full trading participant**, or **settlement participant** are not transferred to any such **participant**, and as a result the funds owed by the **clearing member** to the **clearinghouse** are not transferred to the **clearinghouse**, in the prescribed time and manner.

If **collateral** posted by an **investor** through other **participants** is free, it might be used by the **clearinghouse** to compensate for any losses incurred by any **clearinghouse participants** or by the **clearinghouse** itself, by virtue of the **default** of said **investor**.

The use of **collateral** linked to a certain **investor** is limited to the performance of obligations arising out of the **transactions** of said **investor**.

1.2.6 Using collateral posted by trading participants or foreign participants

Collateral posted by the **trading participant** or **foreign participant** can be used:

(i) By the **full trading participant**, in order to ensure performance of the obligations assumed by the **trading participant** or **foreign participant**, before said **full trading participant**, in the prescribed time and manner; and/or

(ii) By the **clearing member**, in order to ensure performance of the obligations assumed by the

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

relevant **full trading participant** before said **clearing member**, involving the **trading participant** or **foreign participant**'s **transactions**, in case:

(a) The funds transferred by the **trading participant** or **foreign participant** to the **full trading participant** are not transferred by the **full trading participant** to the **clearing member**, in the prescribed time and manner; or

(b) The funds owed by the **trading participant** or **foreign participant** to the **full trading participant** are not transferred to the latter, and as a result the funds owed by the **full trading participant** to the **clearing member** are not transferred to the **clearing member**, in the prescribed time and manner; and/or

(iii) By the **clearinghouse**, in order to ensure performance of the obligations assumed by the relevant **clearing member** before the **clearinghouse**, involving the **trading participant** or **foreign participant**'s **transactions**, in case:

(a) The funds transferred by said **trading participant** or **foreign participant** are not transferred to the **clearinghouse** through the chain of **participants** involved, in the prescribed time and manner; or

(b) The funds owed by the **trading participant** or **foreign participant** to the **full trading participant** are not transferred to the latter, and as a result the funds owed by the **clearing member** to the **clearinghouse** are not transferred to the **clearinghouse**, in the prescribed time and manner.

If **collateral** posted by a **trading participant** or **foreign participant** through other **participants** is free, at the discretion of those other **participants**, it might be used by the **clearinghouse** to compensate for any losses incurred by any **clearinghouse participants** or by the **clearinghouse** itself, by virtue of the **default** of said **trading participant** or **foreign participant**.

1.2.7 Using collateral posted by full trading participants

Collateral posted by the **full trading participant** can be used:

(i) By the **clearing member**, in order to ensure performance of the obligations assumed by the **full trading participant** before said **clearing member**, in the prescribed time and manner; and/or

(ii) By the **clearinghouse**, in order to ensure performance of the obligations assumed by the relevant **clearing member** to the **clearinghouse**, involving the **full trading participant**'s **transactions**, in case:

(a) The funds transferred by said **full trading participant** to the **clearing member** are not transferred by the **clearing member** to the **clearinghouse**, in the prescribed time and manner; or

(b) The funds owed by the **full trading participant** to the **clearing member** are not

transferred to the latter, and as a result the funds owed by the **clearing member** to the **clearinghouse** are not transferred to the **clearinghouse**, in the prescribed time and manner.

The assets that make up the capital of the liquidity fund, the shares of which are held by the **full trading participants**, as described in section 1.4.1 of this chapter, may be used to carry out the transactions planned for the purpose of providing liquidity to the **clearinghouse**.

If **collateral** posted by a **full trading participant** through other **participants** is free, at the discretion of such other **participants**, it might be used by the **clearinghouse** to compensate for any losses incurred by any **clearinghouse participants** or by the **clearinghouse** itself, by virtue of the **default** of said **full trading participant**.

1.2.8 Using collateral posted by settlement participants

Collateral posted by the **settlement participant** can be used:

(i) By the **clearing member**, in order to ensure performance of the obligations assumed by the **settlement participant** before said **clearing member**, in the prescribed time and manner; and/or

(ii) By the **clearinghouse**, in order to ensure performance of the obligations assumed by the relevant **clearing member** to the **clearinghouse**, involving the **settlement participant**'s **transactions**, in case:

(a) The funds transferred by said **settlement participant** to the **clearing member** are not transferred by the **clearing member** to the **clearinghouse**, in the prescribed time and manner; or

(b) The funds owed by the **settlement participant** to the **clearing member** are not transferred to the latter, and as a result the funds owed by the **clearing member** to the **clearinghouse** are not transferred to the **clearinghouse**, in the prescribed time and manner.

The assets that make up the capital of the liquidity fund, the shares of which are held by the **settlement participants**, as described in section 1.4.1 of this chapter, may be used to carry out the transactions planned for the purpose of providing liquidity to the **clearinghouse**.

If **collateral** posted by a **settlement participant** through other **participants** is free, at the discretion of such other **participants**, it might be used by the **clearinghouse** to compensate for any losses incurred by any **clearinghouse participants** or by the **clearinghouse** itself, by virtue of the **default** of said **settlement participant**.

1.2.9 Using collateral posted by clearing members

Collateral posted by the **clearing member** can be used by the **clearinghouse**, in order to ensure performance of the obligations assumed by the **clearing member** to the **clearinghouse**, in the prescribed time and manner.

The assets that make up the capital of the liquidity fund, the shares of which are held by the **clearing members**, as described in section 1.4.1 of this chapter, may be used to carry out the transactions planned for the purpose of providing liquidity to the **clearinghouse**.

1.3 Settlement fund (FLI)

The **settlement fund** is made up of the following:

(i) A contribution made by B3;

(ii) The contributions made by the **full trading participants** and **settlement participants** and

(iii) The contributions made by the **clearing members**.

The **settlement fund** resources are used (i) by the **clearinghouse** to cover losses, in a mutualized manner, resulting from the **default** of one or more **clearing members** to the **clearinghouse**, after exhaustion of **collateral** posted by the **participants** under the responsibility of the **defaulter clearing members** and (ii) by the non-defaulting **clearing member**, in a non-mutualized manner, to cover losses resulting from the **default** of the **full trading participants** or **settlement participants** under its responsibility.

1.3.1 B3's contribution

B3's contribution to the **settlement fund** consists of a portion of its capital, which is allocated to the fund.

The amount of this contribution is, at least, BRL600,000,000.00 (six hundred million Brazilian reals), as determined by the B3 Board of Directors, subject to the provisions of section 1.3.3. Every three months, the Board of Directors' Risk and Financial Committee reviews the amount of said contribution and submits to the Board its recommendation for the alteration thereof, if applicable. The definition of the value of B3's contribution to the **settlement fund** follows the **safeguard** structure sizing criterion, which is based on the minimum level of credit risk coverage described in section 1.6 (Coverage level of the **safeguard** structure for credit risk).

B3's contribution is used according to the criteria described under subsection 1.3.4 (Rules for **settlement fund** use) hereof, and it will not be utilized until the resources deposited by the **defaulter clearing member** are depleted.

1.3.2 Full trading participants' and settlement participants' contributions

The contributions made by the **full trading participants** and **settlement participants** are mandatory and their values are defined by B3, at its sole discretion, and set forth in the B3 access manual. The values of their contributions can be differentiated by **full trading participants** and **settlement participants** category.

The contribution is required for the **full trading participant** or **settlement participant** for each chain of responsibilities in the settlement process that one or the other integrates, that is, by **clearing member** named for settle the **transactions** assigned to the **participant**.

The **full trading participants's** and **settlement participants'** contributions are mutualizable, meaning that the amount of the contribution made by a particular **full trading participant** or **settlement participant** may be used to cover losses resulting either from its own **default** or from the **default** of other **clearing members**, pursuant to the provisions under subsection 1.3.5 (Rules for **settlement fund** use) hereof.

1.3.3 Clearing members' contributions

The contributions made by the **clearing members** are mandatory and their values are defined by B3, at its sole discretion, and set forth in the B3 access manual. The values of their contributions can be differentiated by **clearing member** category.

The **clearing members**' contributions are mutualizable, meaning that the amount of the contribution made by a particular **clearing member** may be used to cover losses resulting either from its own **default** or from the **default** of other **clearing members**, pursuant to the provisions under subsection 1.3.5 (Rules for **settlement fund** use) hereof.

1.3.4 Monetary adjustment of contributions

Until the fifteenth business day of each year, the amounts required as contribution from both B3, **full trading participants**, **settlement participants** and **clearing members** for the **settlement fund** will be adjusted at sixty-six percent (66%) of the cumulative SELIC Rate in the period from January to December of the previous year.

1.3.5 Rules for settlement fund use

Rule 1

The resources in the **settlement fund** can only be used:

(i) by the **clearinghouse**, upon authorization of the B3 Joint Board of Officers, in a mutualized manner, in event of **default** of a **clearing member**.

(ii) by the **clearing member**, in event of **default** of the **full trading participant** or **settlement participant** in front of the referred **clearing member**, in a non-mutualized manner, that is, only the contribution of that **full trading participant** or **settlement participant** can be used**.**

Rule 2

The **full trading participants', settlement participants'** and the **clearing members**' contributions and B3's contribution to the **settlement fund** are mutualizable, meaning that said contributions are liable to be used in the event of **default** by any **clearing member**, in accordance with the order and criteria established in *Rule 5*.

Rule 3

The resources posted by the **full trading participants, settlement participants** and **clearing members** for **settlement fund** replenishment purposes can only be used to cover losses resulting from **defaults** occurring after the one that gave rise to the need to replenish the fund.

*Rule 4 - Sequence of use of **settlement fund** resources*

The use of the **settlement fund** in case of **default** by **clearing member** *CM* follows the order established below, either until the losses stop or the resources in the **settlement fund** capable of being used are exhausted:

1. The full contribution, linked to the **clearing member** *CM*, of the **full trading participants** or the **settlement participants** declared as defaulter by the **clearing member** *CM*;
2. The full free contribution, linked to the **clearing member** *CM,* of the **full trading participants** or the **settlement participants** declared as defaulter by the **clearing member** *CM,* linked to the non defaulter **clearing member**, upon the authorization of such;
3. The full contribution of **clearing member** *CM*;
4. The full contribution of B3; and
5. Other contributions, in proportion to the required contribution of each **participant**, that is:

    (i) The contribution of the **full trading participants** or **settlement participants** declared as **defaulter** by the **clearing member** *MC*, linked to other non defaulter **clearing members, that has not been used**.

    (ii) The contributions of other **full trading participants**, **settlement participants** and **clearing members**.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The use of the **settlement fund** in the event of **default** of a **clearing member** without the identification of the defaulters **full trading participants** or **settlement participants** is pursuant to the section 2.6 (Use of **collateral** in case of failure to identify the **defaulter participants**) of the chapter 2 (Procedures for a **default** or **operational defaulter** event) of this manual.

Rule 5

If liquidity conditions or operational issues impede or preclude the sequence defined in *Rule 4* from being followed, B3 may adopt another sequence of use of **settlement fund** resources.

If a sequence other than the one defined in *Rule 4* is adopted, resulting in the use of resources that otherwise would not be used under *Rule 4*, B3 will take the necessary action to restore the amounts of contributions to the **settlement fund** contributors as if the use of resources had followed the sequence defined in *Rule 4*.

Rule 6

Simultaneous **defaults** are those which:

(i) Occur on the same date, or

(ii) Are submitted to the **clearinghouse** management process in concurrent periods of time (that is, the management process for one starts during the course of the management process for another).

The time frame between the beginning of the first process and the end of the last process is called simultaneity period.

In the event of simultaneous **defaults**, given the possibility of there being nondefaulter and **defaulter** among the **full trading participants, settlement participants** and **clearing members** included in the loss mutualization process established in *Rule 4*, the following should be observed:

(i) The resources in the **settlement fund** are used throughout the simultaneity period, as needed by the **clearinghouse** to cover losses resulting from the relevant **defaults**;

(ii) The contribution of any given **clearing member** is first earmarked for managing its own **default** and the remaining balance, if any, will be used to mutualize losses resulting from the other **defaults**of **clearing members**;

(iii) The contribution of any given **full trading participant** or **settlement participant** is first earmarked for managing its own **default** and the remaining balance, if any, will be used to mutualize losses resulting from the **default** of **clearing members**; and

(iv) After the end of the simultaneity period, the **clearinghouse** calculates the total amount of losses resulting from the simultaneous **defaults** that have been covered by **settlement fund** resources and allocates the amount thus calculated to the **settlement fund** contributors, in order to preserve the provisions of *Rule 4* and *Rule 5*.

Rule 7

For as long as any event of **clearing member default** is submitted to a management process involving the use of **settlement fund** resources, the contributions made by the **participants** remain unavailable for withdrawal, including the contributions of **clearing member**, **full trading participant** or **settlement participant**, whose **access authorization** has been suspended or if the cancellation of the respective **access authorization** has not been carried out until the declaration of **default**.

Rule 8

Should B3's contribution to the **settlement fund** be fully or partially used, the B3 Board of Directors will determine a new value for said contribution, which may differ from the amount set forth in subsection 1.3.1 of this section 1.3, contingent on the availability of B3's own funds, and in the case of a partial replenishment of the **settlement fund** submit to BCB the relevant justifications and regularization plan.

1.3.6 Procedures for settlement fund replenishment

The **settlement fund** can be replenished after the resources therein are used due to the **default** of one or more **clearing members**, at the discretion of B3.

The total value of new contributions to be made by any **full trading participant**, **settlement participant** or **clearing member** to replenish the **settlement fund** over any period of twenty (20) consecutive business days is limited to three (3) times the amount of the individual contribution assigned to each one at the beginning of that period.

The **full trading participants, settlement participants** and **clearing members** are notified in advance of the obligation to replenish the **settlement fund**, subject to the aforementioned limit. The relevant deposit of resources must occur on a specific date, to be set by the **clearinghouse** at each replenishment event, according to the regular **collateral posting** procedure, that is:

(i) The required amounts are included in the **multilateral net balances** of the relevant **full trading participants, settlement participants** and **clearing members** to be settled on such specific date; and

(ii) The deposit of resources to meet the **settlement fund** replenishment requirement must be made according to the time grid for **collateral posting**, as defined in chapter 6 (**Collateral** management) of this manual.

Any **participant** that fails to meet its obligation to replenish the **settlement fund** may be declared either a **defaulter** or an **operational defaulter** by the **clearinghouse**.

1.3.7 Deposit procedures due to a review of the contributions required of clearing members

The values of the contributions required of **full trading participants, settlement participants** and **clearing members** may be reviewed at any time, at the discretion of B3, as provided in subsection 1.3.2 (**Full trading participants'** and **settlement participants' contritbutions**) and in subsection 1.3.3 (**Clearing members**' contributions) hereof.

If the values of the required contributions are revised upwards, the **full trading participants, settlement participants** and **clearing members** must adjust their contributions to the new values.

The **full trading participants, settlement participants** and **clearing members** are notified in advance of the obligation to make new contributions to the **settlement fund**. The relevant deposit of resources must be made within twenty (20) consecutive business days, according to the time grid for **collateral posting**, as defined in chapter 6 (**Collateral** management) of this manual. On the last day of such period, any remaining balance of the required amount still not deposited by any **full trading participants, settlement participants** and **clearing member** is included in the relevant **clearing member**'s **multilateral net balance** to be settled on that same day.

Any **full trading participants, settlement participants** or **clearing member** failing to meet its obligation to allocate resources due to a review of the **settlement fund** may be declared either a **defaulter** or an **operational defaulter** by the **clearinghouse**.

1.4 Liquidity risk management

Liquidity risk can be understood in two ways:

(i) The mismatch risk between the **settlement** dates of rights and obligations; and

(ii) The risk of absence of a counterparty in the market so as to close out the **defaulters**' **positions** in an orderly fashion, that is, without a significant price impact.

In the event of a **payment** or **delivery** failure, the **clearinghouse** becomes exposed to both types of liquidity risk.

During a **position** closeout process, the lack of liquidity may compromise the **clearinghouse** ability to settle the corresponding **positions** within the time frame for which the need of **collateral** was scaled. In order to reduce that risk, restrictions to the closeout process deriving from liquidity conditions are explicitly incorporated into the CORE methodology for risk calculation. Pursuant to chapter 7 (Risk calculation) of this manual, the closeout strategy that determines the amount of required **collateral** satisfies restrictions such as minimum period for each **position** to start being closed out and liquidity level of each **asset** or contract.

Regarding the liquidity risk in the monetization process of **collateral** and **assets** subject to **settlement**, and in order to ensure that the necessary liquidity is available to meet its obligations in the prescribed manner and time, even in the event of simultaneous failures of one or more **clearing members**, B3 imposes restrictions on the types of **assets** acceptable as **collateral** and on their corresponding volumes. In addition, it has

mechanisms in place that allow for the rapid monetization of **collateral** and **assets** under **settlement**, which are:

(i) The FILCB fund;

(ii) A portion of the B3 capital formally and exclusively earmarked for the **clearinghouse**;

(iii) Uncollateralized liquidity assistance facilities; and

(iv) Collateralized liquidity assistance facilities.

1.4.1 Investment Fund B3 Clearinghouse Liquidity (FILCB)

The FILCB fund, whose investment policy must comply with the **clearinghouse** rules, is set up as an investment fund, pursuant to applicable regulations, which is administered and managed by, and held in the custody of, the B3 Bank, with no management costs applicable to the holders of the shares thereof.

The purpose of the fund is to provide liquidity to the **clearinghouse** in the monetization process of **collateral** and **assets** it holds, in the event of failure of one or more **clearing members** to perform their obligations before the **clearinghouse**. The FILCB provides liquidity to the **clearinghouse** by lending Brazilian federal government bonds to the **clearinghouse** against the allocation of collateral to the fund, comprising **assets** settled by the **clearinghouse** or accepted as **collateral** from **participants**. The government bonds borrowed by the **clearinghouse** are then discounted at the BCB discount window, through the B3 Bank, thus securing the necessary liquidity to the **clearinghouse**.

The FILCB fund is made up of resources allocated by B3 and the **full trading participants**, **settlement participants** and **clearing members**, with the sole purpose of depositing its shares in favor of the **clearinghouse safeguard** structure. constituting the **settlement fund**.

1.4.2 Portion of the B3 capital

The portion of the B3 capital formally and exclusively earmarked for the **clearinghouse**, which is made up of highly liquid **assets**, is the simplest mechanism to mitigate liquidity risk.

Such **assets** are intended for use by the **clearinghouse** when managing any failure in the **settlement window**, in order to provide the **clearinghouse** with the necessary funds to fulfill its **payment** obligations towards creditor **clearing members**.

1.4.3 Liquidity assistance facilities

The **clearinghouse** counts on liquidity assistance facilities through which it obtains the necessary financial resources should the time period required for **collateral** liquidation exceed the time period stipulated for the **settlement** of its obligations to the **clearing members**.

Liquidity facilities are based on contracts between B3 and financial institutions, which act as liquidity providers, committing to deliver funds to the **clearinghouse** whenever required, within the prescribed time frame and in the prescribed amount.

B3 counts on both collateralized and uncollateralized liquidity assistance facilities. Collateralized liquidity facilities differ from uncollateralized liquidity facilities to the extent that they are backed by **collateral** in the process of liquidation by the **clearinghouse**. Such **collateral** is valued considering a haircut to its market price, and the proceeds from its liquidation are allocated to the payment of the credit granted.

In the case of **collateral** made up of Brazilian federal government bonds, the **clearinghouse** is able to access the discount window mechanism run by BCB through the B3 Bank, which has direct access to it.

As presented in chapter 6 (**Collateral** management) of this manual, based on the volumes and types of collateralization underlying the liquidity assistance facilities contracted by B3, the **clearinghouse** defines both liquid and illiquid portions of each **participant**'s **collateral** portfolio, limiting the use of the illiquid portion in **margin** coverage to a fraction of the amount resulting from the sum of (i) the amount of the B3's own resources exclusively earmarked for the **clearinghouse**, (ii) FILCB capital and (iii) resources provided through uncollateralized liquidity assistance facilities. Therefore, while seeking to maintain a set of liquidity assistance facilities consistent with the types and volumes of the **assets** that make up **collateral**, B3 also mitigates liquidity risk in the monetization process, restricting the use of **assets** based on existing facilities.

1.5 Sequence of use of collateral

If the **default** of an **investor** causes the **default** of a **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and/or **clearing member**, and upon the proper identification of all these **participants** to the **clearinghouse**, **collateral** deposited by **participants, settlement fund** resources as well as B3's own resources earmarked exclusively for the clearinghouse are used in the following order, until no further losses remain:

1. **Collateral** posted by the **investor** and linked to the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member**;
2. Any free **collateral** posted by the **investor** through other **participants**, upon authorization of such **participants**;
3. **Collateral** posted by the **trading participant** or **foreign participant** and linked to the **full trading participant** and **clearing member**;
4. **Collateral** posted by the **full trading participant** or **settlement participant** and linked to the **clearing member**, which does not include its contribution to the **settlement fund**;
5. **Collateral** posted by the **controlling guarantor** of the **full trading participant** or **settlement participant**

linked to the **full trading participant** and the **settlement participant**;

6. The **full trading participant's** and the **settlement participant's** contributions to the **settlement fund**, linked to the **clearing member**;
7. Free **Collateral** deposited by the **full trading participant** or **settlement participant** linked to other **clearing members,** upon the authorization of such **clearing members**;
8. The **full trading participant's** and the **settlement participants'** free contributions to the **settlement fund**, linked to other **clearing members,** upon the authorization of such **clearing members**;
9. **Collateral** posted by the **clearing member**, except for its contribution to the **settlement fund**;
10. **Collateral** posted by the **clearing member's controlling guarantor** linked to the **clearing member**;
11. The **clearing member**'s contribution to the **settlement fund**;
12. B3's contribution to the **settlement fund**;
13. Other contributions, in proportion to the required contribution of each participant, that is
    (i) The contribution of the **full trading participants** or the **settlement participants** declared as **defaulter** by the **clearing member** *MC*, linked to other non-defaulting **clearing members, that has not been used**; and
    (ii) The contributions of other **full trading participants**, **settlement participants** and **clearing members**; and
14. The B3's own resources exclusively earmarked for the **clearinghouse**.

In each step involving **collateral** of a **participant,** any and all **collateral** deposited by the concerned **participant** is liable to be used regardless of the relevant purposes (which are assigned as described in chapter 6 (**Collateral** management) hereof).

The sequence of use of **collateral** as shown above is modified in case the **participant** declared a **defaulter** does not identify to the **clearinghouse** the defaulting **participants** under the **defaulter**'s responsibility. Modifications to the sequence of use of **collateral** are described in chapter 2 (Procedures for a **default** or **operational defaulter** event) hereof.

In order to mitigate its liquidity risk and the liquidity risk of **participants**, and also ensure compliance with **settlement window** hours, the **clearinghouse** may change the sequence of use of **collateral** prescribed above, in the event that the **assets** posted as **collateral** present distinct characteristics in terms of liquidity or **settlement** date, at its sole discretion. Regardless of the sequence of use of **collateral**, the final allocation of losses among **participants**, if any, must adhere to the sequence originally prescribed.

1.6 Coverage level of the safeguard structure for

The level of coverage of the **clearinghouse safeguard** structure for credit and liquidity risks is assessed daily through stress tests.

1.6.1. Safeguard structure for credit risk

The credit stress testing is the test used to assess the level of coverage of the **clearinghouse safeguard** structure for credit risk. This test consists of comparing:

(a) the amount required to cover the worst loss resulting from the closeout of the portfolios associated with the simultaneous **defaults** of two (2) **clearing members**, considering market stress scenarios with a severity greater than the severity of the scenarios utilized in required **margin** calculation, as established by the Board of Directors; and

(b) the amount of **safeguard** structure resources available for use when managing those **defaults**.

For each scenario of stress indicated in item (a), the two (2) **clearing members** whose **defaults** result in the largest financial losses are selected after the use of **collateral** of the corresponding **defaulter investors**, **full trading participants** and **settlement participants**, and of the contribution of the concerned **clearing member** to the **settlement fund**. For each **clearing member**, the financial loss comprises the losses of the following **participants** under its responsibility:

(i) The **investors** belonging to the **clearing member** group;

(ii) M **full trading participants** or **settlement participants**, including the **investors** belonging to their respective groups; and

(iii) K groups of **investors** with the highest residual risks under the responsibility of each M **full trading participant** or **settlement participant** referred to in (ii).

Where the groups are composed of **investors** with high probability of joint **default** in the relevant risk horizon for the **clearinghouse**, at the discretion of B3, such as the prudential conglomerate defined by BCB in the case of financial institutions.

The difference between (i) the sum of the losses associated with the two (2) **clearing members** selected in the concerned scenario and (ii) the amount remaining in the **safeguard** structure, if positive, indicates the deficit of funds under such scenario, in order to ensure the full coverage of the simultaneous **defaults** of both **clearing members**. After reviewing all the stress scenarios, the worst deficit in the **safeguard** structure for credit risk defines the amount of funds needed to cover the credit risk of two (2) **clearing members**.

In case the **safeguards** structure for credit risk is not being used and stress testing indicates insufficiency therein for the desired level of coverage, the components of the structure to be adjusted to meet such deficit must be determined: the required **margin** (including the additional **margin**), the B3 contribution to the

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

settlement fund, the contributions of the **full trading participants, settlement participants** and **clearing members** to the **settlement fund**, the B3 cash exclusively earmarked for the **clearinghouse**, or a combination of such components.

In order to avoid the implementation of very frequent changes of small materiality, B3 might propose adjustments to the **safeguard** structure in case the test results, on a certain date, indicate a higher deficit than the financial value V determined by B3. After review by the Risk and Financial Committee, it is incumbent on the Board of Directors to decide on changes associated with the amount of the **settlement fund** and of the B3's own resources exclusively earmarked for the **clearinghouse**.

If, due to the use of the **clearinghouse safeguards** structure, the test results indicate an insufficiency therein for the desired level of coverage, the components of the structure can be adjusted to fill this deficit, at the discretion of B3 and without prejudice to action taken for replenishment purposes of the **settlement fund** and B3's own resources exclusively earmarked for the **clearinghouse**, pursuant to the provisions of the **clearinghouse** rules. BCB must be notified whenever adjustments to the **safeguards** structure are not implemented, and also of the justifications thereto.

Daily reverse credit stress test is applied to identify the level of confidence from which the **clearinghouse safeguard** structure is not sufficient to cover the largest loss resulting from the simultaneous **defaults** of two (2) **clearing members**.

1.6.2. Safeguard structure for liquidity risk

The liquidity stress testing is the test used to assess the level of coverage of the **clearinghouse safeguard** structure for liquidity risk. This test consists of comparing:

(a) the amount required to cover the greatest need for funds in local currency to fulfill the **clearinghouse's** obligation to pay creditor **clearing members** in the event of the simultaneous payment failure of two (2) **clearing members** with the largest **multilateral net settlement**, considering market stress scenarios with a severity greater than the severity of the scenarios used to calculate the required **margin**, as established by B3's Board of Directors.

(b) the available **safeguard** structure, meaning, the amount of resources in local currency that can be obtained by the **clearinghouse** through liquidity mechanisms, disregarding those provided by entities belonging to the same prudential conglomerate, as defined by the BCB, of the 2 (two) defaulting **clearing members** referred to in item (a).

For each stress scenario indicated in item (a), the two (2) **clearing members** whose **payment** failures result in the greatest need for the **clearinghouse's** local currency resources are selected.

The difference between (i) the sum of the liquidity needs associated with the **payment** failures of the two (2) **clearing members** selected in the scenario in question and (ii) the available **safeguards** structure, if positive, indicates the liquidity deficit, in this scenario, which prevents the **clearinghouse** from fully meeting its **payment** obligation to the creditor **clearing members**. The worst deficit in the liquidity risk **safeguards** structure, after

analyzing all the stress scenarios, defines the amount of local currency resources needed to ensure coverage of the liquidity risk associated with the two (2) **clearing members**.

If the **safeguard** structure for liquidity risk is not being used and the test indicates an insufficiency in the level of coverage desired, the components of the structure to be adjusted to make up for this deficit must be determined – the **participants' collateral**, the FILCB, B3's other own resources dedicated to the **clearinghouse** for liquidity purposes and the set of collateralized and uncollateralized liquidity assistance lines or a combination of these components.

The **collateral** component deposited by **participants** can be adjusted by replacing illiquid **assets** with liquid **assets**, by requiring an additional contribution of liquid **assets**, including cash, as **collateral** or by reducing the risk of **participants'** portfolios. The FILCB's components and B3's own resources dedicated to the **clearinghouse** can be adjusted by, respectively, increasing the amounts required as a contribution to the **settlement fund** and allocating additional B3 resources. Finally, with regard to liquidity assistance lines, the adjustment consists of increasing the limit of resources to be provided, either by contracting lines with other providers or by adding to the contracts for existing lines.

In order to avoid the adoption of very frequent changes of little materiality, B3 must propose adjustments to the **safeguards** structure if the result of the test, on a given date, indicates a deficit greater than a financial value V determined by B3, and it is up to B3's Board of Directors, after analysis by the Risk and Financial Committee, to decide on changes relating to the value of the **settlement fund** and B3's own resource dedicated to the **clearinghouse**.

If, as a result of the use of the **clearinghouse's safeguards** structure, the test indicates insufficiency for the desired level of coverage, the components of the structure may be adjusted to make up for this deficit, at B3's discretion and without prejudice to the measures to recompose funds obtained via uncollateralized liquidity lines and to recompose B3's **settlement fund** and cash dedicated to the **clearinghouse**, as provided for in the **clearinghouse's** rules. Failure to implement adjustments to the **safeguards** structure must be communicated and justified to the BCB.

A reverse liquidity stress test is applied daily to identify the confidence level at which the **safeguards** structure is not sufficient to cover the liquidity need arising from the simultaneous **payment** failure of two (2) **clearing members**.

1.7 Wrong-way risk

The wrong-way risk materializes when the **default** of a **participant** occurs and also when, for example:

(i) The **defaulter participant**'s **collateral** made up of **assets** issued by the same **participant** suffers a value loss; and/or

(ii) The **defaulter participant**'s exposure increases, such as an exposure to a long position in **assets** issued by the same **participant** and a fall in the relevant **asset** prices.

The **clearinghouse** adopts criteria and procedures to mitigate the risk of losses deriving from a wrong-way correlation between the **participant**'s credit quality, **collateral** amount and **position** values.

In connection with **collateral**, the **clearinghouse** might establish limits to **collateral** constitution subject to wrong way risk, being prohibited to any **investor** to constitute **collateral** at the **clearinghouse** in the form of **assets** issued by the **investors** themselves or by any another related institutions or companies, subsidiaries, controlled or controlling entities of the **investor** constituting the collateral.

In connection with the effect described in paragraph (ii), the **clearinghouse** identifies daily, for each **asset** underlying **derivative** contracts or **lending** agreements, all the **positions** in those instruments held by the **asset** issuer or the **investor** belonging to the same **financial conglomerate** of the **asset** issuer. Once said **positions** have been identified, the **clearinghouse** may determine their closed out, establish limits and require the deposit of additional **collateral**, as recommended by the Central Counterparty Risk Internal Committee based on factors such as size of the concerned **positions** or of the exposure resulting therefrom to the **asset**, credit quality of the **investor** and/or **asset** issuer, among other factors.

1.8 General provisions

1.8.1 Resources accepted for collateral constitution

The **assets** accepted for **collateral** constitution are listed in chapter 6 (**Collateral** management) of this manual.

1.8.2 Updating required amounts and complying with safeguard structure obligations

Collateral posted by **participants** must consist of cash or **assets**, the latter at the discretion of B3.

The amounts of **margin** required of **investors**, **full trading participants** and **settlement participants** are updated by the **clearinghouse** throughout the day, and also after **clearing** of all the **transactions** executed on that same day. **Margin** calls must be met on an intraday basis, whenever required by the **clearinghouse**; those that are made after **clearing** of the **transactions** executed on a certain day must be met on the next business day, in the time grid for **collateral posting** or in the **settlement window**. The time grid for **collateral posting** and **settlement window** hours are respectively given in chapter 6 (**Collateral** management) of this manual and in the **clearinghouse** operating procedures manual.

The amounts of **margin** calls are included in the **multilateral net balances** (MNBs) of **participants**, as follows:

- The **margin** call to be met by any **investor** under a given **trading participant** or **foreign participant**, if applicable, **full trading participant**, or **settlement participant**, and **clearing member** is included in the **investor**'s MNB corresponding to these **participants**; and

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

- The **margin** call to be met by a **full trading participant**, or **settlement participant**, under a given **clearing member** is included in the MNB of the **full trading participant**, or **settlement participant**, under said **clearing member**.

The amounts due by **full trading participants, settlement participants** and **clearing members** as contributions to the **settlement fund** are included in their respective MNBs.

The amounts allocated by **participants** during the time grid for **collateral posting**, which occurs before the **settlement window** for **multilateral net settlement** in local currency, are deducted from their respective MNBs, and the amounts not allocated during that period remain as an obligation of the relevant **clearing members**, to be settled in local currency in the window for **payment** to the **clearinghouse**.

The amounts of required **margin**, whether deposited or to be deposited, are conveyed to **full trading participants**, **settlement participants** and **clearing members** through the risk and **collateral** management systems. **Trading participants** and **foreign participants** must be informed of those amounts by their respective **full trading participants**.

The criteria for constituting and moving **collateral** and other resources earmarked for the **safeguard** structure are described in chapter 6 (**Collateral** management) of this manual.

1.8.3 Position transfer

The transfer of **positions** held by any given **investor** under the responsibility of a **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and of a **clearing member** to other **trading participants** or **foreign participants**, **full trading participants**, or **settlement participants**, and **clearing members** may imply changes to the **margin** call for the **investor**. For example, a **position** is transferred without the corresponding **collateral** transfer, or a **position** is partially transferred which generates a **collateral** deficit in connection with the **positions** remaining in the executing **participants** and/or carrying **participants**.

1.8.4 Posting and withdrawing collateral

The criteria and procedures for posting and withdrawing **collateral** are described in chapter 6 (**Collateral** management) hereof.

The **full trading participants, settlement participants** and **clearing members** obligations to the **settlement fund** follow the provisions of the **clearinghouse** rules.

1.8.5 Call of additional resources in cash when exhaustion of safeguards structure leads to recovery plan activation

Within the scope of the procedures to manage a **payment** failure by one or more **clearing members**, if the components of the **safeguards** structure have been exhausted or, at the discretion of B3, there

is a reasonable likelihood of verifying insufficiency of resources to cover losses, leading to **recovery plan** activation, the nondefaulting **clearing members** may be required to deposit cash.

The amount to be deposited by each **clearing member** is calculated in proportion to the amount of the contribution required for the **settlement fund** and informed via **message** LDL0013.

B3 may require the deposit of additional funds one or more times along the **recovery plan** execution, with the following limits applying:

(i) Each time the **recovery plan** is executed, the total amount deposited by any **clearing member**, considering all calls made, is cumulatively limited to twice the amount of the contribution required from the relevant **clearing member** to the **settlement fund**; and

(ii) Regardless of the number of times the **recovery plan** is executed, the total amount deposited by any **clearing member** over any period of twenty (20) consecutive business days, considering all calls made, cumulatively, is limited to eight (8) times the amount of the contribution required from the relevant **clearing member** to the **settlement fund** at the beginning of said period.

The deadline for meeting cash calls is determined and informed by B3 and may extend from the same day up to the twentieth (20th) subsequent business day. Failure to meet any of the deadlines may result in the concerned **clearing member** being declared an **operational defaulter** or **defaulter**.

The date for the funds deposited to be paid back, as established in the **clearinghouse** rules, is determined and informed by B3.

Chapter 2 - Procedures for a default or operational defaulter event

The failure of any **participants** to meet their obligations, in whole or in part, in the time and manner prescribed by the **clearinghouse** is characterized by B3 as an **operational defaulter** situation or as a **default** situation, contingent on the reason for the failure and pursuant to the provisions of the **clearinghouse** rules and operating procedures manual.

2.1 Chain of responsibilities

The **transaction settlement** process for which B3 acts as a **central counterparty** is subject to a **chain of responsibilities** that comprises B3 itself, **clearing members**, **full trading participants**, **settlement participants**, **trading participants**, **foreign participants** and **investors**. B3's procedures in the event of failure to perform obligations are defined based on that chain, which establishes the responsibilities described below, pursuant to the **clearinghouse** rules.

2.1.1 Responsibility of B3

Under article 4 of Law #10214, of March 27, 2001, B3 assumes the position of **central counterparty** exclusively to the **clearing members** for the **settlement** of obligations resulting from the **transactions** it accepts for **clearing** and **settlement**. In connection with the other **participants**, B3 is not accountable for the **defaults** of ones to the others, regardless of the reasons for the relevant failures.

B3's responsibility to the **clearing member** is extinguished:

(i) In the case of cash **settlement**: upon confirmation by BCB that the **clearinghouse settlement account** has been debited and the **clearing member**'s **settlement agent**'s **Bank Reserves account** or **Settlement account** has been credited;

(ii) In the case of **settlement** by **delivery** of an **asset** or a **commodity**: at the time any such **delivery** is effected, in the manner and time frames prescribed in contract specifications and the **clearinghouse** operating procedures manual; and

(iii) In the case of **settlement** in US dollars of forward, futures and options contracts on agricultural commodities by nonresident **investors**, pursuant to paragraph 1 of article 13 of Joint Resolution BCB and CVM #13, of December 3, 2024: at the time B3 transfers the corresponding funds from its account to the accounts the relevant **investors** hold with their settlement banks abroad.

B3 is exempt from liability for the credit risk existing between **participants**, namely:

(i) Between **clearing members** and **full trading participants**;

(ii) Between **clearing members** and **settlement participants**;

(iii) Between **full trading participants** and **trading participants**;

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

(iv) Between **full trading participants** and **foreign participants**;

(v) Between **full trading participants** and **investors**;

(vi) Between **settlement participants** and **investors**;

(vii) Between **trading participants** and **investors**; and

(viii) Between **foreign participants** and **investors**.

B3 is exempt from liability for the **settlement** of **transactions** registered in the **organized OTC market** (i) in the "uncollateralized" mode or (ii) in the "partially collateralized" mode, whenever the party that required **collateral** is the debtor party.

2.1.2 Responsibility of clearing members

The **clearing member** is liable:

(i) For settling with the **clearinghouse**, in the manner, amount and time frames prescribed by the **clearinghouse**, the obligations resulting from the **transactions** assigned to the **clearing member** and to the **participants** that are linked to the **clearing member**;

(ii) For **posting collateral** required by the **clearinghouse**, also for the **settlement fund**, in the manner, amount and time frames prescribed by the **clearinghouse**;

(iii) For the authenticity and legitimacy of **collateral**, **assets** and documents the **clearing member** delivers to the **clearinghouse**, whether directly or through the **participants** that use the **clearing member**'s **clearing** and **settlement** services; and

(iv) For settling the obligations assumed before **full trading participants** and **settlement participants** that engage the **clearing member**'s **clearing** and **settlement** services.

The **clearing member** becomes responsible for the obligations arising out of a **transaction** from the time of the **acceptance** thereof by the **clearinghouse**, subject to the **give-up** rules. This responsibility extends to the complete extinction of all the obligations resulting from **transactions**, regardless:

(i) Of any failure or inability to make **payments** or **deliveries** by the **full trading participants**, **settlement participants**, **trading participants**, **foreign participants** and **investors** that are linked to the **clearing member**;

(ii) Of the sufficiency and quality of deposited **collateral**; and

(iii) Of the direct or indirect participation of other institutions in the **settlement** process.

The responsibility of any **clearing member** for the **settlement** of **transactions** at the **clearinghouse** is considered to have been terminated:

(i) In the case of cash **settlement**: at the time the **clearinghouse** receives confirmation that the amount of the debit balance was paid to the **clearinghouse settlement account**, in the manner and time frames prescribed in the **clearinghouse** operating procedures manual;

(ii) In the case of **settlement** by **delivery** of an **asset** or a **commodity**: at the time any such **delivery** is effected, in the manner and time frames prescribed in contract specifications and the **clearinghouse** operating procedures manual; and

(iii) In the case of **settlement** in US dollars of forward, futures and options contracts on agricultural commodities by nonresident **investors**, pursuant to paragraph 1 of article 13 of Joint Resolution BCB and CVM #13, of December 3, 2024: at the time B3 receives the corresponding funds in its account with the bank it engages to provide overseas cash **settlement** for their **transactions**.

2.1.3 Responsibility of full trading participants and settlement participants

The **full trading participant** and **settlement participant** are liable:

(i) For settling with the **clearing member**, in the prescribed manner, amount and time frames, the obligations resulting from the **transactions** assigned to them and to the **investors** that are linked to them;

(ii) For **posting collateral** required by the **clearing member** and the **clearinghouse**, in the prescribed manner, amount and time frames, including the **settlement fund**;

(iii) For the authenticity and legitimacy of **collateral**, **assets** and documents they deliver to the **clearinghouse**, whether directly or through the **trading participants** and **investors** that are linked to them; and

(iv) For settling the obligations assumed before the **trading participants**, **foreign participants** and **investors** that are linked to them.

The **full trading participant** remains accountable for the obligations it assumes before the **clearing member** even in the event of failure or inability to make **payments** or **deliveries** by the **investors**, **trading participants** and **foreign participants** that are linked to the **full trading participant**.

The **settlement participant** remains accountable for the obligations it assumes before the **clearing member** and the **clearinghouse** even in the event of failure or inability to make **payments** or **deliveries** by the **investors** that are linked to the **settlement participant**.

2.1.4 Responsibility of trading participants and foreign participants

The **trading participant** and the **foreign participants** are liable:

(i) For settling with the **full trading participant**, in the prescribed manner, amount and time frames, the obligations resulting from the **transactions** assigned to the **trading participant** and to the **investors** that are linked to the **trading participant**;

(ii) For settling the obligations assumed before the **investors** that are linked to the **trading participant**;

(iii) For **posting collateral** required by the **full trading participant**, the **clearing member** and the **clearinghouse**, in the prescribed manner, amount and time frames; and

(iv) For the authenticity and legitimacy of **collateral**, **assets** and documents the **trading participant** delivers to the **clearinghouse**, whether directly or through the **investors** that are linked to the **trading participant**.

The **trading participant** and the **foreign participant** remain accountable for the obligations it assumes before the **full trading participant** even in the event of failure or inability to make **payments** or **deliveries** by the **investors** that are linked to the **trading participant**.

2.1.5 Responsibility of controlling guarantor

The **controlling guarantor** is liable:

(i) for the authenticity and legitimacy of **collateral** and documents delivered to the **clearinghouse**, whether directly or through the **participants** linked to it; and

(i) for providing the required information and for complying with the procedures established in B3 regulations, manuals, circular letters and external communications.

The **controlling guarantor** is co-responsible for the obligations of the **full trading participant**, **settlement participant** or **clearing member** over which it has control, up to the limit of the amount of **collateral** it holds linked to said **participant**.

2.1.6 Responsibility of investors

The **investor** is liable:

(i) For settling with the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant** to which the **investor** is linked, in the prescribed manner, amount and time frames, the obligations resulting from the **transactions** assigned to the **investor**;

(ii) For **posting collateral** required by the **trading participant** or **foreign participant**, **full trading participant**, **settlement participant**, **clearing member** and the **clearinghouse**, in the prescribed manner, amount and time frames; and

(iii) For the authenticity and legitimacy of **collateral**, **assets** and documents the **investor** delivers to the **clearinghouse**, whether directly or through other **participants**.

Nonresident **investors** pursuant to paragraph 1 of article 13 of Joint Resolution BCB and CVM #13, of December 3, 2024, in respect of forward, futures and options contracts on agricultural commodities, settling their obligations directly with the **clearinghouse**, in US dollars, through the settlement bank engaged by B3 to settle **transactions** abroad, are liable for complying with their own obligations to the

clearinghouse, as well as to the **full trading participants**, **settlement participants**, **trading participants** or **foreign participants** to which they are linked.

In the case of **settlement** modes where the transfer of funds occurs directly between the **clearinghouse** and the **investor** (meaning **settlement** of forward, futures and options contracts on agricultural commodities by nonresident **investors** pursuant to paragraph 1 of article 13 o Joint Resolution BCB and CVM #13, of December 3, 2024f as well as **settlement** through the special settlement account—**CEL account**), the corresponding **trading participant**, **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member** remain responsible for **settlement**, assuming the corresponding obligations in the event of failure by the **investor**.

The following figure illustrates the **chain of responsibilities** in the **transaction settlement** process.

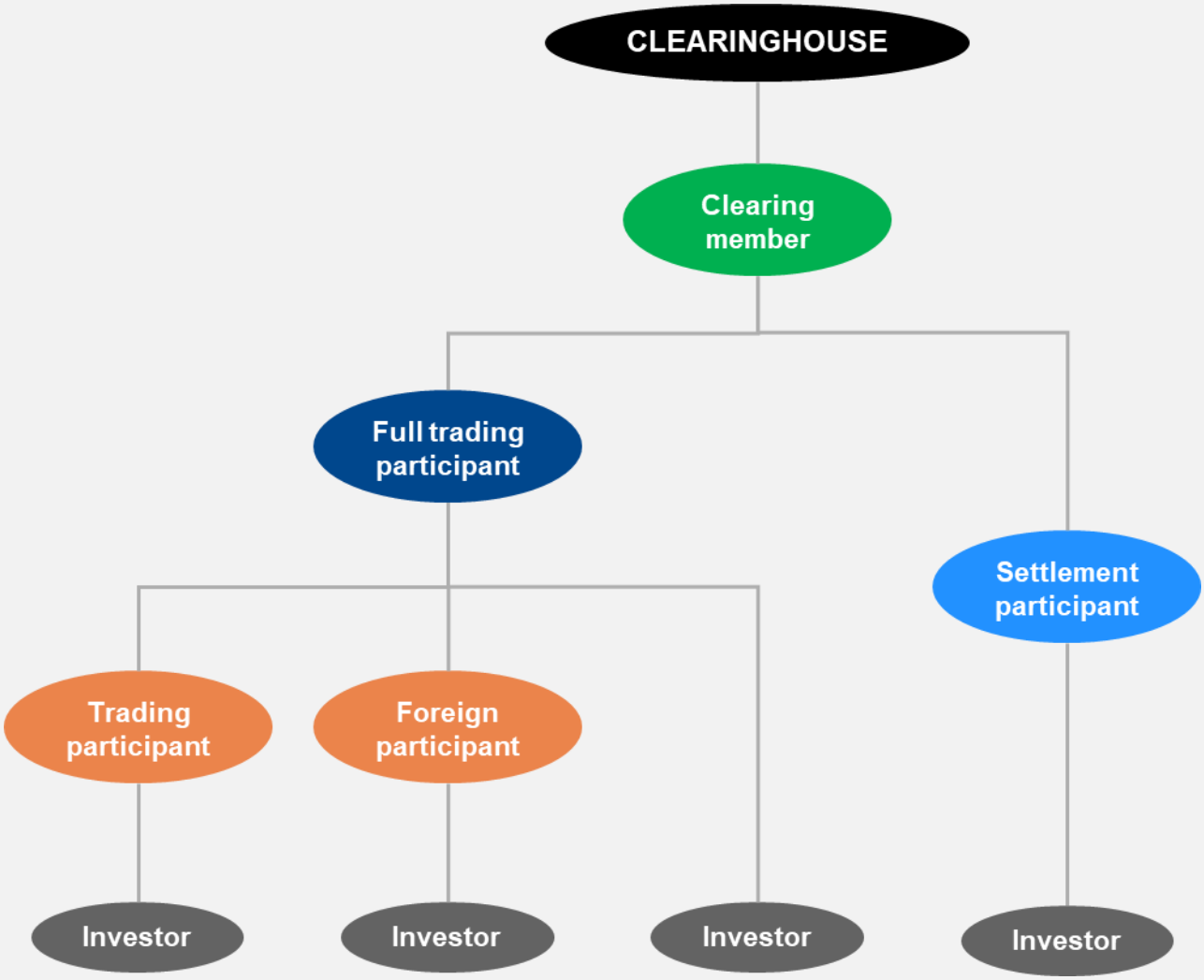


Figure 2.1 - **Chain of responsibilities** in the **transaction settlement** process

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

2.2 Default by investors

2.2.1 Declaring the default of an investor

A declaration stating the **default** of any **investor** must be communicated to B3, via a standard letter:

(i) By the **trading participant** or **foreign participant** under which the failure occurred, if the failing **investor** is linked to a **trading participant**; or otherwise,

(ii) By the **full trading participant**, or **settlement participant** under which the failure occurred.

2.2.2 Procedures for managing the default of an investor

In the event of **default** by any **investor**, irrespective of the type of unfulfilled obligation, B3 may adopt the following procedures:

(i) Include the relevant **investor** in B3's list of **defaulters**;

(ii) Activate the process for managing the **investor**'s **delivery failure**, if applicable, pursuant to the **clearinghouse** operating procedures manual;

(iii) Prohibit the **investor** declared a **defaulter**, or any other party acting on behalf of said **investor** from executing and effecting the **registration** of new **transactions**, except those **transactions** that will be commanded by the **clearinghouse** or by the **participant** responsible for the **investor**, at the discretion of the **clearinghouse**, for the purpose of reducing open **positions** or risks;

(iv) Block the functionalities for registration of **accounts** of the concerned **investor**;

(v) Block the direct accesses to the markets managed by B3 which were granted to the concerned **investor** by **full trading participants**;

(vi) Communicate to the other **trading participants**, **foreign participants**, **full trading participants** and **settlement participants**, as well as to their respective **clearing members**:

- The prohibition on executing and effecting the **registration** of new **transactions** imposed on the **investor** declared a **defaulter**, or on any other party acting on behalf of said **investor**, with the exception of those **transactions** aimed at reducing open **positions** or risks; and
- The blocking of the direct market accesses said **participants** granted to the **investor** declared a **defaulter**, and also the reduction of the trading limits assigned to the **investor**'s **accounts**.

(vii) Block the movement of **assets** allocated as **coverage** by the **investor** declared a **defaulter**, except when so required for the performance of said the **investor**'s obligations or for transfers to said **investor**'s **subaccount** or **collateral account**, depending on the **assets**;

(viii) Transfer the **assets** allocated as **coverage** by the **investor** declared a **defaulter** to said **investor**'s **subaccount** or **collateral account**, depending on the **assets**;

(ix) Block the movement of **collateral**:

- Posted to cover the **transactions** of the concerned **investor**, irrespective of the **participants** responsible for such **transactions**; and
- Posted by **guarantee issuing banks** which issued securities constituting **collateral** deposited to cover the **transactions** of the concerned **investor**.

Blocking the movement of **collateral** dispenses with any requests or consents by the **participants** involved, being effected by means of a **clearinghouse** command to its **collateral** management system.

(x) Prohibit new **collateral**, consisting of securities and other instruments issued by the concerned **investor**, to be deposited by any **participants**;

(xi) Replace **collateral** deposited by any **participants** with the **clearinghouse**, consisting of securities and other instruments issued by the concerned **investor**. Such a replacement must be carried out by the **participant** that posted the relevant **collateral** or **asset**;

(xii) Close out the **positions** held by the **investor** declared a **defaulter** and under the responsibility of any **full trading participants** or **settlement participants**, pursuant to subsection 2.2.3;

(xiii) Use the concerned **investor**'s **collateral**, in order to meet said **investor**'s obligations to the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant** under which the **default** occurred, pursuant to subsection 2.2.4;

(xiv) Within the scope of the **clearinghouse settlement** process, use **assets**, **commodities** and cash resources carrying rights of the **investor** declared a **defaulter**—including the right to receive associated with an **securities lending** agreement,—in order to meet said **investor**'s obligations to the **clearinghouse** or to the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant** under which the **default** occurred, and/or to the corresponding **clearing member**, it being provided that the use of such **assets** and **commodities** may involve the monetization thereof; and

(xv) Adopt further measures, at its discretion, including measures in connection with other services B3 may provide and/or with the securities and other instruments issued by the **investor** declared a **defaulter**.

At its sole discretion, B3 may adopt the above listed procedures in connection with the concerned **investor** in other **settlement** chains, that is, relative to access, **accounts**, **transactions**, **positions**, **collateral**, **assets** and rights of the concerned **investor**, but under the responsibility of **participants** other than the one which declared the **default** of the **investor**.

The **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant** other than the one which declared the **default** of the concerned **investor**, but which is responsible for the concerned **investor** in other **settlement** chains, may adopt the above listed procedures relative to access, **accounts**, **transactions**, **positions**, **collateral**, **assets** and rights under its responsibility, meaning the procedures for blocking access, prohibiting new **transactions** from being executed, closing out **positions**, as well as blocking and using **coverage**, **collateral** and rights.

2.2.3 Position closeout

At the discretion of B3, the **positions** of the **investor** declared a **defaulter** are closed out:

(i) By the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant** under which the **default** occurred, provided the relevant **participant** is not itself in default;

(ii) By another **full trading participant**, which will execute the **transactions** intended to close out the concerned **positions**, giving up the **transactions** to the **full trading participant**, or **settlement participant** under which the **default** occurred; or

(iii) By B3.

The closeout of positions and collateral held by any investor declared a defaulter must follow the order, amounts and time frames defined in the closeout strategy, whose determination is intrinsic to the methodology for calculating margin requirement for such positions (CORE). When liquidity conditions are favorable, positions might be closed out in less time and/or at different amounts than those defined in the closeout strategy, provided that such anticipation and/or modification to closed out amounts do not result in increased risk for the remaining portfolio. The closeout process is subject to clearinghouse monitoring throughout the period during which the failure that caused it will be managed.

If the **investor** declared a **defaulter** acts under the two possible collateralization modes (collateralization by the **investor** and collateralization by the **full trading participant** or **settlement participant**), two closeout strategies are established by the CORE methodology: one associated with the closeout of **positions** collateralized by the **investor** and another covering the **positions** collateralized by the **full trading participant** or **settlement participant**.

In the event of a **delivery failure** by the **defaulter investor** along the **position** and **collateral** closeout process, a specific procedure will be adopted to handle such failure, as described in chapter 3 (Managing a **delivery failure** along the closeout process of the **defaulter participant**'s **positions**) of this manual.

The types and criteria for **position** and **collateral** closeout are described in chapter 7 (Risk calculation) hereof.

2.2.4 Use of collateral

(a) Investors' collateral

The use of the **investor**'s **collateral** occurs upon request to the **clearinghouse** submitted by the **full trading participant**, or **settlement participant** under which the **default** occurred. That request must be submitted by a standard **collateral** liquidation request letter, to which must be attached (i) a declaration of the **investor**'s **default**, or (ii) a request for including said **investor** in the list of **defaulters**, which are both submitted to the **clearinghouse** by the **full trading participant** or **settlement participant**.

Collateral deposited by or for the **investor** under the responsibility of the **full trading participant** or **settlement participant** requesting **collateral** liquidation is liable to be liquidated. If it is not possible for the **clearinghouse** to liquidate any of the **collateral** listed in the **collateral** liquidation request, other **assets** liable to be liquidated may be appointed by the requester, by submitting an additional **collateral** liquidation request.

Any free **collateral** held by the **investor** declared a **defaulter** and posted through another **trading participant**, **foreign participant**, **full trading participant**, or **settlement participant** may be used upon authorization of the relevant **participant(s)** and the **clearinghouse**.

It is incumbent on the **clearinghouse** to define which party—whether B3 or the **participant** submitting a liquidation request—will be responsible for monetizing **collateral** subject to liquidation.

For **collateral** to be monetized by B3, the financial resources resulting from monetization are deposited for the **investor** as **margin**. The amount in excess of the required **margin** value remains available for:

(i) Withdrawal by the **full trading participant** or **settlement participant**, pursuant to the **collateral** withdrawal procedure described in chapter 6 (**Collateral** management) hereof; or

(ii) Transfer to the **full trading participant** or **settlement participant** in the **settlement window**, in which case the **clearinghouse** must be notified of the transfer amount; said amount is transferred to the **clearinghouse settlement account**, with a simultaneous credit entry to the **multilateral net balances** (MNBs) of the **full trading participant**, or **settlement participant**, and of the **clearing member**.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The **full trading participant**, or **settlement participant** may choose between (i) and (ii), according to the relevant needs at the time, either choice being subject to veto by the **clearinghouse**, at its discretion.

For **collateral** to be monetized by the **participant** requesting the liquidation thereof, the relevant **collateral** must be withdrawn according to the procedure described in chapter 6 (**Collateral** management) of this manual.

The use of **collateral** of the **investor** declared a **defaulter** at an amount in excess of said **investor**'s balance of free **collateral** requires a specific authorization by the **clearinghouse**, and it must be linked to the existence of a **multilateral net** debit **balance** for the concerned **investor**. Upon such an authorization, the corresponding funds are made available to the **participant** that requested **collateral** liquidation solely in the **clearinghouse settlement window**. The **investor**'s balance of available **collateral** is defined under section 6.5 (Procedures for posting and withdrawing **collateral**) of chapter 6 (**Collateral** management) hereof.

(b) Collateral posted by guarantee issuing banks

Collateral may be used when posted by a **guarantee issuing bank** with the purpose of increasing issuance limits, in connection with the volume of its issued securities that have been deposited as **collateral**, should the **guarantee issuing bank** not comply with its obligation to redeem or pay for the securities in the prescribed manner and time.

Liquidation of such **collateral** is conducted directly by B3, dispensing with any requests from other **participants**.

2.3 Default by trading participants or foreign participants

2.3.1 Declaring the default of a trading participant or foreign participant

A declaration stating the **default** of any **trading participant** or **foreign participant** must be communicated to B3, via a standard letter, by the **full trading participant** under which the failure occurred.

BCB is immediately notified of the **default** by B3. If the **investor** that caused the **trading participant** or **foreign participant**'s **default** is identified, the **default** of said **investor** must also be communicated to B3, pursuant to subsection 2.2.1 hereof.

2.3.2 Procedures for managing the default of a trading participant or foreign participant

In the event of **default** by any **trading participant** or **foreign participant**, B3 may adopt the following procedures:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

(i) Include the relevant **trading participant** or **foreign participant** declared a **defaulter** in B3's list of **defaulters**;

(ii) Prohibit the **trading participant** declared a **defaulter**, or any other party acting on behalf of said **trading participant** or **foreign participant** from executing and effecting the **registration** of new **transactions**, except those **transactions** that will be commanded by the **full trading participant** responsible for the concerned **trading participant** or by the **clearinghouse**, at the discretion of the **clearinghouse**, for the purpose of reducing the open **positions** under said **trading participant**'s responsibility, or the corresponding risks;

(iii) Block the functionalities for registration of **accounts** of the concerned **trading participant** or **foreign participant**;

(iv) Block the accesses of the **trading participant** or **foreign participant** declared a **defaulter** to the B3 **trading** and **registration systems**, where applicable, as well as the direct market accesses granted to **investors** linked to said **trading participant**;

(v) Communicate to the other **full trading participants** and their respective **clearing members**:

- The prohibition on executing and effecting the **registration** of new **transactions** imposed on the **trading participant** or **foreign participant** declared a **defaulter**, or on any other party acting on behalf of said **trading participant**, with the exception of those **transactions** aimed at reducing the open **positions** under its responsibility or the risks thereof; and
- The blocking of the direct market accesses granted to the **trading participant** or **foreign participant** declared a **defaulter**.

(vi) Block the movement of **assets** allocated as **coverage** by the **investors** of the concerned **trading participant** or **foreign participant**, except when so required for the performance of said **investors**' obligations or for transfers to said **investors**' **collateral subaccount**;

(vii) Transfer the **assets** allocated as **coverage** by the **investors** of the concerned **trading participant** or **foreign participant** to said **investors**' respective **collateral subaccounts**;

(viii) Block the movement of **collateral**:

- Posted by the concerned **trading participant** or **foreign participant**;
- Posted by the **investors** of the concerned **trading participant** or **foreign participant**, irrespective of the **full trading participant** or **settlement participant** responsible for the relevant **transactions** to which said **collateral** is linked; and
- Posted by **guarantee issuing banks** that issued the securities constituting **collateral** deposited by the concerned **trading participant** or **foreign participant** and/or its **investors**.

Blocking the movement of **collateral** dispenses with any requests or consents by the **participants** involved, being effected by means of a **clearinghouse** command to its **collateral** management system.

(ix) Prohibit deposits of new **collateral** by any **participants** consisting of securities and other instruments issued by the concerned **trading participant** or **foreign participant**;

(x) Replace **collateral** deposited by any **participants** with the **clearinghouse**, consisting of securities and other instruments issued by the concerned **trading participant** or **foreign participant**. Such a replacement must be carried out by the **participant** that posted the relevant **collateral** or **asset**;

(xi) Transfer the **positions** and corresponding **collateral** held by nondefaulting **investors** under the responsibility of the **trading participant** or **foreign participant** declared a **defaulter** to other nondefaulting **trading participants**, **foreign participant**, **full trading participants**, or **settlement participants**.

The transfer of **positions** is effected after approval by the **clearinghouse**, based on the risk criteria described in chapter 4 (Intraday risk monitoring) of this manual, and upon consent by the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member** of destination.

Should it not be possible for any nondefaulting **trading participant**, **foreign participant**, **full trading participant**, or **settlement participant** to take responsibility for the **positions** intended to be transferred within the time frame established by B3, B3 may decide to close said **positions** out.

(xii) Close out the **positions** under the responsibility of the **trading participant** or **foreign participant** declared a **defaulter**, pursuant to subsection 2.3.3.

(xiii) Use **collateral** linked to the concerned **trading participant** or **foreign participant**'s **accounts** to meet said **trading participant**'s obligations to the other **participants** and the **clearinghouse**, pursuant to subsection 2.3.4;

(xiv) Within the scope of the **clearinghouse settlement** process, use **assets**, **commodities** and cash resources carrying rights of the **trading participant** or **foreign participant** declared a **defaulter**—including the right to receive associated with an **securities lending** agreement,—in order to meet said **trading participant**'s obligations to the **clearinghouse**, or to the **full trading participant** under which the **default** occurred, and/or to the corresponding **clearing member**, it being provided that the use of such **assets** and **commodities** may involve the monetization thereof;

(xv) Employ the liquidity risk mitigation mechanisms that make up the B3 **safeguard** structure; and

(xvi) Adopt further measures, at its discretion, including measures in connection with other services B3 may provide and/or with the securities and other instruments issued by the **trading participant** or **foreign participant** declared a **defaulter**.

At its sole discretion, B3 may adopt the above listed procedures in connection with the concerned **trading participant** or **foreign participant** in other **settlement** chains, that is, relative to access, **accounts**, **transactions**, **positions**, **collateral**, **assets** and rights of the concerned **trading participant** or **foreign participant** and its **investors**, but under the responsibility of **full trading participants** other than the one which declared the **default** of the **trading participant** or **foreign participant**.

The **full trading participant** other than the one which declared the **default** of the concerned **trading participant** or **foreign participant**, but which is responsible for the concerned **trading participant** in other **settlement** chains, may adopt the above listed procedures relative to access, **accounts**, **transactions**, **positions**, **collateral**, **assets** and rights of the **trading participant** or **foreign participant** and **investors** under its responsibility, meaning the procedures for blocking access, prohibiting new **transactions** from being executed, closing out **positions**, as well as blocking and using **coverage**, **collateral** and rights.

If the defaulting **investor** that caused the **default** of the **trading participant** or **foreign participant** is identified to the **clearinghouse**, the procedures prescribed for managing said **investor**'s **default** also apply, pursuant to section 2.2.

2.3.3 Position closeout

The following **positions** are liable to be closed out:

- Those held by the **investors** declared as **defaulters** under the responsibility of the **defaulter trading participant** or **foreign participant**, including the **positions** of the concerned **trading participant** or **foreign participant** when acting in the capacity of an **investor**; and
- Those held by the nondefaulting **investors** under the responsibility of the **defaulter trading participant** or **foreign participant**, whenever the transfer thereof to other **trading participants**, **foreign participants**, **full trading participants**, or **settlement participants** does not occur within the time period prescribed by the **clearinghouse**.

At the discretion of B3, said **positions** are closed out:

(i) By the **full trading participant** under which the **default** of the **trading participant** or **foreign participant** occurred, if not itself in **default**; or

(ii) By another **full trading participant**, which will execute the **transactions** intended to close out the concerned **positions**, giving up the relevant **transactions** to the **full trading participant** under which the **default** occurred; or

(iii) By the **clearing member** responsible for the **full trading participant** under which the **default** occurred, in the event that said **full trading participant** is also declared a **defaulter**; in this case, the **transactions** intended to close out the relevant **positions** are executed by the **full trading participant** appointed by the **clearing member**; or

(iv) By B3.

The closeout of positions and collateral resulting from the default of any trading participant or foreign participant must follow the order, amounts and time frames defined in the closeout strategies for investor positions, whose determination is intrinsic to the methodology for calculating margin requirement for such positions (CORE). When liquidity conditions are favorable, positions might be closed out in less time and/or at different amounts than those defined in the closeout strategies, provided that such anticipation and/or modification to closed out amounts do not result in increased risk for the remaining portfolio. The closeout process is subject to clearinghouse monitoring throughout the period during which the failure that caused it will be managed.

2.3.4 Use of collateral

(a) Collateral posted by participants, except settlement fund

The use of **collateral** of the concerned **trading participant** or **foreign participant** and respective **investors** occurs upon request to the **clearinghouse** submitted by the **full trading participant** under which the **default** occurred. That request must be submitted by a standard **collateral** liquidation request letter, to which must be attached the communication of the **trading participant** or **foreign participant**'s **default** sent by the **full trading participant** to the **clearinghouse**.

The following **collateral** is liable to be liquidated:

(i) **Collateral** of the **trading participant** or **foreign participant** declared a **defaulter**; and

(ii) If the **investors** that caused the **default** of the **trading participant** or **foreign participant** are identified: **collateral** posted by or for such **investors**, under the **defaulter trading participant** or **foreign participant** and the **full trading participant** under which the **default** occurred.

If it is not possible for the **clearinghouse** to liquidate any of the **collateral** listed in the **collateral** liquidation request, other **assets** liable to be liquidated may be appointed by the requester, by submitting an additional **collateral** liquidation request.

Any free **collateral** of the aforementioned **investors** and **defaulter trading participant** or **foreign participant** posted to cover their **positions** under the responsibility of another **trading participant**, **foreign participant**, **full trading participant**, or **settlement participant** may be used upon authorization of the relevant **participant** and the **clearinghouse**.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

It is incumbent on the **clearinghouse** to define which party—whether B3 or the **participant** submitting a liquidation request—will be responsible for monetizing **collateral** subject to liquidation.

For **collateral** to be monetized by B3, the financial resources resulting from monetization are deposited as **collateral** of the **investor**, of the **trading participant** or of the **foreign participant**, as the case may be. The amount in excess of the required **margin** value remains available for:

(i) Withdrawal by the **full trading participant**, pursuant to the **collateral** withdrawal procedure described in chapter 6 (**Collateral** management) hereof; or

(ii) Transfer to the **full trading participant** in the **settlement window**, in which case the **clearinghouse** must be notified of the transfer amount; said amount is transferred to the **clearinghouse settlement account**, with a simultaneous credit entry to the MNBs of the **full trading participant** and **clearing member**.

The **full trading participant** may choose between (i) and (ii), according to its needs at the time, either choice being subject to veto by the **clearinghouse**, at its discretion.

The use of **collateral** at an amount in excess of the balance of free **collateral** requires a specific authorization by the **clearinghouse**, and it must be linked to the existence of obligations, to be settled in the **clearinghouse settlement window**, resulting from the **positions** and **transactions** of the **investors** of the **trading participant** declared a **defaulter**. Upon such an authorization, the amount liable to be used is limited to the amount of the obligations to be settled, and the corresponding funds are made available to the **participant** that requested **collateral** liquidation exclusively in the **clearinghouse settlement window**.

(b) Collateral posted by guarantee issuing banks

Collateral may be used when posted by a **guarantee issuing bank** with the purpose of increasing issuance limits, in connection with the volume of its issued securities that have been deposited as **collateral**, should the **guarantee issuing bank** not comply with its obligation to redeem the securities in the prescribed manner and time.

The use of said **collateral** is subject to the sequence of use of the concerned securities.

Liquidation of such **collateral** is conducted directly by B3, dispensing with any requests from other **participants**.

2.4 Default by full trading participants or settlement participants

2.4.1 Declaring the default of a trading participant or settlement participant

A declaration stating the **default** of any **full trading participant** or **settlement participant** must be communicated to B3, via a standard letter, by the **clearing member** under which the failure occurred.

BCB is immediately notified of the **default** by B3.

If the **trading participant** and/or **investor** that caused the concerned **default** are/is identified, the **default** of said **trading participant** or **foreign participant** and/or **investor** must be communicated to B3, pursuant to subsections 2.3.1 and 2.2.1 hereof, respectively.

2.4.2 Procedures for managing the default of a full trading participant or of a settlement participant

In the event of **default** by any **full trading participant** or **settlement participant**, B3 may adopt the following procedures:

(i) Include the **full trading participant** or **settlement participant** declared a **defaulter** in B3's list of **defaulters**;

(ii) Prohibit the **full trading participant** or the **settlement participant** declared a **defaulter**, or any other party acting on behalf of one or another from executing and effecting the **registration** of new **transactions**, except those **transactions** that will be commanded by the **clearing member** (through another **full trading participant** of the **clearing member**'s choice) or by the **clearinghouse**, at the discretion of the **clearinghouse**, for the purpose of reducing open **positions** under the responsibility of the **full trading participant** or of the **settlement participant**, or the corresponding risks;

(iii) Block the functionalities for registration of **accounts** under the responsibility of the **full trading participant** or **settlement participant** declared a **defaulter**;

(iv) Block the accesses to the B3 **trading** and **registration systems**, where applicable, of the **full trading participant** or of the **settlement participant** declared a **defaulter**, and also of the **trading participants** and **foreign participants** linked to the **full trading participant** declared a **defaulter**, in addition to the direct market accesses granted to the **investors** under the responsibility of the **full trading participant** or **settlement participant** declared a **defaulter**;

(v) Block the movement of **assets** allocated as **coverage** by the **investors** of the concerned **full trading participant** or **settlement participant**, except when so required for the performance of said **investors**' obligations or for transfers to said **investors**' **collateral subaccounts**;

(vi) Transfer the **assets** allocated as **coverage** by the **investors** of the concerned **full trading participant** or **settlement participant** to said **investors**' **collateral subaccounts**;

(vii) Adjust, to more restrictive values, the trading and risk limits established by B3 and/or the **clearing member** under which the failure occurred and applicable to the **full trading participant** or **settlement participant** declared a **defaulter**;

(viii) Communicate to the other **clearing members** to which the **participant** declared a **defaulter** is linked:

- The prohibition on executing and effecting the **registration** of new **transactions** imposed on the **full trading participant** or on the **settlement participant** declared a **defaulter**, or to any other party acting on behalf of either **participant**, with the exception of those **transactions** aimed at reducing open **positions** under the responsibility of one or another, or the risks thereof; and
- The blocking of the accesses referred to in paragraph (iv).

(ix) Block the movement of **collateral** linked to the **full trading participant** or to the **settlement participant** declared a **defaulter**, namely:

- **Collateral** posted:
  - By or for **investors**, **trading participants** and **foreign participants** under the responsibility of the **full trading participant** or **settlement participant** declared a **defaulter**;
  - By the **full trading participant** or by the **settlement participant** declared a **defaulter**, irrespective of the **clearing member** with which the relevant **collateral** is associated; and
  - By the **clearing member** under which the failure occurred, for operating balance purposes, and allocated to the **full trading participant** or to the **settlement participant** declared a **defaulter**;
- **Collateral** posted by **guarantee issuing banks** which issued securities that constitute **collateral** posted by the **participants** and for the purposes referred to in the previous item;
- **Collateral** posted by **controlling guarantor** linked to the **full trading participant** or **settlement participant** declared a **defaulter**.

Blocking the movement of **collateral** dispenses with any requests or consents by the **participants** involved, being effected by means of a **clearinghouse** command to its **collateral** management system.

(x) Prohibit deposits of new **collateral** by any **participants** consisting of securities and other instruments issued by the **full trading participant** or **settlement participant** declared a **defaulter**;

(xi) Replace **collateral** deposited by any **participants** at the **clearinghouse** consisting of securities and other instruments issued by the **full trading participant** or **settlement participant** declared a **defaulter**. Such a replacement must be carried out by the **participant** that posted the original **collateral** or **asset**;

(xii) Close out the **positions** under the responsibility of the **full trading participant** or **settlement participant** declared a **defaulter**, pursuant to subsection 2.4.3 hereof;

(xiii) Transfer the **positions** and corresponding **collateral** of nondefaulting **investors** under the responsibility of the **full trading participant** or **settlement participant** declared a **defaulter** to nondefaulting **full trading participants** or **settlement participants**.

The transfer of **positions** is effected after approval by the **clearinghouse**, based on the risk criteria described in chapter 4 (Intraday risk monitoring) of this manual, and upon consent by the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member** of destination.

Should it not be possible for any nondefaulting **full trading participant** or **settlement participant** to take responsibility for the **positions** intended to be transferred within the time frame established by B3, B3 may decide to close said **positions** out.

(xiv) Use **collateral** to meet the obligations of the **participant** declared a **defaulter** to the other **participants** and the **clearinghouse**, pursuant to subsection 2.4.4 hereof;

(xv) Within the scope of the **clearinghouse settlement** process, use **assets**, **commodities** and cash resources carrying rights of the **full trading participant** or of the **settlement participant** declared a **defaulter**—including the **delivery** right associated with an **securities lending** agreement,—in order to meet the obligations of one **participant** or the other to the **clearinghouse** or to the **clearing member** under which the failure occurred, it being provided that the use of such **assets** and **commodities** may involve the monetization thereof;

(xvi) Employ the liquidity risk mitigation mechanisms that make up the B3 **safeguard** structure; and

(xvii) Adopt further measures, at its discretion, including measures in connection with other services B3 may provide and/or with the securities and other instruments issued by the **full trading participant** or **settlement participant** declared a **defaulter**.

At its sole discretion, B3 may adopt the above listed procedures in connection with the concerned **full trading participant** or **settlement participant** in other **settlement** chains, that is, relative to access, **accounts**, **transactions**, **positions**, **collateral**, **assets** and rights of the concerned **full trading participant** or **settlement participant**, as well as of the **trading participants**, **foreign participants** and **investors** linked to the relevant **participant**, but under the responsibility of **clearing members** other than the one which declared the **default** of the **full trading participant** or **settlement participant**.

The **clearing member** other than the one which declared the **default** of the concerned **full trading participant** or **settlement participant**, but which is responsible for the concerned **full trading participant** or **settlement participant** in another **settlement** chain, may adopt the above listed procedures relative to access, **accounts**, **transactions**, **positions**, **collateral**, **assets** and rights of the **full trading participant** or **settlement participant**, as well as of the **trading participants**, **foreign participants** and **investors** linked to the relevant **participant** and under the responsibility of said **clearing member**, meaning the procedures for blocking access, prohibiting new **transactions** from being executed, closing out **positions**, as well as blocking and using **coverage**, **collateral** and rights.

If the defaulting **investor** and **trading participant** or **foreign participant** that caused the **default** of the **full trading participant** or of the **settlement participant** are both identified to the **clearinghouse**, the procedures prescribed for managing the **default** of the **investor** and of the **trading participant** also apply, pursuant to sections 2.2 and 2.3, respectively.

2.4.3 Position closeout

If the **investors**, **trading participants** and **foreign participants** that caused the **default** of the **full trading participant** or of the **settlement participant** are identified, pursuant to subsections 2.2.1 and 2.3.1, respectively, then:

- The **positions** of said **investors**, **trading participants** and **foreign participants**, as well as those of the **full trading participant** or of the **settlement participant** declared a **defaulter** when acting in the capacity of an **investor** are subject to mandatory closeout; and
- In the absence of conditions for the transfer of the **positions** of the other **investors**, **trading participants** and **foreign participants** in the time and manner prescribed by the **clearinghouse**, said **positions** are also subject to mandatory closeout.

At the discretion of the **clearinghouse**, **positions** are closed out:

- By the **clearing member** under which the **default** occurred, through the nondefaulting **full trading participant** of the **clearing member**'s choice; or
- By another **full trading participant**, which will execute the **transactions** intended to close out the concerned **positions**, giving up the relevant **transactions** to the **full trading participant** or **settlement participant** declared a **defaulter**; or
- By B3.

The closeout of positions and collateral resulting from the default of any full trading participant or settlement participant must follow the order, amounts and time frames defined in the closeout strategies for investor positions, whose determination is intrinsic to the methodology for calculating margin requirement for such positions (CORE). When liquidity conditions are favorable, positions might be closed out in less time and/or at different amounts than those defined in the closeout strategies, provided that such anticipation and/or modification to closed out amounts do not result in increased risk for the remaining portfolio. The closeout process is subject to clearinghouse monitoring throughout the period during which the failure that caused it will be managed.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

2.4.4 Use of collateral

The following **collateral** is liable to be used:

(a) Investors' collateral

Collateral deposited for the **positions** held by **investors** under the responsibility of the **full trading participant** or **settlement participant** declared a **defaulter** is liable to be liquidated, irrespective of the existence of a **trading participant** or a **foreign participant** between the two parties.

The liquidation of **investors**' **collateral** occurs upon request to the **clearinghouse** submitted by the **full trading participant** or **settlement participant** declared a **defaulter** and also by the **clearing member** that declared the relevant **default**. That request must be sent by a standard **collateral** liquidation request letter, to which must be attached the communication of the concerned **default** or the request for including the **participant** in the list of **defaulters**, which are both submitted to the **clearinghouse** by the **clearing member**.

If the **investor** that caused the **default** of the **full trading participant** or **settlement participant** is identified, pursuant to subsection 2.2.1 hereof, then:

- Only **collateral** associated with the **accounts** of said **investor** may be used;
- Such **collateral** is intended to ensure the performance of said **investor**'s **settlement** obligations and **position** closeout process;
- The use of such **collateral** takes precedence over the use of **collateral** of the **full trading participant** or **settlement participant** declared a **defaulter**; and
- The use of said **investor**'s **collateral** deposited under the responsibility of a nondefaulting **trading participant**, **foreign participant**, **full trading participant**, or **settlement participant** is contingent on the authorization of the relevant **participant** and of the corresponding **clearing member**.

(b) Collateral posted by the full trading participant or settlement participant declared a defaulter or by its controlling guarantor

Liquidation of such **collateral** is conducted upon request submitted to the **clearinghouse** by the **clearing member** under which the **default** occurred, via a standard **collateral** liquidation request letter.

Full trading participant's or **settlement participant's** contributions to the **settlement fund** should be used only after the use of other **collateral** deposited by one or the other or by its **controlling guarantor**.

(c) Collateral posted by guarantee issuing banks

Collateral may be used when posted by a **guarantee issuing bank** with the purpose of increasing issuance limits, in connection with the volume of its issued securities that have been deposited as **collateral**, should the **guarantee issuing bank** not comply with its obligation to redeem the securities in the prescribed manner and time.

The use of said **collateral** is subject to the sequence of use of the concerned securities.

Liquidation of such **collateral** is conducted directly by B3, dispensing with any requests from other **participants**.

It is incumbent on the **clearinghouse** to define which party—whether B3 or the **clearing member** that declared the **full trading participant** or the **settlement participant** a **defaulter**—will be responsible for monetizing **collateral**. For **collateral** to be monetized by B3, the financial resources resulting from monetization are made available to the **clearing member** only. Upon said **clearing member**'s choice and consent by the **clearinghouse**, those resources may either be:

(a) Deposited in the **Bank Reserves account** of the **settlement agent** appointed by the **clearing member**, or if it is not possible to use that **account** in the current account held by the **clearing member** with another financial institution it may appoint to the **clearinghouse**; or

(b) Transferred in the **settlement window**, with the value corresponding to the debit amount to be covered by the relevant funds being transferred to the **clearinghouse settlement account**, with a simultaneous credit entry to the MNB of the **clearing member**.

If it is not be possible to liquidate any of the **collateral** listed in the **collateral** liquidation request, when applicable, other **assets** liable to be liquidated may be appointed by the requester, by submitting an additional **collateral** liquidation request.

2.5 Default by clearing members

2.5.1 Declaring the default of a clearing member

A declaration stating the **default** of any **clearing member** is issued by B3, being immediately reported to BCB.

If the **investor**, **trading participant**, **foreign participant**, **full trading participant**, or **settlement participant** that caused the **clearing member default** is identified, the **investor** or the relevant **participant** must also be declared a **defaulter**, pursuant to subsections 2.2.1, 2.3.1 and 2.4.1, respectively.

2.5.2 Procedures for managing the default of a clearing member

In the event of **default** by any **clearing member** before the **clearinghouse**, B3 may, upon declaring the corresponding **default**, adopt the following procedures:

(i) Include the **clearing member** declared a **defaulter** in B3's list of **defaulters**;

(ii) Prohibit the **participants** under the responsibility of the **clearing member** declared a **defaulter**, or any other party acting on behalf of said **participants** from executing and effecting the **registration** of new **transactions**, except those **transactions** that will be commanded by the **clearinghouse** with the purpose of reducing open **positions** under the responsibility of the concerned **clearing member**, or the corresponding risks;

(iii) Block the functionalities for registration of **accounts** under the responsibility of the **full trading participants** and **settlement participants** linked to the **clearing member** declared a **defaulter**;

(iv) Block the accesses to the B3 **trading** and **registration systems** of the **full trading participants** and **settlement participants** under the responsibility of the **clearing member** declared a **defaulter**, as well as of the **trading participants** and **foreign participants** linked to said **participants**, in addition to the direct market accesses granted to the **investors** linked to them;

(v) Block the movement of **assets** allocated as **coverage** by the **investors** under the responsibility of the concerned **clearing member**, except when so required for the performance of said **investors**' obligations or for transfers to said **investors**' **collateral subaccounts**;

(vi) Transfer the **assets** allocated as **coverage** by the **investors** under the responsibility of the concerned **clearing member** to said **investors**' **collateral subaccounts**;

(vii) Block the movement of **collateral** linked to the **clearing member** declared a **defaulter**, namely:

- **Investors**' **collateral** posted to cover the risk of **positions** under the responsibility of the **clearing member** declared a **defaulter**;
- **Collateral** posted by the **full trading participants** and **settlement participants** under the responsibility of the **clearing member** declared a **defaulter**;
- **Collateral** posted by the **clearing member** declared a **defaulter**;
- **Collateral** posted by the **controlling guarantor** linked to the **clearing member** declared a **defaulter**;
- **Collateral** posted for the **settlement fund**; and
- **Collateral** posted by **guarantee issuing banks** which issued securities that constitute **collateral** deposited by the **participants** and for the purposes referred to in the previous items.

Blocking the movement of **collateral** dispenses with any requests or consents by the **participants** involved, being effected by means of a **clearinghouse** command in its **collateral** management system.

(viii) Prohibit deposits of new **collateral** by any **participants** consisting of securities, **assets** and other instruments issued by the **clearing member** declared a **defaulter**;

(ix) Replace **collateral** and other **assets** making up the B3 **safeguard** structure and deposited by any **participants** at the **clearinghouse**, and consisting of securities, **assets** and other instruments issued by the **clearing member** declared a **defaulter**. Such a replacement must be carried out by the **participant** that posted the concerned **collateral**;

(x) Close out the **positions** under the responsibility of the **clearing member** declared a **defaulter**, pursuant to subsection 2.5.3 hereof;

(xi) Transfer the **positions** held by nondefaulting **participants** under the responsibility of the **clearing member** declared a **defaulter** to other **clearing member(s)**.

The nondefaulting **participants** under the responsibility of the **clearing member** declared a **defaulter** may have their **positions** and **collateral** transferred to nondefaulting **clearing members** of their choice, upon acceptance by the chosen **clearing members**, subject to the time limits for transfers specified by B3.

(xii) Use **collateral** to meet the obligations of the concerned **clearing member** to the **clearinghouse**, pursuant to subsection 2.5.4 hereof;

(xiii) Within the scope of the **clearinghouse settlement** process, use **assets**, **commodities** and cash resources carrying rights of the concerned **clearing member**—including the **delivery** right associated with an **securities lending** agreement,— in order to meet the obligations of said **participant** to the **clearinghouse**, it being provided that the use of such **assets** and **commodities** may involve the monetization thereof;

(xiv) Employ the liquidity risk mitigation mechanisms that make up the B3 **safeguard** structure;

(xv) Order that the **settlement** of **multilateral net balances** in local currency by nondefaulting **full trading participants** and **settlement participants** under the responsibility of the **clearing member** declared a **defaulter** be effected directly between such nondefaulting **participants** and the **clearinghouse**, through the B3 Bank, via the **CELP account**; and

(xvi) In the context of the other services provided by B3, adopt further measures in connection with the procedures prescribed for **default** situations or resulting therefrom, relative to securities and other instruments issued by the **clearing member** declared a **defaulter**.

If the failing **investor**, **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant** that caused the **clearing member default** is identified to the **clearinghouse**, the measures prescribed for managing the relevant **default** also apply, pursuant to the provisions set forth in sections 2.2, 2.3 and 2.4, respectively.

2.5.3 Position closeout

The closeout of **positions** under the responsibility of the **clearing member** declared a **defaulter** is determined by B3.

If the **investors**, **trading participants**, **foreign participants**, **full trading participants**, or **settlement participants** that caused the **clearing member default** are identified, pursuant to subsections 2.2.1, 2.3.1 and 2.4.1, respectively, then:

- The **positions** of said **investors**, **trading participants**, **foreign participants**, **full trading participants**, or **settlement participants** as well as those of the **clearing member** declared a **defaulter**, when acting in the capacity of an **investor**, **trading participant**, **foreign participant**, **full trading participant**, or **settlement participant**, are subject to mandatory closeout; and
- In the absence of conditions for the transfer of the **positions** of the other **investors**, **trading participants**, **foreign participants**, **full trading participants**, or **settlement participants** under the responsibility of the concerned **clearing member** in the time and manner prescribed by the **clearinghouse**, said **positions** are also subject to mandatory closeout.

The closeout of positions and collateral resulting from the default of any clearing member must follow the order, amounts and time frames defined in the closeout strategies for investor positions, whose determination is intrinsic to the methodology for calculating margin requirement for such positions (CORE). When liquidity conditions are favorable, positions might be closed out in less time and/or at different amounts than those defined in the closeout strategies, provided that such anticipation and/or modification to closed out amounts do not result in increased risk for the remaining portfolio. The closeout process is subject to clearinghouse monitoring throughout the period during which the failure that caused it will be managed.

2.5.4 Use of collateral

It is incumbent on B3 to decide on the use of **collateral** held by the **clearing member** declared a **defaulter**, as well as by the **participants** under the responsibility of said **clearing member**, and B3 can do so regardless of any requests or consents by said **participants**.

The use of the **settlement fund** requires a specific authorization by the B3 Joint Board of Officers.

Collateral is monetized by B3 and the proceeds therefrom are used by B3 to meet obligations to the other **clearing members**.

The following **collateral** is liable to be used:

(a) Investors' collateral

If the failing **investor** that caused the concerned **default** is identified, pursuant to subsection 2.2.1 hereof, then:

- Only **collateral** associated with the **accounts** of said **investor** is liable to be used; and
- **Collateral** to be used is intended to ensure the performance of said **investor**'s **settlement** obligations and the **position** closeout process.

The use of **investors**' **collateral** takes precedence over the use of **collateral** deposited by **trading participants**, **foreign participants**, **full trading participants** and **settlement participants**, regardless of the purpose thereof, provided that the **clearinghouse** is notified of the **trading participant**, **foreign participant**, or **investor** that caused the concerned **default**.

(b) Collateral posted by full trading participants, settlement participants and by its controlling guarantors

If the failing **full trading participant** or **settlement participant** that caused the **clearing member default** is identified, pursuant to subsection 2.4.1 hereof, then:

- Only **collateral** posted by said **full trading participant** or **settlement participant, collateral** posted by its **controlling guarantors**, and its contributions to the **settlement fund**, are liable to be used; and
- The use of such **collateral** takes precedence over the use of **collateral** posted by the **clearing members**.

(c) Collateral posted by the clearing member declared a defaulter and by its controlling guarantors, except its contribution to the settlement fund

If the **full trading participant** or **settlement participant** that caused the **clearing member default** is identified, pursuant to subsection 2.4.1 hereof, then:

- The use of **collateral** deposited by the **clearing member** and by its **controlling guarantors** follows the use of **collateral** posted (i) by said **full trading participant** or **settlement participant** and by its **controlling guarantors,** including its contribution to the **settlement fund**, and (ii) also by the **trading participants** and **foreign participants** and **investors** under the responsibility of one **participant** or the other, provided the corresponding **collateral** is capable of being used; and
- The use of such **collateral** deposited by the **clearing member** takes precedence over the use of the **settlement fund**, except the contribution of such **full trading participant** or **settlement participant** for the **settlement fund**.

(d) Collateral posted for the settlement fund

The use of the **settlement fund** will be subject to the rules for **settlement fund** use, as set forth in chapter 1 (**Safeguard** structure) of this manual.

The contribution of the **clearing member** declared a **defaulter** to the **settlement fund** can only be used after all other **collateral** deposited by said **clearing member** is used.

(e) Collateral posted by guarantee issuing banks

Collateral may be used when posted by a **guarantee issuing bank** with the purpose of increasing issuance limits, in connection with the volume of its issued securities that have been deposited as **collateral**, should the **guarantee issuing bank** not comply with its obligation to redeem the securities in the prescribed manner and time.

The use of said **collateral** is subject to the sequence of use of the concerned securities.

Liquidation of such **collateral** is conducted directly by B3, dispensing with any requests from other **participants**.

2.6 Use of collateral in case of failure to identify the defaulter participants

The rules on the use of **collateral** in the event of **default**, as referred to in sections 2.3 through 2.5, apply to the situations where the information required for the identification of the **defaulter participants** along the chain of responsibilities is readily made available to the **clearinghouse**. Should any such information not be made available to the **clearinghouse**, the following provisions shall apply.

2.6.1 Default by a trading participant or foreign participant

If the **investors** that caused the **default** of the **trading participant** or **foreign participant** are not identified, **collateral** liable to be used is the one which is held by all the **investors** who/which, on the date of **default**, have a **multilateral net** debit **balance** under the **trading participant** or **foreign participant** declared a **defaulter** and also under the **full trading participant** that requested **collateral** to be liquidated, pursuant to the procedures described in appendix 1, except those **investors** whose **multilateral net** debit **balances** have been settled directly with the **clearinghouse** through **settlement** via **CEL account** or through **settlement** by nonresident **investors**—CMN Resolution #2687.

2.6.2 Default by a full trading participant or settlement participant

If the failing **trading participant** or **foreign participant** under the **defaulter full trading participant** or **settlement participant** is identified, pursuant to subsection 2.3.1, but the failing **investor** under said **trading participant** or **foreign participant** is not, then:

- **Collateral** liable to be used is the one which is held by the **investors**, under said **trading participant** or **foreign participant**, who, on the date of **default**, have a **multilateral net** debit **balance** under the **full trading participant** declared a **defaulter**, pursuant to the procedures described in appendix 1, except those **investors** whose **multilateral net** debit **balances** have been settled directly with the **clearinghouse** through **settlement** via **CEL account** or through **settlement** by nonresident **investors**—CMN Resolution #2687;

- The use of such **collateral** follows the use of **collateral** held by the failing **trading participant** or **foreign participant**, but takes precedence over the use of **collateral** held by the failing **full trading participant** and by its **controlling guarantors**; and
- The use of **collateral** held by **investors** of the failing **trading participant** or **foreign participant** deposited under the responsibility of a nondefaulting **trading participant** or **foreign participant**, or **full trading participant**, or **settlement participant** is contingent on the authorization of the relevant **participants** and of the corresponding **clearing member**.

If neither the failing **investor** nor the failing **trading participant** or **foreign participant**, if applicable, under the concerned **defaulter** is identified, then:

- **Collateral** liable to be used is the one which is associated with the **investors**' **accounts** showing a **multilateral net** debit **balance** (including **accounts** of **trading participants** and **foreign participants** with a **multilateral net** debit **balance** when acting in the capacity of **investors**) on the date of **default** under the failing **full trading participant** or **settlement participant**, pursuant to the procedures described in appendix 1, except those **investors** whose **multilateral net** debit **balances** have been settled directly with the **clearinghouse** through **settlement** via **CEL account** or through **settlement** by nonresident **investors**—CMN Resolution #2687;
- Such **collateral** is intended to ensure the performance of **settlement** obligations and the closeout process of the **positions** for which it was originally posted;
- The amount to be used associated with each of the aforementioned **accounts** is limited, pursuant to the provisions of appendix 1 of this manual; and
- The use of said **collateral** follows the use of all **collateral** held by the **full trading participant** or **settlement participant** declared a **defaulter** and by its **controlling guarantors**, including **collateral** posted by one **participant** or the other when acting in the capacity of an **investor** and **collateral** deposited in the form of contributions for the **settlement fund**.

2.6.3 Default by a clearing member

If the failing **investors**, **trading participants**, **foreign participants**, **full trading participants**, or **settlement participants** under the **defaulter clearing member** are not identified, then all the **positions** under the responsibility of said **clearing member** are subject to mandatory closeout, except those under the responsibility of **full trading participants** and **settlement participants** whose **net multilateral** debit **balance** have been settled directly with the **clearinghouse** through **settlement** via **CELP account**.

Collateral must be used as follows:

(a) Investors' collateral linked to the accounts of investors under the responsibility of the clearing member declared a defaulter

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

If the failing **investor** is not identified, but the failing **trading participant** or **foreign participant** under the **defaulter clearing member** is, pursuant to subsection 2.3.1 hereof, then:

- **Collateral** liable to be used is the one which is associated with the **accounts** showing **a multilateral net** debit **balance** under said **trading participant** or **foreign participant**, pursuant to the procedures described in appendix 1, except **collateral** of **investors** whose **multilateral net** debit **balances** have been settled directly with the **clearinghouse** through **settlement** via **CEL account** or through **settlement** by nonresident **investors**—CMN Resolution #2687; and
- **Collateral** to be used is intended to ensure the performance of **settlement** obligations and the closeout process of the **positions** under the responsibility of said **trading participant** or **foreign participant**.

If only the failing **full trading participant** or **settlement participant** is identified, pursuant to subsection 2.4.1 hereof, but the failing **investor** and **trading participant** or **foreign participant** are not, then:

- **Collateral** liable to be used is the one which is associated with all the **investors**' **accounts** showing a **multilateral net** debit **balance** on the date of **default** under said **full trading participant** or **settlement participant**, irrespective of the **trading participants** or **foreign participants** responsible for the relevant **accounts**, pursuant to the procedures described in appendix 1, except **collateral** of **investors** whose **multilateral net** debit **balances** have been settled directly with the **clearinghouse** through **settlement** via **CEL account** or through **settlement** by nonresident **investors**—CMN Resolution #2687; and
- **Collateral** to be used is intended to ensure the performance of **settlement** obligations and the closeout process of the **positions** under the responsibility of said **full trading participant** or **settlement participant**.

If the failing **investor**, **trading participant** or **foreign participant** and **full trading participant**, or **settlement participant**, are not identified, then:

- **Collateral** liable to be used is the one which is associated with all the **investors**' **accounts** showing a **multilateral net** debit **balance** on the date of **default** under the concerned **clearing member**, irrespective of the **trading participants**, **foreign participants**, **full trading participants**, or **settlement participants** that are responsible for the relevant **accounts**, except for **full trading participants** or **settlement participants** who have settled their **net multilateral** debit **balance** directly with the **clearinghouse** through **settlement** via **CELP account**, pursuant to the procedures described in appendix 1, except **collateral** of **investors** whose **multilateral net** debit **balances** have been settled directly with the **clearinghouse** through **settlement** via **CEL account** or through **settlement** by nonresident **investors**—CMN Resolution #2687;

- **Collateral** to be used is intended to ensure the performance of **settlement** obligations and the closeout process of the **positions** of the **investors** to whom/which said **collateral** is linked; and
- The amount to be used associated with each **investor** holding a **multilateral net** debit **balance** is limited, pursuant to the provisions of appendix 1 of this manual.

In case the **full trading participant**, or **settlement participant** fails to meet the obligation to inform the **clearinghouse** of the **trading participant**, **foreign participant**, or **investor** that caused the **default**, **collateral** posted by **investors** is used only after the exhaustion of **collateral** of the **full trading participant**, or **settlement participant,** including **collateral** deposited in the form of contributions for the **settlement fund**, as well the **collaterals** posted by the **controlling guarantors** of the **full trading participant** or **settlement participant**.

(b) Collateral posted by full trading participants and settlement participants under the responsibility of the clearing member declared a defaulter and its controlling guarantors

If the failing **full trading participant**, or **settlement participant** is not identified, then:

- **Collateral** liable to be used is the one which is posted by all the **full trading participants** and **settlement participants** having a **multilateral net** debit **balance** under the responsibility of the concerned **clearing member** on the date of **default**, except for **full trading participants** or **settlement participants** who have settled their **net multilateral** debit **balance** directly with the **clearinghouse** through **settlement** via **CELP account**, pursuant to the procedures described in appendix 1;
- The use of such **collateral** takes precedence over the use of **collateral** of **trading participants**, **foreign participant** and **investors** under the aforementioned **full trading participants** and **settlement participants,** including **collateral** deposited in the form of contributions for the **settlement fund**; and
- The use of said **collateral** follows the use of **collateral** posted by the **clearing member** declared a **defaulter**, including **collateral** deposited as its contribution to the **settlement fund**, and **collateral** posted by the **clearing member's controlling guarantors**.

(c) Collateral posted by the clearing member declared a defaulter and its controlling guarantors, except its contribution to the settlement fund

If the failing **full trading participant**, or **settlement participant** under the **defaulter clearing member** and its **controlling guarantors** is not identified, then the use of **collateral** posted by the **clearing member** takes precedence over:

- The use of **collateral** deposited by the **full trading participants** and **settlement participants** under the responsibility of the **clearing members** and its **controlling**

guarantors, as well as by the **trading participants** and **investors** linked to said **participants** and whose **collateral** is capable of being used; and

- The use of the **settlement fund**.

(d) Collateral posted for the settlement fund

In case the failing **full trading participant**, or **settlement participant** under the **defaulter clearing member** is not identified, B3's contribution to the **settlement fund** will follow the use of all **collateral** that is capable of being used, pursuant to paragraphs (a), (b) and (c) of this subsection 2.6.3.

2.7 Use of the Investment Fund B3 Clearinghouse Liquidity (FILCB)

The **assets** that make up the FILCB fund capital may be used to carry out the transactions planned with the purpose of providing liquidity to the **clearinghouse**, regardless of whether all the **defaulter participants** are identified or not.

2.8 Operational defaulter

As established in the **clearinghouse** rules, the failure of a **participant** to meet obligations may be characterized either as an **operational defaulter** situation or as a **default** situation. The action which may be taken by B3 in **default** situations, as described in the previous sections of this chapter, also apply to an **operational defaulter** situation, except those dealing with **position** closeout, **position** and **collateral** transfers, and inclusion of the **participant** in the list of **defaulters**.

2.9 Sequence of use of collateral

In order to mitigate the liquidity risk to which it is exposed and the liquidity risk faced by its **participants**, in addition to ensuring compliance with **settlement window** hours, the **clearinghouse** may change the sequence of use of **collateral** provided in this chapter and in chapter 1 of this manual, in the event the **assets** posted as **collateral** by the **participants** present distinct characteristics in terms of liquidity or settlement date, at its sole discretion. Without prejudice to this provision, the final allocation of losses among **participants**, if any, must adhere to the originally prescribed sequence.

Chapter 3 - Managing a delivery failure along the closeout process of the defaulter participant's positions

The **clearinghouse** adopts two separate processes for **delivery failures**, contingent on whether the **investor** has been declared a **defaulter** or not.

The regular process, which is described in the **clearinghouse** operating procedures manual, applies to the **delivery failure** of a nondefaulting **investor**, meaning the **investor** whose **positions** are not included in a closeout process and who/which, despite the **delivery failure**, continues to meet financial obligations and deposit **margin**.

When a **defaulter investor** commits a **delivery failure** along the **defaulter investor**'s **position** closeout process, the **clearinghouse** manages it in a different manner, as described in this chapter. The purpose of this special process, which is exclusively triggered after a formal declaration of the **investor**'s **default** is submitted to the **clearinghouse** pursuant to chapter 2 (Procedures for a **default** or **operational defaulter** event) hereof, is to allow the **participant** responsible for the concerned **investor** to close out the latter's **positions** more quickly than it would be possible if the regular **delivery failure** management process were followed, thereby mitigating market risk. However, as explained further in this chapter, if the **participant** responsible for the **defaulter investor** does not close out the latter's **positions** within the prescribed time frames, the **clearinghouse** issues a buy-in order to the creditor party damaged by the **delivery failure** (meaning the party that did not receive the **assets**), in order to protect the rights of said **participant**.

As explained in chapter 7 (Risk calculation) of this manual, the closeout strategy for the **defaulter**'s **positions** is defined so as to give priority to avoiding **delivery failures**; therefore, it seeks to anticipate the purchase of the **assets** required for the performance of **delivery** obligations, although some **delivery** obligations may not be met on the expected date, thus generating failures. Since the party responsible for closing out the **defaulter**'s **positions** must accurately meet the priority established by the closeout strategy, the process applicable to failures that occur along the closeout process is based on the fact that purchase of the missing **assets** will already be in progress (by executing purchase **transactions** in advance). Hence, the main feature of this process for managing **delivery failures** is to repeat the failing **position** registration stage or to keep the buy-in **position**, depending on the **asset**, for a few days—having the effect of postponing the original **settlement** date,—ideally until **delivery** can be fulfilled. However, in order to prevent a possible inefficiency in the closeout process, a limit is imposed on the number of successive registrations of a new failing **position** or on the number of days during which the buy-in **position** is held, depending on the **asset**. At the end of the relevant period:

(i) In the **equities market**, the procedure follows the steps of the regular process for managing **delivery failures** (meaning the ones which apply to the failure committed by a nondefaulting **investor**), namely the issue of a buy-in right to the creditor and the subsequent steps, as described in the **clearinghouse** operating procedures manual; and

(ii) In the fixed income ETF market, after reversing the buy-in **position** the procedure moves forward to the final step of the regular process for managing **delivery failures**, as described in the **clearinghouse** operating procedures manual.

3.1 Managing a delivery failure of assets in the equities market

In case a **delivery failure** of **assets** is committed on date T by the **defaulter investor** along the closeout process of the **positions** held by said **investor**, the **clearinghouse** takes the following action, according to the order presented below:

(i) Quantity Q of **assets** still not delivered is calculated;

(ii) If available in the **securities lending** system managed by B3, a **lending transaction** involving the same **assets** is mandatorily executed by the debtor **investor** under the responsibility of the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member** responsible for the **delivery failure**, in order to meet the **delivery** of quantity Q' of **assets** from the **lending transaction** ($Q' \leq Q$).

If $Q' = Q$, the failing **investor**'s **position** that gave rise to the failed **delivery** obligation is excluded from the portfolio, and the failure management is completed.

If $Q' < Q$, the next steps apply.

(iii) Quantity Q of **assets** still not delivered after step (ii) is updated;

(iv) A **fine** is imposed on the failing **investor**, according to the criteria established in the **clearinghouse** operating procedures manual;

(v) The creditor **investors** are selected that will be impacted by the **delivery failure** of **assets** (meaning those who will not receive the expected quantity of **asset**s) and the quantity each creditor **investor** will not receive on T is defined. Such **investor** selection and the definition of unreceived **asset** quantities are determined by means of a B3 algorithm which seeks to preserve the **delivery** of **assets** to those who are not under the responsibility of the **participants** responsible for the **delivery failure** and who are creditors of smaller **asset** quantities;

(vi) The **positions** that gave rise to the **delivery** obligation are excluded;

(vii) Failure **positions** are then registered:

- To each of the creditor **investors** selected in step (v) who still have not received the expected total **asset** quantity, having the effect of:

    1. Transferring to the next business day the relevant creditor **investor**'s **payment** obligation, if any, corresponding to the average price of **transactions** in the **assets** and also to the quantity of **assets** still not received;

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

2. Transferring to the next business day the relevant creditor **investor**'s right to receive the quantity of **assets** still not received; and

3. If the unreceived quantity corresponds to the settlement of the lending **position** in the **securities lending** agreement: crediting to the relevant creditor **investor**'s **multilateral net balance** in local currency, to be settled on the same day, the amount given by product $q \times p$, where q is the still unreceived quantity of the **assets** underlying the **lending** agreement and p is the **asset** closing price on the previous day.

   The creditor **investor**'s failure **position** is considered in the calculation of risk for the purpose of updating **margin** to be required of said **investor** or of said **investor**'s **full trading participant** or **settlement participant**, depending on the collateralization mode for cash market **transactions** under which said **investor** operates.

- A failure **position** is registered to the failing debtor **investor**, having the effect of:

  1. Transferring to the next business day the debtor **investor**'s **delivery** obligation of quantity Q of **assets**;

  2. Transferring to the next business day the debtor **investor**'s right to receive the **payment**, if any, corresponding to quantity Q of **assets**; and

  3. If quantity Q corresponds to the settlement of the borrowing **position** in the **securities lending** agreement: debiting to the debtor **investor**'s **multilateral net balance** in local currency, to be settled on the same day, the amount given by product $q' \times p$, where q' is the still undelivered quantity of **asset**s underlying the **lending** agreement and p is the **asset** closing price on the previous day.

  The debtor **investor**'s failure **position** is considered in risk calculation for the purpose of updating the **margin** to be required of said debtor **investor**.

(viii) Let T' be the business day following the day when the failure **positions** were registered in step (vii). If the failing debtor **investor** makes **delivery** of quantity Q' of **assets** ($Q' \leq Q$) on T', then on T':

1. Quantity Q' is distributed among the creditor **investors** selected in step (v) who still have not received the expected total quantity, being credited to each creditor **investor**'s **multilateral net balance** in **assets** to be settled on T';

2. The financial value corresponding to the **asset** quantity credited to each creditor **investor** is debited to each creditor **investor**'s **multilateral net balance** in local currency to be settled on T';

3. The financial value corresponding to quantity Q' of **assets** is credited to the debtor **investor**'s **multilateral net balance** in local currency to be settled on T';

4. The quantity of **assets** still not received by each creditor **investor** selected in step (v) is updated;

5. If $Q' = Q$, on T' all the obligations and all the rights associated with the failure **positions** registered in step (vii) are considered to having been settled and the failure **positions** are terminated, thus completing the **delivery failure** management process.

(ix) If:

(a) The debtor **investor** has not fully met the **asset delivery** obligation established by the failure **position** that was last registered; and

(b) Date T of the original failure (the failure that caused the current process to be activated) has occurred less than ten (10) business days from T'; and

(c) The **clearinghouse** has not determined step (x) to be taken,

Then the process returns to step (i) on T', but without requiring a new run of step (v).

Otherwise (that is, if at least one of conditions (a), (b) and (c) listed in this paragraph (ix) is not satisfied), step (x) is taken. Whenever the **clearinghouse** deems it necessary and possible to shorten the period for completion of the failure management process, it can command step (x) to be taken before the ten (10) business-day period from the original failure is over, even if the **delivery** obligation is not fully met yet, by issuing a buy-in **position** (which possibly occurs in step (x)) without imposing serious risks on the closeout process for the **positions** of the concerned **defaulter investor**.

(x) Quantity Q of **assets** still not delivered is updated and:

1. If available in the **securities lending system** managed by B3, a **lending transaction** involving the same **assets** is mandatorily executed by the debtor **investor** under the responsibility of the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member** responsible for the **delivery failure**, in order to meet, in whole or in part, the remaining **delivery** obligation of quantity Q' obtained from the **lending transaction** ($Q' \leq Q$).

   If $Q' = Q$, the failure management is completed.

   If $Q' < Q$, the next substeps are followed.

2. A **fine** is imposed on the failing **investor**, according to the criteria established in the **clearinghouse** operating procedures manual.

3. The failure **positions** are terminated.

4. The current date is recorded as $T^{Last\ failure}$.

5. A buy-in **position** is registered to each of the creditor **investors** who/which still have not received the total **asset** quantity owed to them, the effect of which is the **clearinghouse** issuing a buy-in order for the **assets** still not received by each creditor **investor**, the characteristics and results of which are described in the following sections.

The relevant creditor **investor**'s buy-in **position** is considered in risk calculation for the purpose of updating the **margin** to be required of said creditor **investor** or his/her/its **full trading participant** or **settlement participant**, depending on the collateralization mode for cash market **transactions** under which the **investor** operates.

6. A buy-in **position** is registered to the debtor **investor**, the effect of which is to create a **payment** obligation for the amounts indicated in the following sections.

   The debtor **investor**'s buy-in **position** is considered in risk calculation for the purpose of updating the **margin** to be required of said debtor **investor**.

In general, it can be understood that the special case of the **delivery failure** management process—that is, when the failure derives from the closeout process carried out for the **positions** of the **defaulter participants**—differs from the regular **delivery failure** management process in that it allows the repetition of the macrosteps that involve the attempt to obtain the **asset** in the **lending** system and, when it is not enough, the generation of a failure **position**. The sequence of macrosteps is not repeated in the regular failure management process, which anticipates the following macrostep, involving the issuance of a buy-in order. After the buy-in order is issued, the two **delivery failure** management processes become similar. In order to illustrate the differences between the special and regular management processes, flowcharts of the procedures described so far are presented on the next page.

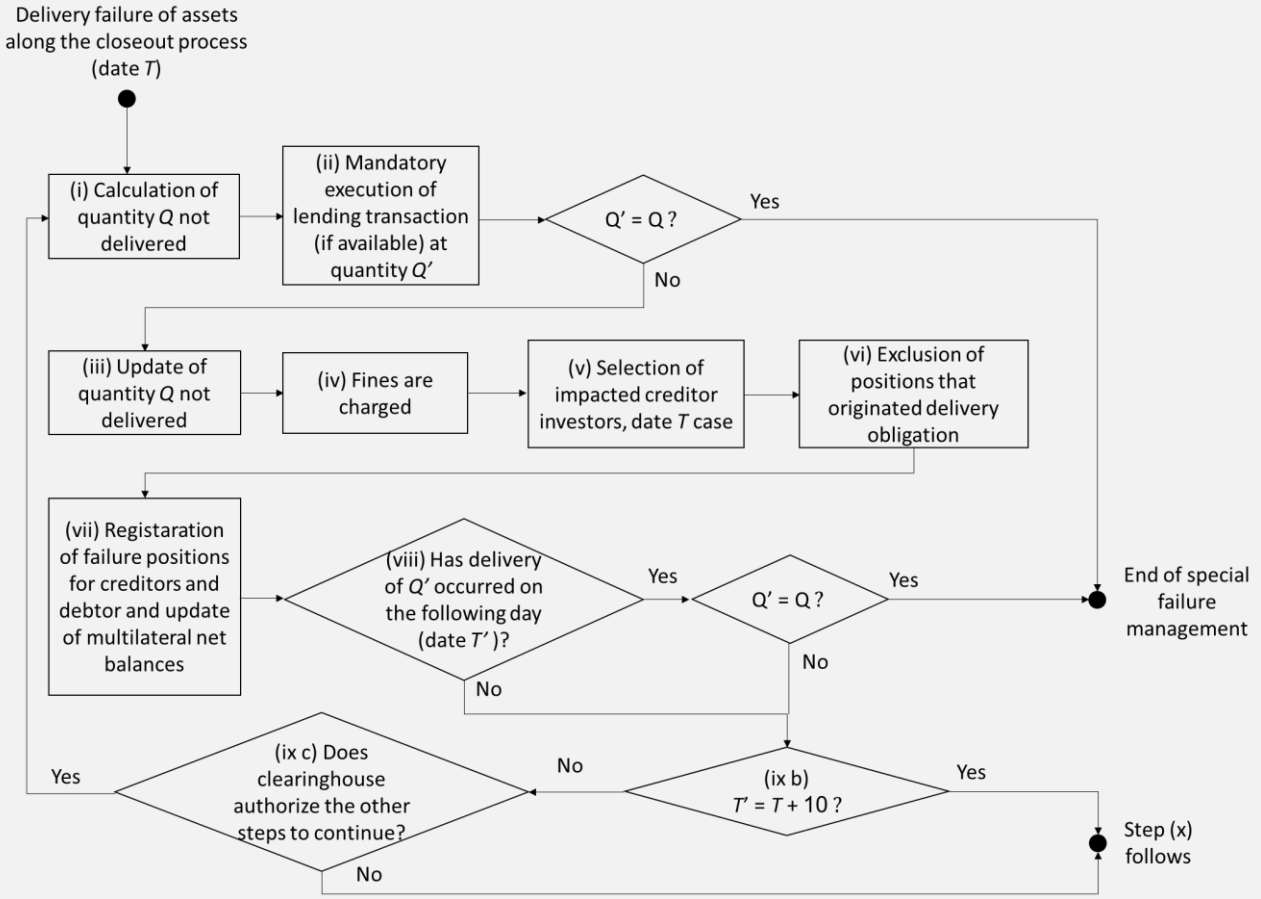


Figure 3.1 - Flowchart of steps (i) thru (ix) of the special **delivery failure** management

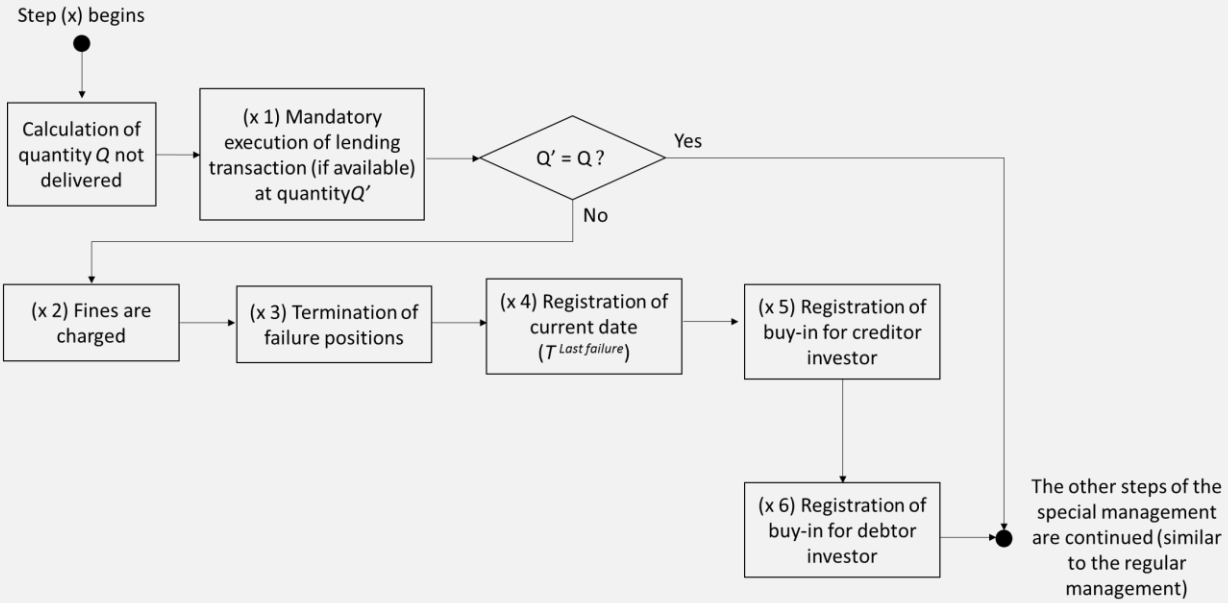


Figure 3.2 - Flowchart of step (x) of the special **delivery failure** management

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

As an example, suppose that the defaulting debtor whose portfolio is submitted to the closeout process due to a **default** fails to make **delivery** of a certain quantity of an **asset** which is not available in the **lending** system at any point along the special **delivery failure** management process. Also assume that the debtor fails successively to perform all the failure **positions** generated along the process. Thus, if the **clearinghouse** does not advance the activation of the step for buy-in order issuance, such a step is triggered after ten (10) business days of the original failure date. Figure 3.3 illustrates this example.

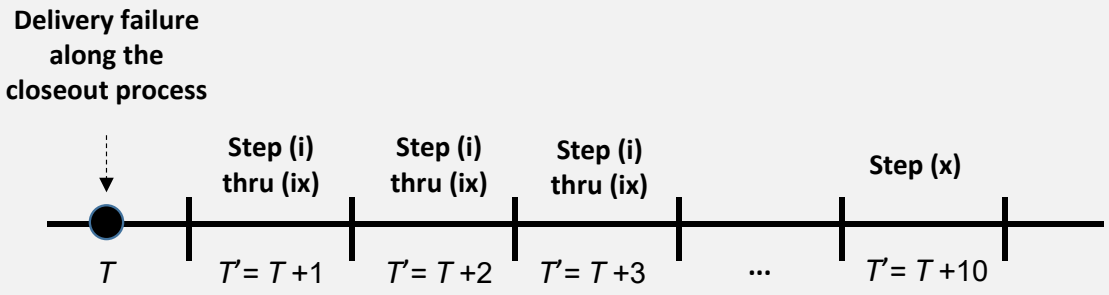


Figure 3.3 - Example of application of the special **delivery failure** management, which extends for ten (10) business days after the original failure date, until the buy-in order issuance step is reached

3.2 Executing a buy-in order – Equities market

The procedure for executing a buy-in order is described below:

Step	Date	Time	Event
1	$T^{Last\ failure}$ (Date, recorded in step (x)(4), which extinguishes the last **delivery failure position**)	By 12:00 AM	Buy-in order is issued The buy-in order is issued by the **clearinghouse**, via system registration, in favor of the **full trading participant** or **settlement participant** responsible for the creditor **investor**.
2	Up to and including ($T^{Last\ failure} + 2$)	Trading hours	Buy-in order is executed The buy-in order must be executed by the **full trading participant**; if the buy-in order was issued in favor of a **settlement participant**, the **transactions** corresponding to the order execution must be given up by the **full trading participant** to the **settlement participant**.
3	Up to and including	By 6:00 PM	Buy-in order execution is notified The **clearinghouse** must be notified of the order execution, via system registration, by the

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Step	Date	Time	Event
	($T^{Last\ failure}+3$)		**full trading participant** or **settlement participant** in whose favor the buy-in order was issued.

Table 3.1 - Procedures for buy-in order execution

At the sole discretion of the **clearinghouse**, the buy-in order may be executed by the **clearinghouse** itself or by an appointed brokerage house, rather than the **full trading participant**.

The **transactions** carried out as part of the buy-in order execution are settled according to regular procedures for **multilateral net settlement** in **assets** and **multilateral net settlement** in local currency performed by the **clearing members** responsible for the buying and selling parties to those **transactions**. Moreover, the costs for the buying party arising out of such **transactions** and the amounts specified below are credited and debited, respectively, to the **multilateral net balances** in local currency of the creditor **investor** damaged by the **delivery failure** and the failing debtor **investor**, for **settlement** on $T+1$ of the date of the buy-in order execution. Any differences between debited and credited amounts, which are not used by the **clearinghouse** to perform its own activities, will be allocated to supervisory, regulatory and financial education activities.

$$V_{Creditor} = Q \times \max\left[P_{Exec} - P_{Creditor}\ ,\ 0\right] \tag{3.1}$$

$$V_{Debtor} = Q \times \max\left[P_{Exec} - P_{Debtor}\ ,\ P_{Creditor} - P_{Debtor}\ ,\ 0\right] \tag{3.2}$$

Where:

$V_{Creditor}$: the amount to be credited to the **multilateral net balance** of the damaged creditor **investor** in local currency;

V_{Debtor}: the amount to be debited to the **multilateral net balance** of the failing debtor **investor** in local currency;

Q: the quantity of **assets** underlying the **transactions** carried out by the creditor party as part of the buy-in order execution;

P_{Exec}: the average purchase price of the **assets** underlying the **transactions**, as appointed by the creditor party, carried out as part of the buy-in order execution;

P_{Debtor}: the average price of the **assets** included in the buy-in order issued by the **clearinghouse** and obtained from all the trades and **positions** based on the same **assets** held by the failing debtor **investor**, which were supposed to have been delivered when the **delivery failure** occurred; and

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

$P_{Creditor}$: the average price of the **assets** included in the buy-in order issued by the **clearinghouse** and obtained from all the trades and **positions** held by the damaged creditor **investor**, which were supposed to have been received when the **delivery failure** occurred.

3.3 Cancelling a buy-in order – Equities market

A buy-in order may be cancelled when:

(i) All the parties involved—meaning the party responsible for the **delivery failure** and the damaged creditor party—agree on the cancellation thereof; and

(ii) The **assets** owed are available for **delivery**.

Cancellation of a buy-in order involves the procedures described on the following table, which must be carried out on a single day:

Step	Date	Time	Event
1	Up to and including ($T^{Last\ failure} + 2$)	By 6:00 PM	Buy-in order cancellation request is registered The cancellation request, which may involve the whole or part of the buy-in order, must be registered in the **clearinghouse** system by the **full trading participant** or **settlement participant** responsible for the **delivery failure**.
2	Up to and including ($T^{Last\ failure} + 2$)	By 6:00 PM	**Asset delivery** The **asset** quantity to be delivered corresponds to the balance of the **assets** stated in the buy-in order cancellation request. For **delivery** to be effected, that balance must be made available to the **custody agent** of the failing debtor **investor**.
3	Up to and including ($T^{Last\ failure} + 2$)	By 6:00 PM	Buy-in order cancellation request is confirmed The buying **full trading participant** or **settlement participant** must consent to the buy-in order cancellation via registration in the **clearinghouse** system.
4	Up to and including ($T^{Last\ failure} + 2$)	By 6:00 PM	Buy-in order cancellation request is reviewed The **clearinghouse** reviews the request and decides on the acceptance or rejection thereof.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Step	Date	Time	Event
			In case of acceptance, which requires compliance with all the previous steps, the **clearinghouse** cancels the buy-in order and calculates the amounts to be credited and debited, respectively, to the **multilateral net balances** of the creditor and debtor **investors** in local currency. In case of rejection, the buy-in order remains valid for execution within the prescribed time period and the **clearinghouse** returns the **assets** delivered by the debtor to the **deposit account** of origin, according to step 2.

Table 3.2 - Procedures for buy-in order cancellation

Both the **asset delivery**, as indicated in step 2, and the cash **settlement** of the amounts, as indicated in step 4, occur:

(i) On the same day of the buy-in order cancellation request registration, when the request is made by 10:00 AM; or otherwise,

(ii) On the business day following the date of the buy-in order cancellation request registration.

3.4 Reversing the buy-in – Equities market

The **clearinghouse** proceeds to reverse the buy-in in the absence of registration of a buy-in order execution or cancellation, that is, when the **full trading participant** responsible for the damaged creditor **investor**:

(i) Executes the buy-in order and does not notify the **clearinghouse** of the excecution thereof, in the prescribed manner and time; or

(ii) Does neither execute nor cancel the buy-in order, in the prescribed manner and time.

In both cases, the buy-in order is cancelled and the transaction is cash settled. Under situation (i), the **transactions** are regularly settled, together with all the other **transactions**.

The reverse buy-in is executed by the **clearinghouse** on $T^{Last\ failure} + 4$, resulting in compensation to the creditor—in whose favor the corresponding buy-in order was issued—for any costs and damages associated with the **assets** not received. In addition to the amount of the costs incurred by the creditor, the following amounts are credited and debited, respectively, to the **multilateral net balances** of the creditor and debtor **investors**. Any differences between debited and credited amounts, which are not used by the **clearinghouse** to perform its own activities, will be allocated to supervisory, regulatory and financial education activities:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

$$V_{Creditor} = Q \times \max\left[P_{Closing} - P_{Creditor} \ , \ 0 \right] \quad (3.3)$$

$$V_{Debtor} = Q \times \max\left[P_{Closing} - P_{Debtor} \ , \ P_{Creditor} - P_{Debtor} \ , \ 0 \right] \quad (3.4)$$

Where:

$V_{Creditor}$: the amount to be credited to the **multilateral net balance** of the creditor **investor** damaged by the **delivery failure**;

V_{Debtor}: the amount to be debited to the **multilateral net balance** of the failing debtor **investor**;

Q: the **asset** quantity pending **delivery** upon execution of the reversal;

$P_{Closing}$: the **asset** closing price at the end of $T^{Last\ failure} + 3$; if, at the discretion of the **clearinghouse**, this price is not representative, it might arbitrate a value for $P_{Closing}$;

$P_{Creditor}$: the **asset** average price included in the buy-in order to be reversed and obtained from all the trades and **positions** based on the same **assets** held by the damaged creditor **investor** and which were supposed to have been received when the **delivery failure** occurred; and

P_{Debtor}: the **asset** average price included in the buy-in order to be reversed and obtained from all the trades and **positions** based on the same **assets** held by the failing debtor **investor** and which were supposed to have been delivered when the **delivery failure** occurred.

3.5 Managing a delivery failure of fixed income ETF shares by the defaulter investor along the closeout process of said investor's positions

In case a **delivery failure** of quantity Q of fixed income ETF shares is committed on date T by the **investor** holding the **multilateral net** debit **balance** in fixed income ETF shares, the **clearinghouse** takes the following action, according to the order presented below:

(i) Quantity Q of fixed income ETF shares still not delivered is calculated;

(ii) If available in the **securities lending** system managed by B3, a **lending transaction** involving the same fixed income ETF shares is mandatorily executed by the debtor **investor** under the responsibility of the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member** responsible for the **delivery failure**, in order to meet the **delivery** of quantity Q' of fixed income ETF shares from the **lending transaction** ($Q' \leq Q$).

If $Q' = Q$, the failing **investor**'s **position** that gave rise to the failed **delivery** obligation is excluded from the **portfolio**, and the failure management is completed.

If $Q' < Q$, the next steps apply.

(iii) Quantity Q of fixed income ETF shares still not delivered after step (ii) is updated;

(iv) A **fine** is imposed on the failing **investor**, according to the criteria established in the **clearinghouse** operating procedures manual;

(v) The creditor **investors** that will be impacted by the **delivery failure** of fixed income ETF shares are selected (meaning those who will not receive the expected quantity of fixed income ETF shares) and the quantity each creditor **investor** will not receive on T is defined. Such **investor** selection and the definition of unreceived quantities are determined by means of a B3 algorithm which seeks to preserve the **delivery** of fixed income ETF shares to those who are not under the responsibility of the **participants** responsible for the **delivery failure** and who are creditors of smaller quantities of fixed income ETF shares;

(vi) The **positions** that gave rise to the **delivery** obligation are excluded;

(vii) Buy-in **positions** are then registered:

- To each of the creditor **investors** selected in step (v) who still have not received the expected total quantity of fixed income ETF shares, having the effect of:

    1. The **clearinghouse** issuing a buy-in order for the quantity of fixed income ETF shares still not received by the creditor **investor** and not previously registered as a buy-in order, according to the time frame and features described in the **clearinghouse** operating procedures manual;

    2. Entering a credit to the **multilateral net balance**, for the current day, of each creditor **investor** selected in step (v), corresponding to the financial value given by the product of the unreceived quantity of fixed income ETF shares by the average price of the fixed income ETF shares supposed to have been received as a result of all the **positions** held by each such **investor**; and

    3. If the unreceived quantity corresponds to the **settlement** of the lending **position** in the fixed income ETF shares underlying the **securities lending** agreement: crediting to the relevant creditor **investor**'s **multilateral net balance** in local currency, to be settled on the same day, the amount given by product $q' \times p$, where q' is the still unreceived quantity of the fixed income ETF shares underlying the **securities lending** agreement and p is the closing price of the fixed income ETF shares on the previous day.

    The creditor **investor**'s buy-in **position** is considered in the calculation of risk for the purpose of updating **margin** to be required of said **investor** or of said **investor**'s **full trading participant** or **settlement participant**, depending on the collateralization mode for cash market **transactions** under which said **investor** operates.

- A buy-in **position** is registered to the failing debtor **investor**, having the effect of:

    1. Registering a buy-in **position** to the debtor **investor** at the same quantity of the still undelivered fixed income ETF shares and not previously registered as a buy-in **position**, the effect of which is to create a **payment** obligation for the amounts indicated in the **clearinghouse** operating procedures manual;

    2. Entering a debit to the **multilateral net balance**, for the current day, of the debtor **investor** of fixed income ETF shares, corresponding to the financial value of the **delivery failure** given by the product of the undelivered quantity of fixed income ETF shares by the average price of the fixed income ETF shares supposed to have been delivered as a result of all the **positions** and trades involved in any such **delivery**; and

    3. If quantity Q corresponds to the settlement of the borrowing **position** in the fixed income ETF shares underlying the **securities lending** agreement: debiting to the debtor **investor**'s **multilateral net balance** in local currency, to be settled on the same day, the amount given by product $q' \times p$, where q' is the still undelivered quantity of the fixed income ETF shares underlying the **securities lending** agreement and p is the closing price of the fixed income ETF shares on the previous day.

    The debtor **investor**'s buy-in **position** is considered in risk calculation for the purpose of updating the **margin** to be required of said debtor **investor**.

(viii) Let T' be the business day following the day when the buy-in **positions** were registered in step (vii). If the failing debtor **investor** makes **delivery** of quantity Q' of fixed income ETF shares ($Q' \leq Q$) on T', then on T':

1. Quantity Q' is distributed among the creditor **investors** selected in step (v) who still have not received the expected total quantity, being credited to each creditor **investor**'s **multilateral net balance** in fixed income ETF shares to be settled on T', and quantity Q' in the buy-in is cancelled;

2. The financial value corresponding to the quantity of fixed income ETF shares credited to each creditor **investor** is debited to each creditor **investor**'s **multilateral net balance** in local currency to be settled on T';

3. The financial value corresponding to quantity Q' of fixed income ETF shares is credited to the debtor **investor**'s **multilateral net balance** in local currency to be settled on T';

4. The quantity of fixed income ETF shares still not received by each creditor **investor** selected in step (v) is updated;

5. If $Q' = Q$, on T' all the obligations and all the rights associated with the buy-in **positions** registered in step (vii) are considered to having been settled and the buy-in **positions** are terminated, thus completing the **delivery failure** management process.

(ix) If:

(a) The debtor **investor** has not fully met the **delivery** obligation of the fixed income ETF shares established by the buy-in **position** that was last registered; and

(b) Date T of the original **delivery failure** (the failure that caused the current process to be activated) has occurred less than ten (10) business days from T'; and

(c) The **clearinghouse** has not determined that step (x) be taken,

Then the process returns to step (i) on T', but without requiring a new run of steps (ii) through (vii).

Otherwise (that is, if at least one of conditions (a), (b) and (c) listed in this paragraph (ix) is not satisfied), step (x) is taken. Whenever the **clearinghouse** deems it necessary, it can command that step (x) be taken before the deadline for closing out the **defaulter investor**'s **portfolio** is over, even if the **delivery** obligation has not been fully met yet.

(x) Buy-in reversal. In the absence of registration of a buy-in order execution or cancellation, the **clearinghouse** proceeds to reverse the buy-in **position**.

In general, it can be understood that the special case of the **delivery failure** management process—that is, when the failure derives from the closeout process carried out for the **positions** of the **defaulter participants**—differs from the regular **delivery failure** management process in that it allows for (i) the repetition of the macrosteps that involve the attempts to obtain the fixed income ETF shares and (ii), when this is not enough, the reversal of the buy-in **position**. The sequence of macrosteps referred to in (i) is not repeated in the regular **delivery failure** management process. In order to illustrate the differences between the special and regular management processes, a flowchart of the procedures described so far is presented on the next page.

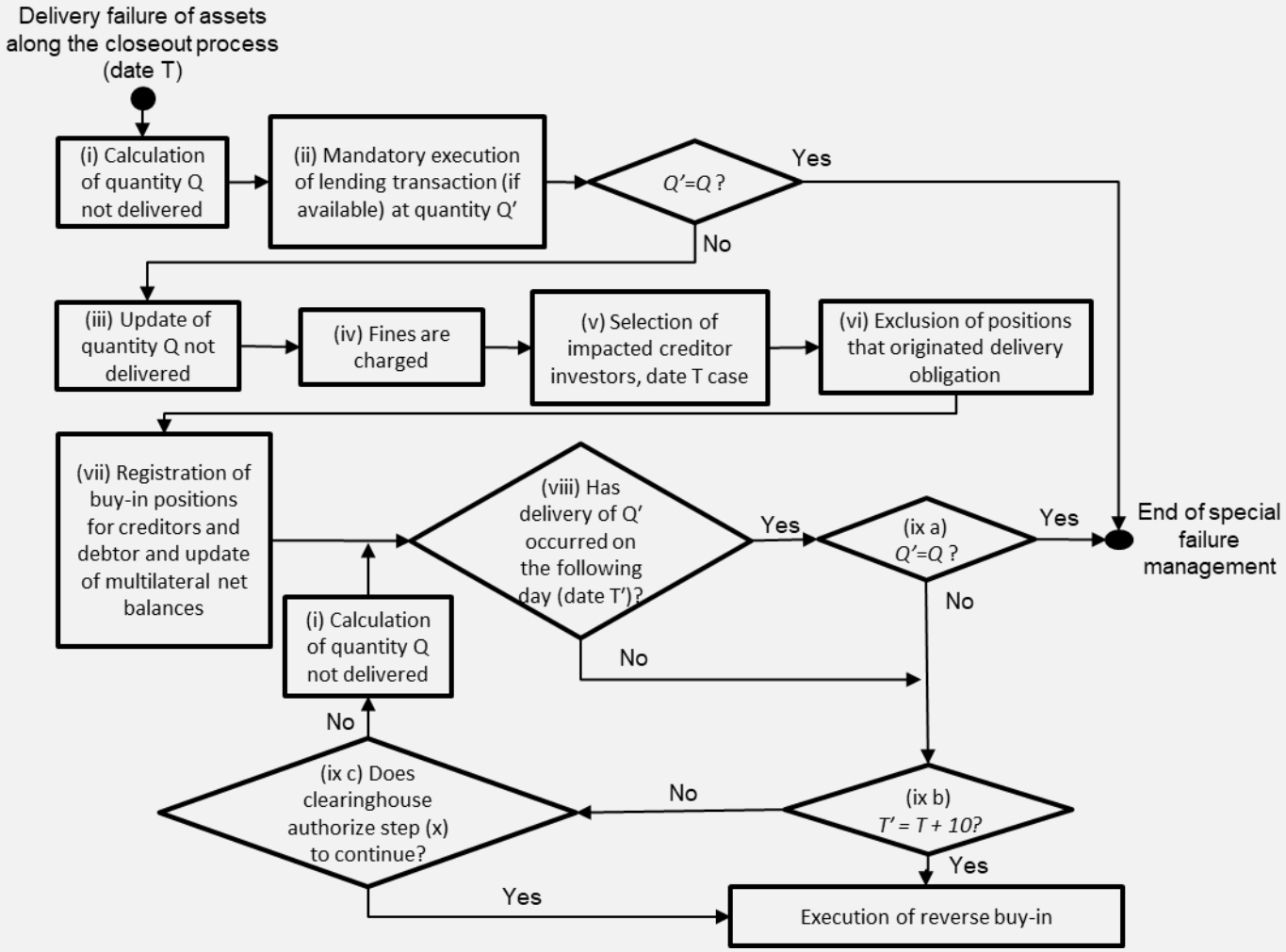
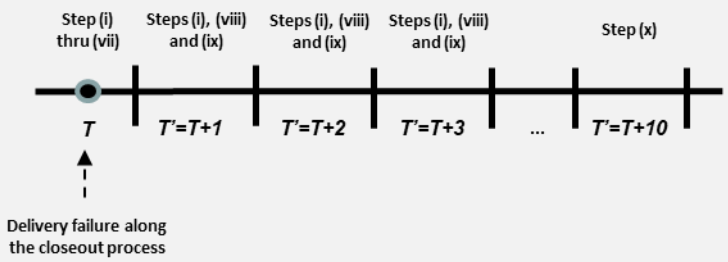


Figure 3.4 - Flowchart of steps (i) thru (x) of the special **delivery failure** management for fixed income ETF shares

As an example, suppose the defaulting debtor **investor** whose portfolio is submitted to the closeout process due to a **default** fails to make **delivery** of a certain quantity of fixed income ETF shares not available in the **securities lending** system. Also assume that the buy-in **positions** have not been fully cancelled during the process. Thus, if the **clearinghouse** does not advance the activation of the buy-in reversal step, such a step is triggered after ten (10) business days of the original failure date. Figure 3.5 illustrates this example.



INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Figure 3.5 - Example of application of the special **delivery failure** management, which extends for ten business days after the original **delivery failure** date, until the buy-in reversal step is reached

3.6 Executing a buy-in order – Fixed income ETF shares

The procedure for executing a buy-in order is described below:

Step	Date	Time	Event
1	**Delivery failure** date	By 1:00 PM	Buy-in order is issued The buy-in order is issued by the **clearinghouse**, via system registration, in favor of the **full trading participant** or **settlement participant** responsible for the creditor **investor**.
2	Up to and including $T+10$ of **delivery failure** date	By 6:00 PM	Buy-in order is executed The buy-in order may be executed by the **clearinghouse** itself or an appointed brokerage house, rather than the **full trading participant**.
3	Up to and including $T+10$ of **delivery failure** date	By 6:00 PM	Buy-in order execution is notified The **clearinghouse** is notified of the order execution, via system registration, by the **clearinghouse** itself.

Table 3.3 - Procedures for buy-in order execution

At the sole discretion of the **clearinghouse**, the buy-in order may be executed by the **clearinghouse** itself or by an appointed brokerage house, rather than the **full trading participant**.

The buy-in order execution request is subject to the deposit, by the **full trading participant** or the **settlement participant** responsible for the creditor **investor**, of the amount originally contracted, as detailed in the buy-in order.

The **transactions** carried out as part of the buy-in order execution are settled according to regular procedures for **multilateral net settlement** in **assets** and **multilateral net settlement** in local currency performed by the **clearing members** responsible for the buying and selling parties to those **transactions**. Also, the costs for the buying party arising out of such **transactions** and the amounts specified below are credited and debited, respectively, to the **multilateral net balances** in local currency of the creditor **investor** damaged by the **delivery failure** and the failing debtor **investor**, for **settlement** on $T+1$ of the date of the buy-in

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

order execution. Any differences between debited and credited amounts, which are not used by the **clearinghouse** to perform its own activities, will be allocated to supervisory, regulatory and financial education activities.

$$V_{Creditor} = Q \times \max\left[P_{Exec} - P_{Creditor} \ , \ 0\right] \tag{3.5}$$

$$V_{Debtor} = Q \times \max\left[P_{Exec} - P_{Debtor} \ , \ P_{Creditor} - P_{Debtor} \ , \ 0\right] \tag{3.6}$$

Where:

$V_{Creditor}$: the amount to be credited to the **multilateral net balance** of the damaged creditor **investor** in local currency;

V_{Debtor} : the amount to be debited to the **multilateral net balance** of the failing debtor **investor** in local currency;

Q : the quantity of **assets** underlying the **transactions** carried out by the creditor party as part of the buy-in order execution;

P_{Exec} : the average purchase price of the **assets** underlying the **transactions**, as appointed by the creditor party, carried out as part of the buy-in order execution;

P_{Debtor} : the average price of the **assets** included in the buy-in order issued by the **clearinghouse** and obtained from all the trades and **positions** based on the same **assets** held by the failing debtor **investor**, which were supposed to have been received when the **delivery failure** occurred; and

$P_{Creditor}$: the average price of the **assets** included in the buy-in order issued by the **clearinghouse** and obtained from all the trades and **positions** held by the damaged creditor **investor**, which were supposed to have been delivered when the **delivery failure** occurred.

3.7 Cancelling a buy-in order – Fixed income ETF shares

A buy-in order for fixed income ETF shares may be cancelled when:

(i) All the parties involved—meaning the party responsible for the **delivery failure** and the damaged creditor party—agree on the cancellation thereof; and

(ii) The **assets** owed are available for **delivery**.

Cancellation of a buy-in order involves the procedures described on the following table, which must be carried out on a single day:

Step	Date	Time	Event
1	Up to and including $T+10$ of **delivery failure** date	By 6:00 PM	Buy-in order cancellation request is registered The cancellation request, which may involve the whole or part of the buy-in order, must be registered in the **clearinghouse** system by the **full trading participant** or **settlement participant** responsible for the **delivery failure**.
2	Up to and including $T+10$ of **delivery failure** date	By 6:00 PM	**Asset delivery** The **asset** quantity to be delivered corresponds to the balance of the **assets** stated in the buy-in order cancellation request. For **delivery** to be effected, that balance must be made available to the **custody agent** of the failing debtor **investor**.
3	Up to and including $T+10$ of **delivery failure** date	By 6:00 PM	Buy-in order cancellation request is confirmed The buying **full trading participant** or **settlement participant** must consent to the buy-in order cancellation via registration in the **clearinghouse** system.
4	Up to and including $T+10$ of **delivery failure** date	By 6:00 PM	Buy-in order cancellation request is reviewed The **clearinghouse** reviews the request and decides on the acceptance or rejection thereof. In case of acceptance, which requires compliance with all the previous steps, the **clearinghouse** cancels the buy-in order and calculates the amounts to be credited and debited, respectively, to the **multilateral net balances** of the creditor and debtor **investors** in local currency. In case of rejection, the buy-in order remains valid for execution within the prescribed time period and the **clearinghouse** returns the **assets** delivered by the debtor to the **deposit account** of origin, according to step 2.

Table 3.4 - Procedures for buy-in order cancellation

Both the **asset delivery**, as indicated in step 2, and the cash **settlement** of the amounts, as indicated in step 4, occur:

(i) On the same day of the buy-in order cancellation request registration, when the request is made by 10:00 AM; or otherwise,

(ii) On the business day following the date of the buy-in order cancellation request registration.

3.8 Reversing the buy-in – Fixed income ETF shares

The **clearinghouse** proceeds to reverse the buy-in in the absence of registration of a buy-in order execution or cancellation. In this case, the buy-in order is cancelled and the **transaction** is cash settled.

The reverse buy-in is executed by the **clearinghouse** until $T+10$ of the **settlement** date when the **delivery failure** occurred, resulting in compensation to the creditor—in whose favor the corresponding buy-in order was issued—for any costs and damages associated with the **assets** not received. In addition to the amount of the costs incurred by the creditor, the following amounts are credited and debited, respectively, to the **multilateral net balances** of the creditor and debtor **investors**. Any differences between debited and credited amounts, which are not used by the **clearinghouse** to perform its own activities, will be allocated to supervisory, regulatory and financial education activities:

$$V_{Creditor} = Q \times \max\left[P_{Closing} - P_{Creditor} \ , \ 0 \right] \tag{3.7}$$

$$V_{Debtor} = Q \times \max\left[P_{Closing} - P_{Debtor} \ , \ P_{Creditor} - P_{Debtor} \ , \ 0 \right] \tag{3.8}$$

Where:

$V_{Creditor}$: the amount to be credited to the **multilateral net balance** of the creditor **investor** damaged by the **delivery failure**;

V_{Debtor}: the amount to be debited to the **multilateral net balance** of the failing debtor **investor**;

Q: the **asset** quantity pending **delivery** upon execution of the reverse buy-in;

$P_{Closing}$: the **asset** closing price on the day preceding the settlement date of the reverse buy-in; if, at the discretion of the **clearinghouse**, this price is not representative, it might arbitrate a value for $P_{Closing}$;

$P_{Creditor}$: the **asset** average price included in the buy-in order to be reversed and obtained from all the trades and **positions** based on the same **assets** held by the damaged creditor **investor** and which were supposed to have been received when the **delivery** failure occurred; and

P_{Debtor} : the **asset** average price included in the buy-in order to be reversed and obtained from all the trades and **positions** based on the same **assets** held by the failing debtor **investor** and which were supposed to have been delivered when the **delivery failure** occurred.

3.9 Managing a delivery failure of assets in the government bond market

In case a **delivery failure** of quantity Q of **assets** is committed on date T by the **investor** holding the **multilateral net** debit **balance** in **assets**, the **clearinghouse** takes the following action, according to the order presented below:

(i) Quantity Q of **assets** still not delivered is calculated;

(ii) If available in the **securities lending system** managed by B3, a **lending transaction** involving the **assets** is mandatorily executed by the debtor **investor** under the responsibility of the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member** responsible for the **delivery failure**, in order to meet the **delivery** of quantity Q' of **assets** from the **lending transaction** ($Q' \leq Q$).

If $Q' = Q$, the failing **investor**'s **position** that gave rise to the failed **delivery** obligation is excluded from the **portfolio**, and the failure management is completed.

If $Q' < Q$, the next steps apply.

(iii) Quantity Q of **assets** still not delivered after step (ii) is updated;

(iv) A **fine** is imposed on the failing **investor**, according to the criteria established in the **clearinghouse** operating procedures manual;

(v) The creditor **investors** that will be impacted by the **delivery failure** of **assets** are selected (meaning those who will not receive the expected quantity of **assets**) and the quantity each creditor **investor** will not receive on T is defined. Such **investor** selection and the definition of unreceived quantities are determined by means of a B3 algorithm which seeks to preserve the **delivery** of **assets** to those who are not under the responsibility of the **participants** responsible for the **delivery failure** and who are creditors of smaller quantities of **assets**;

(vi) The **positions** that gave rise to the **delivery** obligation are excluded;

(vii) The **clearinghouse** seeks to obtain in the **organized OTC market**, as established in its operating procedures manual, quantity Q' of **assets** (including the quantities in the buy-in orders that were not executed) through **purchase and sale transactions** (according to the closeout strategy detailed in section 7.4), **repo transactions** or **repo transactions** matched with BCB through accredited institutions;

(viii) Buy-in **positions** are then registered:

- To each of the creditor **investors** selected in step (v) who still have not received the expected total quantity of **assets**, having the effect of:

    1. The **clearinghouse** issuing a buy-in order for the **assets** still not received by the creditor **investor** and not previously registered as a buy-in order, according to the time frame and features described in the **clearinghouse** operating procedures manual;

    2. Entering a credit to the **multilateral net balance**, for the current day, of each creditor **investor** selected in step (v), corresponding to the financial value given by the product of the unreceived quantity of **assets** by the average price of the **assets** supposed to have been received as a result of all the **positions** held by each such **investor**; and

    3. If the unreceived quantity corresponds to the **settlement** of the lending **position** in the **assets** underlying the **securities lending** agreement: crediting to the relevant creditor **investor**'s **multilateral net balance** in local currency, to be settled on the same day, the amount given by product $q' \times p$, where q' is the still unreceived quantity of **assets** underlying the **securities lending** agreement and p is the closing price of the **assets** on the previous day.

    The creditor **investor**'s buy-in **position** is considered in risk calculation for the purpose of updating the **margin** to be required of said **investor**.

- A buy-in **position** is registered to the failing debtor **investor**, having the effect of:

    1. Registering a buy-in **position** to the debtor **investor** at the same quantity of the still undelivered **assets** and not previously registered as a buy-in **position**, the effect of which is to create a payment obligation for the amounts indicated in the **clearinghouse** operating procedures manual;

    2. Entering a debit to the **multilateral net balance**, for the current day, of the debtor **investor** of **assets**, corresponding to the financial value of the **delivery failure** given by the product of the undelivered quantity of **assets** by the average price of the **assets** supposed to have been delivered as a result of all the **positions** and trades involved in any such **delivery**; and

    3. If quantity Q corresponds to the **settlement** of the borrowing **position** in the **assets** underlying the **securities lending** agreement: debiting to the debtor **investor**'s **multilateral net balance** in local currency, to be settled on the same day, the amount given by product $q' \times p$, where q' is the still undelivered quantity of the **assets** underlying the **securities lending** agreement and p is the closing price of the **assets** on the previous day.

    The debtor **investor**'s buy-in **position** is considered in risk calculation for the purpose of updating the **margin** to be required of said **investor**.

(ix) Let T' be the business day following the day when the buy-in **positions** were registered in step (viii). If the failing debtor **investor** makes **delivery** of quantity Q' of **assets** ($Q' \leq Q$) on T', then on T':

1. Quantity Q' is distributed among the creditor **investors** selected in step (v) who still have not received the expected total quantity, being credited to each creditor **investor**'s **multilateral net balance** in **assets** to be settled on T', and quantity Q' in the buy-in is cancelled;
2. The financial value corresponding to the quantity of **assets** credited to each creditor **investor** is debited to each creditor **investor**'s **multilateral net balance** in local currency to be settled on T';
3. The financial value corresponding to quantity Q' of **assets** is credited to the debtor **investor**'s **multilateral net balance** in local currency to be settled on T';
4. The quantity of **assets** still not received by each creditor **investor** selected in step (v) is updated;
5. If $Q' = Q$, on T' all the obligations and all the rights associated with the buy-in **positions** registered in step (viii) are considered to having been settled and the buy-in **positions** are terminated, thus completing the **delivery failure** management process.

(x) If:

(a) The debtor **investor** has not fully met the **delivery** obligation of **assets**; and

(b) Date *T* of the original **delivery failure** (the failure that caused the current process to be activated) has occurred less than ten (10) business days from T'; and

(c) The **clearinghouse** has not determined that step (xi) be taken,

Then the process returns to step (i) on T', but requiring a new run of steps (i), (vii), (ix) and (x) only.

Otherwise (that is, if at least one of conditions (a), (b) and (c) listed in this paragraph (x) is not satisfied), step (xi) is taken. Whenever the **clearinghouse** deems it necessary, it can command that step (xi) be taken before the deadline for closing out the **defaulter investor**'s **portfolio** is over, even if the **delivery** obligation has not been fully met yet.

(xi) Buy-in reversal. In the absence of registration of a buy-in order execution or cancellation, the **clearinghouse** proceeds to reverse the buy-in **position**.

In general, it can be understood that the special case of the **delivery failure** management process—that is, when the failure derives from the closeout process carried out for the **positions** of the **defaulter participants**—differs from the regular **delivery failure** management process in that it allows for (i) the repetition of the macrosteps that involve the attempts to obtain the **assets** and (ii), when this is not enough, the reversal of the buy-in **position**. The sequence of macrosteps referred to in (i) is not repeated in the regular **delivery failure** management process. In order to illustrate the differences between the special and regular management processes, a flowchart of the procedures described so far is presented below.

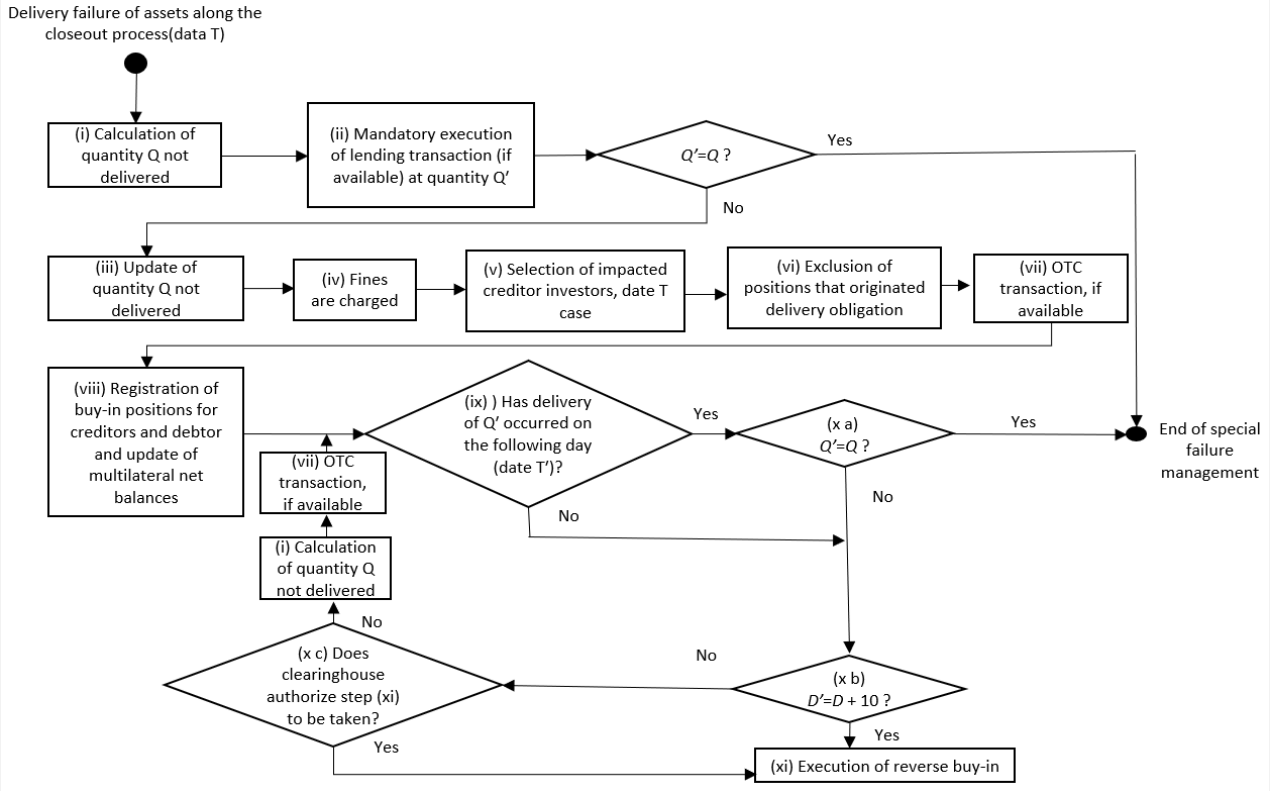


Figure 3.6 - Flowchart of steps (i) thru (xi) of the special **delivery failure** management in the **government bond market**

As an example, suppose the defaulting debtor **investor** whose portfolio is submitted to the closeout process due to a **default** fails to make **delivery** of a certain quantity of **assets** not available in the **securities lending** system or in the **organized OTC market**. Also assume that the buy-in **positions** have not been fully cancelled during the process. Thus, if the **clearinghouse** does not advance the activation of the buy-in reversal step, such a step is triggered after ten (10) business days of the original failure date. Figure 3.7 illustrates this example.

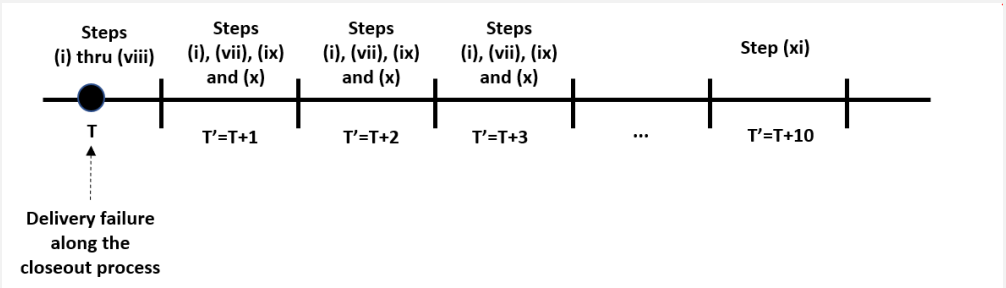


Figure 3.7 - Example of application of the special **delivery failure** management, which extends for ten business days after the original **delivery failure** date, until the buy-in reversal step is reached

3.10 Executing a buy-in order – Government bond market

The procedure for executing a buy-in order is described below:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Step	Date	Time	Event
1	**Delivery failure** date	By 1:00 PM	Buy-in order is issued The buy-in order is issued by the **clearinghouse**, via system registration, in favor of the **full trading participant** or **settlement participant** responsible for the creditor **investor**.
2	Up to and including *T*+10 of **delivery failure** date	By 5:00 PM	Buy-in order is executed The buy-in order may be executed by the **clearinghouse** itself but not by the **full trading participant**.

Table 3.5 - Procedures for buy-in order execution – **Government bond market**

The **transactions** carried out as part of the buy-in order execution are settled according to regular procedures for **multilateral net settlement** in **assets** and **multilateral net settlement** in local currency performed by the **clearing members** responsible for the buying and selling parties to those **transactions**. Also, the costs for the buying party arising out of such **transactions** and the amounts specified below are credited and debited, respectively, to the **multilateral net balances** in local currency of the creditor **investor** damaged by the **delivery failure** and the failing debtor **investor**, for settlement on $T+1$ of the date of the buy-in order execution. Any differences between debited and credited amounts, which are not used by the **clearinghouse** to perform its own activities, will be allocated to supervisory, regulatory and financial education activities.

$$V_{Creditor} = Q \times \max\left[P_{Exec} - P_{Creditor}\ ,\ 0\right] \tag{3.9}$$

$$V_{Debtor} = Q \times \max\left[P_{Exec} - P_{Debtor}\ ,\ P_{Creditor} - P_{Debtor}\ ,\ 0\right] \tag{3.10}$$

Where:

$V_{Creditor}$: the amount to be credited to the **multilateral net balance** of the damaged creditor **investor** in local currency;

V_{Debtor}: the amount to be debited to the **multilateral net balance** of the failing debtor **investor**;

Q: the quantity of **assets** underlying the **transactions** carried out as part of the buy-in order execution;

P_{Exec}: the average purchase price of the **assets** underlying the **transactions** carried out as part of the buy-in order execution;

P_{Debtor} : the average price of the **assets** included in the buy-in order issued by the **clearinghouse** and obtained from all the trades and **positions** held by the failing debtor **investor**, which were supposed to have been delivered when the **delivery failure** occurred; and

$P_{Creditor}$: the average price of the **assets** included in the buy-in order issued by the **clearinghouse** and obtained from all the trades and **positions** held by the damaged creditor **investor**, which were supposed to have settled when the **delivery failure** occurred.

3.11 Cancelling a buy-in order – Government bond market

A buy-in order for **assets** in the **government bond market** may be cancelled when:

(i) All the parties involved—meaning the party responsible for the **delivery failure** and the damaged creditor party—agree on the cancellation thereof; and

(ii) The **assets** owed are available for **delivery**.

Cancellation of a buy-in order involves the procedures described on the following table, which must be carried out on a single day:

Step	Date	Time	Event
1	Up to and including *T*+10 of **delivery failure** date	By 6:00 PM	Buy-in order cancellation request is registered The cancellation request, which may involve the whole or part of the buy-in order, must be registered in the **clearinghouse** system by the **full trading participant** or **settlement participant** responsible for the **delivery failure**.
2	Up to and including *T*+10 of **delivery failure** date	By 6:00 PM	**Asset delivery** The **asset** quantity to be delivered corresponds to the balance of the **assets** stated in the buy-in order cancellation request. For **delivery** to be effected, that balance must be made available to the **custody agent** of the failing debtor **investor**.
3	Up to and including *T*+10 of **delivery failure** date	By 6:00 PM	Buy-in order cancellation request is confirmed The buying **full trading participant** or **settlement participant** must consent to the buy-in order cancellation via registration in the **clearinghouse** system.

Step	Date	Time	Event
4	Up to and including *T*+10 of **delivery failure** date	By 6:00 PM	Buy-in order cancellation request is reviewed The **clearinghouse** reviews the request and decides on the acceptance or rejection thereof. In case of acceptance, which requires compliance with all the previous steps, the **clearinghouse** cancels the buy-in order and calculates the amounts to be credited and debited, respectively, to the **multilateral net balances** of the creditor and debtor **investors**. In case of rejection, the buy-in order remains valid for execution within the prescribed time period and the **clearinghouse** returns the **assets** delivered by the debtor to the **deposit account** of origin, according to step 2.

Table 3.6 - Procedures for buy-in order cancellation – **Government bond market**

Both the **asset delivery**, as indicated in step 2, and the cash **settlement** of the amounts, as indicated in step 4, occur:

(i) On the same day of the buy-in order cancellation request registration, when the request is made by 12:00 noon; or otherwise,

(ii) On the business day following the date of the buy-in order cancellation request registration.

3.12 Reversing the buy-in – Government bond market

The **clearinghouse** proceeds to reverse the buy-in in the absence of registration of a buy-in order execution or cancellation. In this case, the buy-in order is cash settled.

The reverse buy-in is executed by the **clearinghouse** on T+10 of the **settlement** date when the **delivery failure** occurred, resulting in compensation to the creditor of **assets**—in whose favor the corresponding buy-in order was issued—for any costs and damages associated with the **assets** not received. In addition to the amount of the costs incurred by the creditor, the following amounts are credited and debited, respectively, to the **multilateral net balances** of the creditor and debtor **investors**. Any differences between debited and credited amounts, which are not used by the **clearinghouse** to perform its own activities, will be allocated to supervisory, regulatory and financial education activities:

$$V_{Creditor} = Q \times \max\left[P_{Closing} - P_{Creditor} \ , \ 0 \right] \tag{3.11}$$

$$V_{Debtor} = Q \times \max\left[P_{Closing} - P_{Debtor} \ , \ P_{Creditor} - P_{Debtor} \ , \ 0 \right] \tag{3.12}$$

Where:

$V_{Creditor}$: the amount to be credited to the **multilateral net balance** of the creditor **investor** damaged by the **delivery failure**;

V_{Debtor}: the amount to be debited to the **multilateral net balance** of the failing debtor **investor**;

Q: the **asset** quantity pending **delivery** upon execution of the reverse buy-in;

$P_{Closing}$: the price established according to the price of the federal government bond on the previous business day; if, at the discretion of the **clearinghouse**, this price is not representative, it might arbitrate a value for $P_{Closing}$;

$P_{Creditor}$: the **asset** average price included in the buy-in order to be reversed and obtained from all the trades and **positions** held by the damaged creditor **investor** and which were supposed to have been settled when the **delivery failure** occurred; and

P_{Debtor}: the **asset** average price included in the buy-in order to be reversed and obtained from all the trades and **positions** held by the failing debtor **investor** and which were supposed to have been settled when the **delivery failure** occurred.

Chapter 4 - Intraday risk monitoring

4.1 Acceptance of transactions

The **acceptance** of **transactions** by the **clearinghouse** differs for (i) **exchange-traded markets**, (ii) the equities forward market, (iii) other **organized OTC markets** and (iv) the **secedurities lending** market.

The **acceptance** of a **transaction** registered in an **exchange-traded market** occurs when the **trading system** matches the buy and sell orders that originated the **transaction**.

The **acceptance** of a **transaction** in the equities forward market occurs when the **transaction** is registered in the **registration system**.

In any other **organized OTC derivatives market** managed by B3, the **acceptance** of a **transaction** registered in the "fully collateralized" or "partially collateralized" mode occurs after confirmation that **collateral** required of the parties to the trade has been posted and **position** limits, have been adhered to.

A **securities lending transaction** is accepted when (i) the lending deal is closed in the **lending system**; or (ii) by being captured, as defined in the **clearinghouse** operating procedures manual and subjected to the risk evaluation criteria of the **clearinghouse**.

4.1.1 Acceptance of transactions executed in organized OTC markets

4.1.1.1 Swaps, flexible options and currency forwards

Swap, flexible option and currency forward **transactions** executed in both "fully collateralized" and "partially collateralized" **registration** modes are accepted by the **clearinghouse** by:

(i) checking the existence of a **collateral** balance, which occurs on the business day following the date of **registration**, after the end of the period earmarked for **investors** to meet **margin** calls; and

(ii) checking adherence to **position** limits, described in chapter 5 (**Position** limits) of this manual, which occurs on the business day following the date of **registration**.

If **collateral**, is not sufficient or if the **transactions** result in nonadherence to **position** limits the **clearinghouse** informs the **registration environment** of the trades that were not accepted, which cease to integrate the parties' **positions** for **clearinghouse settlement** purposes and are handled, according to the provisions of specific **registration environment** regulations.

Early **settlement registrations** are accepted by the **clearinghouse** for such contracts by checking the existence of a **collateral** balance that is equal to or greater than the **settlement** value of the contract or set of contracts held by the same **investor**. The **settlement** value of the contract or set

of contracts must be deposited as additional **margin** on the day following **registration** of the early **settlement** request. The **clearinghouse** checks whether the **investor** holds the required **collateral** balance on the business day following the **registration** date of the early **settlement** request, after the end of the period earmarked for **investors** to meet **margin** calls.

4.1.1.2 Criteria for transferring a swap contract position by changing investors

The transfer of a swap contract position by changing **investors** is subject to verification as to the sufficiency of **collateral** posted by both the **investor** originating the transfer and the **investor** receiving the transfer.

After **collateral** is posted by the parties and other procedures established by the **clearinghouse** are met, the request is approved and the transfer is effected.

4.1.2 Securities lending transactions contracted on registration mode

Securities lending transactions contracted on **registration** mode are accepted by the **clearinghouse** after checking adherence of both lender and borrower **investors** to the **position** limits defined for **securities lending** agreements on the same **asset** underlying the concerned **transaction** (**asset** *i*) (regardless of the type of **securities lending** contracted), except for mandatory **securities lending transactions** within the scope of the **delivery failure** management process, pursuant to the provisions of the **clearinghouse** operating procedures manual and chapter 3 (Managing a **delivery failure** along the closeout process of the **defaulter participant**'s **positions**) of this manual.

The total **positions** of both lender and borrower **investors** in the **securities lending** agreements on **asset** i are determined by considering the aggregate **positions**, at **investor** level, under a certain **full trading participant** or **settlement participant**. As detailed in chapter 5 (**Position** limits) of this manual, the following are determined for each **investor**:

(i) The **investor**'s lending **position**;

(ii) The **investor**'s borrowing **position** with no **coverage**; and

(iii) The **investor**'s borrowing **position** with **coverage**.

For each **position**, let Q_i' and Q_i be the **investor**'s **positions** considering, respectively, the **securities lending** agreement and not considering the **securities lending** agreement.

The **securities lending transaction** is not accepted by the **clearinghouse** if both conditions (a) and (b) are met:

(a) $abs\left(Q_i'\right) \geq abs\left(Q_i\right)$

(b) $abs(Q_i') \geq Limit_{i,2}$, where $Limit_{i,2}$ is the **position** limit, as defined in chapter 5 (**Position** limits) of this manual.

In respect of the balance of **collateral** posted by the borrowing **investor**, the lack of a balance is not an impediment to the registration of the **transaction**.

Let $ResidRiskLending_{Investor}$ the estimated value of **investor** residual risk after the **securities lending** contracted on registration mode.

$ResidRiskLending_{Investor}$ is calculated by the following equation:

$$ResidRiskLending_{Investor} = Balance_C^{CORE0} + LR_{Potential} - Add\ margin_C + Balance_{Lending}^{CORE0} \quad (4.1)$$

Where:

$Balance_C^{CORE0}$: the balance of **collateral**, calculated according to module CORE0 of the CORE methodology described in chapter 7 (Risk calculation) of this manual, by considering:

(i) **investor** C's opening **position**, plus the **transactions** carried out on the same day and allocated, by the time of risk calculation, to the **investor** C's **accounts** under P's responsibility, all such **transactions** under the collateralization mode by the **investor**. The **lending transaction** under evaluation is not considered; and

(ii) **investor** C's **collateral** deposited to cover such **positions**, that is, for **transaction** guarantee purposes;

$LR_{Potential}$: the potential liquidity resource, calculated according to module CORE0 of the CORE methodology described in chapter 7 (Risk calculation) of this manual;

$Add\ margin_C$: the amount of **collateral investor** C must deposit, due to a **position** limit violation or another need for additional **collateral** to be posted, at the sole discretion of B3;

$Balance_{Lending}^{CORE0}$: the collateral balance of a **portfolio** containing only the **securities lending transaction** under evaluation, calculated according to module CORE0 of the CORE methodology described in chapter 7 (Risk calculation) of this manual.

The **securities lending transaction** is automatically accepted if condition (c) or condition (d) is met:

(c) $ResidRiskLending_{Investor} \geq 0$

(d) $ResidRiskLending_{Investor} - ResidRisk_{Investor} \leq 0$

Where $ResidRisk_{Investor}$ is defined according to paragraph (c) of subsection 4.3.2.1 of this chapter.

If neither of the conditions (c) and (d) is met, the **lending transaction** is accepted and the **assets** delivered by the borrowing **investor** are allocated by the **clearinghouse** to the **coverage subaccount** of the borrowing **investor** and blocked against movements.

B3 may, at its sole discretion and in specific cases, accept the registration of **transactions**, early **settlements** and ownership transfers at odds with the aforementioned criteria. The Central Counterparty Risk Internal Committee will (i) review each case, upon a formal request submitted to B3 before **transaction** registration by the **full trading participant** or **settlement participant** responsible for the concerned **investor**; and (ii) decide on the acceptance or rejection of the request. The request review by the Central Counterparty Risk Internal Committee will be based, among other aspects, on the nature of the activities performed by the concerned **investor**, the risk of the **investor**'s **portfolio**, the motivation for the **transaction**, the potential impacts of the acceptance and rejection of the request, and the trading conditions for the **transaction**.

4.2 Pre-trade risk monitoring

4.2.1 Eletronic trading of derivatives, assets in equities markets and corporate debt assets

The pre-trade risk monitoring performed by the **clearinghouse** consists of the risk analysis of all **investors**, regardless of access mode, through the B3 pre-trade risk management model. This model is based on the assessement of orders, order changes or trades against a set of limits that is processed, in the case of a new order or an order chance, prior to or immediately after the order enters the book and, in the case of a trade, immediately after the trade is executed.

The applicable limits by individual instruments, to which orders or order changes are subject, are defined by B3 and my be reduced by the **trading participant** or **foreign participant**, **full trading participant** or **settlement participant**. The values of the applibable limites by aggregat instrumentes are mandatorily assigned to each **investor** (identified by CPF, CNPJ or CVM code for brazilian nonresident investors, as the case may be), and/or to each **investor**'s **account** and each **master account**, and are defined by the respective concerned **trading participant** or **foreign participant**, **full trading participant** or **settlement participant**. Hence, the assessment is based on the identification of the **investor** (identified by CPF, CNPJ or CVM code for Brazilian nonresident investors, as the case may be) and/or the **account** to which the trades resulting from the order will be allocated. This identification is required for orders entered by high-frequency **investors** or sent direct market access.

The limits of the B3 pre-trade risk management model are based on one or more features below, contingent on the type of limit:

(i) The characteristics of the assessed order or order change (order side, quantity, etc);

(ii) The set of orders, identified for the same **investor** (identified by CPF, CNPJ or CVM code for Brazilian nonresident investors, as the case may be) and the same **account** of the assessed order, included in the order book at the time of assessment

(iii) The trades executed, on the date of assessment, for the same **investor** (identified by CPF, CNPJ or CVM code for Brazilian nonresident investors, as the case may be) and the same **account** of the assessed order; and

(iv) The set of **positions** held by **investor** (identified by CPF, CNPJ or CVM code for Brazilian nonresident **investors**, as the case may be) at the end of the previous day's trading session.

By adopting the B3 model, **trading participants, foreign participants**, **full trading participants** or **settlement participants** are able to define the maximum risk values that fit the profile of each **investor**'s (identified by CPF, CNPJ or CVM code for Brazilian nonresident investors, as the case may be), registering the values of the limits applicable to each **account,** as defined by the model, in the B3 **pre-trade risk management system**.

New orders and changes to existing orders are subject to a minimum set of limits, defined as follows:

- Maximum order size: the maximum quantity (number of contracts or **asset** units) or financial value of an order to buy or sell an instrument;
- *Maximum size of a potential position in an instrument*: the maximum daily quantity or financial value of a potentially long or short **position** in an instrument. This limit considers (i) the quantity or financial value of contracts/**asset** units in the order; (ii) the balance of trades executed on the date of assessment; and (iii) the orders entered by the **investor** and available in the **trading system**'s order book; and
- *Maximum size of a position by equivalent instrument*: the maximum daily quantity or financial valye of a long or short **position** in an equivalent instrument.

Equivalent instrument means the fictitious instrument defined by B3 based on instruments with similar features, such as all the maturities of a futures contract on a given underlying asset. In general, an equivalent instrument aggregates the selected instruments based on a risk weighting criterion (so that the risk of a unit of the equivalent instrument is approximately equal to the risk of the set of individual **positions** in each of the instruments included in the set). For example, the weighting factor may be the duration (for interest rate instruments) or the delta (for options instruments). In order to check for conformity of an order linked to a given **account** (or of changes to an existing order) involving an instrument that makes up an equivalent instrument, the **positions**, associated with the concerned **account**, in the instruments that make up said equivalent instrument

are aggregated into a single **position** in the equivalent instrument, which is processed according to the same risk weighting criterion that defines the equivalent instrument.

B3 may, at its sole discretion, add further limits to the minimum set shown above, as well as cancel or replace existing limits.

The result of the order or trade assessment may give rise to one of the procedures described below, conditioned on the limit and characteristics of the **investor**'s **account**:

(i) In the absence of registration of any of the *maximum order size* and *maximum size of a potential position in an instrument* limits, the order or order change is rejected and not included in the order book; in the absence of registration of the other limits, the protected mode is activated;

(ii) In the case of the *maximum order size* and *maximum size of a potential position in an instrument* limits in an **account** without a **give-up link** or an origin **account** of a **give-up link**, the order or order change assessment is processed before the order is included in the order book; therefore, if any of the limits is violated, the order is rejected and not included in the order book; and

(iii) In the other cases, the assessment is processed immediately after the order or order change is included in the order book or immediately after the trade is executed. Hence, after the violation of one or more limits is identified:

  (d) Cancellation orders are issued to cancel, depending on the violated limit, the order that violated the limit, if it is still pending execution, or all the **investor**'s orders; and

  (e) The protected mode is activated.

In case a **trading participant, foreign participant**, **full trading participant** or **settlement participant** assigns inadequate risk limits under such model to the **accounts** under its responsibility, B3 may, at its sole discretion:

- Determine an immediate review and adjustment of the limits the **participant** has assigned to **investors**;
- Limit the flow of orders from the **participant** and/or the **investor**;
- Require the **investor**, **settlement participant**, **full trading participant** or **clearing member** to post additional **collateral**; and
- Adopt additional prudential measures, in order to mitigate both operational risk and counterparty risk.

Protected mode: A trading mode which only admits orders that offset open interest, considering the previous day's closing **positions** jointly with the **transactions** executed during the day, with the **investor**'s identification, and reduce risk increment for **derivative** contracts. Risk increments, generated while long and short **positions** in the same risk factor are being offset, are permitted up

to a value established by B3. The protected mode can also be activated by the **trading participant**, **foreign participant**, **full trading participant**, **settlement participant** and by B3, regardless of any metric violation. In this case, however, cancellation orders are issued to all the orders in the order book associated with the **account** or the concerned **investor**.

4.2.2 Electronic trading of securities lending

The pre-trade risk monitoring carried out by the **clearinghouse** consists of the risk analysis of all the **investors** through the pre-trade risk management model for f B3's electronic system for trading **securities lending** contracts.

This model is based on the assessment of each order in relation to a set of limits, presented below, processed before ithey enter the order book. If an order results in the violation of one or more limits, it is rejected and not included in the order book. The applicable limitsby instrument, to which orders are subject, are defined by B3, while the values of aggregate limits mandatorily assigned to each **investor** are defined by the relevant **trading participant**, **foreign participant**, **full trading participant** or **settlement participant**.

The limits of the B3 pre-trade risk management model are based on:

- The characteristics of the assessed order (order side, quantity, etc.); the limits are applicable to borrowing orders earmarked for the free **subaccount** and uncertified lending oorders;
- The set of the **investor**'s orders included in the order book at the time of assessment;
- The set of the **investor**'s **securities lendings** contracts under the responsibility of the same **trading participant** and **clearing member**; and
- The trades carried out on behalf of the **investor** on the date of assessment.

New orders and order changes are subject to a minimum set of limits, which are defined below:

- **Potential borrower balance per asset**: the maximum daily quality of the **positions** in an instrument. This limit considers: (i) the quantity of contracts/**asset** unitsin the order; (ii) the balance of trades executed on the date of assessment; (iii) theorders entered by the **investor** and available in the **trading system**'s order book; and (iv) the quantity of contracts/**asset** units of which the **investor** appears as the **borrower** under the responsibility of the same **full trading participant** or **settlement participant**.
- **Potential lender balance per asset**: the maximum daily quantity of lender **positions** in an **instrument**. This limit considers: (i) the quantity of contracts/**asset** units in the order; (ii) the balance of trades executed on the date of assessment; (iii) the orders entered by the **investor** and available in the **trading system**'s order book; and (iv) the quantity of contracts/**asset** units of which the **investor** appears as the **lender** under the responsibility of the same **full trading participant** or **settlement participant**.

- **Potential aggregate borrowing balance**: the maximum daily financial exposure of borrowing **positions** in all **assets**. This limit considers: (i) the quantity of contracts/**asset** units in the oorder; (ii) the balance of trades executed on the date of assessment on all **assets**; and (iii) the orders entered by the **investor** and available in the **trading system**'s order book. The financial exposure is calculated by multiplying quantities (i) thru (iii) by the average price of the corresponding **asset** for the previous business day.
- **Potential aggregate lender balance**: the maximum daily financial exposure of lender **positions** in all **assets**. This limit considers: (i) the quantity of contracts/**assets** units in the order; (ii) the balance of trades executed on the of assessment date on all **assets**; and (iii) the orders entered by the **investor** and available in the **trading system**'s order book. The financial exposure is calculated by multiplying quantities (i) thru (iii) by the average price of the corresponding **asset** for the previous business day.

B3 may, at its sole discretion, adopt additional limits to the minimum set indicated above, as well as exclude or replace existing limits.

Limits are devaluated in a sequential manner, with the automatic rejection of an order change, whenever:

(i) The order or order change results in the violation of any established limits; or

(ii) The value of a limit associated with the concerned instrument is not registered in the risk management system.

In case a **trading participant, full trading participant** or **settlement participant** assigns inadequate risk limits under such model to the **accounts** under its responsibility, B3 may, at its sole discretion:

- Determine an immediate review and adjustment of the limits the **participant** has assigned to **investors**;
- Limit the flow of orders from the **participant** and/or the **investor**;
- Require the **full trading participant** to post additional **collateral**; and
- Adopt additional prudential measures, in order to mitigate both operational risk and counterparty risk.

4.2.3 Trading in systems operated by external system managing entities

In order to ensure the **clearinghouse** integrity and protection, the following rules over the adoption of pre-trade risk management systems are applicable to the **external system** managing entities for using services provided by the **clearinghouse**.

Concerning the relative to **transactions** under the **acceptance** upon closing the deal model, the **external system** managing entity must adopt a pre-trade risk management system into their

trading platform with the same functionalities and controls as the system defined and offered by B3 to its **participants**. Concerning **transactions** under the **capture** model, the pre-trade risk management system is optional in their platform.

In the case of adoption of pre-trade risk management system, the **external system** managing entity may, at its own discretion, choose to use a proprietary system or use the system provided by B3, by signing a licensing agreement. When the **external system** managing entity adopts a proprietary pre-trade risk management system, this system must have the same functionalities and controls as the system provided by B3, as assessed by B3 and attested by an external independent auditor duly authorized by CVM, of well-known reputation and credibility, and approved by B3. B3 must be granted enquiry access to the pre-trade risk management system employed by the **external system** managing entity, in order to be able to monitor in real time the risk parameters registered by the **external system** managing entity participants.

In addition to adopting a pre-trade risk management system as described above, regardless the **transactions acceptance** model, the **external system** managing entity must employ additional risk controls and mitigation mechanisms as those utilized by B3 in its own systems, namely:

- Other risk mitigation mechanisms and controls in the **trading system**:
  - (i) Order rejection tunnels preventing the registration of orders that reach certain price or quantity parameters;
  - (ii) Auction tunnels automatically submitting to auction any trades that reach certain price parameters, based on opening price, last traded price and price moving average;
  - (iii) Auction protection tunnels automatically extending an auction termination time in case the theoretical price or theoretical quantity thereof reach certain parameters;
  - (iv) Maximum quantity limit per order;
  - (v) Circuit breaker mechanism;
  - (vi) Control for the number of orders per second (throttle mechanism);
  - (vii) Automatic order cancellation in case of failure of the participant's electronic connection with the trading platform (cancel on disconnect mechanism); and
  - (viii) Automatic order cancellation whenever a trading parameter predefined by the user is reached (market protection mechanism).
- Other risk mitigation mechanisms and controls in the **lending system**:
  - (i) Order rejection tunnels preventing the registration of orders that reach certain **lending** rates;
  - (ii) Maximum quantity limit of **asset** per order; and
  - (iii) Control for the number of orders per second (throttle mechanism).

The settings and parameters of the tunnels and other control mechanisms referred to in paragraphs (i) thru (viii) above must be identical to those used by B3, and B3 must be able to monitor their adequacy n real time. The definition of such settings and parameters is exclusively incumbent on B3.

Upon request by the **external system** managing entity, B3 may review the feasibility of risk management mechanisms other than those listed above to be utilized, provided they are considered equivalent in terms of safety and of guaranteeing the integrity of the **clearinghouse**, the market and its **participants**.

In the event of failure to comply with the provisions of the **clearinghouse** rules and manuals, the **clearinghouse** may determine the interruption of the **acceptance** of **transactions** under the responsibility of one or more **participants** at any time, in which case the **external system** managing entity must be immediately notified.

4.3 Post-trade risk monitoring

In order to mitigate the risks associated with the **settlement** of **transactions** in **exchange-traded markets**, the **clearinghouse** monitors its own exposure to the credit risk of **participants** during the trading sessions, through monitoring the **intraday risk** arising out of **transactions**. This constant monitoring enables the **clearinghouse** to reduce its own risk exposure, anticipating **margin** and other **collateral** calls throughout the day and assuming a central role in the provision of risk mitigation mechanisms, which ensure the stability of the **settlement** structure in the event of **default** by one or more **participants**.

4.3.1 Intraday risk limit

One of the prerogatives of intraday risk monitoring in the post-trade environment is the definition, by the **clearinghouse**, of an **intraday risk limit** (*IRL*) for each **full trading participant** and **settlement participant**, relative to the performance of the relevant **participant** under a particular **clearing member**.

For each **full trading participant** and **settlement participant** an **intraday risk limit** is defined by the **clearinghouse** in connection with each **clearing member** under which the **full trading participant** or the **settlement participant** operates, which **intraday risk limit** may be reduced by the **clearing member**, since **clearing members** are ultimately responsible for the **settlement** of **transactions**, being incumbent on them to post **collateral** required of **participants**.

When posted by **full trading participants** or **settlement participants**, or by their **clearing members**, additional **collateral** calls are meant to cover the amount of risk exposure in excess of the relevant **intraday risk limit** level, thus preserving the operational regularity for those **participants**.

The **intraday risk limit** is a reference value for risk exposure, triggering additional **collateral posting** requirements by the **clearinghouse** for **full trading participants** or **settlement participants**, for

investors under their responsibility, or for the corresponding **clearing members**. When posted by a **full trading participant**, or **settlement participant**, or by the corresponding **clearing member**, such additional **collateral** is meant to cover the amount of risk exposure in excess of the relevant **intraday risk limit** level, thus preserving the operational regularity for said **full trading participant**, or **settlement participant**.

Through intraday monitoring of the **full trading participants**' and **settlement participants**' risk, the **clearinghouse** assesses, at the frequency it defines, adherence of the set of their **transactions** to the relevant limits applicable to **full trading participants** and **settlement participants**.

4.3.2 Operating balance

The operating balance of **full trading participant** or **settlement participant** P**,** called OB_P, relative to P's activities under **clearing member** CM, is a function of the **intraday risk limit** assigned to P, of posted **collateral** and of the risk associated with P's **transactions**, which is algebraically represented by the following equation:

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P \tag{4.2}$$

Where:

IRL_P: the **intraday risk limit** of **full trading participant** or **settlement participant** P ($IRL_P \geq 0$);

$Collateral_{CM,P}$: the amount of **collateral** posted by **clearing member** CM for operating balance purposes, in order to increase the operating balance of **full trading participant** or **settlement participant** P ($Collateral_{CM,P} \geq 0$);

$Collateral_P$: the amount of **collateral** posted by **full trading participant** or **settlement participant** P for operating balance purposes ($Collateral_P \geq 0$); and

$Risk_P$: the intraday risk associated with **full trading participant** or **settlement participant** P.

A nonadherent operating balance level is characterized by $OB_P < 0$, meaning that the intraday risk value of **full trading participant** or **settlement participant** P has exceeded (in absolute value) the

relevant **intraday risk limit** plus **collateral** earmarked for extending the operating balance (meaning **collateral** posted for operating balance purposes).

4.3.2.1 Intraday risk of full trading participants or settlement participants

The intraday risk of a **full trading participant** or **settlement participant** comprises the risk of the allocated **transactions** under the collateralization mode by the **full trading participant** or **settlement participant**, the residual risk of **investors** (that is, by considering their **positions** under the collateralization mode by the **investors** themselves and corresponding **collateral**), the risk of **transactions** pending **allocation** under the **full trading participant** or **settlement participant** responsibility, and the additional **margin** required of the **full trading participant** or **settlement participant**, according to the following equation:

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ inv} + Add\ margin_P \qquad (4.3)$$

Segregation between allocated **transactions** and unallocated **transactions** is necessary because certain trades may only be allocated at the end of the day or on the day following the date the **transactions** were executed. In general, while the sole source of uncertainty in connection with allocated **transactions** is market price volatility, unallocated **transactions** include an uncertainty that derives from the several possibilities for **transaction** distribution among **investors**.

Details of the calculation of each risk component for **full trading participants** or **settlement participants** are shown below.

(a) Risk associated with allocated transactions under collateralization mode by full trading participants or settlement participants

The risk associated with allocated **transactions** under the collateralization mode by **full trading participant** or **settlement participant** (P), that is, component $Risk_{Alloc\ trans\ coll\ P}$ of equation (4.3), is given by measure $Risk^{CORE2}_{P,No\ Coll}$, which is calculated according to module CORE2 of the CORE methodology, as described in chapter 7 (Risk calculation) of this manual, by considering the set of **transactions** under the collateralization mode by **full trading participant** or **settlement participant** P, or:

$$Risk_{Alloc\ trans\ coll\ P} = Risk^{CORE2}_{P,\ No\ Coll} \qquad (4.4)$$

(b) Risk of unallocated transactions

The risk associated with unallocated **transactions** (component $Risk_{Unalloc\ trans}$ of equation (4.3)) is based on the assumption of no **netting** between winning and losing **positions**, since such **positions** may be allocated to different **investors**.

That risk component for **full trading participant** or **settlement participant** P refers to the risk of P's **transactions** pending **allocation** to **investors**, that is, registered in transitory **accounts** under P's responsibility (**master accounts**, **brokerage accounts**, etc.) by the time risk is calculated. By the end of the **allocation** period, **positions** are no longer allowed to be held in transitory **accounts**, according to the **clearinghouse** operating procedures manual.

Calculation of said risk component is given by $Risk_{A,\,No\ Coll}^{CORE1}$, which is calculated by module CORE1 of the CORE methodology described in chapter 7 (Risk calculation) hereof.

(c) Residual risk of allocated transactions under collateralization mode by investors

The residual risk measure for the **transactions** allocated to the **accounts** under the responsibility of **full trading participant** or **settlement participant** P under the collateralization mode by **investors** (component $ResidRisk_{Alloc\ trans\ coll\ inv}$ of equation (4.3)) is given by the sum of the largest **collateral** deficits associated with such **accounts**, relative to the **positions** under the collateralization mode by **investors** and corresponding **collateral**:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = \sum_{j \in \Omega_P} ResidRisk_C^j \tag{4.5}$$

Where:

Ω_p: the set of N_p **investors**, under the responsibility of **participant** P, presenting the highest residual risks, where N_p is a parameter defined by B3 for **participant** P; and

$ResidRisk_C^j$: the *j*-th highest residual risk from among the residual risks of **investors** under the responsibility of **participant** P; ($ResidRisk_C^j \geq 0$).

The residual risk of **investor** C corresponds to the deficit of **collateral** in **investor** C's **accounts** under the responsibility of P, due to the risk of **investor** C's **positions** under the collateralization mode by the **investor** and corresponding **collateral**, and also to the additional **margin** required of **investor** C, according to equation (4.6). For this calculation, the **positions** registered in separate **accounts** held by **investor** C under **participant** P can be consolidated.

$$ResidRisk_C = -\min\left[Balance_C^{CORE0} - Add\ margin_C\ ,\ 0\right] \tag{4.6}$$

Where:

$Balance_C^{CORE0}$: the balance of **collateral**, which is calculated according to module CORE0 of the CORE methodology described in chapter 7 (Risk calculation) of this manual, by considering:

- **investor** C's opening **position** plus the **transactions** performed on the day and allocated to **investor** C's **accounts** under P's responsibility by the time risk is calculated, all such **transactions** under the collateralization mode by the **investor**; and
- **investor** C's **collateral** posted to cover such **positions**, that is, for **transaction** guarantee purposes; and

$Add\ margin_C$: the amount of **collateral investor** C must post due to a **position** limit violation or to any other need to post additional **collateral**, at B3's sole discretion.

The residual risk of **investors** is calculated during the day in two different ways:

(I) The so-called calculation "T0," which considers **transactions** whose **settlement** occurs on the day of calculation and aims to reflect the risk of the **investor** at the time of calculation; and

(II) The so-called calculation "T1," which considers T+1 as the reference date, meaning the date subsequent to the date of calculation, in order to provide **participants** with a preview value for the **margin** call to be met by the **investor** on the next day, anticipating events that change the **investor**'s **portfolio**, such as contract maturity, subportfolio 2 procedure (described in subsection 7.6.8 of chapter 7/Risk calculation hereof), among others.

(d) Additional margin

The last term of the risk equation for **full trading participant** or **settlement participant** P ($Add\ margin_P$) corresponds to the required amount of **collateral** to be additionally posted by P, at the sole discretion of B3.

4.3.2.2 Give-ups

With the purpose of computing the operating balance of **full trading participants** or **settlement participants**, a **transaction** allocated to an **account** with a **give-up** link is included:

- In the destination **account** of the **give-up** link (that is, under the responsibility of the **carrying participant**), if the **give-up** is not rejected; or

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

- In the origin **account** of the **give-up** link (that is, under the responsibility of the **executing participant**), if the **give-up** is rejected.

4.3.3 Trading participant and foreign participant's intraday risk

The **intraday risk** of **trading participant** TP or **foreign participant** FP, relative to its activities under a given **full trading participant** P, which is called $Risk_{TP/P}$ or $Risk_{FP/P}$, respectively,, is calculated according to the following equation:

$$Risk_{TP/P} = Risk_{Unalloc\ trans\ P/TP} + ResidRisk_{Alloc\ trans\ coll\ inv\ P/TP} \quad (4.7)$$

The terms $Risk_{Unalloc\ trans\ P/TP}$ and $Risk_{Unalloc\ trans\ P/FP}$ are calculated by module CORE 1 of the CORE methodology, as described in chapter 7 (Risk calculation) hereof, by considering all the **transactions** assigned to **master accounts** under the responsibility of **trading participant** TP or **foreign participant** FP, respectively, acting under **full trading participant** P and still not allocated to the **investor**. The terms $ResidRisk_{Alloc\ trans\ coll\ inv\ P/TP}$ and $ResidRisk_{Alloc\ trans\ coll\ inv\ P/FP}$ are calculated by using formula (4.5) and considering all the **investors**' **accounts** under the responsibility of **trading participant** TP or of **foreign participant** FP, respectively, acting under **full trading participant** P.

4.3.4 Criteria for accepting a transaction allocation cancellation request

A **transaction allocation** can only be cancelled when **clearinghouse** risk criteria are met. This restriction arises from the possibility that a cancelled **allocation** results in increased residual risk for the **investor** and/or operating balance violation for the corresponding **full trading participant** or **settlement participant**.

The risk criteria for accepting an **allocation** cancellation request consist of the following:

Rule 1: Let RC_p be the upper risk limit of **full trading participant** or **settlement participant** P for the automatic acceptance of a **transaction allocation** cancellation, as defined by B3.

If the risk value of a **transaction** whose **allocation** is intended to be cancelled—given by the amount of **collateral** that would be required if said **transaction** were to be considered alone (that is, as the single **position** of an **investor** with no **collateral**)—is less than or equal to RC_p, then the request for **allocation** cancellation is granted. Otherwise, the request is submitted to verification of rule 2.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Rule 2: Let:

- OB_p and OB'_p be the **full trading participant**'s or **settlement participant**'s operating balance levels obtained by considering, respectively, the maintenance of an **allocation** and the cancellation thereof; and
- $ResidRisk_C$ and $ResidRisk'_C$ be the **investor**'s residual risk values calculated according to equation (4.6) by considering, respectively, the maintenance of the **allocation** and the cancellation thereof.

An **allocation** cancellation request is granted when both (a) and (b) are met:

(a) $OB'_p \geq 0$ or $OB'_p - OB_P \geq 0$

(b) $ResidRisk'_C = 0$ or $ResidRisk'_C - ResidRisk_C \leq 0$

In either case, the authorization for an **allocation** cancellation may be contingent on the timely deposit of additional **collateral** with the **clearinghouse**, as the case may be.

4.3.5 Criteria for accepting position and collateral transfers

The approval of a request for the transfer of an **investor**'s **position** and/or **collateral**, whether changing ownership or not, depends on the risk analysis conducted by the **clearinghouse**.

Let:

- $ResidRisk_{C,Origin}$ and $ResidRisk'_{C,Origin}$ be the residual risk values associated with the **position**'s origin **account** by considering, respectively, the maintenance of the **position** in the origin **account** and the transfer thereof; and
- $ResidRisk_{C,Destination}$ and $ResidRisk'_{C,Destination}$ be the residual risk values associated with the **position**'s destination **account** and calculated, according to equation (4.6), by considering, respectively, the original **position** (that is, without the **position** intended to be transferred) and the final **position** resulting from the transfer.

A **position** transfer request is granted when both (a) and (b) are met:

(a) $ResidRisk'_{C,Origin} = 0$ or $ResidRisk'_{C,Origin} - ResidRisk_{C,Origin} \leq 0$

(b) $ResidRisk'_{C,Destination} = 0$ or $ResidRisk'_{C,Destination} - ResidRisk_{C,Destination} \leq 0$

In either case, the authorization for a **position** transfer may be contingent on the timely deposit of additional **collateral** with the **clearinghouse**, as the case may be.

4.3.6 Acceptance criteria for modifications to position coverage

A **position coverage** can only be modified when **clearinghouse** risk criteria are met. This restriction arises from the possibility that a modified **position coverage** might result in increased risk for the **investor**, operating balance violation by the corresponding **full trading participant**.

Let $ResidRisk_c$ and $ResidRisk'_c$ be the residual risk values for an **investor**, calculated, according to equation (4.6), by considering, respectively, the maintenance of a **position coverage** and the modification thereof. Condition (a) and/or (b) must be met:

(a) $ResidRisk'_c \leq 0$

(b) $ResidRisk'_c - ResidRisk_c \leq 0$

In either case, the authorization for a **position coverage** modification may be contingent on the timely deposit of additional **collateral** with the **clearinghouse**, as the case may be.

4.3.7 Criterion for the acceptance of amendments to securities lending agreements

Any amendments (renewal, modification of grace date and/or of reversion) to **securities lending** agreements can only be implemented when **clearinghouse** risk criteria are met. This restriction arises from the possibility that an amended **securities lending** agreement results in increased risk for the **investor** and/or operating balance violation for the corresponding **full trading participant** or **settlement participant**.

Let $ResidRisk_c$ and $ResidRisk'_c$ be the residual risk values for an **investor**, calculated according to equation (4.6), by considering, respectively, that the **securities lending** agreement will not be amended and that it will be amended. A **securities lending** agreement amendment request is granted when either (a) or (b) is met:

(a) $ResidRisk'_c = 0$

(b) $ResidRisk'_c - ResidRisk_c \leq 0$

In either case, the authorization for a **securities lending** agreement amendment may be contingent on the timely deposit of additional **collateral** with the **clearinghouse**, as the case may be.
For government debt **securities lending**, amendments to agreements will be further subjected to the **asset** eligibility verification to **securities lending**. Requests to amend agreements are accepted when, at the time of submitting the relevant request, the **asset** is eligible to **securities lending**; otherwise, the amendment request may be rejected by the **clearinghouse**.

4.3.8 Procedures for nonadherent operating balance levels

By monitoring intraday risk, B3 verifies adherence of the set of **transactions** of each **full trading participant** and **settlement participant** to their respective operating balance levels.

As the **full trading participant** or **settlement participant** performs the **allocation** of **transactions** via **clearinghouse** systems, the allocated trades are excluded from risk calculation for unallocated **transactions** and included in risk calculation for allocated **transactions**.

Therefore, the operating balance of the **full trading participant** or **settlement participant** is released through the **allocation** of **transactions** to **investors** whose **positions** are covered by a sufficient amount of **collateral**, or through **transactions** that offset the trades carried out on the day, leading to a decrease in the risk of their portfolios.

Through its services network, B3 provides **full trading participants** and **settlement participants** with specific applications to monitor their respective operating balance levels, as well as the parameters and other information used in the calculation thereof.

It is a duty of **clearing members**, **full trading participants** and **settlement participants** to get to know the operation of intraday risk monitoring and corresponding calculation criteria, in addition to continuously monitoring the evolution of information generated and provided by the **clearinghouse** throughout the day.

Adherence of a **full trading participant** or **settlement participant** to the corresponding operating balance level is monitored through the percentage of use of the relevant balance, given by the ratio between (i) intraday risk and (ii) **intraday risk limit** plus **collateral**:

$$Percentage\ of\ use = \frac{Risk_P}{IRL_P + Collateral_{P,CM}} \tag{4.8}$$

A nonadherent operating balance level is equivalent to a negative operating balance level, that is, to a percentage of use in excess of one-hundred percent (100%).

Full trading participants and **settlement participants** must anticipate the **transactions** they intend to execute, whether proprietary or for **investors**, by taking the necessary measures to avoid that the risk associated with their **transactions** exceeds the risk limits they were assigned plus the amount of their **collateral**, that is, to avoid that the percentage of use of their limits exceeds one-hundred percent (100%). Among those measures are:

(i) Simulating the impact of new **transactions**, whether allocated or not, on the percentage of use of their operating balance levels, by utilizing the application provided by B3;

(ii) Depositing in advance additional **collateral** of their own with the **clearinghouse**, in order to extend their operating balance levels;

(iii) Depositing in advance additional **collateral** with the **clearinghouse** for **transactions** that may result in increased risk exposure for one or more **investors**, as the volume thereof may cause

the violation of their operating balance levels, and promptly allocating **transactions** to their respective **investors**; and

(iv) Promptly allocating **transactions** that may result in reduced risk exposure for one or more **investors**, as such **transactions** may result in negative operating balance levels.

If the operating balance level of any **full trading participant** or **settlement participant** is nonadherent, that is, if the percentage of use of the relevant operating balance level exceeds one-hundred percent (100%), then the following measures are adopted:

(i) The **clearinghouse** notifies the **full trading participant** or **settlement participant** and the relevant **clearing member** of the nonadherent balance levels;

(ii) Within the time frame established by the **clearinghouse**, the **full trading participant** or **settlement participant** must take the necessary action to adjust operating balance levels, as follows:

(a) Post additional **collateral** with the **clearinghouse**;

(b) Allocate the **transactions** with the greatest impact on operating balance levels to the relevant **investors**, followed, if necessary, by the immediate posting of additional **collateral** by such **investors**; and

(c) Offset in the market the **transactions** with the greatest impact on operating balance levels, followed by the prompt **allocation** of the offsetting **transactions** to the corresponding **investors**;

(iii) If the **full trading participant** or the **settlement participant** does not adjust operating balance levels within the time frame set by the **clearinghouse**, the **clearinghouse** may:

(a) Require **collateral posting** of the relevant **clearing member** for operating balance purposes, in favor of the concerned **full trading participant** or **settlement participant**, granting to the **clearing member** a specific additional time to comply with such a requirement;

(b) Charge the amount required as **collateral** of the **full trading participant** or **settlement participant** to the relevant **clearing member**, through a debit entry of the corresponding amount to the **multilateral net balance** of such **clearing member** in local currency, to be settled in the next **settlement window**; and

(c) Grant an additional time to the **full trading participant** or **settlement participant** should the **clearinghouse** consider, at its sole discretion, that the delay in adjusting operating balance levels arises from operational problems beyond the control of the relevant **participant**;

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

(iv) If the **full trading participant** or the **settlement participant** does not adjust operating balance levels within the time frame set by the **clearinghouse**, in addition to the measures set forth in paragraph (iii) above, B3 may:

(a) Formally warn the **full trading participant**, or **settlement participant**, and relevant **clearing member** about the situation;

(b) Levy a **fine** on the **full trading participant** or **settlement participant**, which will be charged to the **multilateral net balance** of the **clearing member**;

(c) Prohibit new **transactions** from being executed under the responsibility of the **full trading participant** or **settlement participant**, except for those aimed at reducing open **positions**;

(d) Suspend, on a timely and precautionary basis, the access of the **full trading participant** to the B3 **trading** and **registration systems**;

(e) Suspend, on a timely and precautionary basis, the possibility of the **full trading participant** or **settlement participant** receiving, through **give-ups**, **transactions** executed by other **full trading participants** or **settlement participants**, notifying the other B3 **participants** of this determination; and

(f) Determine that some or all the **transactions** under the responsibility of the **full trading participant** or **settlement participant** be offset in the market, taking the necessary action to that end; and

(v) Should any of the measures referred to in the previous paragraphs be adopted, any costs or damages arising out of the suspension of a **participant**'s access to the B3 **trading system**, **registration system** and **give-up** system, as well as originating from **transactions** offset in the market are the sole responsibility of the concerned **full trading participant**, or **settlement participant**, and relevant **clearing member**.

The calculation criteria for the fine referred to in paragraph (iv)(b) will be established and published by circular letter. However, the amount of the fine might be set according to the amount of the nonadherent operating balance level (that is, of the negative operating balance level) and progressively with each repeated violation in the course of the previous twenty-four (24) month period.

In cases of repeated and unjustified nonadherent operating balance levels, the **clearinghouse** may, at its own discretion, require of the **full trading participant**, or **settlement participant**, and/or of the corresponding **clearing member** the maintenance of additional **collateral** with the **clearinghouse**, within the time frame established by B3, at an amount sufficient to reduce the possibility of future nonadherent operating balance levels.

B3 will notify BCB, CVM and BSM of the application of penalties referred to in the previous paragraphs.

Chapter 5 - Position limits

Position limits are employed by B3 as a prudential measure, in order to ensure the integrity of its markets, mitigating the liquidity risk and also the risks to the price discovery process. The policies and parameters associated with the **position** limits are defined by the B3 Central Counterparty Risk Internal Committee, which reviews periodically the appropriateness thereof in light of current market conditions. The parameters are disclosed to the market through the B3 website.

B3 sets **position** limits for **derivatives** and **securities lending**, which are applied to aggregate **positions** at various levels of **participant** aggregation and considers transactions made during the entirely negotiation period, including extended trading periods (after-market) and after-hours trading.

The **positions** outstanding at the various aggregation levels are monitored by the **clearinghouse** on a daily basis, in order to assess their adherence to the relevant limits. The **positions** are then compared to their respective limits and the quantities in excess of any such limit are considered a violation.

For each **derivative** contract or **securities lending** agreement, two limits are considered:

- Limit 1: the quantity relating to the **position** for which B3 also requires additional **margin**; and
- Limit 2: the quantity relating to the **position** upon which B3 also imposes a mandatory reduction associated with the portion thereof in excess of this limit, within a set time frame. In addition, B3 might decide to:

  (i) Require additional **margin**; and/or

  (ii) Levy a **fine**.

Where Limit 2 $\geq$ Limit 1.

Position limits are set for each instrument and group of instruments on **derivatives** contracts and **securities lending** agreements, based on the individual particularities thereof, which may be associated, among other things, with the underlying asset, maturity, liquidity, market type (futures, options, forwards, swaps or **securities lending**) and option type (calls or puts), where appropriate.

Limit 1 is applied to the following levels of **participant** aggregation:

- Agg_1: the **positions** held by an **investor** registered under the responsibility of a particular **full trading participant** or **settlement participant**;
- Agg_2: the **positions** held by an **investor** registered under the responsibility of all the **full trading participants** and **settlement participants**;
- Agg_3: the **positions**, registered under the responsibility of a particular **full trading participant** or **settlement participant**, held by different **investors** belonging to a group of **investors** presenting one or more characteristics defined by B3; and

- Agg_4: the **positions**, registered under the responsibility of all the **full trading participants** and **settlement participants**, held by different **investors** belonging to a group of **investors** presenting one or more characteristics defined by B3.

Limit 2 is applied to aggretation levels Agg_1, Agg_2, Agg_3 and Agg_4 and also to aggregation level Agg_5:

- Agg_5: the **positions** held by different **investors** registered under the responsibility of a particular **full trading participant** or **settlement participant**.

Limits 1 and 2 for any instrument or group of instruments at aggregation level i, denoted respectively by $Limit_{i,1}^{Agg}$ and $Limit_{i,2}^{Agg}$, are said to be violated when in excess of aggregate quantity $Q_i^{Agg}\left(P\right)$ of instrument i in connection with the **position** of **participant** or **participants** P at the relevant aggregation level, that is, if the following inequalities are verified:

$$Limit_{i,1}^{Agg} \leq Q_i^{Agg}\left(P\right)$$

$$Limit_{i,2}^{Agg} \leq Q_i^{Agg}\left(P\right)$$

B3 also sets **position** limits for the total open **positions** in each **asset** underlying **derivatives** contracts with **asset delivery** and **securities lending** agreements. Such limits are defined, both individually and jointly, for the following types of contracts and agreements: forwards, **securities lending** and options on **assets** traded in the **equities**, in the **organized OTC market**, in the **government bond market** and **corporate debt markets**.

If the **position** limit is reached, B3 will adopt procedures for its regularization, as described below:

(i) When the **position** limit has demonstrably been reached for a determined underlying **asset**, B3 will publish an External Communication communicating the fact and will suspend registration of new contracts. The registration of contracts aimed at rollovers and the closeout of existing **positions** may occur, subject to B3's authorization;

(ii) Identification all the **transactions** where the limit has been reached in the market and in the underlying **asset**, ordered by the time and date of the trade or of the registration in a descending order (from newest to oldest), excluding rollover **transactions**;

(iii) Definition, following this ordering, the totality of **positions** that must be closed out, so that total outstanding **positions** are covered by the prevailing limits, and will request the **participants** responsible for these **positions to execute the close out**;

(iv) B3 will publish an External Communication informing the market of the reestablishment of the registration of new contracts for the market and underlying **asset** in question.

The calculation of the **position** limits and the methodologies for determining the aggregate quantities considered for limit adherence purposes are contingent on the types of **position** and level of **participant** aggregation, and are described, respectively, in sections 5.1 and 5.2. The calculation of the additional **margin** required because of Limit 1 violation is discussed in section 5.3 and, finally, the conditions for granting a waiver request in case of violation of Limits 1 and 2 are dealt with in section 5.4.

Examples of the calculation and application of **position** limits are presented in appendix 3 of this manual.

The following types of contracts and agreements are considered:

- Futures and options contracts traded in the financial and commodity **derivatives** markets;
- **Securities lending** agreements based on **assets** traded in the equities and corporate debt markets;
- **Securities lending** agreements and **repo transactions** based on **assets** traded in the **government bond market**;
- Options contracts based on **assets** traded in the equities and corporate debt markets; and
- Swap, currency forward and flexible options contracts traded in the **organized OTC market**.

On a daily basis, B3 monitors the aggregate **positions** of groups of **investors** formed in accordance with the various criteria it defines, in connection with the **position** limits. For adherence purposes of groups of **investors** to the **position** limits, B3 also assesses whether the **investors** belonging to any such group meet at least one of the following features:

- Act in concert;
- Submit to the same decision-making authority for the purpose of trading in the financial and/or capital market; or
- Represent the same interests, at the sole discretion of either B3 or CVM.

For certain types of groups of **investors**, adherence to the **position** limits is automatically required. For other types, it depends on an assessment process that considers, among other inputs, information provided by the **full trading participants** or **settlement participants** responsible for the **positions** held at B3 as well as information obtained by B3 in other ways, such as the degree of synchronization between the **transactions** carried out by the concerned **investors** and their track records in the financial and/or capital market. At the end of this process, the decision of whether or not the group of **investors** adheres to the relevant **position** limits lies with B3.

Given the potential impacts of **position** limit violations on system liquidity and, as a consequence, on other market **participants**, and without prejudice to the actions contemplated above, should any such violation occur, B3 may, at its sole discretion and through the relevant **full trading participant** or **settlement participant**, require that a letter be forwarded by the **investor** or group of **investors**, containing information on the nature of their **positions** and on their trading strategies.

The **full trading participant** or the **settlement participant**, at the discretion of either **participant**, is allowed to set for **investors position** limits lower than those determined by B3, being also incumbent on the relevant **participant** to control the adequacy of the **positions** within the more restrictive limits.

Given that the **position** limits are applied to the consolidated **positions** of each **investor** or group of **investors** acting in concert, regardless of the **full trading participants**, **settlement participants** and **clearing members** responsible for such **positions**, B3 may contact any and all **full trading participants** and **settlement participants** under which the **investors** hold open **positions**.

B3 may, at its sole discretion and at any time:

- Modify the **position** limits applicable to any instrument or group of instruments, for one or more **participants** on an individual basis or for the market as a whole, even taking into account the nature of risk of the set of **transactions** in their **portfolios**;
- Require additional **margin** of **full trading participants** or **settlement participants** on account of Limit 1 violations at aggregation level Agg_5;
- Form groups of instruments other than those described in the following sections and apply to any such groups the **position** limit methodologies deemed the most appropriate; and
- Establish **position** limit values at aggregation level Agg_5 for the **full trading participants** or **settlement participants** acting as settlement agents in **give-ups** of trades executed at B3 in an amount greater than those defined for the **participants** that do not perform such an activity.

5.1 Defining the position limits

B3 may, at its sole discretion, assign different values to the parameters that define the **position** limits, according to the type of **position** and aggregation level of **participants**.

For any type of contract and level of **participant** aggregation, the quantity of instrument or group of instruments *i*, Q_i, is said to be long if $Q_i > 0$ or short if $Q_i < 0$, being denominated in each case $Q_{i,\mathrm{lg}}$ and $Q_{i,sh}$, respectively.

For swap and currency forward contracts traded in the **organized OTC market**, which involve a pair of underlying assets, denominating a long or short **position** requires prior definition of the reference underlying asset, so that a buying **position** in it is called long and, similarly, a selling position in it is called short.

5.1.1 Positions limits for financial and commodity derivatives markets and futures contracts on assets traded in the equities market with cash settlement – exchange traded

For futures contracts traded in the financial and commodity **derivatives** markets and futures contracts on **assets** traded in the **equities market** with cash **settlement**, an instrument is defined by the set of futures contracts on the same underlying with the same maturity.

For options contracts traded in the financial and commodity **derivatives** markets, an instrument definition varies according to:

Regular option: an instrument is the set of all the options of the same type (calls or puts) on the same underlying with the same expiration date. Thus:

- Call options on underlying asset A expiring on t define instrument i_1;
- Put options on underlying asset A expiring on t define instrument i_2;
- Call options on underlying asset A expiring on t' define instrument i_3;
- Put options on underlying asset A expiring on t' define instrument i_4 ; and so on.

Binary option: an instrument is the set of all the options on the same underlying with the same expiration date. Thus:

- Options on underlying asset A expiring on t define instrument i_1;
- Options on underlying asset A expiring on t' define instrument i_2; and so on.

Limits 1 and 2 for instrument i are defined as the maximum value between a percentage of the total number of contracts outstanding on that instrument and a fixed number of contracts, according to the following equations:

$$Limit_{i,1} = \max\left[P(i,1) \times Q_i^{Total} \ , \ L(i,1) \right]$$
$$Limit_{i,2} = \max\left[P(i,2) \times Q_i^{Total} \ , \ L(i,2) \right] \quad (5.1)$$

Where:

$P(i,n)$: the parameter, expressed as a percentage, defined by B3 for instrument i and limit n, n = 1 or 2;

$L(i,n)$: the fixed number of contracts defined by B3 for instrument i and limit n, n = 1 or 2; and

Q_i^{Total} : the total **positions** outstanding in the market on instrument i, as measured by the number of contracts.

Parameter $L\ i,n$ determines a minimum level of concentration that enables market development. Through said parameter it is possible to avoid restricting the development of emerging and/or less liquid markets, which could be compressed by imposing limits defined only in terms of market size. $L\ i,n$ is equally important for markets with an apparently low liquidity level, but with supply and demand levels highly sensitive to price.

B3 may, at its sole discretion, adopt different values for parameters $P(i,n)$ and $L(i,n)$, according to the type of **position** and aggregation level of **participants**.

For futures contracts, Q_i^{Total} corresponds to the total number of contracts outstanding in the instrument's market, that is, to half the sum of the number, in absolute value, of all the long and short **positions** in the instrument.

For options contracts, Q_i^{Total} corresponds to the total delta-equivalent quantity outstanding in the instrument's market, as given by equation 5.2:

$$Q_i^{Total} = \sum_{k \in SP} Q_{i,k,\text{lg}} \times abs\left(\Delta_{i,k}\right) \tag{5.2}$$

Where:

SP : the set of strike prices for the options contracts that define instrument i;

$OP_{i,k}$: the option belonging to instrument i with strike price k;

$Q_{i,k,\text{lg}}$: the total number of long **positions** in option $OP_{i,k}$; and

$\Delta_{i,k}$: the delta of option $OP_{i,k}$.

For instruments underlying futures or options contracts in the commodity **derivatives** market with physical **delivery** and maturity or expiration dates on the first contract month, B3 may set the following Limits 1 and 2:

$$Limit_{i,1} = \max\left[P(i,1) \times Q_i^{Total}\ ,\ L(i,1)\right] - convergence\ factor_{i,1}$$

(5.3)

$$Limit_{i,2} = \max\left[P(i,1) \times Q_i^{Total}\ ,\ L(i,1)\right] - convergence\ factor_{i,2}$$

$$convergence\ factor_{i,1} = \left\{\max\left[P(i,1)\times Q_i^{Total}\ ,\ L(i,1)\right] - \alpha(i,1)\times QD_i\right\}\times\frac{d(i,1)-d_{DN}}{d(i,1)} \quad (5.4)$$

$$convergence\ factor_{i,2} = \left\{\max\left[P(i,2)\times Q_i^{Total}\ ,\ L(i,2)\right] - \alpha(i,2)\times QD_i\right\}\times\frac{d(i,2)-d_{DN}}{d(i,2)}$$

Where:

$\alpha(i,n)$: the parameter, expressed as a percentage, defined by B3 for instrument i and limit n, n = 1 or 2;

QD_i : the quantity of underlying instrument i valid for **delivery**, as defined by B3;

$d(i,n)$: the parameter, in number of business days, defined by B3 for instrument i and limit n, n = 1 or 2; and

d_{DN} : the number of business days to the first day of the period for tendering **delivery notices**.

The determination of the **position** limits according to the previous equations aims to make said limits converge to a percentage of the quantity of the underlying asset valid for **delivery**.

5.1.2 Positions limits for forward contracts, securities lending agreements and options contracts on assets traded in the equities and corporate debt markets and futures contracts on assets traded in the equities market with cash settlement

For forward contracts, **securities lending** agreements and futures contracts on **assets** traded in the **equities market** with cash **settlement**, an instrument is defined for each underlying.

For options contracts on **assets** traded in the equities and corporate debt markets, an instrument is defined by the set of all the options on the same underlying with the same expiration date, regardless of the option type (call or put).

Limits 1 and 2 for each instrument and group of instruments are defined by the underlying asset quantity and given by the smaller of the following two quantities:

(i) A percentage of the total quantity of the underlying asset outstanding in the market; and

(ii) The maximum value between a percentage of the median of the quantity traded daily in the underlying asset and a fixed quantity.

Limits 1 and 2 for instrument i underlying the contracts referred to in the current subsection are given by the following equations:

$$Limit_{i,1} = \min\left[P_{Outst}\ i,1 \times Outst_i\ ,\ \max\left[P_{Trd}\ i,1 \times Q_i^{Trd}\ ,\ L\ i,1\ \right]\right]$$
$$Limit_{i,2} = \min\left[P_{Outst}\ i,2 \times Outst_i\ ,\ \max\left[P_{Trd}\ i,2 \times Q_i^{Trd}\ ,\ L\ i,2\ \right]\right] \quad (5.5)$$

Where:

$P_{Outst}\ i,n$: the parameter, expressed as a percentage, defined by B3 for underlying asset i and limit n, n = 1 or 2;

$Outst_i$: the outstanding quantity of underlying asset i;

$P_{Trd}\ i,n$: the parameter, expressed as a percentage, defined by B3 for underlying asset i and limit n, n = 1 or 2;

Q_i^{Trd} : the median of the quantity of underlying asset i traded daily over a given period of time defined by B3; and

$L\ i,n$: the fixed quantity, defined by B3, for underlying asset i and limit n, n = 1 or 2.

5.1.3 Position limits for securities lending agreements and repo transactions on assets traded in the government bond market

For **securities lending** agreements and **repo transactions** on **assets** traded in the **government bond market**, an instrument is defined by the set of **securities lending** agreements or **repo transactions** on the same underlying asset. The underlying asset is a government bond with a given maturity date.

Limits 1 and 2 for instrument i are defined as the maximum value between a percentage of the liquidity measure of the underlying asset quantity traded daily and a fixed quantity, according to the following equations:

$$Limit_{i,1} = \max\left[P_{Trd}\left(i,1\right) \times Q_i^{Trd}\ ,\ L\left(i,1\right)\right]$$
$$Limit_{i,2} = \max\left[P_{Trd}\left(i,2\right) \times Q_i^{Trd}\ ,\ L\left(i,2\right)\right] \quad (5.6)$$

Where:

$P_{Trd}\ i,n$: the parameter, expressed as a percentage, defined by B3 for underlying asset i and limit n, n = 1 or 2;

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Q_i^{Trd} : a liquidity measure in quantity of underlying asset i traded daily over a given period of time defined by B3; and

$L\ i,n$: the fixed quantity, defined by B3, for underlying asset i and limit n, n = 1 or 2.

5.1.4. Position limits for swap, currency forward and flexible options contracts traded in the financial and commodity derivatives markets – organized OTC market

The time to maturity of swaps, forwards and flexible options in the **organized OTC market** is not standardized, as it is freely agreed upon between the parties. Therefore, for the purpose of **position** limit control, the contracts are aggregated, according to their time to maturity, into maturity ranges. A range of maturities is delimited by minimum and maximum time to maturity, defined in business or calendar days.For cash settled flexible options in the financial and commodity **derivatives** markets, instrument i is defined by the set of all the options of the same type (calls or puts), same functionality (with or without a barrier price), on the same underlying asset and belonging to the same maturity range.

Limits 1 and 2 for instrument i are defined as the maximum value between a percentage of the total outstanding position in that instrument and a fixed quantity, according to the following equations:

$$Limit_{i,1} = \max\left[P(i,1) \times Q_i^{Total} \ , \ L(i,1) \right]$$
$$Limit_{i,2} = \max\left[P(i,2) \times Q_i^{Total} \ , \ L(i,2) \right] \quad (5.7)$$

Where:

$P(i,n)$: the parameter, expressed as a percentage, defined by B3 for instrument i and limit n, n = 1 or 2;

$L(i,n)$: the fixed quantity defined by B3 for instrument i and limit n, n = 1 or 2; and

Q_i^{Total} : the total **positions** outstanding in the market on instrument i.

B3 may, at its sole discretion, adopt different values for parameters $P(i,n)$ and $L(i,n)$, according to the type of **position**, aggregation level of **participants** and the method for determining the aggregate quantity, the latter especially in the case of continuous exercise options.

For swaps and currency forwards, Q_i^{Total} corresponds to the sum of the base value of the total long **positions** in instrument i.

For flexible options, Q_i^{Total} corresponds to the total delta-equivalent quantity outstanding in instrument i's market, as given by the following equation:

$$Q_i^{Total} = \sum_{l \in CTN} Q_{i,l,cp} \times abs\left(\Delta_{i,l}\right) \tag{5.8}$$

Where:

$CNT_{i,l}$: the set of flexible options contracts that define instrument i;

$FO_{i,l}$: the l-th flexible option belonging to instrument i;

$Q_{i,l,\text{lg}}$: the underlying asset quantity bought through flexible option $FO_{i,l}$; and

$\Delta_{i,l}$: the delta of contract $FO_{i,l}$.

5.1.5 Position limits for swaps, forwards and flexible options contracts on assets traded in the equities market with cash settlement – organized OTC market

The time to maturity of swaps, forwards and flexible options on **assets** traded in the **equities market** is not standardized, as it is freely agreed upon between the parties. Therefore, for the purpose of **position** limit control, the contracts are aggregated, according to their time to maturity, into maturity ranges. A range of maturities is delimited by minimum and maximum time to maturity, defined in business or calendar days.

For swap contracts on **assets** traded in the **equities market**, with cash **settlement**, an instrument is defined as the set of contracts on the same pair of underlying **assets** and belonging to the same maturity range. The designation of long or short **position** requires the prior definition of the reference underlying **asset**, such that an active **position** in it is called long, and similarly, a passive **position** is called short. For cash settled flexible options on **assets** traded in the **equities market**, an instrument is defined by the set of all the options of the same type (calls or puts), same functionality (with or without a barrier price), on the same underlying asset and belonging to the same maturity range.

Limits 1 and 2 for instrument i underlying the contracts referred to in this subsection are given by the following equations:

$$Limit_{i,1} = \min\left\{P_{Outst}\left(i,1\right)\times Outst_i, \max\left[P\left(i,1\right)\times Q_i^{Total}\ ,\ L\left(i,1\right)\right]\right\}$$

$$Limit_{i,2} = \min\left\{P_{Outst}\left(i,2\right)\times Outst_i, \max\left[P\left(i,2\right)\times Q_i^{Total}\ ,\ L\left(i,2\right)\right]\right\} \quad (5.9)$$

Where:

$P_{Outst}\ i,n$: the parameter, expressed as a percentage, defined by B3 for underlying asset i and limit n, n = 1 or 2;

$Outst_i$: the outstanding quantity of underlying asset i;

$P\left(i,n\right)$: the parameter, expressed as a percentage, defined by B3 for underlying asset i and limit n, n = 1 or 2;

$L\left(i,n\right)$: the fixed quantity, defined by B3, for underlying asset i and limit n, n = 1 or 2; and

Q_i^{Total} : the total **positions** outstanding in the market on instrument i, as defined in subsection 5.1.3.

B3 may, at its sole discretion, adopt different values for parameters $P_{Outst}\ i,n$, $P\left(i,n\right)$ and $L\left(i,n\right)$, according to the type of **position** and aggregation level of **participants**. For swap, forward, and flexible option contracts, the total quantity Q_i^{Total} is defined in a manner equivalent to that set forth in subsection 5.1.4.

5.1.6 Position limits for sets of derivatives contracts and securities lending agreements with common exposure to a certain primitive risk factor

B3 may, at its sole discretion, assign **position** limits to **derivatives** contracts and **securities lending agreements** subject to common exposure to a certain primitive risk factor (PRF). For each group of instruments, a "pivot" instrument, representing the liquidity available to manage the risk represented by the relevant PRF, will be defined, at the discretion of B3. When **position** limits are defined for a group of instruments, such group, its constituents and the corresponding pivot instrument will be published on the B3 website (www.b3.com.br).

Limits 1 and 2 for group of instruments *GF*, in the cases where the group's pivot instrument is traded in the **equities market** and **corporate debt market**, are given by the following equations:

$$Limit_{GF,1} = \min\{ P_{Outst}(GF,1) \times Outst_{GF},\ \max\left[P(GF,1) \times Q_{GF}^{Trd}, L(GF,1)\right]\}$$
$$Limit_{GF,2} = \min\{ P_{Outst}(GF,2) \times Outst_{GF},\ \max\left[P(GF,2) \times Q_{GF}^{Trd}, L(GF,2)\right]\} \quad (5.10)$$

In all other cases, limits 1 and 2 are given by the following equations:

$$Limit_{GF,1} = \max\left[P(GF,1) \times Q_{GF}^{Trd}, L(GF,1)\right]$$
$$Limit_{GF,2} = \max\left[P(GF,2) \times Q_{GF}^{Trd}, L(GF,2)\right] \quad (5.11)$$

Where:

$P_{Outst}(GF,n)$: the parameter, expressed as a percentage, defined by B3 for group of instruments *GF*, for limit *n*, *n* = 1 or 2, when the pivot instrument is traded in the **equities** and **corporate debt markets**;

$Outst_{GF}$: the outstanding quantity of the pivot instrument in group *GF*, when the pivot instrument is traded in the **equities** and **corporate debt markets**;

$P(GF,n)$: the parameter defined by B3 for group of instruments *GF*, for limit *n*, *n* = 1 or 2;

$L(GF,n)$: the fixed quantity defined by B3 for group of instruments *GF*, for limit *n*, *n* = 1 or 2; and

Q_{GF}^{Trd}: the median of the quantity of the pivot instrument in group *GF*, traded daily over a certain period of time defined by B3, when the pivot instrument is traded in the **equities** and **corporate debt markets**, or the total outstanding **position** in the market for the pivot instrument in group *GF*, in all other cases.

5.2 Determining the aggregate quantity considered for position limit adherence purposes

The methodology for calculating aggregate long and short **positions** at aggregation levels *Agg1* and *Agg2* may allow for the **netting** of long and short quantities held by the same **investor**, contingent on the type of contract.

The methodology for calculating aggregate long and short **positions** at aggregation levels *Agg3*, *Agg4* and *Agg5* does not allow for the **netting** of long and short quantities held by different **investors**, regardless of the type of contract.

For continuous exercise options, the methodology for calculating aggregated **positions** should also be carried out based on the sum of the quantities, in absolute value, of all **positions**, both long and short.

5.2.1 Aggregate quantities for futures contracts traded in the financial and commodity derivatives markets and futures contracts on assets traded in the equities market with cash settlement – exchange traded

The adherence of **positions** in an instrument underlying futures contracts to the **position** limits is assessed in connection with the number of outstanding contracts at each aggregation level and on each type of **position**. Two types of **positions** are evaluated for each instrument:

- Long **position**; and
- Short **position**.

The aggregate quantity of **investor** Inv in instrument i, under the responsibility of **full trading participant** or **settlement participant** P, at aggregation level Agg_1, denoted by $Q_i^{Agg}\left(Inv,P\right)$, is given by the net sum of the long and short quantities held by the same **investor** under the responsibility of P.

The aggregate quantity of **investor** Inv in instrument i at aggregation level Agg_2 is given by the following equation:

$$Q_i^{Agg_2}\left(Inv\right)=\sum_{j=1}^{N}Q_i^{Agg_1}\left(Inv,P_j\right) \tag{5.12}$$

Where N is the number of **full trading participants** and **settlement participants**.

The aggregate long quantities of group of **investors** G in instrument i at aggregation levels Agg_3 and Agg_4 are defined by equations (5.13) and (5.14), respectively:

$$Q_{i,\mathrm{lg}}^{Agg_3}\left(G,P\right)=\sum_{Inv\in G}Q_{i,\mathrm{lg}}^{Agg_1}\left(Inv,P\right) \tag{5.13}$$

$$Q_{i,\mathrm{lg}}^{Agg_4}\left(G\right)=\sum_{Inv\in G}Q_{i,\mathrm{lg}}^{Agg_2}\left(Inv\right) \tag{5.14}$$

The aggregate long quantity of **full trading participant** or **settlement participants** P in instrument i at aggregation level Agg_5 is determined by the following equation:

$$Q_{i,\mathrm{lg}}^{Agg5}\left(P\right)=\sum_{Inv\in P}Q_{i,\mathrm{lg}}^{Agg1}\left(Inv,P\right) \tag{5.15}$$

The aggregate short quantities at aggregation levels Agg_3, Agg_4 and Agg_5 are determined in an equivalent manner to the aggregate long quantities, according to equations (5.13), (5.14) and (5.15), respectively.

5.2.2 Aggregate quantities for forward contracts and securities lending agreements on assets traded in the equities, corporate debt and government bond markets

The adherence of **positions** in forward contracts and **securities lending** agreements to the **position** limits is assessed in connection with the underlying asset quantity associated with the **position**, at each aggregation level and for each type of **position**. Two types of **positions** are evaluated for each instrument:

- Long **position**: a long forward **position**, a lending **position** in a **securities lending** agreement or a sale of securities with a commitment to repurchase in a **repo transaction**; and
- Short **position**: a short forward **position** or a borrowing **position** in a **securities lending** agreement or a purchase of securities with a commitment to resale in a **repo transaction**.

Forward or **securities lending positions** to which an early **settlement** request has been submitted are not considered when calculating the aggregate quantities of the contracts and agreements discussed in this subsection.

The **positions** in mandatory agreements derived from the **delivery failure** management process are considered when calculating the aggregate quantities for the agreements discussed in this subsection.

Long and short **positions** in a particular instrument are not netted against each other at any level of **participant** aggregation.

The aggregate long quantity of **investor** Inv in instrument i, under the responsibility of **full trading participant** or **settlement participant** P, at aggregation level Agg_1, denoted by $Q_{i,\mathrm{lg}}^{Agg_1}\left(Inv,P\right)$, is given by the net sum of the long quantities held by the same **investor** under the responsibility of P.

The aggregate long quantity of **investor** Inv in instrument i at aggregation level Agg_2 is given by the following equation:

$$Q_{i,\mathrm{lg}}^{Agg_2}\left(Inv\right)=\sum_{j=1}^{N}Q_{i,\mathrm{lg}}^{Agg_1}\left(Inv,P_j\right) \tag{5.16}$$

Where N is the number of **full trading participants** and **settlement participants**.

The aggregate short quantities in instrument i at aggregation levels Agg_1 and Agg_2 are determined in an equivalent manner to the aggregate long quantities.

For the calculation of the aggregated quantity in an intermediary **account**, for an **investor** or group of **investors**, the long and short **positions** in instrument *i* have their compliance with the open interest **position** concentration limits assessed separately. For the calculation at the aggregation levels of **participants** and of the market, the aggregated quantity in instrument i is determined by the difference between the aggregated bought quantity and the aggregated sold quantity of this **investor** in this instrument.

The aggregate long quantities at aggregation levels Agg_3, Agg_4 and Agg_5 are defined by equations (5.13), (5.14) and (5.15), respectively.

The aggregate short quantities at the same **participant** aggregation levels are determined in an equivalent manner to the aggregate long quantities.

The total quantity of instrument i outstanding in the forward market, Q_{Fwd,A_i}^{Total}, is the sum of the quantities of underlying asset A_i associated with all the long **positions** outstanding in the market.

The total quantity of instrument i outstanding in the **securities lending** market, Q_{Lnd,A_i}^{Total}, is the sum of the quantities of underlying asset A_i associated with all the lending **positions** outstanding in the market.

5.2.3 Aggregate quantities for options contracts traded in the financial and commodity derivatives markets – exchange traded

The adherence of **positions** in an instrument or group of instruments underlying an option contract traded in the financial and commodity **derivatives** markets to the **position** limits is assessed in connection with the number of delta-equivalent contracts outstanding in the instrument or group of instruments, at each aggregation level and on each type of **position**. Two types of **positions** are evaluated for each instrument and group of instruments:

- Long **position**: the long delta-equivalent **position**; and
- Short **position**: the short delta-equivalent **position**.

For the calculation of the aggregate quantity in instrument i, consider:

SP : the set of strike prices of the options that define instrument i;

$\Delta_{i,k}$: the delta of the option belonging to instrument i with strike price k.

The aggregate quantity of **investor** Inv in instrument i, under the responsibility of **full trading participant** or **settlement participant** P, at aggregation level Agg_1 is given by the following equation:

$$Q_i^{Agg_1}(Inv,P) = \sum_{k \in SP} Q_{i,k}(Inv,P) \times \Delta_{i,k} \qquad (5.17)$$

Where $Q_{i,k}(Inv,P)$ is the long quantity of **investor** Inv in the option belonging to instrument i with strike price k, under the responsibility of **participant** P.

The aggregate long quantity of **investor** Inv in instrument i at aggregation level Agg_2 is given by:

$$Q_i^{AGG}\left(Inv\right) = \sum_{k \in SP} \Delta_{i,k} \times \left[\sum_{j=1}^{N} Q_{i,k}\left(Inv, P_j\right) \right] \tag{5.18}$$

Where N is the number of **full trading participants** and **settlement participants**.

The aggregate long quantities at aggregation levels Agg_3, Agg_4 and Agg_5 are defined by equations (5.13), (5.14) and (5.15), respectively.

The aggregate short quantities at the same **participant** aggregation levels are determined in a like manner, by considering $Q_{i,k}\left(Inv,P\right)$ as the short quantity of **investor** Inv in the option belonging to instrument i with strike price k, under the responsibility of P.

Aggregate quantities for a group of instruments of the same type on the same underlying asset

The **position** limits are applied to a group of instruments consisting of options of the same type on the same underlying asset. The only feature that distinguishes the instruments that make up the group of instruments is their expiration dates.

Long delta-equivalent **positions** and short delta-equivalent **positions** in options with different expiration dates belonging to a group of instruments are not netted against each other at any **participant** aggregation level.

The aggregate long delta-equivalent quantity of **investor** Inv in group of instruments TA, under the responsibility of **full trading participant** or **settlement participant** P, at aggregation level Agg_1 is given by the following equation:

$$Q_{TA,\mathrm{lg}}^{AGG}\left(Inv,P\right) = \sum_{i \in TA} Q_{i,\mathrm{lg}}^{AGG}\left(Inv,P\right) \tag{5.19}$$

Where TA is the group of instruments consisting of all the options of the same type on the same underlying asset A.

The aggregate short delta-equivalent quantity is determined in an equivalent manner.

The aggregate long delta-equivalent quantity of **investor** Inv in group of instruments TA at aggregation level Agg_2 is given by the following equation:

$$Q_{TA,\mathrm{lg}}^{Agg}\left(Inv\right) = \sum_{j=1}^{N} Q_{TA,\mathrm{lg}}^{Agg}\left(Inv,P_j\right) \tag{5.20}$$

The aggregate short delta-equivalent quantity is determined in a like manner.

The aggregate long delta-equivalent quantities at aggregation levels Agg_3, Agg_4 and Agg_5 are defined by equations (5.13), (5.14) and (5.15), respectively, by replacing index i by TA. The aggregate short delta-equivalent quantities are determined in an equivalent manner.

For continuous exercise options, in addition to the aggregations, quantities should be aggregated on an absolute value basis.

5.2.4 Aggregate quantities for options contracts on assets traded in the equities and corporate debt markets – exchange traded

The adherence of **positions** in an instrument or group of instruments consisting of options on **assets** traded in the equities and corporate debt markets to the **position** limits is assessed in connection with the underlying asset quantity. Two types of **positions** resulting from simulations are evaluated for each instrument and group of instruments:

- Long **position**: the greatest potential right to receive the underlying asset; and
- Short **position**: the greatest potential obligation to deliver the underlying asset.

The aggregate quantity of **investor** Inv in a particular instrument at aggregation level Agg_1, under the responsibility of a given **full trading participant** or **settlement participant**, is the largest quantity of the asset underlying call and put options belonging to the same instrument that might become a **delivery** obligation on the expiration date, according to a set of simulations. The aggregate short quantity is defined in a like manner.

Consider a set of call and put options belonging to the same instrument, expiring on T and held by a given **investor** under the responsibility of a **full trading participant** or **settlement participant**. The set of strike prices in ascending order is $\{K_1, K_2, ..., K_j, ..., K_n\}$.

Let $\{S_1, S_2, ..., S_{2n+1}\}$ be the set of underlying asset prices such that, for j = 1, 2, …, n, $S_{2j-1} < K_j$, $S_{2j} = K_j$ and $K_j < S_{2j+1} < K_{j+1}$, as illustrated in figure 5.1:

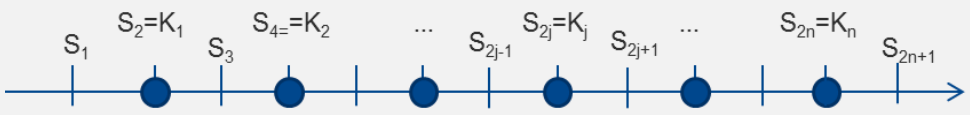


Figure 5.1 - Set of underlying asset prices

For each S_j, two underlying asset quantities are determined:

D_j: the potential quantity involving the obligation to deliver the underlying asset on *T*, given by the sum of the underlying asset quantities associated with the short **positions** with no **coverage**

in call options with strike prices less than S_j and with the long **positions** in put options with strike prices greater than S_j; and

R_j: the potential quantity involving the right to receive the underlying asset on *T*, given by the sum of the underlying asset quantities associated with the long **positions** in call options with strike prices less than S_j and with the short **positions** in put options with strike prices greater than S_j.

Quantities D_j and R_j are calculated according to the following equations:

$$D_j = -\sum_{K<S_j} min\left[Q_{Call,k}, 0\right] + \sum_{K>S_j} max\left[Q_{Put,k}, 0\right]$$

(5.21)

$$R_j = \sum_{K<S_j} max\left[Q_{Call,k}, 0\right] - \sum_{K>S_j} min\left[Q_{Put,k}, 0\right]$$

(5.22)

For each j, the net quantity of the obligation to deliver or of the right to receive the underlying asset is given by:

$$Q_j = R_j - D_j \tag{5.23}$$

If $Q_j > 0$, the simulation results in the right to receive the underlying asset (long **position**), and $Q_{j,sh} = 0$.

If $Q_j < 0$, the simulation results in the obligation to deliver (short **position**), and $Q_{j,\text{lg}} = 0$.

The aggregate long and short quantities of **investor** Inv in instrument i, under the responsibility of **full trading participant** or **settlement participant** P, at aggregation level Agg_1 are determined, respectively, by the following equations:

$$Q_{i,\text{lg}}^{Agg}\left(Inv, P\right) = \max_j\left(Q_{j,\text{lg}}\right) \tag{5.24}$$

$$Q_{i,sh}^{Agg}\left(Inv, P\right) = \min_j\left(Q_{j,sh}\right) \tag{5.25}$$

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The aggregate long quantity of **investor** *Inv* in instrument *i* at aggregation level Agg_2 is given by equation (5.16).

The aggregate long quantities at aggregation levels Agg_3, Agg_4 and Agg_5 are defined by equations (5.13), (5.14) and (5.15), respectively.

The aggregate short quantities at the same **participant** aggregation levels are determined in an equivalent manner.

Aggregate quantity for a group of instruments on the same underlying asset

The **position** limits are applied to a group of instruments on the same underlying asset. The only feature that distinguishes the instruments that make up the group of instruments is their expiration dates.

The **positions** with an obligation to deliver or a right to receive the underlying asset with different expiration dates are not netted against each other at any **participant** aggregation level.

Consider group of instruments *GA* consisting of options belonging to instruments with the same underlying asset *A* and different expiration dates.

The aggregate long quantities of **investor** *Inv* in group of instruments *GA* at aggregation levels Agg_1 and Agg_2 are given by equations 5.19 and 5.20, by replacing index *TA* by *GA*.

The aggregate long quantities of **investor** *Inv* in group of instruments *GA* at aggregation levels Agg_3, Agg_4 and Agg_5 are defined by equations 5.13, 5.14 and 5.15, respectively, by replacing index *i* by *GA*.

The aggregate short quantities in group of instruments *GA* at all the **participant** aggregation levels are calculated in an equivalent manner to the aggregate long quantities.

Total quantity outstanding in the market on an underlying asset

The total quantity outstanding in the options market based on **assets** traded in the **equities** and **corporate debt markets** is obtained by considering the group of instruments on the same underlying asset and measured as the quantity of the asset underlying the options in such group of instruments.

For group of instruments GA_i whose underlying asset is A_i, the total quantity outstanding in the market on the instruments belonging to this group is calculated by considering the **investors' delivery** obligations and receipt rights associated with all the instruments belonging to the group.

For each **investor** holding options on instrument *i*, the potential quantities involving **delivery** obligations and receipt rights associated with the underlying asset are respectively determined by

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

equations (5.21) and (5.22), and the net **delivery** obligation or receipt right associated with the underlying asset held by each **investor** is determined by equation (5.23).

The total aggregate long and short quantities in instrument *i* for the market are respectively determined by equations (5.24) and (5.25), by replacing index *Inv* by *Market*.

The total quantity outstanding in the market on instrument *i* is defined as the aggregate short quantity in this instrument. The total quantity outstanding in the market on underlying asset A_i is calculated by the sum of the total quantities outstanding in the market for all instruments *i* belonging to group of instruments GA_i.

5.2.5 Aggregate quantity for swap and currency forward contracts – organized OTC market

The adherence of **positions** in an instrument underlying swaps and currency forwards to the **position** limits is assessed in connection with the base value of the outstanding contracts at each aggregation level and on each type of **position**. Two types of **positions** are evaluated for each instrument:

- Long **position**; and
- Short **position**.

The aggregate quantity of **investor** Inv in instrument i, under the responsibility of **full trading participant** or **settlement participant** P, at aggregation level Agg_1, denoted by $Q_i^{Agg1}(Inv,P)$, is given by the net sum of the long and short base values held by the same **investor** under the responsibility of P. For equity swaps, the long or short notional value must be divided by the respective initial quotation of each contract and thus converted into quantities of shares.

The aggregate quantity of **investor** Inv in instrument i at aggregation level Agg_2 is given by the following equation:

$$Q_i^{Agg_2}(Inv) = \sum_{j=1}^{N} Q_i^{Agg_1}(Inv, P_j) \tag{5.26}$$

Where N is the number of **full trading participants** and **settlement participants**.

The aggregate quantities at aggregation levels Agg_3, Agg_4 and Agg_5 are determined by equations (5.13), (5.14) and (5.15), respectively.

5.2.6 Aggregate quantity for flexible options contracts traded in the financial, commodity and equities derivatives with cash settlement – organized OTC market

The adherence of **positions** in an instrument or group of instruments underlying a flexible option traded in the financial, commodity and equities **derivatives** markets with cash **settlement** to the

position limits is assessed in connection with the number of delta-equivalent contracts outstanding in the instrument or group of instruments, at each aggregation level and on each type of **position**. Two types of **positions** are evaluated for each instrument and group of instruments:

- Long **position**: the long delta-equivalent **position**; and
- Short **position**: the short delta-equivalent **position**.

For the calculation of the aggregate quantity in instrument i, consider:

CNT_i: the set of flexible options that define instrument i; and

$\Delta_{i,l}$: the delta of the l-th flexible option belonging to instrument i, that is, CNT_i.

The aggregate quantity of **investor** Inv in instrument i, under the responsibility of **full trading participant** or **settlement participant** P, at aggregation level Agg_1 is given by the following equation:

$$Q_i^{Agg_1}\left(Inv, P\right) = \sum_{l \in CNT} Q_{i,l}\left(Inv, P_j\right) \times \Delta_{i,l} \tag{5.27}$$

Where $Q_{i,l}\left(Inv, P\right)$ is the underlying asset quantity of the l-th flexible option belonging to instrument i held by **investor** Inv under the responsibility of **participant** P.

The aggregate quantity of **investor** Inv in instrument i at aggregation level Agg_2 is given by:

$$Q_i^{Agg_2}\left(Inv\right) = \sum_{J=1}^{N} \sum_{l \in CNT} Q_{i,l}\left(Inv, P_j\right) \times \Delta_{i,l} \tag{5.28}$$

Where N is the number of **full trading participants** and **settlement participants**.

The aggregate quantities at aggregation levels Agg_3, Agg_4 and Agg_5 are defined by equations 5.13, 5.14 and 5.15, respectively.

Aggregate quantity for a group of instruments

The **position** limits are applied to a group of instruments consisting of flexible options of the same type (calls or puts), same functionality (with or without a barrier price), on the same underlying asset. The only feature that distinguishes the definition of instrument from the definition of group of instruments is the maturity range.

The long delta-equivalent **positions** and the short delta-equivalent **positions** in flexible options with different maturity ranges belonging to a certain group of instruments are not netted against each other at any **participant** aggregation level.

The aggregate long delta-equivalent quantity held by **investor** Inv in group of instruments TA, under the responsibility of **full trading participant** or **settlement participant** P, at aggregation level Agg_1 is given by the following equation:

$$Q_{TA,\lg}^{Agg_1}\left(Inv,P\right)=\sum_{i\in TA}Q_{i,\lg}^{Agg_1}\left(Inv,P\right) \tag{5.29}$$

Where TA is the group of instruments consisting of all the options of the same type with the same functionality on the same underlying asset A.

The aggregate short delta-equivalent quantity is determined in an equivalent manner.

The aggregate long delta-equivalent quantity held by **investor** Inv in group of instruments TA at aggregation level Agg_2 is given by the following equation:

$$Q_{TA,\lg}^{Agg_2}\left(Inv\right)=\sum_{J=1}^{N}Q_{TA,\lg}^{Agg1}\left(Inv,P_j\right) \tag{5.30}$$

Where N is the number of **full trading participants** and **settlement participants**.

The aggregate short delta-equivalent quantity is determined in an equivalent manner.

The aggregate long delta-equivalent quantities at aggregation levels Agg_3, Agg_4 and Agg_5 are defined by equations 5.13, 5.14 and 5.15, respectively, by replacing index i by TA. The aggregate short delta-equivalent quantities are determined in an equivalent manner.

5.2.7 Aggregate quantities for a group of instruments on derivatives contracts with asset delivery and securities lending agreements on the same underlying asset

The **position** limits are applied to:

- Each group of instruments consisting of instruments on forward contracts and instruments on **securities lending** agreements; and
- Each group of instruments on options contracts based on **assets** traded in the equities and corporate debt markets that share the same underlying asset.

For **position** limit adherence purposes, the aggregate quantity is measured as the quantity of the asset underlying each group of instruments.

The total quantity outstanding in the market for the instruments belonging to the group of instruments whose underlying asset is A_i is determined by the following equation:

$$Q_{A_i}^{Total} = Q_{Opt,A_i}^{Total} + Q_{Fwd,A_i}^{Total} + Q_{Lnd,A_i}^{Total} \quad (5.31)$$

5.2.8 Aggregate quantity for sets of derivatives contracts and securities lending agreements with common exposure to a certain primitive risk factor

The adherence of **positions** in a group of instruments, subject to common exposure to a certain primitive risk factor (PRF), to the **position** limits is assessed in connection with the sum of the equivalent quantities of the group's pivot instrument.

Equities forward or **securities lending positions** to which an early **settlement** request has been submitted are not considered when calculating the aggregate quantities of the instruments belonging to the group of instruments.

The **positions** in mandatory agreements derived from the **delivery failure** management process are considered when calculating the aggregate quantities for the **securities lending** agreements belonging to the group of instruments.

Long and short **positions** in all of the instruments are consolidated into their equivalent quantities in the pivot instrument at **participants'** aggregation levels Agg_1, Agg_2, Agg_3, Agg_4 and Agg_5.

The total aggregate quantity in group *GF* of the instruments held by **investor** *Inv* under the responsibility of **full trading participant** or **settlement participant** *P*, at aggregation level Agg_1, is calculated by the net sum of the **positions** in all the instruments belonging to group *GF* held by the same **investor** under the responsibility of *P*, and is given by the following equation:

$$Q_{GF}^{Agg_1}(Inv,P) = \sum_{\substack{c \in GF \\ c \in Inv}} \left(Q_c^{Agg_1}(Inv,P) \times \Delta_{GF,c} \right) \quad (5.32)$$

Where:

$Q_c^{Agg_1}(Inv,P)$: the total quantity of instrument *c*, either long (positive sign) or short (negative sign), of **investor** *Inv* under the responsibility of **participant** *P*; and

$\Delta_{GF,c}$: a multiplicative factor that converts the quantities of instrument *c* into equivalent quantities in group *GF*'s pivot instrument.

The total aggregate quantity in group *GF* of the contracts held by **investor** *Inv* under the responsibility of **full trading participant** or **settlement participant** *P*, at aggregation level Agg_2, is given by the following equation:

$$Q_{GF}^{Agg_2}(Inv) = \sum_{j=1}^{N} Q_{GF}^{Agg_1}(Inv,P_j) \quad (5.33)$$

Where *N* is the number of **full trading participants** and **settlement participants**.

The total aggregate quantities in group *GF* of the contracts held by the **investors** belonging to group of **investors** *G*, at aggregation levels Agg_3 and Agg_4, are respectively given by the following equations:

$$Q_{GF,cp}^{Agg_3}(G,P) = \sum_{Inv \in G} Q_{GF,cp}^{Agg_1}(Inv,P) \quad (5.34)$$

$$Q_{GF,cp}^{Agg_4}(G) = \sum_{Inv \in G} Q_{GF,cp}^{Agg_2}(Inv) \quad (5.35)$$

The aggregate long quantity of **full trading participant** or **settlement participant** *P* in group of instruments *GF*, at aggregation level Agg_5, is determined by the following equation:

$$Q_{GF,cp}^{Agg_5}(P) = \sum_{Inv \in P} Q_{GF,cp}^{Agg_1}(Inv,P) \quad (5.36)$$

The aggregate short quantities at aggregation levels Agg_3, Agg_4 and Agg_5 are determined in an equivalent manner to the aggregate long quantities, according to equations (5.34), (5.35) and (5.36).

5.3 Additional margin required for position limit violation

The additional **margin** to be required of a **participant** in case of violation of any **position** limits is calculated at the instrument level, as given by the following formula:

$$\begin{aligned} AddMargin_P &= \left(MaxTM_i \times PropExcessLimit_{i,1} \times p_{i,1}\right) \\ &\quad + \left(MaxTM_i \times PropExcessLimit_{i,2} \times p_{i,2}\right) \\ PropExcessLimit_{i,n} &= ExcessLimit_{i,n} \times ProratedExcess_i \\ ProratedExcess_i &= \frac{|Q_i|}{\sum_{i \in P}|Q_i|} \\ ExcessLimit_{i,1} &= \min[\max[Q_P - Limit_1\ , 0]\ , Limit_2 - Limit_1] \\ ExcessLimit_{i,2} &= \max[Q_P - Limit_2, 0] \end{aligned} \quad (5.37)$$

Where:

$AddMargin_{i,P}$: the additional **margin** required of **participant** P;

$PropExcessLimit_{i,n}$: the proportional excess of instrument i, in number of contracts, in relation to the aggregate quantity of an instrument or group of instruments;

$ProratedExcess_i$: the proportion of each instrument in relation to the total aggregate quantity of **participant** P;

Q_i: the number of contracts in instrument i. In the case of groups of instruments with common exposure to a PRF, it is calculated in equivalent quantities of the pivot instrument in group *GF*;

Q_P the aggregate quantity of **participant** P in instrument *i* or in group *GF;*

$Limit_{i,n}$: the **position** limit for instrument i, at level n;

$MaxTM_i$: the maximum theoretical **margin** for instrument i, defined as $MaxTM_i = Balance_i^{CORE0}$, where $Balance_i^{CORE0}$ is calculated according to module CORE0 of the CORE methodology, as described in chapter 7 (Risk calculation) of this manual, by considering a hypothetical **portfolio** with only one unit of instrument i; and

$p_{i,n}$: the percentage set by B3 for $Limit_{i,n}$ violations, whose value depends on the **participant portfolio**, being equal to 100% for n = 2.

When additional **margin** is required of a group of **investors** due to the violation of Limit 1, the value of the additional **margin** required of each **investor** belonging to the same group must be in proportion to their **positions** in connection with the group's aggregate **position**.

5.4 Conditions for granting a waiver request in case of position limit violations

For the **position** limit violations listed below and upon review by the Central Counterparty Risk Internal Committee, B3 may accept waiver requests in the following cases:

(i) Those that are substantiated by the relevant **participant**;

(ii) Those in which the building, holding and closing out of the related **position** and **transactions** do not affect the quality of the price discovery process, under B3's assessment; and

(iii) Those in which the related **position** does not pose a risk to the stability of the **clearinghouse** operation.

The waiver request must be submitted to B3 by the **participant**, containing the **investor**'s identification, the list of instruments and related quantities subject to waiver, time period of waiver, a detailed description of the reason for holding the relevant **position** above limit and, if required by B3, any other elements supporting or declaring such need. When the waiver request covers contracts with different maturities on the same underlying **asset**, with the potential need to rollover **positions** between such instruments, the request must

also contain a detailed description of the trading strategy to be adopted for this purpose. Any such a strategy must be formulated with a view to carrying out the rollover in an orderly manner, subject to the instruments' liquidity and provided no impact on the price discovery process results therefrom.

B3 may also grant a waiver request for additional **margin** required in case of Limit 1 violations, in the event that the nonadherent **position** was caused by structured **transactions** or **portfolio transactions** executed by **investors** belonging to the same group of **investors** that virtually eliminates the individual risks of the violating **positions**.

B3 may allow a **position** to be held in excess of Limit 2 in the following cases:

(i) A passive nonadherent **position**, that is, arising from facts not associated with the **investor**'s performance, such as reduction of total open **positions**, changes to one or more parameters that define limit values, or reduction of liquidity in the concerned instrument;

(ii) A nonadherent **position** that is provenly required for hedging purposes of other securities transactions executed by the **issuer**, transactions that have the same underlying asset, or transactions held by the **investor** where the underlying is highly correlated, at the sole discretion of B3;

(iii) A nonadherent **position** derived from the **investor**'s activities as a market maker for the concerned contract;

(iv) A nonadherent **position** due to structured **transactions** or **portfolio transactions** aimed at synthesizing financial results and presenting, in the aggregate, a risk lower than that of one or more of the components of such **transactions**;

(v) A nonadherent **position** resulting from the execution of a differentiated **securities lending** agreement for IPO underwriters;

(vi) A nonadherent **position** originated in the execution of a **securities lending** agreement under the **borrower** or **lender** mode, in order to avoid a **delivery failure**;

(vii) A nonadherent **position** by an **investor** stemmed from **positions** under the responsibility of different decision-making authorities for the purpose of trading in the financial and/or capital market, or

motivated by different investment strategies, provided such **transactions** are duly segregated in separate **accounts**; and

(viii) A nonadherent **position** in a commodity contract traded in the **derivatives market** that is provenly required for hedging purposes and involves:

(i) Positions in the physical commodities market; and/or

(ii) Positions in purchase and sale contracts generating positions in the physical commodities market; and/or

(iii) Positions in securities whose values are directly determined by a commodity price in the physical market; and/or

(iv) Estimated production for the commodity produced by the **investor** or estimated demand for the commodity as an input in the production chain of which the **investor** is a part, both duly documented, at the discretion of B3, based on historical information.

Upon a formal request submitted to B3 by the **full trading participant** or **settlement participant** responsible for the concerned **investor**, the Central Counterparty Risk Internal Committee will review each case and decide on the request acceptance or rejection. The Central Counterparty Risk Internal Committee will review the request based, among other issues, on the nature of the activities performed by the **investor**, the risk of the **investor**'s **portfolio**, the financial capacity of the **investor** and **participants** in the **chain of responsibilities**, the quality of the **investor**'s internal control and compliance activities, under B3 assessment, the motivation for the **position** and for holding the **position**, the potential impacts of the request acceptance and rejection, and the trading conditions for the instrument. The acceptance of a request follows the Credit Risk Technical Committee's internal governance programming and practices and the assessment determines the appropriate level of waiver, which might be lower than requested. The acceptance of a request does not exempt the **participant** from posting the additional **margin** required.

For as long as a nonadherent **position** waiver, as described in paragraph (h), remains in force, the following rules apply to **position** management carried out by the **investor** and the **participants** concerned:

(i) When the waiver covers contracts with different maturities on the same underlying **asset**, any **transactions** needed to rollover the **position** to longer maturities must be executed in an orderly manner, subject to the instruments' liquidity and provided no impact on the **derivatives market** price discovery process results therefrom, according to the plan included in the waiver request accepted by B3;

(ii) In the case of a contract to be settled by physical **delivery**, the **commodity** to be delivered by the relevant **investor** must be certified, in accordance with the rules established for the contract by B3, at a volume equivalent to, at least, the total amount of the **position** to be held in excess of Limit 2; and

(iii) B3 may, at its sole discretion and in case market conditions are dysfunctional, determine the closeout of the **position** in excess of Limit 2, at a price equivalent to the fluctuation limit in force for the contract at the time.

The **investor** that was granted a waiver request for **position** limit adherence purposes and the **full trading participants** and **settlement participants** responsible for said **investor** are responsible for:

(ix) Timely informing B3 of any changes to the conditions on which the waiver request was based, including changes to the **investor**'s financial capacity; and

(ii) Ensuring that building, holding and closing out the **position** and executing **transactions** associated with the **position** not jeopardize the quality of the price discovery process.

Failure to comply with the above provisions will subject the **investor** and the **full trading participants** and **settlement participants** concerned to a warning or a **fine**. The amount of the **fine** will be defined according to the size of the **position** subject to waiver and debited to the **multilateral net balance** of the **clearing member**.

Holding a certain **position** in excess of Limit 2 is considered to pose a risk to the stability of the **clearinghouse** operation when it results in the violation of the following condition:

$$\sum_{j \in \Omega_N} ExcessRisk_{Inv}^{j} \leq M \tag{5.38}$$

$$ExcessRisk_{Inv} = \sum_{i} ExcessQty_{Inv}(i) \times MaxTM_{i} \tag{5.39}$$

Where:

Ω_N: the set of N **investors** whose **positions** in excess of their respective Limits 2 represent the highest risks; N is a parameter established by the B3;

$ExcessRisk_{Inv}^{j}$: the j-th highest risk, among the **investors**, of the **positions** in excess of Limit 2; the risk of the excess **positions** of each **investor** Inv is given by $ExcessRisk_{Inv}$;

M: a parameter established by B3;

$ExcessQty_{Inv}(i)$: the quantity of instrument i in **investor** Inv's **position** in excess of Limit 2; and

$MaxTM_i$: the maximum theoretical **margin** for instrument i, defined as $MaxTM_i = Balance_i^{CORE0}$, where $Balance_i^{CORE0}$ is calculated according to module CORE0 of the CORE methodology, as described in chapter 7 (Risk calculation) of

this manual, by considering a hypothetical portfolio with only one unit of instrument i.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Chapter 6 - Collateral management

Collateral management involves both the acceptance and the management of the **assets** that are delivered to the **clearinghouse** by **participants** in order to integrate its **safeguard structure**, including processes for moving **assets** and management of the use of **collateral** in the event of failure of **participants** to meet their obligations.

The acceptance of each type of **asset** as **collateral** is contingent on the fulfillment of criteria for the application of haircuts, deposit limits and other conditions that the **clearinghouse** may establish, at its sole discretion, in order to control and mitigate liquidity, credit and market risks in connection with the use of **collateral**, meaning the risk of not obtaining the necessary financial resources when **collateral** is monetized. Said criteria are defined based mainly on the volatility and the liquidity conditions of **assets**.

The **collateral** delivered to the **clearinghouse** by **participants** are not reused by the **clearinghouse**, except for the purpose of collateralizing liquidity mechanisms activated in case of **payment** failure by one or more **participants**.

Regarding custody and investment risks, the movement of **collateral**, including for execution purposes, is directly instructed by the **clearinghouse** to the **central depositories** previously authorized by the **clearinghouse** to post **collateral**, without the participation of third parties. As a way of mitigating its risk, the **clearinghouse** may establish and alter maximum limits on the value of **collateral** accepted by **central depository** authorized by the **clearinghouse** to post **collateral**, considering the economic and operational capacities of each **central depository**.

The maximum limits of **collateral** value assigned to each **central depository** authorized by the **clearinghouse** for **collateral** custody will be established by the B3 Central Counterparty Risk Internal Committee. The B3 Central Counterparty Risk Internal Committee may determine the alteration or blocking of these limits.

Collateral constituted in currency are held in the name of the **clearinghouse** and can be invested by B3 in accordance with B3's Financial Investment Policy, aiming to maintain a high level of liquidity and capital preservation.

Without prejudice to its responsibility for protecting the **collateral** received from **participants**, the **clearinghouse** will not compensate **participants** for the loss of **collateral** constituted in **assets** or currencies due to insolvency, negligence, fraud, mismanagement, or operational failure of the bank or **central depository** where they are deposited.

6.1 Eligibility criteria

Only the **assets** that have an acceptable level of risk, at the sole discretion of the **clearinghouse**, are eligible to be deposited. The eligibility criteria for **assets** to be accepted as **collateral** are described in detail in this section.

Irrespective of the acceptance of any given **assets** as **collateral** by the **clearinghouse**, the **trading participant**, **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member** responsible for the **transactions** and **positions** associated with such **collateral**, or **controlling guarantor**, in case the **collateral** was posted by the latter, are liable for the credit risk of the corresponding issuance, for the authenticity of the **assets**, and for the improvement and enforceability of the **collateral**, including in relation to **collateral** deposited abroad as well as for the immediate replacement thereof, if so determined by the **clearinghouse**. This liability goes even further, so as to include those cases where the **clearinghouse** deems that **collateral** had its integrity or enforceability affected. In such circumstances, the **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member** may be called upon to make the deposit of the corresponding amount in cash. The **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member** are responsible for the liquidation and/or receipt thereof, including in relation to **collateral** deposited abroad, as well as for the immediate replacement of such **collateral** or payment of the corresponding amount in cash, if determined by B3.

The **clearinghouse** will not accept the **collateral** constitution on **assets**:

(i) of **issuer** submitted to court-supervised or out-of-court reorganization, intervention, temporary special administrative proceeeding, bankruptcy, or out-of-court liquidation proceedings; and
(ii) to wich is attributed, at B3's discretion, a maximum haircut for **participant's** risk calculation purpose, greater than a defined parameter, periodically reviewed and disclosed by B3.

The maximum haircut referred in (ii) is defined as the return envelope scenario of the **asset**'s primitive risk factor, in accordance to chapter 7 of this manual.

At its sole discretion, B3 may refuse any **assets** presented as **collateral**.

6.1.1 Eligible assets

Collateral posting must be in local currency, but local currency may be replaced by the deposit of other **assets** and currencies, at the discretion of the **clearinghouse**. The following **assets** are eligible to be accepted by the **clearinghouse** as **collateral**, as replacements for local currency, subject to the restrictions indicated in the following sections and tables 6.2 and 6.3:

(i) Federal government bonds traded in Brazil (federal government bonds);

(ii) Shares of a stock issued by a publicly-traded company listed on B3;

(iii) Certificates of deposit of shares of a stock (units) issued by a publicly-traded company listed on B3;

(iv) American Depositary Receipts (ADRs) representing stocks eligible to be accepted as **collateral**;

(v) Brazilian Depositary Receipts (BDRs) representing equity assets traded abroad or Exchange Traded Fund (ETF) with reference index composed of fixed income, equity assets traded abroad, or gold as financial **asset** or silver as financial **asset**;

(vi) Fixed-income securities issued by **guarantee issuing banks**:

(a) Bank certificates of deposit (CDs);

(b) Real Estate Letters of Credit (LCIs); and

(c) Agribusiness Letters of Credit (LCAs);

(vii) United States dollars;

(viii) Euro;

(ix) Debt securities issued by the United States, German French, Dutch, Mexican and Canadian treasuries;

(x) Bank letters of credit (LCs);

(xi) ETF shares traded in Brazil;

(xii) Shares of the investment fund *B3 Margem Garantia Renda Fixa Referenciado DI Fundo de Investimento em Cotas de Fundos de Investimento* (FIC);

(xiii) Investment Fund B3 Clearinghouse Liquidity (FILCB) shares;

(xiv) Investment fund shares listed at B3;

(xv) Debentures; and

(xvi) Shares of stock of publicly-traded companies listed abroad (shares of stock traded abroad).

The **clearinghouse** adopts specific rules and procedures for individual **assets** to be accepted and constituted as **collateral** provided by the **participants**. At the discretion of B3, the acceptance criteria defined for each **asset** is a function, among others, of the **issuer** of the relevant **asset**, of the amount of **collateral** constituted by that **asset**, of the **participant** category to which the depositor belongs, and of the purpose of **collateral**.

The specific rules for each **asset** type are presented below.

Local currency

The deposit of local currency is automatically accepted by the **clearinghouse** for **collateral** constitution, with no need for prior consultation.

Collateral in local currency are not remunerated for any reason.

Federal government bonds traded in Brazil

The deposit of federal government bonds traded in Brazil is automatically accepted by the **clearinghouse** for **collateral** constitution, provided they are accepted at the BCB discount window.

The **clearinghouse** periodically publishes a list of the federal government bonds accepted as **collateral**.

The acceptance of federal government bonds as third-party **collateral** requires prior consultation to the **clearinghouse**, which evaluates the availability of the limits referred to in section 6.3.

Shares of stocks and certificates of deposit of shares of stocks (units) issued by publicly-traded companies listed on B3

Shares and units are eligible to be accepted as **collateral** by the **clearinghouse**, provided that the deposit thereof does not violate the limits referred to in section 6.3 and also that they meet all of the conditions listed below:

(i) Have, for the period of the last m_1 months ended, an average closing price equal to or greater than BRL1.00 (one Brazilian real);

(ii) Have been traded in at least p_1% of the trading sessions over the last m_2 months ended;

(iii) Have, for the period of the last m_3 months ended, a median of the daily number of trades at or above q;

(iv) Have, for the period of the last m_4 months ended, a median of the daily financial volume at or above v_1; and

(v) Have, for the period of the last m_5 months ended, a p_2% of the free float at or above v_2. For units, the free float is calculated based on the assets that make them up.

The values of the parameters indicated in items (i) through (iv) above are not necessarily equal to those established for other **assets** that are subject to the same criteria.

The acceptance of shares and units which have been admitted to trading on B3, or have been subject to **corporate action** events at a later date to the beginning of any of the periods established above (m_1, m_2, m_3, m_4 and m_5 months ended) will be reviewed by B3 on a case-by-case basis.

The acceptance of shares of other stocks and units listed on B3 requires prior consultation to the **clearinghouse** and is a function of the relevant **asset**'s liquidity conditions and risk.

B3 reviews and publishes periodically a list of the shares and units eligible to be accepted as **collateral** that do not require prior consultation to the **clearinghouse**, as well as the values assigned to parameters p_1, p_2, v_1, v_2, m_1, m_2, m_3, m_4 and m_5 of the eligibility criteria set forth above for shares of stocks and certificates of deposit of shares of stocks (units) issued by public-traded companies listed on B3 and the acceptance limits referred to in subsection 6.3.4.

The shares issued by B3 are not acceptable as **collateral**.

Only shares of the stocks or units that meet the following requirements are acceptable as **collateral**:

(i) They must be owned by the relevant depositor; and

(ii) They must be held in the deposit of the **B3 central depository**.

Brazilian Depositary Receipts (BDR)

BDRs are eligible to be accepted as **collateral** by the **clearinghouse**, provided that the BDRs thereof were issued by Brazilian depository institutions authorized by CVM that (i) have as coverage, securities issued by public-traded company with registered office abroad or (ii) ETF shares with reference index composed of fixed income or equity assets traded abroad, gold as financial **asset** or silver as financial **asset**, originating of the primary market, secondary market or new tender offer, whose deposit does not represent violation of the constitution referred to in section 6.3 and:

(a) For which the **clearinghouse** has established liquidity assistance mechanism for the **settlement** process (for example by means of liquidity assistance contract signed with one or more banks); or

(b) That they meet all the following criteria for accepting:

  (i) Have, for the period of the last m_1 months ended, an average closing price equal to or greater than BRL1.00 (one Brazilian real);

  (ii) Have been traded in at least p_1% of the trading sessions over the last m_2 months ended;

  (iii) Have, for the period of the last m_3 months ended, a median of the daily number of trades at or above q;

  (iv) Have, for the period of the last m_4 months ended, a median of the daily financial volume at or above v_1; and

The acception of BDR which have been admitted for trading on B3, or have been subject to **corporate action** at a later date to the beginning of any of the periods established above (m_1, m_2, m_3, m_4 and m_5 months ended) will be reviewed by B3 on a case-by-case basis.

B3 reviews and publishes periodically a list of the BDRs eligible to be accepted as **collateral** that do not require prior consultation to the **clearinghouse**, as well as the values assigned to parameters p_1, p_2, v_1, v_2, m_1, m_2, m_3, m_4 and m_5 of the eligibility criteria set forth above of BDRs and the acceptance limits referred to in subsection 6.3.4.

Only BDR that meet the following requirements is acceptable as **collateral**:

(i) They must be owned by the relevant depositor;

(ii) They must be held in the custody of the **B3 central depository**; and

(iii) For which there is a depository institution at Brazil and custodian institution in the country of the origin responsible for your maintenance in deposit.

The acceptance of BDR ETF shares depends on the availability of the limits referred to in section 6.3.

The deposit of BDR ETF shares traded in Brazil for **collateral** constitution is subject to prior consultation to the **clearinghouse**, which will analyze, among other aspects, the liquidity of the fund's benchmark index and rules.

B3 reviews and publishes periodically:

(a) a list of BDR ETFs eligible to be accepted as **collateral** that do not require prior consultation to the **clearinghouse**;

(b) the values attributed to the parameters p_1, v_1, m_1, m_2, m_3 and m_4 of criteria of eligibility above established to BDR ETF whose reference index is composed of fixed income or equity assets traded abroad or gold as financial **asset** or silver as financial **asset**,; and

(c) the acceptance limits referred to in section 6.3.4.

Shares of stock of publicly traded companies listed abroad

The shares of stock issued by publicly traded companies listed abroad which are eligible to be accepted as **collateral** are those for which the deposit does not represent a violation of the constitution limits established in section 6.3 and:

(a) For which the **clearinghouse** has established liquidity assistance mechanisms for the **liquidation** process (for example, through a liquidity assistance contract established with one or more banks); and

(b) Meet the following acceptance criteria:

a. Present, for the period of the last m_1 closed months, average closing prices equal or grater than US$1.00 (one US dollar);

b. Have been traded in at least p_1% of the trading sessions over the last m_2 closed months;

c. Present, for the period of the last m_4 closed months, daily median trade financial volume equal or greater than v_1; and

(c) Are included in the list of **assets** previously defined by the B3 **clearinghouse**. For the constitution of this list, the **clearinghouse** will analyze, among other aspects, the liquidity of each asset in question, as well as the characteristics of the markets in which it is traded and liquidated.

In the B3 website, the **clearinghouse** will publish the list of shares of stock traded abroad that are eligible to be accepted as collateral.

Fixed-income securities issued by guarantee issuing banks (bank CDs, LCIs and LCAs)

The acceptance of fixed-income securities issued by **guarantee issuing banks** (bank CDs, LCIs and LCAs) as **collateral** is subject to prior consultation to the **clearinghouse**, which assesses whether the limits referred to in section 6.3 are still available and also the risk of the relevant **asset**, by considering the features, the time to maturity, interest vote, the liquidity, and the market and credit risks of the **issuer** thereof.

Only the securities that meet the following requirements are acceptable as **collateral**:

(i) They must be issued by banks previously registered and reviewed by the **clearinghouse**;
(ii) Whose maturity is:
    a) up to 5 (five) years from the **collateral** deposit date, for securities with a "with daily liquidity specific condition" characteristic; or
    b) up to 2 (two) years from the **collateral** deposit date, for securities with a "with market daily liquidity condition" or "without liquidity condition" characteristic; and
(iii) fixed-rate or floating-rate indexed to the DI or IPCA.
(iv) They must be deposited in a depositary and cash settlement system authorized by BCB or CVM.

Bank letters of credit

The deposit of bank LCs for **collateral** constitution is subject to prior consultation to the **clearinghouse** and the acceptance thereof is contingent on whether the limits referred to in section 6.3 are still available.

The bank LCs that meet the following requirements are liable to be accepted as **collateral**:

(i) They must be issued by banks previously registered and reviewed by the **clearinghouse**;

(ii) The **issuers** thereof cannot be institutions that are linked to, or are subsidiaries or affiliates of, or are controlled by, or control the relevant depositor;

(iii) Their tenor and form must conform to the standards established by B3;

(iv) They must be signed by attorneys-in-fact of the **guarantee issuing bank** and affix a notary seal to attest to the authenticity of the signatures thereon;

(v) The issuance thereof must have been electronically confirmed by the corresponding **guarantee issuing bank**; and

(vi) They must not be issued as **collateral** of another banking financial institution.

The bank LCs posted as **collateral** must be replaced or amended prior to the maturities thereof, as determined by B3. Such a replacement follows the procedures for depositing new letters of credit and withdrawing the LCs to be replaced, in this order.

Exchange-traded fund shares traded in Brazil

- **ETF with reference index composed of fixed income or equity assets traded in Brazil**

  Are only eligible for acceptance as **collateral**:

  (a) ETF shares that meet the acceptance criteria set forth in paragraphs (i) thru (iv) applicable to shares of stocks and units are eligible to be accepted as **collateral** or, alternatively, whenever each one of the **assets** making up the ETF benchmark index;

  (b) ETF shares with a reference index composed of income assets, if each of the **assets** constituting the ETF's reference index is accepted as **collateral**.

- **ETF with reference index composed of fixed income or equity assets traded abroad or index composed of gold as financial asset or silver as financial asset**

  Only ETFs shares that meet the following requirements are eligible to be accepted as **collateral**:

  (a) With redemption of quotas settled in national currency or, alternatively for which the **clearinghouse** has established liquidity assistance mechanism for the **settlement** process of the ETF (for example by means of liquidity assistance contract signed with one or more banks); or

  (b) That comply the follow accept criteria:

  (i) Have, for the period of the last m_1 months ended, an average closing price equal to or greater than BRL1.00 (one Brazilian real);

  (ii) Have been traded in at least p_1% of the trading sessions over the last m_2 months ended;

  (iii) Have, for the period of the last m_3 months ended, a median of the daily number of trades at or above q;

  (iv) Have, for the period of the last m_4 months ended, a median of the daily financial volume at or above v_1.

ETFs with a reference index composed of fixed income assets traded abroad can only be accepted as collateral if each constituent asset of the ETF's reference index is accepted as collateral.

The acceptance of ETF shares depends on the availability of the limits referred to in section 6.3.

The deposit of ETF shares traded in Brazil for **collateral** constitution is subject to prior consultation to the **clearinghouse**, which will analyze, among other aspects, the liquidity of the fund's benchmark index and rules.

B3 reviews and publishes periodically:

(d) a list of ETFs eligible to be accepted as **collateral** that do not require prior consultation to the **clearinghouse**;

(e) the values attributed to the parameters p_1, v_1, m_1, m_2, m_3 and m_4 of criteria of eligibility above established to ETF whose index of refer is composed of fixed income, equity assets traded abroad or gold as financial **asset** or silver as financial **asset**,; and

(f) the limits referred to in section 6.3.

Shares of the investment fund *B3 Margem Garantia Renda Fixa Referenciado DI Fundo de Investimento em Cotas de Fundos de Investimento* (FIC);

The deposit of FIC shares is automatically accepted as **collateral** by the **clearinghouse**. Said investment fund, which is managed and administered by B3 Bank and held in the custody of the latter, was exclusively created to constitute **collateral** and is only made up of cash funds and federal government bonds.

The shares acquired by a **participant** are automatically pledged in favor of the **clearinghouse**, and only the **clearinghouse** can authorize the release thereof for redemption, being incumbent on the administrator to control the investments made in the fund.

Investment Fund B3 Clearinghouse Liquidity (FILCB) shares

FILCB shares are accepted for deposits associated with **settlement fund** contributions.

The shares acquired by a **clearing member**, **full trading participant**, **settlement participant**, and the B3 are automatically pledged in favor of the **clearinghouse**, and only the **clearinghouse** can authorize the release thereof for redemption, being incumbent on the administrator to control the investments made in the fund.

Investment fund shares traded at B3

Investment fund shares are eligible to be accepted as **collateral** only if they fulfill the acceptance criteria listed in items (i) through (iv) indicated below and if they belong to one of the fund types listed on B3's website.

(i) Have, for the period of the last m_1 months closed, average daily closing price equal to or above R$ 1.00 (one real);

(ii) Have been traded on at least p_1% of the trading sessions in the last m_2 months closed;

(iii) Have, for the period of the last m_3 months closed, median daily number of trades equal to or above q ; and

(iv) Have, for the period of the last m_4 months closed, median daily traded volume equal too or above .

The parameter values indicated in items (i) through (iv) are not necessarily equal to those established for other **assets** that are subject to the same criteria.

The eligibility of fund shares is conditioned on the approval of the regulation, as well as by the fund administrator and the fund manager.

Additionally, fund shares traded at B3 are only accepted as **collateral** if they are:

(i) Owned by the depositor; and
(ii) Deposited at the B3 central depositary.

Debentures

Debentures are eligible to be accepted as **collateral** by the **clearinghouse**, provided that the deposit thereof does not violate the limits referred to in section 6.3 and also that they meet all of the conditions listed below:

(i) Have an issuer´s credit rating by all credit rating agencies that rate it equal to or higher than r_1;
(ii) Have an average maturity (*duration*) of less than y_1 years;
(iii) Have, for the period of the last m_1 months ended, an average of the daily financial volume at or above v_1;
(iv) Have an issuance volume equal or greater than v_2;
(v) Have a maximum difference of s_1 between the indicative rate of the debenture and the indicative rate of the government bond with equivalent average time to maturity (*duration*) and index, where the indicative rates are references for marked-to-market and calculated by B3 as IRR (internal rate of return) expressed as a percentage per year; and
(vi) Have been traded in at least p_1% of the trading sessions over the last $m_2$months ended.

The debenture is accepted as **collateral** only if:

(i) Owned by the depositor;

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

(ii) Accepted by the BCB for the Financial Liquidity Line (LFL);

(iii) With a defined maturity date;

(iv) Without the possibility of conversion or exchange into other **assets**;

(v) Issued by a company listed in the listing segments defined by B3; and

(vi) Deposited in a **central depository** authorized by the CVM.

Debentures issued by B3 or companies within B3's economic group are not accepted as **collateral**.

B3 periodically reviews and publishes the list of debentures accepted as collateral that do not require prior consultation with the CCP, as well as the values assigned to the parameters m_1, m_2, p_1%, v_1, v_2, r_1, s_1 e y_1 of the eligibility criteria established above for debentures and the acceptance limits referred to in section 6.3.4.

Assets deposited abroad

Term, futures and options contracts on agricultural products entered into by nonresident **investors** pursuant to paragraph 1 of article 13 of Joint Resolution BCB and CVM #13, of December 3, 2024 are allowed to post as **collateral** US dollars and securities issued by the US Treasury, which represent the only **assets** acceptable to constitute **collateral** by said **investors**. The nonresident **investors** domiciled in the United States of America, United Kingdom, France, Netherlands, Cayman Islands and Luxembourg pursuant to the types indicated in table 6.1, as well as **investors** resident in Brazil under the provisions of BCB Resolution number 469 and BCB resolution number 304, are allowed to post the following **assets** as **collateral**, subject to the restrictions set out below and to the limits referred to in section 6.3:

(i) US dollars;

(ii) Euro;

(iii) Debt securities issued by US Treasury, denominated in the local currency of the issuing country;

(iv) Debt securities issued by German Treasury, denominated in the local currency of the issuing country; and

(v) ADRs representing stocks eligible to be accepted as **collateral**.

Nonresident investors domiciled in the United States of America, United Kingdom and Netherlands, of the types indicated in Table 6.1 and **investors** resident in Brazil, are authorized to deposit as collateral, in addition to the assets listed above, debt securities issued by the French, Dutch, Mexican and Canadian treasury, denominated in the local currency of the issuing country, subject to the restrictions set forth below and the limits referred to in section 6.3.

Nonresident **investors** domiciled in the United States of America, the United Kingdom and the Netherlands, of the types indicated in table 6.1 and **investors** resident in Brazil are authorized to

deposit as **collateral**, in addition to the above listed assets, shares of stock of companies that are publicly-traded abroad (shares of stock traded abroad) that meet the conditions defined above.

Collateral in the following currencies are not remunerated for any reason:

1- US Dollars
2- Euro

The **clearinghouse** publishes on the B3 website a list of debt securities issued by treasuries from foreign countries, ADRs and shares of stock traded abroad which are eligible to be accepted as **collateral**.

The **clearinghouse** publishes periodically a list of **assets** deposited abroad which are eligible to be accepted as **collateral**.

Home jurisdiction	Investors eligible to post collateral abroad (Type of investor in home jurisdiction)
United States of America	**1.** ***Certain Debtors Subject to the US Bankruptcy Code:*** **(a)** ***Mutual funds, hedge funds*** **and** ***nonfinancial entities that are organized as corporations, limited liability companies, partnerships*** **and** ***business trusts*** ▪ Relevant legislation/regulations*: United States Bankruptcy Code* **(b)** ***Futures commission merchants (FCMs)*** **registered with the** ***Commodity Futures Trading Commission (CFTC)*** ▪ Relevant legislation/regulations: *CFTC Rules*
	2. ***Investment Banks, Brokers*** (include *broker-dealers* that are *CFTC*-registered *FCMs*) ▪ Relevant legislation/regulations: *Securities Investor Protection Act*
	3. ***Nationally- and State-Chartered Commercial Banks*** (*nationally- and state-chartered banking and savings institutions that take deposits insured by the Federal Deposit Insurance Corporation*) ▪ Relevant legislation/regulations: *Federal Deposit Insurance Act*
	4. ***Systemically Important Financial Institutions*** (*financial companies that could be "Certain Debtors Subject to the US Bankruptcy Code" and "Investment Banks, Brokers" but whose failure and resolution under an otherwise applicable legal regime would have, as determined by the US Secretary of the Treasury, serious adverse effects on the financial stability of the United States*) ▪ Relevant legislation/regulations: *Dodd-Frank Wall Street Financial Reform and Consumer Protection Act of* 2010

Home jurisdiction	Investors eligible to post collateral abroad (Type of investor in home jurisdiction)
	5. ***New York State-Licensed Branches of non-US Banks*** ▪ *Branches of non-US banks that are licensed under New York law and supervised by the New York Department of Financial Services (NYDFS)* ▪ Relevant legislation/regulations: *New York Law*
United Kingdom	**1.** ***Investment Firms*** ▪ Include *Investment Banks, Brokers* and *Fund Managers* ▪ Relevant legislation/regulations: *Regulation (EU) No. 575/2013 of the European Parliament and of the Council on prudential requirements for credit institutions and investment firms (CRR), Banking Act 2009* *Directive 2004/39/EC of the European Parliament and of the Council on Markets in Financial Instruments (MiFID), Financial Services and Markets Act 2000*
	2. ***English Credit Institutions*** ▪ Relevant legislation/regulations: *Financial Services and Markets Act 2000*
	3. ***UK-Regulated Branches of Third Country Credit Institutions and Investment Firms*** ▪ Relevant legislation/regulations: *Financial Services and Markets Act 2000* *Prudential Regulation Authority (PRA)* *Financial Conduct Authority (FCA)*
	4. ***Other UK-Incorporated Entities*** ▪ Other than *English Investment Firms* or *English Credit Institutions* ▪ Relevant legislation/regulations: *Companies Act 2006*
France	**1.** ***Credit Institutions ("établissements de crédit")*** ▪ Relevant legislation/regulations: *"Code monétaire et financier"*
	2. ***Investment Firms ("entreprises d'investissement")*** ▪ Relevant legislation/regulations: *"Code monétaire et financier"*
	1. ***Private limited liability company* (*besloten vennootschap met beperkte aansprakelijkheid*)** ▪ Relevant legislation/regulations: *Netherlands Civil Code (Burgerlijk Wetboek, "NCC")* **2.** ***Public limited liability company (naamloze vennootschap)***

Home jurisdiction	Investors eligible to post collateral abroad (Type of investor in home jurisdiction)
Netherlands	▪ Relevant legislation/regulations: *Netherlands Civil Code (Burgerlijk Wetboek, "NCC")* **3. *Foundation (stichting)*** ▪ Relevant legislation/regulations: *Netherlands Civil Code (Burgerlijk Wetboek, "NCC")*
	4. *Limited partnerships (commanditaire vennootschap)* ▪ Relevant legislation/regulations: *Netherlands Commercial Code (Wetboek van Koophandel)* **5. *General partnerships (vennootschap onder firma)*** ▪ Relevant legislation/regulations: *Netherlands Commercial Code (Wetboek van Koophandel)* **6. *Investment funds*** *(structured as a pool of assets and liabilities based upon a sui generis contractual relationship established under Netherlands Law between a manager, title holder and participants, referred to as a fund for joint account (fonds voor gemene rekening) ("FGR"))* ▪ Relevant legislation/regulations: *Netherlands Law*
	7. *Credit Institutions:* *credit institutions (kredietinstellingen) as defined in Article 4 "CRR" incorporated under Netherlands Law, in the form of a public limited liability company, and licensed pursuant to Section 2:12 or Section 2:13 Netherlands Financial Supervision Act (Wet op het financieel toezicht, "NFSA") ("Banks");* ▪ Relevant legislation/regulations: *Regulation (EU) 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firm* *Netherlands Law* *Netherlands Financial Supervision Act (Wet op het financieel toezicht, "NFSA")* **8. *Investment Firms:*** *investment firms (beleggingsondernemingen)* ▪ Relevant legislation/regulations: *Netherlands Financial Supervision Act (Wet op het financieel toezicht, "NFSA")*
	9. *Investment Institutions**:* (a) ***Investment companies (beleggingsmaatschappijen)*** *as defined in Section 1:1 NFSA incorporated under Netherlands Law in the form of a private or public limited liability company and having their registered seat in the Netherlands that are: (i) required to obtain and have obtained a license pursuant to Section 2:65(b) NFSA; or (ii)managed by a manager (beheerder van een beleggingsinstelling) as defined in Section 1:1 NFSA in the form of a private or public limited liability company incorporated*

	under Netherlands Law that is required to obtain and has obtained a license pursuant to Section 2:65(a) NFSA ("AIFM") (such party hereinafter, an "AIF Company")) ▪ Relevant legislation/regulations: *Netherlands Financial Supervision Act (Wet op het financieel toezicht, "NFSA")* (b) ***Companies for collective investment in transferable securities*** *(maatschappij voor collectieve belegging in effecten) as defined in Section 1:1 NFSA, incorporated under Netherlands Law in the form of a private or public limited liability company and having their registered seat in the Netherlands that are: (ii) licensed pursuant to Section 2:69b(1)(b) NFSA; or (ii) managed by a management company (beheerder van een icbe) as defined in Section 1:1 NFSA in the form of private or public limited liability company incorporated under Netherlands Law, that is required to obtain a license and has obtained a license pursuant to Section 2:69b(1)(a) NFSA (the "UCITS Manager") (such party hereinafter, a "UCITS Company");* ▪ Relevant legislation/regulations: *Netherlands Law* *Netherlands Financial Supervision Act (Wet op het financieel toezicht, "NFSA")* (c) ***Investment funds*** *(beleggingsfondsen) or funds for collective investments in transferable securities (fonds voor collectieve belegging in effecten) in each case as defined in Section 1:1 NFSA, in the form of a pool of assets and liabilities based upon a sui generis contractual relationship governed by Netherlands Law among: (i) an AIFM or a UCITS Manager respectively; and (ii) a title holder (bewaarentiteit) incorporated under Netherlands Law that is legally entitled (rechthebbende) to the fund assets and the legal debtor of the fund liabilities (the "Title Holder")[1], and (iii) participants (deelnemers) as defined in Section 1:1 NFSA (such party hereinafter referred to as an "AIF" or a "UCITS Fund" respectively).* *([1] This Title Holder must be distinguished from the depositary (bewaarder) as referred to in the AIFM Directive (Directive 2011/61/EU of the European Parliament and of the Council of 8 June 2011, "AIFMD") and the UCITS V Directive (Directive 2014/91/EU of the European Parliament and of the Council of 23 July 2014, "UCITS V") and defined in Section 1:1 NFSA. Pursuant to Section 4:62m NFSA, every Manager must appoint a depositary (bewaarder) as defined in Section 1:1 NFSA ("Depositary") for each investment institution or UCITS under its management. The Depositary's duties include ensuring that the investment policy is properly implemented, that cash flows are properly monitored and that the investment institution's assets are correctly administered).* ▪ Relevant legislation/regulations:*Netherlands Law* *Netherlands Financial Supervision Act (Wet op het financieel toezicht, "NFSA")*

Home jurisdiction	Investors eligible to post collateral abroad (Type of investor in home jurisdiction)
	(An AIF and a UCITS Fund that have the form of a Limited Partnership or an FGR and are hereinafter collectively referred to as the "Investment Fund". A UCITS Company and an AIF Company are collectively referred to as an "Investment Company". An Investment Fund and an Investment Company are collectively referred to as an "Investment Institution". *A UCITS Manager and an AIFM are collectively referred to as the "Manager").*
	10. *Non-Regulated Entities* Do not include *Bank, Investment Firm* or *Investment Institution.*
Cayman Islands	**1.** *Companies, banks, securities dealers, insurance companies, mutual funds and hedge funds which are established as entities falling within*: ***a. Company incorporated or organised under the laws of the Cayman Islands ("Company"), including limited duration companies incorporated or organised in the Cayman Islands*** ▪ Relevant legislation/regulations: *Companies Law (2018 Revision) of the Cayman Islands*. ***b. Limited liability company incorporated under the laws of the Cayman Islands (a "LLC")*** ▪ Relevant legislation/regulations: *Limited Liability Companies Law (2018 Revision) of the Cayman Islands.* ***c. Exempted limited partnership (an "Exempted Limited Partnership") and a limited partnership, each established in the Cayman Islands (together, a "Partnership")*** ▪ Relevant legislation/regulations: *Partnership Law (2013 Revision) of the Cayman Islands.* ***d. A unit trust established under Cayman Islands law with a trustee incorporated in the Cayman Islands (a "Trust")*** ▪ Relevant legislation/regulations: Trusts Law (2018 Revision) of the Cayman Islands.
Luxembourg	**1.** ***Fonds commun de placement ("FCP")****: an undivided collection of assets made up and managed by a management company on behalf of joint owners who are liable up to the*

Home jurisdiction	Investors eligible to post collateral abroad (Type of investor in home jurisdiction)
	amount contributed by them and whose rights are represented by units, as incorporated, organised, established or formed under Luxembourg Law. Relevant legislation/regulations: *the law of 17 December 2010 relating to undertakings for collective investment, the law of 13 February 2007 relating to specialised investment funds, the law of 23 July 2016 on reserved alternative investment funds*.
	2. *Investment company with fixed capital (société d'investissemenl à capital fixe) ("SICAF")* Relevant legislation/regulations: *the law of 17 December 2010 relating to undertakings for collective investment, the law of 13 February 2007 relating to specialised investment funds, the law of 23 July 2016 on reserved alternative investment funds*.
	3. *Investment company with variable capital (société d'investissement à capital variable) ("SICAV")* Relevant legislation/regulations: *the law of 17 December 2010 relating to undertakings for collective investment, the law of 13 February 2007 relating to specialised investment funds, the law of 23 July 2016 on reserved alternative investment funds*.
	4. *Financial Institutions**: credit institutions (établissements de crédit) within the meaning of Article 1.12 of the Financial Sector Law*. Relevant legislation/regulations: *Article 1.12 of the Financial Sector Law*.
	5. *Private limited liability company (Société à responsabilité limitée or S.à r.l.)* Relevant legislation/regulations: *law of 10 August 1915 on commercial companies*.
	6. Public limited company (société anonyme) Relevant legislation/regulations: *law of 10 August 1915 on commercial companies*.

Table 6.1 - Types of nonresident **investors** by home jurisdiction authorized to deposit **assets** abroad as **collateral**

6.1.2 Collateral purposes

Upon **registration** of a request for posting or transferring **collateral** in the **clearinghouse collateral** management system, the relevant **collateral** purpose must be identified from among those listed below:

(i) **Transaction** guarantee;

(ii) Operating balance;

(iii) **Settlement fund**;

(iv) Issuance limits;

(v) Access Requirements; and

(vi) Pre-trade risk limit.

The following tables list the **collateral** purposes and the **participants** to which they apply (table 6.1) and the **assets** eligible to be accepted as **collateral** and the purposes for which they can be used (table 6.2).

	Collateral purpose					
Participant	**Transaction guarantee**	**Operating balance**	**Settlement fund**	**Issuance limits**	**Access Requirements**	**Pre-trade risk limit**
Investor	X					X
Trading participant and foreign participant						
Full trading participant		X	X			X
Settlement participant		X	X			X
Clearing member		X	X			X
Guarantee issuing bank				X		
Controlling guarantor					X	

Table 6.2 - **Collateral** purposes applicable to each **participant** category

Asset	Collateral purpose							
	Transaction guarantee			Operating balance	Issuance limits	Settlement fund	Access Requirements	Pre-trade risk limit
	Nonresident investors under Joint Resolution BCB and CVM #13/2024, art. 13, §1	Nonresident investors – Jurisdictions and types specified in table 6.1 and investors resident in Brazil	Further investors					
Local currency		X	X	X	X		X	X
Federal government bonds		X	X	X	X		X	X
Shares of stock		X	X					
Units		X	X					
ADRs		X						
BDR		X	X					
Bank CDs, LCIs and LCAs		X	X					
US dollars	X	X						
Euro		X						
US Treasury bonds	X	X						
German Treasury bonds		X						
French Treasury bonds(*)		X						
Dutch Treasury bonds(*)		X						
Mexican Treasury bonds(*)		X						
Canadian Treasury bonds(*)		X						
Bank LCs (**)		X	X					
ETF shares		X	X					
FIC shares		X	X					
FILCB shares						X		
Investment fund shares		X	X					

Asset	Collateral purpose							
	Transaction guarantee			Operating balance	Issuance limits	Settlement fund	Access Requirements	Pre-trade risk limit
	Nonresident investors under Joint Resolution BCB and CVM #13/2024, art. 13, §1	Nonresident investors – Jurisdictions and types specified in table 6.1 and investors resident in Brazil	Further investors					
Debentures		X	X					
Shares of stock traded abroad (*)		X						

(*) **Securities accepted as collateral solely from non-resident investors domiciled in the United States, United Kingdom and Netherlands** and **investors** resident in Brazil**.**
(**) Bank LCs are not accepted as **collateral** by **investors** who are financial banking institutions.

Table 6.3 - **Assets** acceptable as **collateral** and purposes for use

The **assets** posted as any given **investor**'s **collateral** (**transaction** guarantee purposes):

(i) Are segregated from the **assets** posted as other **investors**' **collateral**, and for **clearinghouse** managerial control purposes are also segregated by **trading participant** or **foreign participant**, **full trading participant**, or **settlement participant**, and **clearing member**; and

(ii) Must be owned by the **investor** holding the **transactions** covered by such **assets**; exceptions to this condition, subject to the limits described in section 6.3, is the use of Brazilian federal government bonds or US treasury bonds held by third parties.

The **assets** posted as **collateral** by any given **trading participant** or **foreign participant**:

(i) Are segregated from the **assets** deposited as **collateral** by other **trading participants** or **foreign participants**;

(ii) Are segregated by **full trading participant** and **clearing member**; and

(iii) Must be owned by the **trading participant** or **foreign participant**.

The **assets** posted by any given **full trading participant** or **settlement participant**:

(i) Are segregated by **collateral** purpose;

(ii) Are segregated by **clearing member**; and

(iii) Must be owned by the **full trading participant** or **settlement participant** that deposited the relevant **assets**, except for the cases where the **clearing member** performs the distribution of **collateral** it deposited for operating balance purposes.

The **assets** deposited by any given **clearing member**:

(i) Are segregated by **collateral** purpose;

(ii) Must be owned by the **clearing member** that deposited the relevant **assets**; and

(iii) Are segregated, for **clearinghouse** managerial control purposes, by **full trading participant** or **settlement participant**, in the case of **collateral** deposited for operating balance purposes of **full trading participants** and **settlement participants**.

In order for **assets** posted as **collateral** by a **controlling guarantor**, with the purpose of meeting access requirements, it is imperative that the **assets** are owned by the same **controlling guarantor** who has posted them.

6.2 Valuating assets accepted as collateral

The definitions of the calculation models used in **asset** valuation are incumbent on the B3 Central Counterparty Risk Internal Committee.

6.2.1 FIC and FILCB shares, bank CDs, LCIs, LCAs and bank letters of credit

Collateral made up of FIC and FILCB shares are valuated at their opening prices on T−1, except for the valuation of FILCB shares on the day of deposit, in which case the T+0 opening prices apply.

Bank CDs, LCIs and LCAs are valued by applying a haircut to the updated price of the relevant security at the time of valuation, according to the agreed-upon rate, adjusted to time to maturity.

Bank LCs are valuated at their issuance prices, requiring no haircuts.

6.2.2 Other collateral

The values of the other **assets** are updated, pursuant to the CORE methodology described in chapter 7 (Risk calculation) of this manual:

(i) At every movement occurred in the **collateral** portfolio to which the **asset** belongs, that is, at every deposit, withdrawal, distribution, or transfer of any **collateral** to or from the portfolio;

(ii) After any modifications are made to the portfolio of **positions** with which **collateral** is associated, within the scope of the intraday risk monitoring activities; and

(iii) On a daily basis, when the calculation of **margin** calls is processed.

The value of the **collateral** portfolio associated with any given **investor** is updated in situations (i), (ii) and (iii) above. In the CORE methodology, the same **asset** making up an **investor**'s **collateral** may assume different values at the same time, according to the **portfolio** with which **collateral** is associated, depending on the worst case scenario chosen for the relevant **portfolio** under the CORE methodology. Similarly, if an **asset** constitutes **collateral** posted for different purposes or components of the **safeguard** structure, such an **asset** may take on different values, depending on the relevant purpose or component, by virtue of the risk scenarios utilized in the **asset**'s valuation.

6.3 Limits for accepting assets as collateral

The limits for accepting a given **asset** represent a restriction to the amount of that **asset** that will be allocated to make up **collateral** of a **participant** or group of **participants** belonging to the same **financial conglomerate** or acting in concert, at the sole discretion of the **clearinghouse**.

In order to control adherence to acceptance limits, the **positions** in any **asset** are aggregated by ID number (CPF, CNPJ, CVM code), and the total volume of that **asset** posted as **collateral** for all the **accounts** of any **participant** (or group of **participants**) cannot exceed the corresponding limit, regardless of the purpose of **collateral**.

The limits applicable to the use of **assets** in the constitution of **collateral** are:

1. Limits for bank letters of credit, CDs, LCIs and LCAs;
2. Limits for the deposit of bank CDs, LCIs and LCAs with no early redemption clauses;

3. Limits for the deposit of Brazilian federal government bonds or US treasury bonds as third-party **collateral**;

4. Acceptance limits for shares of stocks, ADRs, BDRs, ETF shares, investment fund share traded at B3, units, debentures and shares of stock traded abroad;

5. Utilization limits for illiquid **collateral**;

6. Utilization limits for **assets** deposited abroad;

7. Limits for the acceptance of other **assets**; and

8. Limits per issuer and type of instrument.

The limits in place for the **assets** accepted as **collateral** by the **clearinghouse**, as well as the values of the parameters that define such limits, which are periodically reviewed at the discretion of B3, are available on the B3 website (www.b3.com.br).

6.3.1 Limits for bank LCs, CDs, LCIs and LCAs

At its sole discretion, the **clearinghouse** may establish limits by **guarantee issuing bank** for the deposit of LCs, CDs, LCI and LCAs as **collateral** by **participants**, subject to the procedures, parameters and conditions described below.

The CDs, LCs, LCIs and LCAs issued by **guarantee issuing banks** are jointly referred to in this subsection 6.3.1 as “securities” or “securities issued by **guarantee issuing banks**.”

Irrespective of the limits established by B3, the securities issued by any given **guarantee issuing bank** are not allowed to be used as **collateral** for the **positions**:

(i) Held in the proprietary portfolio of the **guarantee issuing bank**;

(ii) Held by companies, financial or otherwise, linked to the **guarantee issuing bank**, including nonresident companies in Brazil;

(iii) Held by investment funds or classes of shares in investment funds under the management of institutions linked to the **guarantee issuing bank**;

(iv) Held by individuals holding the control of the **guarantee issuing bank**;

(v) Held by executive officers appointed pursuant to the bylaws of the **guarantee issuing bank**;

(vi) Held by **invertors** who are financial banking institutions.

The limits for the deposit of securities issued by **guarantee issuing banks** refer to the financial volume of deposited **collateral**, among others.

In order to define such limits, the following factors, among others, must be considered: the analysis of the credit risk of the **guarantee issuing bank**; the risk exposure of the **positions** under the

responsibility of the **guarantee issuing bank** when acting in the capacity of a B3 **participant** under another category; and the characteristics of **collateral** deposited by the **guarantee issuing bank**.

Limits are assigned to each **guarantee issuing bank** by the B3 Central Counterparty Risk Internal Committee, which can alter or block the relevant limits, at its sole discretion and at any time, promptly applying the new limits or the blocking, as the case may be. When limits are blocked new deposits of **collateral** consisting of securities issued by the **guarantee issuing bank** are rejected.

The limit values assigned to each **guarantee issuing bank**, as well as any limit modifications and blockings are notified by the **clearinghouse**, becoming valid as of the date of notification. Deposit limits comprise only the securities issued by banks which:

(i) Are previously registered as "collateral issuer" in the B3 **participant registration** system;

(ii) Submit to B3, on a regular basis, documents and information required pursuant to the provisions of the **clearinghouse** access manual; and

(iii) Keep updated, at the B3 Participant Registration Center system, the signature cards of officers and attorneys-in-fact empowered to sign letters of credit.

The limits applicable to any **guarantee issuing bank** that fails to meet the provisions set forth in paragraphs (ii) and (iii) above may be blocked, with new deposits of securities issued by said bank not being accepted as **collateral**, even if the new deposits fall within the relevant limits.

The limits of the **guarantee issuing bank** which does not meet a **clearinghouse** request, within the time frame it establishes, for the redemption of the securities of its issuance, except securities with no early redemption clauses or securities with early redemption clauses after a future date, will be reduced or blocked by the **clearinghouse**.

A single limit is granted to institutions belonging to the same **financial conglomerate**, which can be distributed among the **guarantee issuing banks** taking part in the conglomerate.

The limits applicable to the utilization of the securities issued by **guarantee issuing banks** as **collateral** are:

1. Deposit limit for the securities issued by a given **guarantee issuing bank** ($IL_{Issuing\ bank}$);
2. Deposit limit per **participant** or group of **participants** for the securities issued by a certain **guarantee issuing bank** ($IL_{Issuing\ bank,\ Participant}$); and
3. Limit for deposits through a **trading participant** (TP), **foreign participant** (FP), **full trading participant** (FTP), **settlement participant** (SP), or **clearing member** (CM) linked to the **guarantee issuing bank** ($DL^{linked\ to\ IB}_{TP,FP,FTP,SP,CM}$).

The characteristics of such limits, the corresponding prohibitions and the criteria to extend limits are defined below.

6.3.1.1 Deposit limits for the securities issued by guarantee issuing banks

Deposit limits are assigned by B3 to each **guarantee issuing bank** and cover the total amount of securities issued and deposited by any such bank as **collateral** with the **clearinghouse**.

Regardless of the criteria employed to assign limits, the maximum value granted to each **guarantee issuing bank** (single institution or **financial conglomerate** to which several **guarantee issuing banks** belong) cannot exceed L, which is established by the B3 Central Counterparty Risk Internal Committee, that is:

$$IL_{Issuing\ bank} \leq L \tag{6.1}$$

The limit granted to any **guarantee issuing bank** may be extended against the deposit of local currency or federal government bonds owned by the **guarantee issuing bank** as **collateral** with the **clearinghouse**, pursuant to the provisions set forth in subsection 6.3.1.4 (Limit extensions).

Given two **guarantee issuing banks**, one (or the companies linked thereto) is prohibited from simultaneously constituting **collateral** with securities issued by the other. Denoting such banks by A and B, bank A (or companies linked thereto) is not allowed to constitute **collateral** with securities issued by bank B and, concurrently, bank B (or companies linked thereto) is not allowed to constitute **collateral** with securities issued by bank A.

6.3.1.2 Deposit limits per participant or group of participants for the securities issued by guarantee issuing banks

The deposit limit per **participant** or group of **participants**, denoted by $IL_{Issuing\ bank,\ Participant}$, refers to the maximum **collateral** amount that may consist of securities issued by a given **guarantee issuing bank** in favor of the same **participant** or group of **participants**.

No more than a certain percentage, which is defined by B3, of the deposit limit assigned to a particular **guarantee issuing bank** ($IL_{Issuing\ bank}$) can be utilized as **collateral** by the same **participant** or group of **participants** P, that is:

$$IV_{Issuing\ bank,\ P} \leq IL_{Issuing\ bank,\ Participant} \tag{6.2}$$

$$IL_{Issuing\ bank,\ Participant} = p_1 \times IL_{Issuing\ bank} \tag{6.3}$$

Where:

p_1: the parameter defined by B3; and

$IV_{Issuing\ bank,\ P}$: the total amount of the securities issued by the **guarantee issuing bank** and deposited as **collateral** by **participant** or group of **participants** P.

The deposit limit per **participant** or group of **participants** may be extended beyond the values established in (6.2) and (6.3), against the deposit of federal government bonds or local currency by the **guarantee issuing bank** as **collateral** with the **clearinghouse**, pursuant to the provisions set forth in subsection 6.3.1.4 (Limit extensions).

6.3.1.3 Limits for deposits through trading participants, foreign participants, full trading participants, settlement participants, or clearing members linked to guarantee issuing banks

Denoted by $DL_{\substack{TP,FP,FTP,SP,CM \\ linked\ to\ IB}}$, such a limit is applied to the total amount of securities issued by **guarantee issuing bank** IB and posted as **collateral** for a **participant** or group of **participants** under the responsibility of a given **trading participant** (TP), or **foreign participant** (FP) **full trading participant** (FTP), **settlement participant** (SP), or **clearing member** (CM) linked to IB, meaning a **participant** that is linked to, or is a subsidiary or affiliate of, or is controlled by, or controls **guarantee issuing bank** IB.

The total amount of such **collateral** cannot exceed a certain percentage, which is defined by B3, of the deposit limit assigned to the **guarantee issuing bank** ($IL_{Issuing\ bank}$); this rule also applies to the **trading participant**, **foreign participant**, **full trading participant**, or **settlement participant** that is not linked to the **guarantee issuing bank**, but whose **clearing member** is. Hence, given **participant** TP, FP, FTP, SP, or CM linked to IB having under its responsibility **collateral** made up of securities issued by said bank, the following restriction applies:

$$IV_{\substack{TP,FP,FTP,SP,CM \\ linked\ to\ IB}} \leq DL_{\substack{TP,FP,FTP,SP,CM \\ linked\ to\ IB}} \tag{6.4}$$

$$DL_{\substack{TP,FP,FTP,SP,CM \\ linked\ to\ IB}} = p_2 \times IL_{Issuing\ bank} \tag{6.5}$$

Where:

$IV_{\substack{TP,FP,FTP,SP,CM \\ linked\ to\ IB}}$: the amount of all the securities issued by **guarantee issuing bank** IB and posted as **collateral** by a **participant** or group of **participants** under the responsibility of **participant** TP, FP, FTP, SP, or CM linked to IB;

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

$IL_{Issuing\ bank}$: the deposit limit assigned to IB; and

p_2 : the parameter defined by B3.

Limit $DL_{TP,FP,FTP,SP,CM\ linked\ to\ IB}$ may be extended beyond the values established in (6.4) and (6.5), against the deposit of federal government bonds or local currency by the **guarantee issuing bank** as **collateral** with the **clearinghouse**, pursuant to the provisions set forth in subsection 6.3.1.4 (Limit extensions).

6.3.1.4 Limit extensions

B3 may, at its sole discretion, allow the use of securities issued by any given **guarantee issuing bank** to constitute **collateral** at an amount exceeding the limits defined by B3 if, to that purpose, the **guarantee issuing bank** deposits federal government bonds or local currency as additional **collateral** in favor of the **clearinghouse**. Such **collateral**:

(i) Under current regulations, is subject to the same rules and operating procedures as those applicable to **collateral** posted with the **clearinghouse**;

(ii) Is accepted by the **clearinghouse** and, in the case of federal government bonds, is subject to the prices at which said bonds are accepted; should a significant change be observed in the acceptance prices of the bonds, B3 may, at any time, modify the amounts thereof required of the **guarantee issuing bank**; and

(iii) Remains blocked for as long as deposits at amounts exceeding the originally-established limits persist.

The following limits are liable to be extended:

(i) The deposit limit for securities issued by a given **guarantee issuing bank**;

(ii) The deposit limit, per **participant** or group of **participants**, for securities issued by the **guarantee issuing bank**; and

(iii) The limit for deposits through a **trading participant**, **foreign participant**, **full trading participant**, **settlement participant**, or **clearing member** linked to the **guarantee issuing bank**.

(a) Collateral amount required of guarantee issuing banks

The amount of **collateral** required of a **guarantee issuing bank** to extend limits is determined according to the criteria described below.

Case A: Where there is no utilization of securities issued by the **guarantee issuing bank** as **collateral** for **participants** or groups of **participants** linked to a **trading participant**,

foreign participant, **full trading participant**, **settlement participant**, or **clearing member** linked to the **guarantee issuing bank**.

Let $Coll_{Deposit\ per\ participant}$ be the amount of **collateral** required of the **guarantee issuing bank** due to the excess securities of its issuance that are deposited as **collateral** for **participants** or groups of **participants**, given by the following equations:

$$Coll_{Deposit\ per\ participant} = \sum_{i=1}^{N} G_i \tag{6.6}$$

$$G_i = \max\left[IV_i - p_4 \times IL_{Issuing\ bank}\ ,\ 0 \right] \tag{6.7}$$

Where:

N : the number of **participants** or groups of **participants** owning **collateral** made up of securities issued by the concerned **guarantee issuing bank**;

G_i : the amount of **collateral** required of the **guarantee issuing bank** due to the amount of securities it issued for the i-th **participant** or group of **participants**;

IV_i : the amount of securities issued by the concerned **guarantee issuing** and posted as **collateral** by the i-th **participant** or group of **participants**;

p_4 : the parameter defined by B3 ($0 \le p_4 \le 1$); and

$IL_{Issuing\ bank}$: the deposit limit assigned by B3 to the concerned **guarantee issuing bank**.

Let $Coll_{Deposit\ per\ bank}$ be the amount of **collateral** required of the concerned **guarantee issuing bank** due to the excess deposit of securities of its issuance, not considering the portion whose risk is already covered by the deposit of additional **collateral**, given by:

$$Coll_{Deposit\ per\ bank} = \max\left[\sum_{i=1}^{N} IV_i - Coll_{Deposit\ per\ participant} - IL_{Issuing\ bank}\ ,\ 0 \right] \tag{6.8}$$

The total amount of **collateral** required of the **guarantee issuing bank** due to the excess securities of its issuance that are posted as **collateral** is given by:

$$RequiredCollateral_{Issuing\ bank} = Coll_{Deposit\ per\ participant} + Coll_{Deposit\ per\ bank} \quad (6.9)$$

Case B: Where securities issued by the **guarantee issuing bank** are utilized as **collateral** for **participants** or groups of **participants** linked to a **trading participant**, **full trading participant**, **foreign participant**, **settlement participant**, or **clearing member** linked to the **guarantee issuing bank**.

Let $Coll_{TP,FP,FTP,SP,CM}$ be the amount of **collateral** required of the **guarantee issuing bank** due to the excess securities of its issuance deposited as **collateral** for **participants** or groups of **participants** under the responsibility of **trading participant** TP, **foreign participant** FP, **full trading participant** FTP, **settlement participant** SP, or **clearing member** CM linked to **guarantee issuing bank** IB, not considering the excess portion whose risk is already covered by the deposit of federal government bonds or local currency, given by:

$$Coll_{TP,FP,FTP,SP,CM} = \max\left[\left(\sum_{i=1}^{N} RCE_{i,\ TP,FP,FTP,SP,CM}\right) - DL_{\substack{TP,FP,FTP,SP,CM \\ linked\ to\ IB}}\ ,\ 0\right] \quad (6.10)$$

$$RCE_{i,TP,FP,FTP,SP,CM} = \max\left[IV_{i,TP,FP,FTP,SP,CM} - G_i\ ,\ 0\right] \quad (6.11)$$

Where:

$DL_{\substack{TP,FP,FTP,SP,CM \\ linked\ to\ IB}}$: the limit for deposit of securities per IB through **trading participant**, **foreign participant**, **full trading participant**, **settlement participant**, or **clearing member** linked to IB, as granted by B3;

N: the number of **participants** or groups of **participants** owning securities issued by IB and deposited as **collateral**;

$RCE_{i,\ TP,FP,FTP,SP,CM}$: the residual credit exposure of the i-th **participant** or group of **participants** under TP, FP, FTP, SP, or CM linked to IB, given by the amount of securities issued by IB and posted as **collateral** for the **participant** or group of **participants**,

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

discounted from the amount of federal government bonds and local currency deposited by the **guarantee issuing bank** due to the excess deposit for such a **participant** or group of **participants**;

$IV_{i,TP,FP,FTP,SP,CM}$: the amount of securities issued by IB and deposited for the i-th **participant** or group of **participants** as **collateral** under **participant** TP, FP, FTP, SP, or CM linked to IB; and

G_i: the amount of **collateral** required of the **guarantee issuing bank** due to the amount of securities of its issuance deposited for the i-th **participant** or group of **participants**, as given by equation (6.7).

Let $Coll_{Deposit\ per\ bank}$ be the amount of **collateral** required of the **guarantee issuing bank** due to the excess deposit of securities of its issuance, not considering the portion whose risk is already covered by the deposit of federal government bonds or local currency, given by:

$$Coll_{Deposit\ per\ bank} = \max\left[\sum_{i=1}^{N} IV_i - Coll_{Deposit\ per\ participant} - Coll_{TP,FP,FTP,SP,CM} - IL_{Issuing\ bank}\ ,\ 0\right] \quad (6.12)$$

Where $Coll_{Deposit\ per\ participant}$ and IV_i are given by equations (6.6) and (6.7).

Finally, the amount of **collateral** required of the **guarantee issuing bank** to extend the use of securities of its issuance is given by:

$$RequiredCollateral_{Issuing\ bank} = Coll_{Deposit\ per\ participant} + Coll_{TP,FP,FTP,SP,CM} + Coll_{Deposit\ per\ bank} \quad (6.13)$$

(b) Reserve of collateral deposited by guarantee issuing banks

The amount posted as **collateral** by any given **guarantee issuing bank** to extend the limits associated with the securities of its issuance can be reserved for use by one or more specific **participants**, provided that such an amount is not required to correct any situations involving limit violation existing prior to the deposit thereof.

The reserve must be registered in the **clearinghouse collateral** management system by the **guarantee issuing bank** or by the **clearinghouse** itself, upon request by said bank. After a reserve is registered and within the time period specified therein, only the **participants**

appointed in the reserve may request **collateral postings** with the **clearinghouse** made up of securities issued by the concerned **guarantee issuing bank**. Moreover, the total amount included in all the requests for deposit made by any such **participant** within the specified time period is subject to the maximum value assigned in the reserve by the relevant **guarantee issuing bank** to said **participant**.

(c) Moving collateral deposited by guarantee issuing banks

Collateral posted by any given **guarantee issuing bank** may be moved provided that it is not required to correct any situations involving limit violation in connection with the securities issued by said bank, according to the criteria described in section 6.5.

6.3.2 Deposit limit for bank CDs, LCIs and LCA with no early redemption clauses

The limit for deposit of bank CDs, LCIs and LCAs with no early redemption clauses or with early redemption clauses after a future date refers to the maximum amount of **collateral** represented by such securities that can be deposited by a **participant** or group of **participants** belonging to the same **financial conglomerate**, that is:

$$V_{No\ early\ redemption} \leq L \tag{6.14}$$

Where:

$V_{No\ early\ redemption}$: the total amount of securities with no early redemption clauses or with early redemption clauses after a future date deposited as **collateral** by the **participant** or group of **participants** belonging to the same **financial conglomerate**, regardless of the issuers of such securities and **collateral** purposes, calculated according to the valuation method for **collateral** consisting of bank CDs, LCIs and LCAs; and

L: the parameter, expressed as a financial value, established by B3.

Regardless of parameter L's definition, for prudential reasons B3 may assign different limits to each **participant** or group of **participants** belonging to the same **financial conglomerate**.

6.3.3 Deposit limits for Brazilian federal government bonds or US treasury bonds as third-party collateral

At its sole discretion, the **clearinghouse** may grant limits to each financial institution duly authorized by BCB or CVM for the deposit of federal government bonds held by any such financial institution when constituting **collateral** for **investors**, subject to the procedures, parameters and conditions described below, and provided the financial instituion:

(i) Is duly registered as a **clearing member**, **full trading participant**, **settlement participant**, or **trading participant**;

(ii) Belongs to the **chain of responsibilities** in the settlement process of the **investor**'s **transactions** for which the bonds will be deposited as **collateral**; and

(iii) Submits to B3, on a regular basis, balance sheets and documents associated with changes to corporate and/or administrative structure.

Also, at sole discretion of the clearinghouse, a deposit limit for US treasury bonds may be granted to **foreign participants** for the constitution of **collateral** abroad for nonresident investors, observing the procedures, parameters and conditions described as follows, as long as the institution acts as a **foreign participant**:

(i) It belongs to the **chain of responsibilities** in the settlement process of the nonresident **investor** transactions for which the bond is to be posted as **collateral**; and

(ii) It regularly sends B3 the balance sheet, trial balances and documents related to changes in the corporate and/or administrative structure.

The aforementioned limits refer to the total financial volume provided as third-party **collateral** and to the volume liable to be distributed to the same third party. Should the concerned participant not submit the documents referred above within the stipulated time frames, the limits assigned thereto might be blocked, and new deposits of federal government bonds or US treasury bonds held by that financial institution as **collateral** for third parties will not be accepted, even if the new deposits represent no limit violation.

In order to define the applicable limits, the following factors, among others, must be considered: the analysis of the balance sheet of the **participant** holding the relevant **asset**, the risk exposure of the **positions** under the responsibility of the **participant** holding the relevant **asset**, and the characteristics of **collateral** deposited by them and of **collateral** of their issuance.

The limits are assigned to each **participant** by the B3 Central Counterparty Risk Internal Committee, which can alter or block the relevant limits, at its sole discretion and at any time, immediately applying the new limits or the blocking thereof, as the case may be. When limits are blocked new deposits of **assets** held by the same **participant** for third-party **collateral** are rejected. A limit increase request must be submitted to B3 by the **participant** holding the **asset**. B3 will decide whether to grant the limit increase after reviewing the applicant's reasons for submitting the request, the relevant financial and governance conditions, and other aspects.

The **clearinghouse** notifies the **participants** of the limits values, as well as of any limit modifications and blockings, becoming valid as of the date of notification. Limits comprise only federal government bonds and US treasury bonds acceptable as **collateral** by the **clearinghouse**.

A single limit is granted to financial institutions belonging to the same **financial conglomerate**, which can be distributed among the institutions taking part in the conglomerate.

In order to grant limits, the B3 Central Counterparty Risk Internal Committee takes into account quantitative and qualitative aspects determining the credit quality of the **participant** holding the relevant **asset**, including, but not limited to, minimum capital requirements, economic and financial performance indicators, risk ratings issued by rating agencies, and performance profile.

To verify adherence of **investors** to the limits, the **clearinghouse** may consider the institutions belonging to the same **financial conglomerate** jointly.

For all purposes, except as expressly stated otherwise in this manual or in the rules that supplement this manual, **collateral** made up of bonds posted by a **participant** for a third-party **investor** is considered as **collateral** made up of **assets** held by the same **investor**.

The limits applicable to the deposit of **collateral** for third parties by **participants** are:

(i) Limit to provide **collateral** for third parties (TPL_P); and

(ii) Limit to provide **collateral** for each third party ($TPL_{P,Investor}$).

6.3.3.1 Limit to provide collateral for third parties

The limit for **participant** to provide **collateral** for third parties is assigned by B3 to each institution and applies to the total amount of **assets** held by them and deposited with the **clearinghouse** as **collateral** for **investors** or groups of **investors**.

Regardless of the criteria employed to assign limits, the maximum value granted to each **participant** (single institution or **financial conglomerate**) cannot exceed M, which is established by B3 and is periodically reviewed, according to the criteria it defines, that is:

$$TPL_P \leq M \tag{6.15}$$

The limit granted to a **participant** is unique and must cover the total amount of **assets** held by the concerned institution and deposited as **collateral** for third parties, irrespective of the markets for which the bonds are intended.

6.3.3.2 Limit to provide collateral for each third party

This limit refers to the distribution of the **assets** held by a **participant** among **investors** or groups of **investors**.

The limit, denoted by $TPL_{P,Investor}$, refers to the maximum portion of the third-party **collateral** limit granted by B3 to **participant** P that can be deposited as **collateral** for the same **investor** or group of **investors**. Therefore, each **investor** or group of **investors** C is subject to the following restriction:

$$Allocated\ amt_{P,C} \leq TPL_{P,Investor} \tag{6.16}$$

$$PL_{P,Investor} = p \times TPL_P \quad (6.17)$$

Where:

$Allocated\ amt_{P,C}$: the amount of **collateral** made up of **assets held** by **participant** P for **investor** or group of **investors** C; and

p: the positive percentage, as defined by B3.

Regardless of the definition of parameter p's value, B3 may assign different percentages or values per **investor** or group of **investors** as a result of the evaluation of the credit risk of the relevant **investor** or group of **investors**.

6.3.4 Acceptance limits for shares of stocks, ADRs, BDRs, ETF shares, investment fund shares traded at B3, certificates of deposit of shares (units), debentures and shares of stock traded abroad

It is prohibited the use of **assets** issued by a given issuer to constitute **collateral** for positions of:

(i) Companies, financial or not, linked to the issuer, including those not resident in Brazil;

(ii) Investment funds and classes of investment fund shares or closed pension plans managed by institutions linked to the issuer;

(i) Clients that are banking financial institutions, when the issuer is also a banking financial institution; and

(ii) Issuer of the **collateral**.

The publication and periodical application of acceptance limits relative to shares of stocks, ADRs, BDRs, ETF shares, investment fund shares traded at B3, units, debentures and shares of stock traded abroad are subject to the following procedures:

(i) The list of shares of stocks, ADRs, BDRs, ETF shares, investment fund shares traded at B3, units, debentures and shares of stock traded abroad acceptable as **collateral** and the relevant acceptance limits are published on the second business day of each month;

(ii) When shares of a stock, ADRs, BDRs, ETF shares**,** investment fund shares traded at B3, units debentures and shares of stock traded abroad are included in the list of acceptable **collateral**, or when the relevant acceptance limits are extended, the new criteria become effective as of and including the date referred to in paragraph (i);

(iii) When shares of a stock, ADRs, BDR, ETF shares, investment fund shares traded at B3, units, debentures or shares of stock traded abroad are no longer acceptable as **collateral**, or when the relevant acceptance limits are reduced, the new criteria are applied for adjustment purposes as of the date to be established by the B3, as its discretion and on a case by case;

(iv) Acceptance limits apply to each **participant**, identified by CPF number, CNPJ number, or nonresident **investor**'s CVM code, as the case may be, to **participants** belonging to the same **financial conglomerate**, or to **participants** acting jointly, regardless of the purpose of **collateral**.

The acceptance limits for stock, ADR, BDR, unit, ETF share, investment fund share traded at B3, debenture or share of stock traded abroad eligible to be accepted as **collateral** are given by:

- Acceptance limit for share of stocks, ADR, investment fund shares traded at B3 or unit:

$$AcceptanceLimit(i) = c(i) \times MedianQty(i,p) \tag{6.18}$$

- Acceptance limit for BDR:

$$AcceptanceLimit(i) = c(i) \times MedianQty(i,p) + LiquidityLimit(i) \tag{6.19}$$

- Acceptance limit for ETF with reference index composed of equity assets or government fixed income **assets** traded in Brazil:

$$AcceptanceLimit(i) = \max\left[c(i) \times MedianQty(i,p), \frac{A}{P_{ETF,t}} \right]$$

$$A = \frac{1}{R} \times \min\left[\frac{P_{comp_{1,t}} \times AcceptanceLimit(comp_1)}{Weight_{comp_{1,t}}}, \ldots, \frac{P_{comp_{N,t}} \times AcceptanceLimit(comp_N)}{Weight_{comp_{N,t}}} \right] \tag{6.20}$$

- Acceptance limit for ETF with reference index composed of debentures traded in Brazil:

$$AcceptanceLimit_1 = min\left[\frac{P_{Serie(1,1,t)} \times AcceptanceLimitSerie(1,1)}{Weight_{1,1,t}}, \ldots, \frac{P_{Serie(i,j,t)} \times AcceptanceLimitSerie(i,j)}{Weight_{i,j,t}} \right]$$

$$AcceptanceLimit_2 = min\left[\frac{AcceptanceLimitGroup(1)}{Weight(1)}, \ldots, \frac{AcceptanceLimitGroup(K)}{Weight(K)} \right]$$

$$Weight(K) = \sum_{j=1}^{k} \sum_{i=1}^{m} Weight_{i,j,t}$$

$$AcceptanceLimit_3 = min\left[\frac{AcceptanceLimitDuration(1)}{Weight(1)}, \ldots, \frac{AcceptanceLimitDuration(T)}{Weight(T)} \right]$$

$$Weight(T) = \sum_{j=1}^{n} \sum_{i=1}^{t} Weight_{i,j,t}$$

$$A = \frac{1}{R} \times min[AcceptanceLimit_1, AcceptanceLimit_2, AcceptanceLimit_3]$$

$$AcceptanceLimit(i) = max\left[c(i) \times MedianQty(i,p), \frac{A}{P_{ETF,t}} \right]$$

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

(6.21)

- Acceptance limit for ETF with reference index composed of fixed income or equity assets traded abroad or index composed of gold as financial asset or silver as financial **asset**:

$$AcceptanceLimit(i) = c(i) \times MedianQty(i,p) + LiquidityLimit\ (i) + RedemptionLimit \quad (6.22)$$

- Acceptance limit for shares of stock issued by publicly traded company listed abroad (shares of stock traded abroad):

$$\text{AcceptanceLimit}(i) = \min(\text{c}(i) \times \text{MedianQtyOff(i,p)}; \text{LiquidityLimit}\ (i)) \quad (6.23)$$

Where:

i: each share of stock, ADR, BDR, unit, or ETF;

$c(i)$: the positive constant defined by B3 for each **asset** i, based on liquidity metrics; and

$MedianQty(i,p)$: the median of the daily quantity of **asset** i traded over a given period of time p defined by B3.

$comp_j$: *j*-th stock or *j*-th fixed income **asset** component of reference index of the ETF;

$P_{comp_j,t}$: price of *j*-th stock or *j*-th fixed income **asset** component of reference index of ETF on date t;

$P_{Serie(i,j,t)}$: price of the i-th issuance of the debenture from the j-th issuer of the reference index of the credit fixed income ETF, on date t;

$Weight_{i,j,t}$: weight of the i-th issuance of the debenture from the j-th issuer of the reference index of the credit fixed income ETF, on date t;

$Weight(K)$: weight of the group of k debenture issuers in the reference index of the credit fixed income ETF, on date t;

$Weight(T)$: weight of the group of *n* debentures, with average duration categorized into maturity ranges, of the reference index of the credit fixed income ETF t ;

$P_{ETF,t}$: price of ETF on date t ;

$Weight_{comp_{j,}t}$: the weight of *j*-th stock or *j*-th fixed income **asset** in the reference index of the ETF on date t ;

R : reduction parameter defined by B3;

$AcceptanceLimit(i)$ limit, defined as equation (6.18), to *j*-th equity **asset**or *j*-th fixed income **asset** component of reference index of ETF;

$AcceptanceLimitSerie(i,j)$: limit, defined according to equation (6.21), for the i-th issuance of the j-th debenture component of the reference index of the credit fixed income ETF;

$AcceptanceLimitGroup(K)$: limit, defined according to equation (6.21), for the group of k debenture issuers in the reference index of the credit fixed income ETF;

$AcceptanceLimitDuration(T)$: limit, defined according to equation (6.21), for the group of *n* debentures, with average duration categorized into maturity ranges, of the reference index of the credit fixed income ETF;

$LiquidityLimit(i)$: limit, in quantity, defined by B3 as per the financial volume available to execute of the **collateral** made up of BDR, ETF or share of stock traded abroad through liquidity assistance mechanism; $RedemptionLimit(i)$: limit, in quantity, defined by B3 for acceptance of ETF with redemption of shares settled in local currency; and

$\mathrm{MedianQtyOff(i,p)}$: Median of the daily quantity of **asset** *i* traded in a period *p,* determined by B3, in the foreign market in which the share of stock is traded.

- Acceptance limit for Debentures
  - Limit per issuance serie

$$IssuanceSerieLimit(i,j) = min(p_1(i,j) \times Q_{debenture\ issuance}(i,j), FixedLimit_1(i,j)) \quad (6.24)$$

- Limit per group of issuers

$$GroupIssuerLimit(K) = min\left(p_2(K) \times \sum_{j=1}^{k} \sum_{i=1}^{m} V_{debenture}(i,j)\,, FixedLimit_2(K)\right)$$

(6.25)

- Limit per average term (*duration*)

$$DurationLimit(T) = min\left(d(T) \times \sum_{j=1}^{n} \sum_{i=1}^{t} V_{debenture}(i,j)\,, FixedLimit_3(T)\right)$$

(6.26)

Where:

i: each issuance of debenture (series);

j: each issuer of debenture;

K: each group of k issuers of debentures (set of related institutions or companies, subsidiaries, controlled or controlling entities that include various issuers of debentures);

T: each group of t debentures with an average maturity (duration) within maturity ranges. A maturity range is defined by minimum and maximum maturity periods, as established by B3 in business or calendar days;

$Q_{debenture\ issuance}(i,j)$: total quantity of a debenture belonging to the i-th series, issued by issuer j;

$V_{debenture}(i,j)$: value, at market price, of the total quantity of a debenture belonging to the i-th series, issued by issuer j;

$p_1(i,j)$: constant defined by B3;

$p_2(K)$: constant defined by B3;

$d(T)$: constant defined by B3;

$FixedLimit_1(i,j)$: limit, in quantity, defined by B3;

$FixedLimit_2(K)$: limit, in financial terms, defined by B3; and

$FixedLimit_3(T)$: limit, in financial terms, defined by B3.

For the **assets** represented by shares of stock, ADR, BDR, units, or ETF shares, the limit applies to the sum of the **asset** quantity deposited as **collateral** and the quantity of the **asset** underlying lending **positions** in **securities lending** agreements.

For purposes of **investor** adherence to limits, the **clearinghouse** calculates daily, for each **investor** and **asset**, the excess **asset** quantity deposited as **collateral** and the quantity of the **asset** in excess of the set of lending **positions** in **securities lending** agreements, pursuant to item (iv) above, and:

(i) Assigns a null financial value to the excess **asset** quantity deposited as **collateral**; and

(ii) Requires additional **margin** of the **investor** based on the excess **asset** quantity associated with the lending positions.

6.3.4.1 Limit for depositing collateral subject to wrong way risk

This limit, denoted by $LD_{WWR,C}$, applies to the sum of the financial value of **collateral** deposited by an **investor** or group of **investors** subject to wrong way risk, as defined in section 1.7, in accordance with the following restriction:

$$\sum_{I=1}^{n} \sum_{A=1}^{n} C_{I,A} \leq LD_{WWR,I,} \quad (6.27)$$

where:

I: each **investor** in the group of **investors**;

A: each **asset** deposited as **collateral** subject to wrong way risk; and

$C_{I,A}$: financial value of **collateral** posted under the form of asset A, by investor I, after haircut.

For **assets** that are shares, ADRs, BDRs, units, or ETF shares, the limit applies to the sum of the amount of the **asset** deposited as **collateral** and the amount of the **asset** that is the subject of lending positions in loan agreements.
If the limit is exceeded by the **investor** or group of **investors**, the clearinghouse:
(i) Assigns zero financial value to the excess amount deposited as **collateral**; and
(ii) Requires the **investor** to post additional margin depending on the excess amount associated with the lending positions.

The clearinghouse may, at its sole discretion and upon approval by the Internal Central Counterparty Risk Committee, accept the deposit of **collateral** with wrong way risk beyond the limits established in this section, provided that the resulting risk to the **investor** constituting the **collateral**, considering positions and **collateral** together, is lower than the risk that would result from the deposit of other **collateral** without a wrong way risk.

6.3.5 Utilization limits for illiquid collateral

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Liquid **collateral** is that whose time frame for monetization (conversion into bank reserves), upon liquidation, is compatible with the **clearinghouse settlement window**, as determined by the **clearinghouse**. Conversely, illiquid **collateral** is that whose time frame for monetization exceeds the available time frame for **settlement**.

Under such a definition, federal government bonds may be considered liquid, in view of the fact that the **clearinghouse** can, if necessary, carry out a sale or a repo **transaction** in the relevant bonds, in order to receive the corresponding financial resources on the same day, in a shorter period than the **settlement window**. On the other hand, in the absence of liquidity assistance facilities collateralized by shares of stocks, for example, such **assets** are considered illiquid, in view of the fact that the **settlement** of purchase and sale **transactions** involving shares of stocks occurs only on the second business day after trade **registration**, that is, on *T*+2.

It is the B3's own resources exclusively earmarked for the **clearinghouse** and liquidity assistance facilities between B3 and some banks that allow the **clearinghouse** to accept certain illiquid **collateral**, enabling the **clearinghouse** to obtain funds, in a short period of time, to make the **payments** due in the **settlement window**.

In order to manage its exposure to illiquid **collateral** and mitigate the risks associated with the process of **collateral** liquidation, the **clearinghouse** imposes restrictions on how **collateral** is used. To that end, **collateral** deposited by a **participant** or group of **participants** belonging to the same **financial conglomerate** is classified by the **clearinghouse** as either liquid or illiquid, contingent on the available liquidity provision mechanisms in the event of a **settlement** failure, using half of the monetization capacity of each type of **collateral** to ensure that it will be capable of meeting its own obligations, even if two **participants default** simultaneously.

With the purpose to define the limits applicable to the use of illiquid **collateral** by any given **participant** or group of **participants**, consider the following variables:

V_i: the total amount, in local currency, of **collateral** type i, i = 1, 2, … n, posted by the **participant** or group of **participants** belonging to the same **financial conglomerate**, except **collateral** consisting of **assets** deposited abroad; **collateral** "type i" refers to the type of **asset** or instrument that makes it up, such as shares of stocks, bank CDs, federal government bonds, etc;

V_{USD}: the amount, in local currency, of the US dollars posted as **collateral** by the **participant** or group of **participants** belonging to the same **financial conglomerate**;

$V_{j,USD}$: the amount, in local currency, of **asset** types j, j = 1, 2, … n_{USD}, denominated in US dollars and deposited abroad as **collateral** by the **participant** or group of **participants** belonging to the same **financial conglomerate**; "type j" refers to the type of **asset** or instrument that makes it up, such as ADRs and US Treasury bonds;

V_{euro}: the amount, in local currency, of Euros posted as **collateral** by the **participant** or group of **participants** belonging to the same financial conglomerate;

$V_{k,Euro}$: the amount, in local currency, of **asset** types k, k = 1, 2, … n_{Euro}, denominated in euros and deposited abroad as **collateral** by the **participant** or group of **participants** belonging to the same **financial conglomerate**; "type k" refers to the type of **asset** or instrument that makes it up, such as German Treasury bonds;

LIQ_i: the limit, in local currency, for monetizing **collateral** type i, i = 1, 2, … n, excluding **collateral** made up of **assets** constituted abroad, within the **clearinghouse settlement window**, according to the liquidity assistance facilities; for **collateral** type i, which is considered liquid, LIQ_i assumes an infinite value, regardless of whether liquidity assistance facilities are in place or not;

LIQ_{USD}: the limit, in local currency, for monetizing US dollars within the **clearinghouse settlement window**, according to the liquidity assistance facilities;

$LIQ_{j,USD}$: the limit, in local currency, for monetizing, in US dollars, **collateral** type j, j = 1, 2, … n_{USD}, deposited abroad and denominated in US dollars, within the **clearinghouse settlement window**, according to the liquidity assistance facilities; for **collateral** type j, which is considered liquid, $LIQ_{j,USD}$ assumes an infinite value, regardless of whether liquidity assistance facilities are in place or not;

LIQ_{Euro}: the limit, in local currency, for monetizing euros within the **clearinghouse settlement window**, according to the liquidity assistance facilities; and

$LIQ_{k,Euro}$: the limit, in local currency, for monetizing, in euros, **collateral** type k, k = 1, 2, … n_{Euro}, deposited abroad and denominated in euros, within the **clearinghouse settlement window**, according to the liquidity assistance facilities; for **collateral** type k, which is considered liquid, $LIQ_{k,Euro}$ assumes an infinite value, regardless of whether liquidity assistance facilities are in place or not.

(a) Liquidity rating for collateral denominated in local currency

Total amount V_i of **collateral** deposited by any given **participant** or group of **participants** belonging to the same **financial conglomerate**, i = 1, 2, … n, is segregated in both a liquid portion and an illiquid portion, respectively V_i^{Iliq} and V_i^{Liq}. The portion considered illiquid is

given by the value that exceeds half of the limit available to the **clearinghouse** to monetize **collateral** type i, with the remainder being considered liquid, that is:

$$V_i = V_i^{Iliq} + V_i^{Liq} \tag{6.28}$$

$$V_i^{Iliq} = \max\left[V_i - \frac{LIQ_i}{2} \ , \ 0 \right] \tag{6.29}$$

$$V_i^{Liq} = \min\left[V_i \ , \ \frac{LIQ_i}{2} \right] \tag{6.30}$$

Taking into account the whole set of **collateral** V_1 , V_2 , ..., V_n deposited by a **participant** or a group of **participants** belonging to the same **financial conglomerate**, the **clearinghouse** considers as illiquid and liquid, respectively, the portions:

$$V^{Iliq} = \sum_{i=1}^{n} V_i^{Iliq} \qquad \text{and} \qquad V^{Liq} = \sum_{i=1}^{n} V_i^{Liq} \tag{6.31}$$

(b) Liquidity rating for collateral made up of assets deposited abroad and denominated in US dollars

The liquid and illiquid portions of **collateral** consisting of US dollars and other **assets** deposited abroad and denominated in US dollars are determined jointly, due to the fact that the monetization of such **assets** in local currency ultimately depends on the limits of the **transaction** to buy and sell US dollars.

The portion of **collateral** made up of **asset** type j, j = 1, 2, … n_{USD} that cannot be readily monetized in US dollars, namely $V_{j,USD}^{Iliq}$, is given by the value of type j **assets** posted as **collateral** that exceeds half of the value of the liquidity facilities in US dollars available for that **asset**. To the extent that portion $V_{j,USD}^{Iliq}$ cannot be readily monetized in US dollars, it cannot be readily monetized in local currency either, being therefore considered illiquid.

$$V_{j,USD}^{Iliq} = \max\left[V_{j,USD} - \frac{LIQ_{j,USD}}{2} \ , \ 0 \right] \tag{6.32}$$

The portion of **collateral** consisting of **asset** type j that can be readily monetized in U.S dollars is given by:

$$V_{j,USD}^{Liq} = V_{j,USD} - V_{j,USD}^{Iliq} \tag{6.33}$$

From the standpoint of the **collateral** monetization process, that portion is handled just like the US dollars posted as **collateral**, meaning that the monetization thereof in local currency depends only on the sale **transaction** of the US dollars. The portion of US dollars and type j **assets** considered illiquid, namely V_{USD}^{Iliq}, is given by:

$$V_{USD}^{Iliq} = \max\left[V_{USD} + \sum_{j=1}^{n_{USD}} V_{j,USD}^{Liq} - \frac{LIQ_{USD}}{2} \ , \ 0 \right] \tag{6.34}$$

The sum of terms V_{USD}^{Iliq} and $\sum_{j=1}^{n_{USD}} V_{j,USD}^{Liq}$ represents the portion of the total amount of **collateral** deposited abroad, in the form of US dollars and/or other US dollar-denominated **assets**, that cannot be monetized within the **clearinghouse settlement window**, thus being characterized as illiquid.

(c) Liquidity rating for collateral made up of assets deposited abroad and denominated in euros

The liquid and illiquid portions of **collateral** consisting of euros or other **assets** deposited abroad and denominated in euros are determined jointly, due to the fact that the monetization of such **assets** in local currency ultimately depends on the limits of the **transaction** to buy and sell euros.

The portion of **collateral** made up of **asset** type k, k = 1, 2, … n_{Euro} that cannot be readily monetized in euros, namely $V_{k,Euro}^{Iliq}$, is given by the value of type k **assets** posted as **collateral** that exceeds half of the value of the liquidity facilities in euros available for that **asset**. To the extent that portion $V_{k,Euro}^{Iliq}$ cannot be readily monetized in euros, it cannot be readily monetized in local currency either, being therefore considered illiquid.

$$V_{k,Euro}^{Iliq} = \max\left[V_{k,Euro} - \frac{LIQ_{k,Euro}}{2} \ , \ 0 \right] \tag{6.35}$$

Therefore, the portion of **collateral** consisting of **asset** type k that can be readily monetized in euros is given by:

$$V_{k,Euro}^{Liq} = V_{k,Euro} - V_{k,Euro}^{Iliq} \tag{6.36}$$

Regarding the **collateral** monetization process, this portion is treated as euros posted as **collateral**, therefore, their monetization in local currency depends only on the sale

transaction of the euros. Hence, the portion of the euros and type **K assets** considered illiquid, namely V_{Euro}^{Iliq}, is given by:

$$V_{Euro}^{Iliq} = max\left[V_{Euro} + \sum_{k=1}^{n_{Euro}} V_{k,Euro}^{Liq} - \frac{LIQ_{Euro}}{2}, 0\right] \quad (6.37)$$

The sum of terms V_{Euro}^{Iliq} and $\sum_{k=1}^{n_{Euro}} V_{k,Euro}^{Liq}$ represents the portion of the total amount of **collateral** deposited abroad and in the form of Euros and/or other Euro-denominated **assets** that cannot be monetized within the **clearinghouse settlement window**, thus being characterized as illiquid.

The portion of the total **collateral** deposited abroad that is considered illiquid, namely V_{Abroad}^{Iliq}, is given by:

$$V_{Abroad}^{Iliq} = V_{USD}^{Iliq} + \sum_{j=1}^{n_{USD}} V_{j,USD}^{Iliq} + V_{Euro}^{Iliq} + \sum_{k=1}^{n_{Euro}} V_{k,Euro}^{Iliq} \quad (6.38)$$

Consequently, the liquid portion of the total **collateral** deposited abroad is given by:

$$V_{Abroad}^{Liq} = V_{Abroad} - V_{Abroad}^{Iliq} \quad (6.39)$$

With:

$$V_{Abroad} = V_{USD} + \sum_{j=1}^{n_{USD}} V_{j,USD} + V_{Euro} \sum_{k=1}^{n_{Euro}} V_{k,Euro} \quad (6.40)$$

(d) Liquidity rating for the total collateral posted by participants

The total amount of illiquid **collateral** deposited by a **participant** or group of **participants** belonging to the same **financial conglomerate** is given by:

$$V_{Total}^{Iliq} = V^{Iliq} + V_{Abroad}^{Iliq} \quad (6.41)$$

In the event of a **settlement** failure, this value cannot be readily monetized, being then borne by the B3's own resources exclusively earmarked for the **clearinghouse** and uncollateralized liquidity assistance facilities. In case of a **settlement** failure by a **participant** whose **positions** are covered by illiquid **collateral** only, cash funds may be used by the **clearinghouse** to make the **payments** due by the **clearinghouse** in the **settlement window**, with the funds that were drawn upon being returned after completion of the **collateral** liquidation process under the responsibility of the **defaulter**.

For a proper control of liquidity risk, the **clearinghouse** sets a fraction of the amount available to the **clearinghouse** as the deposit limit for illiquid **collateral**.

The amount of illiquid **collateral** deposited by any **participant** or group of **participants** belonging to the same **financial conglomerate** considered for **margin** coverage purposes is limited as follows:

$$\textit{Iliquid collateral deposited} \leq \min\left[V_{Total}^{Iliq} \ , \ \frac{1}{N} \times V_{Clrgh\ cash} \right] \tag{6.42}$$

Where:

N: the parameter defined by the B3 Central Counterparty Risk Internal Committee at a value greater than or equal to 2; and

$V_{Clrgh\ cash}$: the amount available to the **clearinghouse**, which is made up of the B3's own resource exclusively earmarked for the **clearinghouse** and of the funds provided through FILCB and uncollateralized liquidity assistance facilities, discounted the liquidity resource value used by the **participant** in question, as defined in chapter 7 (risk calculation).

Without prejudice to the limit established in (6.39) for **collateral** deposited by each **participant** or group of **participants** belonging to the same **financial conglomerate**, and in addition to that limit, the **clearinghouse** may set a limit to the total volume of illiquid **collateral** deposited under the responsibility of the same **trading participant**, **foreign participant**, **full trading participant**, **settlement participant**, or **clearing member** and considered for **margin** coverage purposes.

The **clearinghouse** publishes, on a regular basis, a list of **collateral** considered liquid and a list of **collateral** considered illiquid, as well as the financial limits from which illiquid **collateral** is considered liquid due to specific monetization agreements in place.

6.3.6 Utilization limits for assets deposited abroad

Pursuant to the provisions set forth in BCB Resolution 304, the global limit, which corresponds to the total amount of **collateral** that can be kept abroad for the purpose of meeting domestic **collateral** requirements is given by:

$$GL_t = 0.08 \times RM_t \geq \sum_{c=1}^{N} OC_{c,t} \tag{6.43}$$

Where:

GL_t: the **clearinghouse**'s global limit in Brazilian reals for **collateral posting** abroad on date t;

RM_t: the aggregate **margin** required by the **clearinghouse** in Brazilian reals on date t, as published daily by B3; and

$OC_{c,t}$: the haircut value in Brazilian reals of the **assets** posted as **collateral** abroad by **investor** c on date t, as calculated by the CORE methodology;

N: the number of **investors** with **assets** posted as **collateral** abroad.

The **clearinghouse** will assign one of the following two types of limits to each **investor** authorized to deposit **assets** abroad: (i) a financial limit in Brazilian reals, or (ii) a limit as a percentage rate of the aggregate required **margin**, regardless of the **chain of responsibilities** to which the **investor** belongs.

In order to define the utilization limits for **assets** deposited abroad, the following variables are considered:

FC: the set of all the **investors** submitted to financial limits;

PC: the set of all the **investors** submitted to limits as a percentage rate of the aggregate required **margin**;

FL_i: the financial limit established for **investor** $i \in FC$; and

PL_j: the percentage rate limit of the aggregate required **margin** established for **investor** $j \in CP$.

In addition:

(a) The total limit assigned by the **clearinghouse** to **investors** belonging to set FC is given by:

$$FL = \sum_{i \in FC} FL_i \tag{6.43.a}$$

(b) As FL is one of the portions of the global limit, it must meet the following inequation:

$$FL \leq GL_t \tag{6.43.b}$$

(c) The sum of the percentage rate limits assigned to the **investors** belonging to set PC must be equal to or less than the unit:

$$\sum_{j \in PC} PL_j \leq 1 \tag{6.43.c}$$

(d) The percentage rate limit assigned to **investor** j belonging to set PC must be transformed daily into a financial value, by means of equation:

$$\textit{Investor's limit in BRL valid for date } t = PL_j \times (0.08 \times RM_t - FL) \qquad (6.43.d)$$

Subject to the relationships (a) thru (d) above, the total amount of **collateral** deposited overseas will be in compliance with BCB Resolution 304 on any date t, that is:

$$FL + \sum_{j \in CP} PL_j \times (0.08 \times RM_t - FL) \leq 0.08 \times RM_t \qquad (6.44)$$

- **Criteria for granting individual limits**

  The **clearinghouse** will grant individual limits according to the following factors: (i) the restriction imposed by the global limit; (ii) the liquidity resources deriving from the **clearinghouse** liquidity risk mitigation mechanisms; (iii) the requests submitted by **investors** to reserve individual limits; (iv) the historical **margin** required of each **investor**; (v) the actual use of the individual limits granted to **investors** in previous cycles; and (vi) the criteria defined by B3's Chief Operating Officer and Chief Product & Client Officer aimed at promoting the liquidity of certain products and facilitating the entry of new nonresident **investors** into the domestic market, among other purposes.

  B3 may modify any such criteria over time, in order to optimize the utilization of the available global limit.

  The measurement of the degree of utilization of **collateral** deposited abroad will be provided based on the concept of appropriated **collateral**. An **asset** deposited abroad will be considered as appropriated only if the withdrawal thereof is not allowed by the **clearinghouse**, pursuant to the rules set forth in section 6.5 of this chapter.

  In order to provide predictability for eligible **investors**, the limits granted for **posting collateral** overseas will follow quarterly cycles, which will coincide with the quarters of the calendar year.

  As soon as an **investor** realizes that all or part of the limit he/she/it was granted during a cycle will not be used, the **clearinghouse** must be promptly notified thereof through the relevant **participant**, so that such limit can be redistributed.

  The **clearinghouse** may impose a fine on the **investors** that do not use in an effective manner the individual limits they were granted in a certain cycle, provided it informed the **participants** of the rules for determining the amounts of said fine prior to the beginning of the relevant cycle.

  In order to ensure its proper functioning and mitigate risks, the **clearinghouse** may, at any time and at its sole discretion, reduce the limit granted to any **investor** by notifying the relevant **participant**.

- **Criteria for the acceptance and valuation of collateral abroad**

Subject to the **collateral posting** procedure described under section 6.5 of this chapter, at each new request for **posting collateral** overseas submitted by any **investor** to the **clearinghouse collateral** management system through a **full trading participant** or **settlement participant**, the **clearinghouse** will assess the relevant nonresident **investor**'s compliance with the individual deposit limit of the **investors** belonging to sets FC and PC, as given by the following inequations:

(a) For the **investors** belonging to set FC:

$$OC_{i,t} + HOCR_{i,t} \leq FL_i^k \tag{6.45}$$

Where:

$OC_{i,t}$: the haircut value of the **assets** posted as **collateral** abroad by **investor** i on date t for cycle k, as calculated by the CORE methodology;

$HOCR_{i,t}$: the haircut value in Brazilian reals of the new **posting collateral** abroad requested by the **participant** responsible for **investor** i on date t, pending review by the **clearinghouse**; and

FL_i^k: the limit in financial value assigned to **investor** i belonging to set FC valid for cycle k.

(b) For the **investors** belonging to set PC:

$$OC_{j,t} + HOCR_{j,t} \leq PL_j^k \times (0.08 \times RM_t - FL) \tag{6.46}$$

Where:

PL_j^k: the percentage rate of the aggregate **margin** required by the **clearinghouse** that can be deposited by **investor** j belonging to set PC during cycle k.

If the individual limit of the **investor** belonging to either set FC or PC and the other limits applicable to **collateral posting** presented in section 6.3 of this chapter are met, then the total **collateral** in the new deposit request will be accepted and valued according to the CORE methodology. If any of the applicable limits is not met, the deposit will be made, but a unit price (PU) at a value equal to zero will be assigned to the portion of the deposit that exceeds the corresponding violated limit(s).

- **Restoring limits in the event of passive nonadherence**

A passive nonadherence of the individual limit of any **investor** or of the global limit may occur in the following situations:

(i) Reduction in the aggregate **margin** required by the **clearinghouse** on date t ; and

(ii) Increase in the haircut unit prices of the **assets** deposited as **collateral** abroad, with their respective values taken into account in Brazilian reals.

The **clearinghouse** will assess daily the adherence of the total haircut value in Brazilian reals of **collateral** posted overseas by **investors** to a ten percent (10%) limit of the **margin** required in Brazilian reals by the **clearinghouse**. Should that limit be violated, the haircut values in Brazilian reals of **collateral** posted abroad by each **investor** will be adjusted, on the same date of violation, to the corresponding individual limits in force. In further cases of passive nonadherence (global limit between eight percent (8%) and ten percent (10%) and/or individual limits above the individual limit assigned to the relevant **investor**), the limits will be restored on the first business day of the next quarterly cycle.

On the first business day of each quarterly cycle, or at any date on which the ten percent (10%) global limit violation occurs, the **clearinghouse** will assess the conformity of the haircut values in Brazilian reals of **collateral** deposited overseas with the individual limit assigned to each **investor**, by considering the limits valid for the concerned cycle.

(a) For the **investors** belonging to set FC :

$$OC_{i,T} \leq PL_i^k \tag{6.47}$$

Where:

$OC_{i,T}$: the haircut value in Brazilian reals, as calculated by the CORE methodology, of the **assets** posted abroad as **collateral** by **investor** i on date T, that is, on the first business day of quarterly cycle k.

(b) For the **investors** belonging to set PC :

$$OC_{j,T} \leq PL_j^k \times 0.08 \times (RM_T - FL) \tag{6.48}$$

Where:

PL_j^k : the percentage rate of the aggregate **margin** required by the **clearinghouse** that can be deposited by **investor** j belonging to set PC during cycle k.

Whenever a passive nonadherence occurs, the excess amounts will be valued with unit prices equal to zero and, if necessary, **collateral** will be required to be posted in local currency, which requirement might be met by eligible **assets** denominated in Brazilian reals, as stipulated by subsection 6.1.1 of this chapter. In order to choose the **assets** to be valued with their respective

unit prices equal to zero, the **assets** will be ordered according to increasing liquidity, from the lowest to the highest. Therefore, each **investor**'s **collateral** deposited abroad and the total **collateral** required by the **clearinghouse** will initiate a quarterly cycle within their respective limits.

6.3.7 Acceptance limits for other assets

B3 reserves the right to set out acceptance limits for any other **assets** eligible to be accepted as **collateral**.

6.3.8 Acceptance limits of collaterals by issuer and type of collateral

The **clearinghouse** may set limits on the total amount of **collateral** it accepts, defined for each issuer and type of **collateral**.

The limits in force are published on B3's website (www.b3.com.br) and are periodically reviewed at B3's discretion.

6.3.9 Limits of sovereign bonds deposited abroad

The **clearinghouse** may set limits on sovereign bonds deposited abroad as **collateral** per **participants** or group of **participants** belonging to the same **financial conglomerate**.

The limits in force are published on B3's website (www.b3.com.br) and may vary depending upon country of issuance, type, maturity, index, among other bond characteristics.

6.4 Monitoring and meeting collateral calls

6.4.1 Frequency of collateral calls

6.4.1.1 Daily calls

The following calls occur on a daily basis, based on the previous day's closing **positions**, that is, after all the executed trades are allocated:

(i) **Margin** calls for **investors**, **full trading participants** and **settlement participants**, which are also updated when a **delivery failure** is managed in the **clearinghouse** asset **delivery** window;

(ii) **Collateral** calls to meet the contributions required to the **settlement fund**, due to a negative price fluctuation of the **assets** deposited with that purpose.

Margin calls are announced to **full trading participants** and **settlement participants** by the **clearinghouse**. The other **collateral** calls are made to the **participants** of whom/which they are required.

6.4.1.2 Intraday calls

Collateral earmarked for **full trading participants**' or **settlement participants**' operating balance purposes, required by the **clearinghouse** within the scope of the intraday risk monitoring activities, must be posted within the specific time periods defined by the B3 in each case.

6.4.1.3 Undefined frequency calls

Participants may be required to deposit **margin** at any time of the day, as a result of a possible increase in the **clearinghouse** risk exposure identified by the intraday risk monitoring activities. The amounts that must be posted are announced by the **clearinghouse** to **full trading participants**, **settlement participants** and their respective **clearing members** through the **intraday risk management system**.

Concerning **settlement fund** contributions, the relevant deposits are required:

(i) During the **participant qualification** process;

(ii) Whenever the amount of the contributions is increased; and

(iii) Along the **settlement fund** replenishment process.

Collateral required of a **guarantee issuing bank** must be posted whenever **participants** need to constitute **collateral** issued by such a bank at the same amount of the violation of the limits assigned by B3 to the bank. The **clearinghouse** notifies **guarantee issuing banks** of the required amounts by telephone contact.

Additional **margin** calls occur in the situations and according to the criteria established in the **clearinghouse** rules and this manual. Additional **margin** calls may be debited to the **multilateral net balance**, in local currency, to be settled in the **settlement window** on the same day, except when another time limit has been expressly defined by the **clearinghouse** for the performance of the relevant obligation.

6.4.2 Schedule for moving collateral

The time frame for moving **collateral** (deposits, withdrawals, distributions and transfers) extends from 7:30 AM to 8:30 PM, with restrictions associated with the timetables of other institutions engaged in moving **collateral**, such as **central depositories** and the B3 Bank.

The following table shows the time grid for moving **collateral**.

Hour	Event
7:30 AM	Beginning of period for moving **collateral**. Beginning of compliance monitoring by the **clearinghouse** in connection with **margin** calls and other **collateral** purposes.
1:30 PM	End of period for **posting collateral** to meet **collateral** calls for the current day. End of period for withdrawing **collateral** made up of FIC and FILCB shares or local currency in the **settlement window**.
4:00 PM	End of period for moving **collateral** made up of FIC and FILCB shares (via the B3 Bank). End of period for moving **collateral** made up of local currency.
5:00 PM	End of period for moving **collateral** deposited abroad.
6:30 PM	End of period for moving **collateral** posted in Brazil, except those deposited in BCB-SELIC and **collateral** in the form of stocks deposited in **B3's central depository**. End of period for moving **collateral** in local currency via **Bank Reserves account** or **Settlement account** (SPB message LDL0015).
8:00 PM	End of period for moving **collateral** made up of stocks deposited in **B3's central depository**.
8:30 PM	End of period for moving **collateral** deposited in BCB-SELIC.

Table 6.4 - Time grid for moving **collateral**

The values of **margin** calls made to **investors** are entered as a debit to the **investors**' **multilateral net balances**, in local currency, to be settled on the same day (T), and are also reflected on the **multilateral net balances**, in local currency, of the corresponding **full trading participants**, or **settlement participants**, and **clearing members**.

The values of **margin** and other **collateral** calls made to **full trading participants** or **settlement participants** (except **collateral** for operating balance purposes, within the scope of the intraday risk monitoring activities) are entered as a debit to said **participants**' **multilateral net balance**s, in local currency, to be settled on the same day (T), which are reflected on the **multilateral net balances**, in local currency, of the corresponding **clearing members**.

The values of **collateral** calls made to **clearing members** are entered as a debit to the **clearing members**' **multilateral net balances**, in local currency, to be settled on the same day (T).

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

At 1:00 PM on T, the **clearinghouse** updates the debit amounts entered to the **multilateral net balances**, in local currency, of all the **participants**, in connection with the **margin**/**collateral** calls made to them, reducing such debit amounts in the **collateral** amount deposited by this time by the relevant **participant** for the corresponding purposes. The updated debit amount (V, $V \geq 0$) to be entered to the **multilateral net balances**, in local currency, to be settled on T is given by:

$$V = \max\left[\sum_{f} Call_f - G_f \ , \ 0\right] \tag{6.49}$$

Where:

$Call_f$: the amount of the **collateral** call for purpose f, to be covered on T; $Call_f > 0$; and

G_f: the amount of **collateral** posted by the **participant** by 1:00 PM on T for purpose f; $G_f \geq 0$.

6.5 Procedures for posting and withdrawing collateral

The movement or replacement of **assets** deposited as **collateral**, regardless of the relevant purpose, is expressly authorized by B3 through the **clearinghouse collateral** management system, and each activity can be carried out as follows:

- In the case of **collateral** deposited for **investors** (**transaction** guarantee purposes):
  - (i) By the **full trading participant** or **settlement participant** responsible for the **investor** holding the **asset**; or
  - (ii) By the **clearing member**, **full trading participant**, or **settlement participant**, in the case of **assets** held by such **participants** and deposited for third parties or in the case of **assets** held by **trading participants** or **foreign participants** deposited for third parties;
- In the case of **collateral** posted on behalf of **investors** (for pre-trade risk limit purposes), by the **clearing member**, **full trading participant** or **settlement participant** responsible for the **investor** that holds the **assets**;
- In the case of **assets** deposited by the **full trading participant** or **settlement participant** for operating balance **settlement fund** and pre-trade risk limit purposes, only by the **full trading participant** or **settlement participant**;
- In the case of **assets** deposited by the **clearing member** for operating balance, **settlement fund** and pre-trade risk limit purposes, only by the **clearing member**;
- In the case of bank letters of credit, only by the **full trading participant** or **settlement participant** if the **full trading participant** or **settlement participant**, or an **investor** under the responsibility of the **full trading participant** or **settlement participant** is the beneficiary thereof.

6.5.1 Posting collateral

The procedures for depositing any of the **assets** acceptable as **collateral** consist of three steps, namely: **collateral posting** request, **collateral posting** request review and, upon approval of a request, actual **collateral posting**.

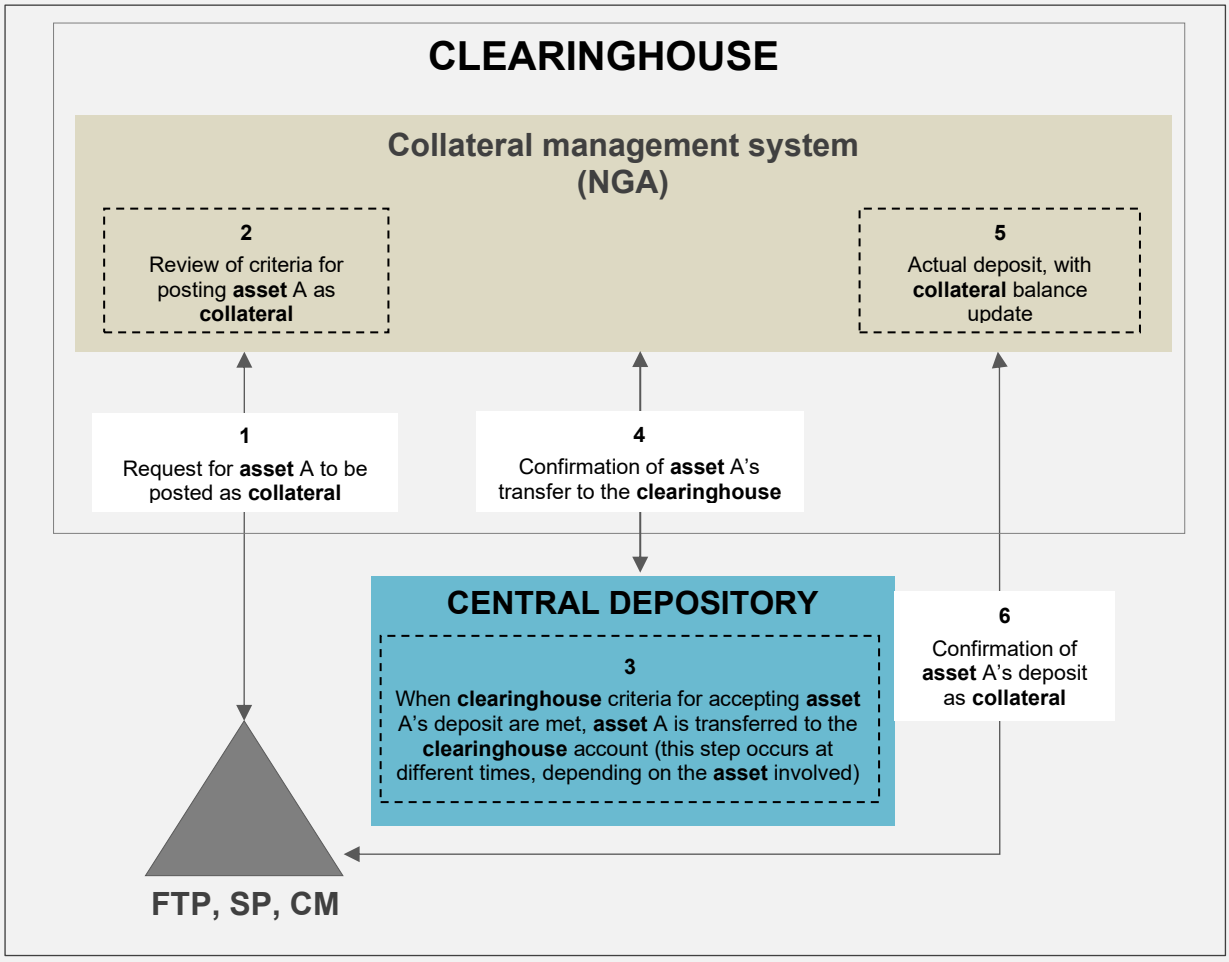


Figure 6.1 - **Collateral posting** process

6.5.1.1 Collateral deposit request

A **collateral posting** request consists of the input of the characteristics of the **asset** desired to be posted as **collateral** into the **clearinghouse collateral** management system by **full trading participants**, **settlement participants**, **clearing members**, **guarantee issuing banks** and **controlling guarantors** as the case may be.

- **Full trading participants** and **settlement participants** must register **collateral posting** requests for proprietary **collateral,** including **collateral** deposited in the form of contributions for the **settlement fund,** and for **collateral** of **investors** under their responsibility. In the case of **collateral** posted for **investors** for pre-trade risk limit purposes, **full trading participants** and **settlement participants** must indicate the **investors** to whom the **collateral** is allocated.

- **Clearing members** must register **collateral posting** requests for proprietary **collateral**, including **settlement fund collateral**. In the case of the operating balance purpose for **full trading participants** and **settlement participants** under their responsibility, **clearing members** must name, through the **clearinghouse collateral** management system, the **full trading participants** and **settlement participants collateral** is intended to, so that the aforementioned purpose can be met by such **collateral**. In the case of **collateral** posted for pre-trade risk limit purposes for **investors**, **full trading participants** and **settlement participants** under its responsibility, in order for the posted **collateral** to serve this purpose, the **clearing member** must indicate the **investors**, **full trading participants** and **settlement participants** to whom the **collateral** is allocated.

- **Guarantee issuing banks** must register **collateral posting** requests for proprietary **collateral**, that is, **collateral** they are required to post in order to adjust the volume of **collateral** of their issuance, posted by **participants**, to the acceptance limits assigned to each bank by B3. Such requests must be registered in the **clearinghouse collateral** management system:

  (i) By the **guarantee issuing bank** itself, whenever it acts in the capacity of a **participant** with access to that system; or otherwise,

  (ii) By the **clearinghouse**, upon instruction from the **guarantee issuing bank**.

- **Gold refiners** must submit **collateral posting** requests for proprietary **collateral**, that is, **collateral** required for their **qualification** as **participants** in the B3 custody system. Their requests are registered by the **clearinghouse** in its **collateral** management system, upon instruction from the relevant **gold refiner**.

- **Controlling Guarantors** must register **collateral posting** requests for proprietary **collateral**, to meet the access requirements of **full trading participants**, **settlement participants**, and **clearing members** under its control. Such requests must be registered in the **collateral** administration system of the **clearinghouse**:

  (i) By the **controlling guarantor** itself, in case it acts as a **participant** with access to that system; or otherwise,

(ii) By the **clearinghouse**, upon instruction from the **controlling guarantor**.

6.5.1.2 Collateral posting request review

After a **collateral posting** request is registered, the **clearinghouse** proceeds to review the relevant request. As a result, the request will be either accepted or rejected. The **clearinghouse** reviews the characteristics of the **asset** to be posted, the attributes of the **participants** involved (**collateral** holder, **participants** responsible for the **positions** that **collateral** is aimed to cover, and **collateral issuers**) and the impacts of such **collateral posting** on the **clearinghouse** risk exposure.

A **collateral posting** request is rejected whenever it entails the violation of the limits and restrictions defined by B3 and applicable to, or associated with the **participants** involved. After approving a **collateral posting** request and monitoring said limits at a time subsequent to the time of review of the deposit request, the **clearinghouse** may require that the newly-posted **collateral** be replaced, in case the maintenance thereof implies the violation of those limits or of other limits.

6.5.1.3 Collateral posting

In general, **collateral** whose deposit requests are accepted by the **clearinghouse** are posted by transferring the corresponding **assets** to B3. The procedures applicable to each **asset** type are shown below.

Federal government bonds traded in Brazil

Federal government bonds are deposited as **collateral** through the transfer of the relevant securities (stated in the **collateral posting** request registered in the **collateral** management system) to the **clearinghouse** account with BCB-SELIC. The bonds are transferred by way of an instruction from both the relevant custodian and the **clearinghouse** to BCB-SELIC. After the transfer is made and no information is pending registration or confirmation in the BCB-SELIC environment, the relevant deposit is completed for **collateral** purposes, meaning that the deposited balance is entered into the **clearinghouse collateral** management system.

Shares of stocks, ETF shares, investment fund shares traded at B3, certificates of deposit of shares (units) and debentures

Shares of stocks, ETF shares, investment fund shares traded at B3, units and debentures are deposited as **collateral** through the transfer of the relevant **assets** (stated in the **collateral posting** request registered in the **collateral** management system) to the B3 **collateral** portfolio held by the **custody agent** with the **B3 central depository**, pursuant to the provisions set forth in the B3 operating procedures manual. If the **custody agent** and the **participant** are not the same institution, the number of said transfer (instruction number) in the **B3 central depository** must be registered in the **clearinghouse collateral** management system by the **participant** upon registration of the **collateral posting** request. Otherwise, the **clearinghouse collateral** management system will automatically record the movement in B3's **central depository**.

In the case of a debenture deposited in a deposit system other than the B3 central depositary, the deposit of **collateral** is processed through the linking of the debenture to the **clearinghouse** account in the corresponding deposit system. This linking is carried out through a dual command in the deposit system (commands from the custodian and the **clearinghouse**). The deposit of **collateral** in the form of a debenture is terminated upon confirmation, from the deposit system to the **clearinghouse collateral** management system, of the completion of the linking.

Upon maturity or early **settlement** of the **securities lending** agreement, the **asset** underlying the agreement can be transferred directly, in the **settlement** by **delivery**, from the **clearinghouse settlement account** to the B3 **collateral subaccount** of the **lender investor**'s **account** with the **B3 central depository**. The **full trading participant** or **settlement participant** must instruct such **subaccount** as the destination of the **delivery** in the **lending system**, until the last business day preceding the **settlement**.

Bank certificates of deposit (CDs), Real Estate Letters of Credit (LCIs) and Agribusiness Letters of Credit (LCAs)

Bank CDs, LCIs and LCAs are deposited as **collateral** by linking the relevant securities to the **clearinghouse** account with the corresponding depository system. Linking is made through dual command in the depository system (by the custodian and the **clearinghouse**). **Collateral posting** is completed upon confirmation by the depository system to the **clearinghouse collateral** management system that the linking process is completed.

Bank letters of credit

Bank LCs are deposited as **collateral** against the receipt and acceptance of the hard copy of the relevant letters by the **clearinghouse**, as well as the electronic confirmation of the issuance thereof by the **guarantee issuing bank**.

Shares of the investment fund *B3 Margem Garantia Renda Fixa Referenciado DI Fundo de Investimento em Cotas de Fundos de Investimento* (FIC)

Upon the acquisition of FIC shares, they are automatically pledged in favor of the **clearinghouse**.

The purchase of shares occurs according to the following steps:

1. Cash funds are transferred to the **clearinghouse** account with the B3 Bank. This transfer is made by the **full trading participant** or **settlement participant** responsible for the **investor** to whom/which **collateral** is intended; said **investor** must be properly registered with the bank and qualified to acquire fund shares;

2. The B3 Bank inputs into the **clearinghouse collateral** management system the amount that was credited to the **clearinghouse** account, and the **full trading participant** or **settlement participant** indicates, in that same system, that the cash funds must be used to acquire fund shares; and

3. The **clearinghouse** instructs the B3 Bank to purchase fund shares for the **investor** indicated in the **clearinghouse collateral** management system by the **full trading participant** or **settlement participant**.

Investment Fund B3 Clearinghouse Liquidity (FILCB) shares

FILCB shares are automatically pledged in favor of the **clearinghouse** at the time they are acquired.

The purchase of shares occurs according to the following steps:

1. Cash funds (local currency) are transferred to the FILCB account under the custody of the B3 Bank by the **clearing member**, **full trading participant**, **settlement participant**, or B3;
2. The B3 Bank informs the **clearinghouse** of the financial amount that was credited to the FILCB account and the number of shares acquired; and
3. The **clearinghouse** inputs into the **collateral** management system the number of shares acquired in favor of the **clearing member**, **full trading participant**, **settlement participant**, or B3 for the applicable **collateral** purpose.

Cash funds – Local currency

The **clearinghouse** provides three options for **posting collateral** in cash, namely: through the B3 Bank, in the **settlement window**, or via SPB messaging.

- Through the B3 Bank, cash funds must be transferred by the **participant** to the **clearinghouse** account with said bank. Upon completion of the transfer, the deposit information is relayed electronically to the **clearinghouse collateral** management system, after which the **participant** must indicate, in that same system, how the funds are to be distributed among the relevant purposes. The aforementioned **participant** may be:

  (i) A **full trading participant** or **settlement participant**, in the case of funds intended to constitute **collateral** required of one **participant** or the other, or of **investors**;

  (ii) A **clearing member**, in the case of funds intended to constitute **collateral** required of any such member; or

  (iii) A **controlling guarantor**, in the case of funds intended to constitute **collateral** to meet access requirements.

- In the **settlement window**, cash funds are entered as a debit to the **multilateral net balances** of the **participants** involved, in local currency, in order to be settled:

  (i) On the same day, for **collateral posting** requests registered by 1:00 PM; or

  (ii) On the following business day, for **collateral posting** requests registered after 1:00 PM.

- Via SPB messaging, in the **clearinghouse collateral** management system, the **full trading participant**, the **settlement participant**, or the **clearing member** requests **message** LDL0013 to be sent, whereby the **settlement agent** of the relevant **clearing member** is requested to transfer the funds to the **clearinghouse settlement account**.

  The **participants** whose **multilateral net balances** (MNBs) are debited are:

  (i) The **investor** and the corresponding **full trading participant**, or **settlement participant**, and **clearing member**, in the case of **collateral** earmarked for **transaction** guarantee purposes;

(ii) The **full trading participant** or **settlement participant**, in the case of **collateral** posted for the applicable purposes, and the corresponding **clearing member**; and

(iii) The **clearing member**, in the case of **collateral** posted for the purposes applicable to **clearing members**.

Cash deposits are effected for **collateral posting** purposes upon confirmation of the funds transfer in the **settlement window** by the **clearing member** responsible for the **participant(s)** involved, in favor of the **clearinghouse** account with its **settlement agent**.

Cash funds – Foreign Currency

Foreign currency deposits are processed for **collateral posting** purposes through the transfer of the relevant cash funds to the B3 account with the bank it engages overseas to that end. The relevant deposits are completed upon confirmation of the credit to either account.

US Treasury bonds, German Treasury bonds, French Treasury bonds, Dutch Treasury bonds, Mexican Treasury bonds, Canadian Treasury bondsADRs and shares of stock traded abroad

The deposit of such **collateral** is effected through the transfer of the relevant **assets** to the **clearinghouse collateral** account with a **central depository** (DTC or Euroclear). Said transfer must follow the procedures of the relevant **central depository** and be performed by each **asset**'s custodian in favor of B3. The deposit is completed in the **clearinghouse collateral** management system for **collateral posting** purposes upon confirmation of the credit of the relevant **assets** to the B3 account.

6.5.2 Withdrawing collateral

The withdrawal of **collateral** is the reverse procedure to **collateral posting**, whereby a given **asset** ceases to constitute **collateral** at the **clearinghouse**.

The procedure for withdrawing **collateral** consists of three steps, namely: withdrawal request, withdrawal request review and, upon approval of a request, actual withdrawal.

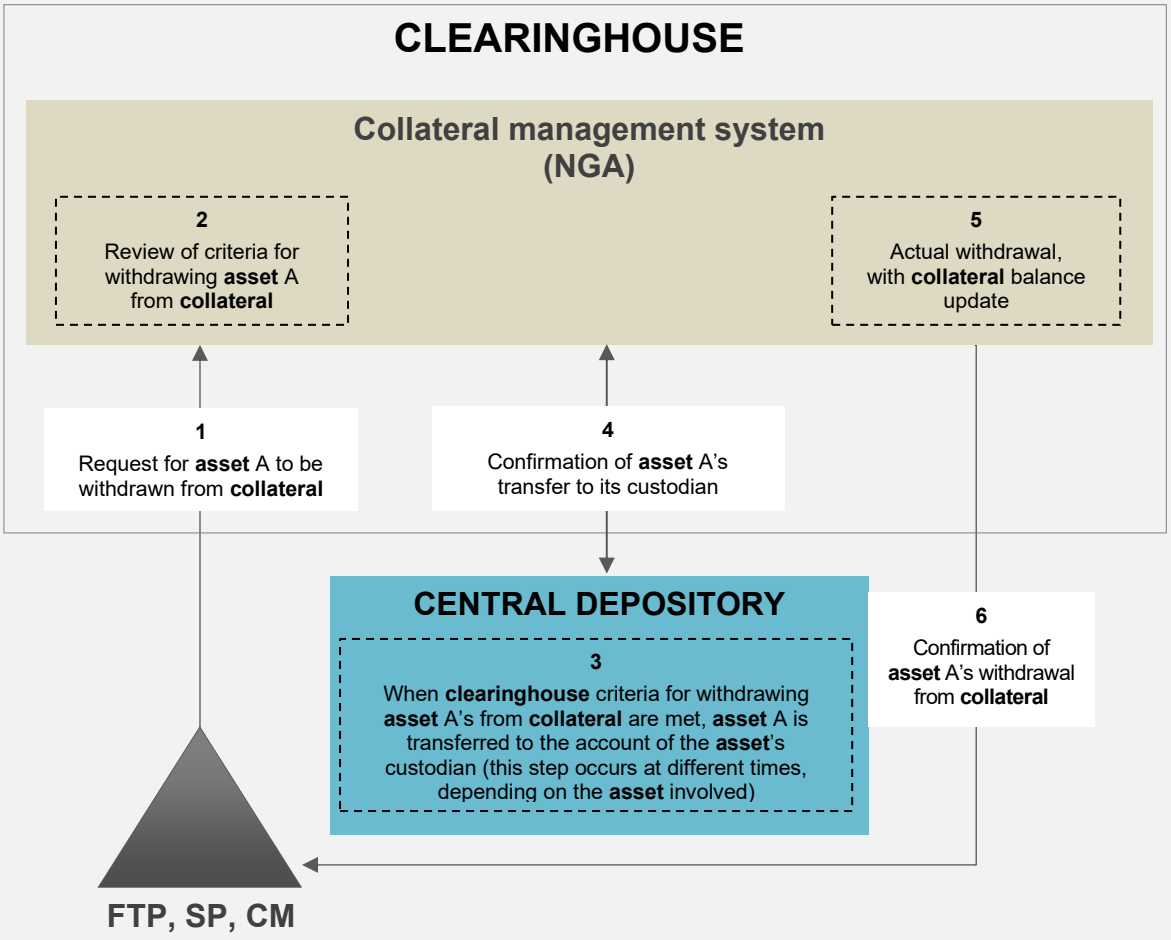


Figure 6.2 - **Collateral** withdrawing process

6.5.2.1 Collateral withdrawal request

A withdrawal request is submitted through registration, in the **collateral** management system, of the identification of the **asset** to be removed. Withdrawal requests may be registered by **full trading participants**, **settlement participants**, **clearing members**, **guarantee issuing banks** and **controlling guarantors,** according to the purposes of **collateral** to be removed, as follows:

- **Full trading participants** and **settlement participants** must register withdrawal requests for proprietary **collateral,** including **collateral** deposited as contribution to the **settlement fund**, for pre-trade risk limit purposes, or **collateral** deposited for third parties (federal government bonds), and for **collateral** of **investors** under their responsibility; in the case of **investors**' **collateral** (that is, for **transaction** guarantee purposes or pre-trade risk limit purposes), a withdrawal request involving a given **collateral** must be submitted by the same **participant** that posted it, meaning the same **participant** that registered the corresponding deposit request, even if such **collateral** has been distributed over time, in order to guarantee **transactions** or

pre-trade risk limits under the responsibility of other **full trading participants** or **settlement participants**.

- **Clearing members** must register withdrawal requests for proprietary **collateral**, meaning **collateral** deposited for the **settlement fund**, for adjusting the operating balance levels of **full trading participants** and **settlement participants** under their responsibility, for pre-trade risk limit purposes, or for providing third-party **collateral** (Brazilian federal government bonds).
- The **guarantee issuing bank** must request the withdrawal of proprietary **collateral**, that is, **collateral** it deposited to adjust the volume of **collateral** of its issuance, which is deposited by **participants**, to the acceptance limits assigned to the bank by B3. Such requests must be registered in the **clearinghouse collateral** management system:
  - (i) By the **guarantee issuing bank** itself, whenever it acts in the capacity of a **participant** with access to said system; or otherwise,
  - (ii) By the **clearinghouse**, upon instruction from the **guarantee issuing bank**.
- **Gold refiners** must submit **collateral withdrawal** requests for proprietary **collateral**. Their requests are registered by the **clearinghouse** in its **collateral** management system, upon instruction from the relevant **gold refiner**.
- **Controlling guarantors** must submit proprietary **collateral** withdrawal requests, that is, **collateral** it deposited to meet access requirements for **participants** that are linked to it. Such requests must be registered in the **collateral** administration system of the **clearinghouse**:
  - (i) By the **controlling guarantor**, if it acts as a **participant** with access to such a system; or
  - (ii) By the **clearinghouse**, if it does not act as a **participant**, upon instruction from the **controlling guarantor**.

Any and all **collateral** withdrawal requests must comply with the timetable established by the **clearinghouse** for moving **collateral**, the hours of operation of the corresponding **central depository** as well as the hours of operation of banks, should any bank participate in the withdrawal process.

When extraordinary facts so warrant, BCB might make an exceptional declaration to alter Reservation Transfer System's (STR) operating hours. The **clearinghouse** might also determine modifications to its **collateral** withdrawal time schedules and related processes, in case the change to STR's operation impacts such processes.

6.5.2.2 Collateral withdrawal request review – Criteria for releasing collateral

All the **collateral** withdrawal requests are reviewed by the **clearinghouse**. The criteria to release **collateral** is based on the evaluation of portfolios of **positions** and **collateral** held by **investors**, **full**

trading participants, **settlement participants**, **clearing members**, **guarantee issuing banks** and **controlling guarantors**, according to the purpose of **collateral** underlying a withdrawal request.

The **clearinghouse** may reject a withdrawal request:

(i) Whenever **collateral** desired to be withdrawn is blocked; or

(ii) In the absence of a free balance of **collateral**, which is a function of required, posted and blocked **collateral** associated with the **participant** to which **collateral** underlying a withdrawal request is assigned, and of the **multilateral net balance**, in local currency, due on the withdrawal request date (T+0); or

(iii) Whenever the withdrawal implies the violation of any limits or restrictions established by B3; or

(iv) Whenever the withdrawal implies non-compliance with access requirements established by B3.

The term "blocked **collateral**" refers to **collateral** posted by a **participant**, but which cannot be moved by said **participant** due to (i) a court order received by the **clearinghouse**, in which case only the free balance is subject to blocking; (ii) a request submitted by the **clearinghouse collateral** management system to manage any **settlement** failure, or (iii) the **clearinghouse** perception that the credit risk of the **participant** has deteriorated.

As referred to in chapter 2 (Procedures for a **default** or **operational defaulter** event) of this manual, **collateral** associated with **participants** declared as **defaulters** or characterized as **operational defaulters** by the **clearinghouse** will remain blocked for as long as there are **positions** and obligations to be settled by such **participants**. Blocked **collateral** may not be withdrawn, transferred, or distributed.

Regarding the requests approved by the **clearinghouse**, the withdrawable amount is limited to the value of **collateral** made up of the **asset** desired to be withdrawn and to the criteria presented in the following paragraphs.

(a) Releasing investors' collateral

Consider the following purposes for which **collateral** posted by the **investor** may be allocated:

(i) **Collateral** for transactions; and

(ii) Pre-trade risk limit.

(a.1) **Collateral** for **transactions**

The free balance of **collateral** posted for **transaction** guarantee purposes and registered in **account** C of a given **investor**, under the responsibility of **full trading participant** or **settlement participant** P and **clearing member** CM, is given by:

$$FB_C(D) = \min\left[B_C(T-1)\ ,\ B_C(T)\right] + \min\left[MNB_C^T,\ 0\right] - BlockedColl_C \qquad (6.50)$$

Where:

$B_C(T-1)$: the deficit ($B_C(T-1)<0$) or surplus ($B_C(T-1)\geq 0$) of **collateral** to cover the **transactions** registered in **account** C under the responsibility of P and CM, calculated according to the CORE methodology, as described in chapter 7 (Risk calculation) of this manual, by considering (i) the $T-1$ closing **positions** registered in **account** C; and (ii) **collateral** deposited in **account** C at the time the free balance is calculated on date T; for the purposes of rule 1 described below, this value includes **collateral** underlying the withdrawal request; for the purposes of rule 3 described below, this value does not include **collateral** underlying the withdrawal request;

$B_C(T)$: the deficit ($B_C(T)<0$) or surplus ($B_C(T)\geq 0$) of **collateral** to cover the **transactions** registered in **account** C under the responsibility of P and CM, according to $Balance_C^{CORE0}$ defined in chapter 4 (Intraday risk monitoring) of this manual and calculated according to the CORE methodology, as described in chapter 7 (Risk calculation) hereof, by considering (i) the **positions** registered in **account** C at the time the free balance is calculated on day T; and (ii) **collateral** deposited in **account** C at the time the free balance is calculated on date T; for the purposes of rule 1 described below, this value includes **collateral** underlying the withdrawal request; for the purposes of rule 3 described below, this value does not include **collateral** underlying the withdrawal request;

MNB_C^T: the **multilateral net balance**, in local currency, of **account** C, under the responsibility of P and CM, to be settled in the **settlement window** of date T; $MNB_C^T<0$ if debit balance, $MNB_C^T>0$ if credit balance, and $MNB_C^T=0$ if there is no balance to be settled, or if the free balance is calculated after the end of the **settlement window**, with debtor **participants** C, P and MC meeting their respective payment obligations;

if the withdrawal of cash (local currency) and FIC shares occurs via the **settlement window**, then $MNB_C^T = 0$; and

$BlockedColl_C$: the amount of **collateral** blocked by the **clearinghouse**, made up of the **asset** underlying the withdrawal request and posted to cover the **transactions** registered in **account** C.

The free balance is null when calculated after the end of the **settlement window** and one or more **participants**, from among C, P and MC, fail to meet their payment obligations, meaning that the total amount of **collateral** deposited to cover **investor** C's **transactions** is blocked.

Denote by $WV_{C^*}(T,A)$ the amount of **collateral** available for withdrawal on date T, made up of **asset** A which is posted, for **transaction** guarantee purposes, in **account** C^* of a given **investor**, under the responsibility of **full trading participant** or **settlement participant** P^* and **clearing member** CM^*. The criteria to release the **investor**'s **collateral** consist of the following rules:

Rule 1: The **clearinghouse** does not allow **collateral** to be withdrawn whenever the free balance of **collateral** in any of the **investor**'s **accounts**, under any **full trading participant**, or **settlement participant**, and any **clearing member**, is null or negative, that is:

$$WV_{C^*}(T,A) = 0, \text{ if } FB_C(T) < 0 \text{ for any account } C \text{ held by the investor} \quad (6.51)$$

Rule 2: The **clearinghouse** does not allow **collateral** made up of cash funds (local currency), or FIC shares to be withdrawn via the B3 Bank whenever the **multilateral net balance**, in local currency, of **full trading participant** or **settlement participant** P^*, $MNB_{P^*}^T$, is a debit on the date of withdrawal, meaning that, for A consisting of local currency or selected investment fund shares:

$$WV_{C^*}(T,A) = 0 \quad \text{if} \quad MNB_{P^*}^T < 0 \quad (6.52)$$

Rule 3: If the **clearinghouse** allows **collateral** to be withdrawn, then the amount withdrawable from **account** C^* is limited to the free balance value of **collateral** in such an **account**, if positive, that is:

$$WV_{C^*}(T,A) = \max\left[FB_{C^*}(T),\ 0\right] \quad (6.53)$$

For nonresident **investors**, as defined in paragraph 1, article 13 of Joint Resolution BCB and CVM #13, of December 3, 2024, trading agricultural forward, futures and options contracts, the **multilateral net balances** considered in this criterion for releasing **collateral** correspond to amounts in US dollars, and not in local currency.

The rules of this paragraph (a) do not apply whenever the withdrawal request for a certain **asset** has the purpose (i) to fulfill a **delivery** obligation involving that same **asset** in the **settlement window** of the **multilateral net balance** in **assets**, that is, when the **investor** shows a **multilateral net** debit **balance** in the **assets** involved, or (ii) for **assets** in the **equities market**, to enter a lending order in the **lending system** and subsequently **deliver** the relevant **assets** to the **borrower** if the order is filled. Whenever an **asset**'s release results in a negative **collateral** balance, a **margin** call is entered into the **investor**'s **multilateral net balance** at an equivalent amount, in local currency.

(a.2) Pre-trade risk limit

As detailed in Chapter 4 (Intraday risk monitoring), the pre-trade risk monitoring carried out by the **clearinghouse** consists of a risk analysis of all **investors**, regardless of the access modality, through B3's **pre-trade risk management system**. If the risk limits assigned by the **trading participant**, **full trading participant** or **settlement participant**, under this model, to the **accounts** under their responsibility are deemed inadequate, B3 may, at its discretion and among several other measures, require the **investor**, the **settlement participant**, the **full trading participan**t or the **clearing member** to post additional **collateral**. Any request for the release of **collateral** posted for pre-trade risk limit purposes will therefore be analyzed by B3, which will assess the pre-trade risks and the respective limits assigned by **the trading participant, full trading participant** or **settlement participant**, under this model, to the **accounts** under their responsibility. The withdrawal is considered appropriate if it does not cause any breach of the limits assigned to such accounts or **participants** for pre-trade risk purposes, as defined in Chapter 4 of this manual.

Withdrawal of collateral exceeding applicable acceptance limits

The volume of shares of stocks, ADRs, units, ETF shares, investment fund shares traded at B3, debentures and shares of stock traded abroad deposited in excess of the acceptance limit established in subsection 6.3.4 is liable to be withdrawn on date T in case the **investor** presents a **collateral** surplus ($FB_{C^*}(T) \geq 0$).

If the **investor** presents a **collateral** deficit ($FB_{C^*}(T) < 0$), from the total excess volume of the **asset** (stock, ADR, unit, ETF share, debentures and shares of stock traded abroad) only the

portion that, in financial value, exceeds the amount of the deficit can be withdrawn on date T, according to the following equation:

$$Q_{Free\ excess} = \max\left[Q_{Excess} + \frac{FB_C(T)}{MCV \times (1 - Pct_{Haircut})} \ , \ 0 \right] \quad (6.54)$$

Where:

Q_{Excess}: the **asset** quantity in excess of the acceptance limit on date T;

$FB_C(T)$: the free balance of the **investor**'s **collateral** on date T, if negative, calculated according to equation (6.44);

MCV: the **asset** value calculated according to module CORE0 of the CORE methodology, as described in chapter 7 (Risk calculation) of this manual, by considering a hypothetical **portfolio** containing only one **asset** unit; and

$Pct_{Haircut}$: the haircut applicable to the minimum **asset** value, at a percentage rate established by the **clearinghouse**.

If $Pct_{Haircut}$ is parameterized at one-hundred percent (100%), no portion of the surplus **asset** quantity is liable to be withdrawn.

This withdrawal criterion also applies to shares of stocks, ADRs, units, ETF shares,debentures and shares of stock traded abroad in excess of the acceptance limit and which are not being considered for **margin** coverage purposes.

(b) Releasing collateral posted by full trading participants and settlement participants

Consider the following purposes to whom **collateral** can be deposited by the **full trading participant** or **settlement participant**:

(i) Operational balance;
(ii) **Settlement fund**;
(iii) **transaction** guarantee purposes, in the case of federal government bonds held by the **full trading participant** or **settlement participant**; and
(iv) Pre-trade risk limit.

The free balance of the **full trading participant** or **settlement participant**, associated to such purposes, are defined as follows:

(b.1) Free balance, on date T, of **collateral** deposited for operating balance purposes

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The free balance, on date T, of **collateral** posted by **full trading participant** or **settlement participant** P, under the responsibility of **clearing member** CM, for operating balance purposes is given by:

$$FB_P^{OB} = \min\left[FB_P^{OB}\left(T-1\right) \ , \ FB_P^{OB}\left(T\right) \right] - BlockedColl_P^{OB} \quad (6.55)$$

With:

$$FB_P^{OB}\left(T-1\right) = \min\left[PostedColl_P^{OB} \ , \ S\left(T-1\right) \right] \quad (6.56)$$

$$B\left(T-1\right) = PostedColl_P^{OB} + PostedColl_{P,CM}^{OB} - RequiredColl_P^{OB}\left(T-1\right) \quad (6.57)$$

$$FB_P^{OB}\left(T\right) = \min\left[PostedColl_P^{OB} \ , \ B \right] \quad (6.58)$$

$$B = PostedColl_P^{OB} + PostedColl_{P,CM}^{OB} - RequiredColl_P^{OB} \quad (6.59)$$

Where:

$FB_P^{OB}\left(T-1\right)$: the free balance, at the time of the calculation thereof, of **collateral** posted by **participant** P, by considering (i) the **margin** required based on the closing **position** of date $T-1$ and (ii) **collateral** posted for operating balance purposes at the time the free balance is calculated on date T; for the purposes of rules 1 and 3 described below, this value includes **collateral** underlying the withdrawal request;

$FB_P^{OB}\left(T\right)$: the free balance, at the time of the calculation thereof, of **collateral** posted by **participant** P for operating balance purposes, by considering (i) the **margin** required for operating balance purposes (with OB_P defined in chapter 4 (Intraday risk monitoring) of this manual) at the time the free balance is calculated on date T and (ii) **collateral** posted for operating balance purposes at the time the free balance is calculated on date T; for the purposes of rules 1 and 3 described below, this value includes **collateral** underlying the withdrawal request; for the purposes of rule 4 described below, this value does not include **collateral** underlying the withdrawal request;

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

$PostedColl_{P}^{OB}$: the amount of **collateral** posted for operating balance purposes by **participant** P at the time the free balance is calculated; for the purposes of rules 1 and 3 described below, this value includes **collateral** underlying the withdrawal; for the purposes of rule 4 described below, this value does not include **collateral** underlying the withdrawal;

$PostedColl_{P,CM}^{OB}$: the amount of **collateral** posted by **clearing member** CM for operating balance purposes of **participant** P at the time the free balance is calculated;

$RequiredColl_{P}^{OB}\left(T-1\right)$: the required **margin** of **participant** P, based on the $T-1$ closing **position**, at the time the free balance is calculated, for operating balance purposes in connection with cash market **positions** and unallocated **transactions**; and

$RequiredColl_{P}^{OB}\left(T\right)$: the amount of **collateral** required of **participant** P for operating balance purposes at the time the free balance is calculated; and

$BlockedColl_{P}^{OB}$: the amount, on date T, of **collateral** blocked by the **clearinghouse**, made up of the same **asset** that constitutes **collateral** underlying the withdrawal and posted by **participant** P for operating balance purposes.

(b.2) Free balance, on date T, of **collateral** deposited as contribution to the **settlement fund.**

$$FB_{P}^{FLI}\left(T\right)=PostedColl_{P}^{FLI}-RequiredAmt_{P}^{FLI}-BlockedColl_{P}^{FLI} \quad (6.60)$$

Where:

$PostedColl_{P}^{FLI}$:: the amount of **collateral** posted as contribution to the **settlement fund** by **participant** P at the time the free balance is calculated; for the purposes of rules 1 and 3 described below, this value includes **collateral** underlying the withdrawal; for the purposes of rule 4 described below, this value does not include **collateral** underlying the withdrawal;

$RequiredAmt_P^{FLI}$: the amount of **collateral** required of **participant** P contribution to the **settlement fund** at the time the free balance is calculated; and

$BlockedColl_P^{FLI}$: the amount, on date T, of **collateral** blocked by the **clearinghouse**, made up of the same **asset** that constitutes **collateral** underlying the withdrawal and posted by **participant** P to the **settlement fund**.

(b.3) Free balance, on date T, of federal government bonds held by **participant** P deposited as **collateral** for **investors** (for **transaction** guarantee purposes)

The free balance, on date T, of **collateral** made up of federal government bonds held by **participant** P posted by **participant** P for its **investors** is given by:

$$FB_P^{TG}(T) = PostedColl_P^{TG} - \sum_{i=1}^{N} UsedColl_{P,C_i}^{TG} - BlockedColl_P^{TG} \qquad (6.61)$$

Where:

$PostedColl_P^{TG}$: the amount of **collateral** posted by **participant** P, at the time the free balance is calculated, for **transaction** guarantee purposes, irrespective of whether such **collateral** is allocated to **investors** under **participant** P's responsibility or not, excluding **collateral** underlying the withdrawal if the purpose thereof is operating balance; for the purposes of rules 1 and 3 described below, this value includes **collateral** underlying the withdrawal; for the purposes of rule 4 described below, this value does not include **collateral** underlying the withdrawal;

N : the number of **investors** to whom government bonds owned by **participant** P and posted for **transaction** guarantee purposes have been allocated;

$UsedColl_{P,C_i}^{TG}$: the amount of the portion of **collateral** posted by **participant** P for **transaction** guarantee purposes and allocated to the i-th **investor**; and

$BlockedColl_P^{TG}$: the amount of **collateral** blocked by the **clearinghouse**, made up of the same **asset** that constitutes **collateral** underlying the withdrawal request and posted by **participant** P for **transaction** guarantee purposes.

Consider **collateral** made up of **asset** *A*, deposited by a given **full trading participant** or **settlement participant** P^*. Let $WV_{P^*}(T,A)$ be the amount of that **collateral** available for withdrawal on date T. The following rules comprise the criteria to release **collateral**:

Rule 1: The **clearinghouse** does not allow **collateral** to be withdrawn whenever the balance of **collateral** posted by **participant** P^* for any purpose is negative, that is:

$$WV_{P^*}(T,A)=0 \quad \text{if} \quad \begin{cases} FB_{P^*}^{TG}(T)<0 & \text{or} \\ FB_{P^*}^{OB}(T)<0 & \text{or} \\ FB_{P^*}^{FLI}(T)<0 & \text{or} \\ FB_{P^*}^{PRE}(T)<0 & \text{or} \\ FB_C(T)<0 & \end{cases} \tag{6.62}$$

Where $FB_C(T)$ is calculated according to equation (6.47) of paragraph (a) and C indicates any proprietary **account** held by **participant** P^*, that is, in the capacity of an **investor**, regardless of the **full trading participant** or **settlement participant** responsible for said **account**.

Rule 2: The **clearinghouse** does not allow **collateral** made up of cash funds (local currency) or FIC shares to be withdrawn via the B3 Bank whenever the **multilateral net balance**, in local currency, of **full trading participant** or **settlement participant** P^* is a debit on the date of withdrawal, meaning that, for local currency or FIC shares (each denominated by A):

$$WV_{P^*}(T,A)=0 \quad \text{if} \quad MNB_{P^*}<0 \tag{6.63}$$

Rule 3: The **clearinghouse** does not allow **collateral** to be withdrawn whenever the total free balance of **collateral** posted by **participant** P^* is a debit. Denoting the total free balance, on date T, by $TotalFB_C(T)$, then:

$$WV_{P^*}^{f}(T,A)=0 \quad \text{if} \quad TotalFB_C(T)<0 \tag{6.64}$$

$$TotalFB_C(T)=FB_{P^*}^{OB}(T,A)+FB_{P^*}^{FLI}(T,A)+FB_{P^*}^{TG}(T,A)+min\left[MNB_{P^*}^{T},0\right] \tag{6.65}$$

Where $MNB_{P^*}^{T}$ is the **multilateral net balance**, in local currency, of **full trading participant** or **settlement participant** P^* to be settled on the **settlement window** of date T; $MNB_{P^*}^{T} < 0$ if debit balance, $MNB_{P^*}^{T} > 0$ if credit balance, and $MNB_{P^*}^{T} = 0$ if there is no balance to be settled, or if the free balance is calculated after the end of **the settlement window**.

Rule 4: If the **clearinghouse** allows **collateral** to be withdrawn, then the withdrawable amount of **collateral** is limited to the free balance value of **collateral** posted by **participant** P^* for the relevant purpose, that is:

$$\begin{aligned} WV_{P^*}^{TG}(T,A) &= max\left[FB_{P^*}^{TG}(T)\,,0\right] \\ WV_{P^*}^{OB}(T,A) &= max\left[FB_{P^*}^{OB}(T)\,,0\right] \\ WV_{P^*}^{FLI}(T,A) &= max\left[FB_{P^*}^{FLI}(T)\,,0\right] \end{aligned} \tag{6.66}$$

(b.4) Free balance, on date T, of **collateral** posted to increase pre-trade risk limits (pre-trade risk limit purpose):

The free balance on a given date T for this purpose is defined as the maximum amount of **collateral** posted by **full trading participants** and **settlement participants** that may be withdrawn without causing any breach of the pre-trade risk limits assigned by these **participants** to the **accounts** under their responsibility, as defined in Chapter 4 of this manual. Therefore, any request for the release of **collateral** posted for pre-trade risk limit purposes will be analyzed by B3, which will assess the pre-trade risks and the respective limits assigned by the **participants**.

(c) Releasing collateral posted by clearing members

Consider the following purposes to which **collateral** posted by any **clearing member** can be allocated:

(i) **Settlement fund**;

(ii) Operating balance;

(iii) **Transaction** guarantee, in the case of federal government bonds deposited for third parties; and

(iv) Pre-trade risk limit.

The free balances of **clearing member** CM associated with the aforementioned purposes are defined as follows:

(c.1) Free balance, on date T, of **collateral** deposited as contribution to the **settlement fund**

$$FB_{CM}^{FLI}(T) = PostedColl_{CM}^{FLI} - \text{Re}quiredAmt_{CM}^{FLI} - BlockedColl_{CM}^{FLI} \quad (6.67)$$

Where:

$PostedColl_{CM}^{FLI}$: the amount of **collateral** posted by **clearing member** CM as contribution to the **settlement fund** at the time the free balance is calculated on date T; for the purposes of rules 1 and 2 described below, this value includes **collateral** underlying the withdrawal; for the purposes of rule 3 described below, this value does not include **collateral** underlying the withdrawal;

$RequiredAmt^{FLI}$: the fixed amount required by B3 as the **clearing member** contribution to the **settlement fund**; and

$BlockedColl_{CM}^{FLI}$: the amount, on date T, of **collateral** blocked by the **clearinghouse**, made up of the same **asset** that constitutes **collateral** underlying the withdrawal and posted by **clearing member** CM as contribution to the **settlement fund**.

(c.2) Free balance, on date T, of **collateral** deposited for operating balance purposes

Collateral deposited by a **clearing member** for operating balance purposes of **full trading participants** and **settlement participants** under its responsibility is distributed or allocated among such **participants**, at the discretion of the concerned **clearing member**. Only the portion of undistributed **collateral** is liable to be withdrawn, meaning that the withdrawal of any allocated portion can only occur after the relevant allocation is cancelled. The cancellation of an allocation to a given **participant** is subject to the same criteria applied to the withdrawal of **collateral** posted by **full trading participants** or **settlement participants** for operating balance purposes.

The free balance of **clearing member collateral** deposited for operating balance purposes is, then, given by:

$$FB_{CM}^{OB}(T) = PostedColl_{CM}^{OB} - \sum_{i=1}^{N} UsedColl_{CM,P_i}^{OB} - BlockedColl_{CM}^{OB} \quad (6.68)$$

Where:

$PostedColl_{CM}^{OB}$: the amount of **collateral** posted by **clearing member** CM for operating balance purposes at the time the free balance is calculated, irrespective of whether said **collateral** is allocated to **participants** under its responsibility or not, excluding **collateral** underlying the withdrawal if the purpose thereof is operating balance; for the purposes of rules 1 and 2 described below, this value includes **collateral** underlying the withdrawal; for the purposes of rule 3 described below, this value does not include **collateral** underlying the withdrawal;

N: the number of **full trading participants** or **settlement participants** under the responsibility of **clearing member** CM;

$UsedColl_{CM,P_i}^{OB}$: the portion of **collateral** posted by **clearing member** CM for operating balance purposes and allocated to the i-th **full trading participant** or **settlement participant** under its responsibility; and

$BlockedColl_{CM}^{OB}$: the amount, on date T, of **collateral** blocked by the **clearinghouse**, made up of the same **asset** that constitutes **collateral** underlying the withdrawal and posted by **clearing member** CM for operating balance purposes.

(c.3) Free balance, on date T, of **collateral** deposited for **transaction** guarantee purposes – Federal government bonds deposited for third parties

The free balance of **collateral** deposited by **clearing member** CM for third-party **transaction** guarantee purposes is given by:

$$FB_{CM}^{TG}(T) = PostedColl_{CM}^{TG} - \sum_{i=1}^{N}\left(\sum_{j=1}^{M_i} UsedColl_{CM,P_i,C_j}^{TG}\right) - BlockedColl_{CM}^{TG} \qquad (6.69)$$

Where:

$PostedColl_{CM}^{TG}$: the amount of **collateral** posted by **clearing member** CM for **transaction** guarantee purposes at the time the free balance is calculated, irrespective of whether such **collateral** is allocated to **participants** under its responsibility or not, excluding **collateral** underlying the withdrawal if the purpose thereof is operating balance; for the purposes of rules 1 and 2 described below, this value includes **collateral** underlying the withdrawal;

for the purposes of rule 3 described below, this value does not include **collateral** underlying the withdrawal;

$UsedColl^{TG}_{CM,P_i,C_j}$: the amount of the portion of **collateral** posted by **clearing member** CM for **transaction** guarantee purposes and allocated to **investor** C_j under **full trading participant** or **settlement participant** P_i under CM's responsibility;

N: the number of **full trading participants** and **settlement participants** responsible for **investors** to whom government bonds owned by **clearing member** CM and posted for **transaction** guarantee purposes have been allocated;

M_i: the number of **investors** under the responsibility of **participant** P_i; and

$BlockedColl^{TG}_{CM}$: the amount, on date T, of **collateral** blocked by the **clearinghouse**, made up of the same **asset** that constitutes **collateral** underlying the withdrawal and posted by **clearing member** CM for **transaction** guarantee purposes.

Consider **collateral** made up of **asset** *A*, posted by **clearing member** CM^* for purpose f, from among purposes (i), (ii) and (iii) above. Let $WV^f_{CM^*}(T,A)$ be the amount of **collateral** available for withdrawal on date T. The following rules comprise the criteria to release **collateral** allocated to such purposes:

Rule 1: The **clearinghouse** does not allow **collateral** to be withdrawn whenever the balance of **collateral** posted by **clearing member** CM^* for purpose (i), (ii), or (iii) is not positive, that is:

$$WV^f_{CM^*}(T,A)=0 \quad \text{if} \quad \begin{cases} FB^{FLI}_{CM^*}(T)<0 & \text{or} \\ FB^{OB}_{CM^*}(T)<0 & \text{or} \\ FB^{TG}_{CM^*}(T)<0 & \text{or} \\ FB_C(T)<0 & \end{cases} \tag{6.70}$$

Where $FB_C(T)$ is calculated according to equation (6.42) of paragraph (a) and C indicates any proprietary **account** held by **clearing member** CM^*, that is, in the

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

capacity of an **investor**, regardless of the **full trading participant**, or **settlement participant**, and **clearing member** responsible for said **account**.

Rule 2: The **clearinghouse** does not allow **collateral** to be withdrawn whenever the total free balance of **collateral** posted by **clearing member** CM^* is negative. By denoting the total free balance on date T by $TotalFB_{CM^*}(T)$, then:

$$WV^{f}_{CM^*}(T,A) = 0 \quad \text{if} \quad TotalFB_{CM^*}(T) < 0 \tag{6.71}$$

With:

$$TotalFB_{CM^*}(T) = FB^{FLI}_{CM^*}(T) + FB^{OB}_{CM^*}(T) + FB^{TG}_{CM^*}(T) + \min\left[MNB^{T}_{CM^*}\ ,\ 0\right] \tag{6.72}$$

Where $MNB^{T}_{CM^*}$ is the **multilateral net balance**, in local currency, of **clearing member** CM^* to be settled in the **settlement window** of date T; $MNB^{T}_{CM^*} < 0$ if debit balance; $MNB^{T}_{CM^*} > 0$ if credit balance, and $MNB^{T}_{CM^*} = 0$ if there is no balance to be settled, or if the free balance is calculated after the end of the **settlement window**.

Rule 3: If the **clearinghouse** allows **collateral** to be withdrawn, then the withdrawable amount of **collateral** is limited to the free balance value of **collateral** posted by **clearing member** CM^* for purpose f, that is:

$$\begin{aligned} WV^{FLI}_{CM^*}(T,A) &= \max\left[FB^{FLI}_{CM^*}(T)\ ,\ 0\right] \\ WV^{OB}_{CM^*}(T,A) &= \max\left[FB^{OB}_{CM^*}(T)\ ,\ 0\right] \\ WV^{TG}_{CM^*}(T,A) &= \max\left[FB^{TG}_{CM^*}(T)\ ,\ 0\right] \end{aligned} \tag{6.73}$$

(c.4) Free balance, on date T, of **collateral** posted to increase pre-trade risk limits (pre-trade risk limit purpose):

The free balance on a given date T for this purpose is defined as the maximum amount of **collateral** posted by **clearing members** that may be withdrawn without causing any breach of the pre-trade risk limits assigned by these **participants** to the **accounts** under their responsibility, as defined in Chapter 4 of this manual. Therefore, any request for the release of **collateral** posted for pre-trade risk limit purposes will be analyzed by B3, which will assess the pre-trade risks and the respective limits assigned by the **participants**.

(d) Releasing collateral posted by guarantee issuing banks for adherence of their issued assets to acceptance limits

The following rules comprise the criteria to release **collateral** posted by **guarantee issuing banks** to provide adherence of the **assets** of their issuance to the relevant acceptance limits:

Rule 1: The **clearinghouse** does not allow **collateral** to be withdrawn whenever the free balance of **collateral** posted by the **guarantee issuing bank** is either null or negative; and

Rule 2: If the **clearinghouse** allows **collateral** to be withdrawn, then the withdrawable amount of **collateral** is limited to the free balance value of **collateral** posted by the **guarantee issuing bank**, if positive.

The free balance of **collateral** posted by the **guarantee issuing bank** is given by:

$$FB_{IB}\left(T\right) = PostedColl_{IB} - RequiredColl_{IB} - BlockedColl_{IB} \qquad (6.74)$$

Where:

$PostedColl_{IB}$: the total amount of **collateral** posted by the **guarantee issuing bank** at the time the withdrawal request is reviewed, in order to provide adherence of the **assets** of its issuance to the relevant acceptance limits;

$RequiredColl_{IB}$: the amount of **collateral** required of the **guarantee issuing bank** at the time the balance is calculated, in order to provide adherence of the **assets** of its issuance to the relevant acceptance limits, as given by equations (6.11) and (6.15); and

$BlockedColl_{IB}$: the amount, on date T, of **collateral** blocked by the **clearinghouse**, made up of the same **asset** that constitutes **collateral** underlying the withdrawal and posted by the **guarantee issuing bank**.

(e) Releasing collateral posted by the controlling guarantor to meet access requirements

The following rules comprise the criteria to release **collateral** posted by **controlling guarantor** to meet access requirements for **participants** linked to it:

Rule 1: The **clearinghouse** does not allow **collateral** to be withdrawn whenever the free balance of **collateral** posted by the **controlling guarantor** is either null or negative; and

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Rule 2: If the **clearinghouse** allows **collateral** to be withdrawn, then the withdrawable amount of **collateral** is limited to the free balance value of **collateral** posted by the **controlling guarantor**, if positive.

The free balance of **collateral** posted by the **controlling guarantor** is given by:

$$FB_{CG}(T) = PostedColl_{CG} - \sum_p max\left(0\,, FLA_P^{Required} - FLA_P^{Observed}, NEV_P^{Required} - NEV_P^{Observed}\right) - BlockedColl_{CG} \quad (6.75)$$

Where

$PostedColl_{CG}$: Total value of **collateral** deposited by the **controlling guarantor**, until the moment of evaluation of the withdrawal request, to comply with access requirements of the **participants** linked to it;

$FLA_P^{Required}$: the value of Free Liquid Assets required from **participant** P, at the time of balance calculation;

$FLA_P^{Observed}$: the value of Free Liquid Assets from **participant** P considered by B3, in accordance with the B3 access manual, at the time of balance calculation;

$NEV_P^{Required}$: the value of required Net Equity Value from **participant** P, at the time of balance calculation;

$NEV_P^{Observed}$: the value of Net Equity Value from **participant** P considered by B3, in accordance with the B3 access manual, at the time of balance calculation; and

$BlockedColl_{CG}$: the amount, on date T, of **collateral** blocked by the **clearinghouse**, made up of the same asset that constitutes collateral underlying the withdrawal and posted by the **controlling guarantor**.

(f) Releasing collateral posted by foreign participants

The purpose for which a collateral posted by a foreign participant can be used is as **transaction** collateral, in the case of US treasury bonds held by the foreign participant themselves.

The free balances of a foreign **participant** associated with this use are defined as:

(f.1) The free balance, on date T, of US treasury bonds held by **participant *P***, posted for their investors (for the purpose of transaction **collateral**)

The free balance of **collateral** comprised by US treasury bonds held by **participant *P*** and posted for their investors is given by:

$$FB_P^{TC}(T) = PostedColl_P^{TC} - \sum_{i=1}^{N} UsedColl_{P,I_i}^{TC} - \text{Blocked}Coll_P^{TC}$$

(6.76)

Where:

$PostedColl_P^{TC}$: the value of the **collateral** posted by **participant *P***, up to the moment of the calculation of the free balance, for the purpose of **transaction** collateral, regardless of it being allocated to investors under their responsibility. For the purposes of rule 1, described below, this value includes the **collateral** underlying the withdrawal; for the purposes of rule 2, described below, this value does not include the **collateral** underlying the withdrawal;

N**:** Quantity of **investors** for which are allocated the US treasury bonds held by **participant *P*** and posted as collateral for purposes of transaction **collateral**;

$UsedColl_{P,I_i}^{TC}$: The value of the portion of the **collateral** posted by **participant *P*** for the purpose of **transaction** collateral allocated to the i-th **investor;** and;

$\text{Blocked}Coll_P^{TC}$: value of the **collateral** blocked by the **clearinghouse**, comprised of the **asset** subject to the withdraw request, posted for the purpose of transaction **collateral** by participant ***P***.

Consider a **collateral** comprised of **asset** A, posted by a given **foreign participant *P*.*** Let $WV_{p*}(T, A)$ be the value available for withdraw, on time T, of such **collateral**. The following rules comprise the release criteria:

Rule 1: The withdraw of the **collateral** is prohibited by the clearinghouse if the balance of the **collateral** posted by **participant** P* for the purpose in question is negative, that is:

$$WV_{p*}(T, A) = 0, if\ FB_{P*}^{TC}(T) < 0 \quad (6.77)$$

Rule 2: If the withdraw is not prohibited by the **clearinghouse**, then the volume of the collateral that can be withdrawn is limited to the value of the free balance of the **collateral** posted by participant ***P**** for the purpose in question, that is:

$$WV_{p*}^{TC}(T, A) = \max[FB_{P*}^{TC}(T), 0] \quad (6.78)$$

6.5.2.3 Collateral withdrawal

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

In general, **collateral** whose withdrawal requests are accepted by the **clearinghouse** are withdrawn by transferring the relevant **assets** to **participants** or **guarantee issuing banks**, as the case may be. The procedures applicable to each **asset** type are presented below.

Federal government bonds traded in Brazil

Federal government bonds traded in Brazil are withdrawn when the **clearinghouse** transfers the relevant securities from the **participant**'s **collateral** account with to the same **participant**'s proprietary **account** with BCB-SELIC. The command number of the transfer is relayed by the **clearinghouse collateral** management system to the **participant** that registered the withdrawal request, and it must be used by the custodian of the bonds' owner to complete the transfer thereof in the BCB-SELIC environment. In the event of withdrawal, duly requested by the **participant** through the **asset** management system, to create a balance for entering a lending order in the **lending system** or meeting a **delivery** obligation, the **clearinghouse** transfers the securities directly in the BCB-SELIC environment, from the **participant**'s **collateral account** to the **participant**'s **deposit account**, such transfer being automatically reflected, in the **clearinghouse asset** management system, on the **participant**'s corresponding **federal government bond deposit account**, under the **purpose** of deposit of government debt **assets**.

Shares of stocks, ETF shares, investment fund shares traded at B3, certificates of deposit of shares (units) and debentures

Shares of stocks, ETF shares, units and gold are withdrawn by transferring the relevant **assets** from the **clearinghouse collateral subaccount** to the destination **subaccount** of the **assets**' owner.

If the destination **account** is the free **subaccount**, the **custody agent** of the **assets**' owner must instruct the **B3 central depository** to provide the transfer thereof, pursuant to the B3 operating procedures manual. If the **custody agent** and the **participant** are not the same institution, the number of said transfer (instruction number) in the **B3 central depository** must be registered by the **participant** in the **clearinghouse collateral** management system upon registration of the withdrawal request. Otherwise, the **clearinghouse's collateral** management system will automatically record the movement in **B3's central depository**.

In the case of a debenture deposited in a deposit system other than the B3 central depositary, the withdrawal of **collateral** in the form of a debenture occurs when the **clearinghouse** unlinks it from its account in the debenture deposit system. The unlinking command number is provided by the **clearinghouse collateral** management system to the **participant** who registered the withdrawal request, which must be used by the custodian of the **participant** to complete the unlinking in the deposit system.

If the destination **subaccount** is the **securities lending subaccount** – bridge (that is, when the withdrawal purposes is the use of the **asset** to enter a lending order in the **lending system**) the **full**

trading participant or **settlement participant** responsible for the **lender investor** must indicate the **collateral subaccount** as origin in the **lending system**, which will instruct the transfer of **assets** in the **B3 central depository**.

Bank certificates of deposit (CDs), Real Estate Letters of Credit (LCIs) and Agribusiness Letters of Credit (LCAs)

Bank CDs, LCIs and LCAs are withdrawn when the **clearinghouse** unlinks the relevant securities from its account with the CD, LCI or LCA depository system. The command number of the unlinking process is relayed by the **clearinghouse collateral** management system to the **participant** that registered the withdrawal request, and it must be used by the custodian of the securities owner to complete the unlinking thereof in the depository system.

Bank letters of credit (LCs)

After a withdrawal request is accepted, bank LCs are withdrawn upon cancellation of the **registration** thereof in the **clearinghouse collateral** management system. As of the first business day following an LC **registration** cancellation, the **clearinghouse** issues a "notice of cancellation" for the cancelled LCs and the hard copy thereof remains available for withdrawal by the **guarantee issuing bank** or by the **participant** responsible for the LCs' beneficiary.

Shares of the investment fund *B3 Margem Garantia Renda Fixa Referenciado DI Fundo de Investimento em Cotas de Fundos de Investimento* (FIC)

After a withdrawal request is accepted, FIC shares are withdrawn by the **clearinghouse collateral** management system and the redeemed amount is credited in cash through the B3 Bank, in the **settlement window**, or via SPB messaging.

- Through the B3 Bank, the redeemed amount is deposited in the bank/account indicated by the **participant** that registered the withdrawal request.
- In the **settlement window**, the redeemed amount is entered as a credit to the **multilateral net balances**, in local currency, of the **participants** involved (the **investor** to whom/which **collateral** underlying the withdrawal is intended, if applicable, the **full trading participant**, or **settlement participant**, and the **clearing member**), in order to be settled on the same day.

  The **participants** whose MNBs are credited are:

  (i) The **investor** and the corresponding **full trading participant**, or **settlement participant**, and **clearing member**, in the case of withdrawal of **collateral** posted for **transactions** guarantee purposes;

  (ii) The **full trading participant**, or **settlement participant**, and the corresponding **clearing member**, in the case of withdrawal of **collateral** posted by the **full trading participant**, or **settlement participant**; and

(iii) The **clearing member**, in the case of withdrawal of **collateral** posted by the relevant **clearing member**.

- Via SPB messaging, the **full trading participant**, the **settlement participant**, or the **clearing member** requests, via the **clearinghouse collateral** management system, **message** LDL0015 to be sent in order to transfer the funds to the **Settlement account** or **Bank Reserves account** of the **settlement agent** of the relevant **clearing member**.

Investment Fund B3 Clearinghouse Liquidity (FILCB) shares

Upon acceptance of a **collateral** withdrawal request, FILCB shares are withdrawn by the **clearinghouse collateral** management system.

Shares are redeemed according to the following steps:

1. The **clearinghouse collateral** management system notifies the B3 Bank of the number of shares and the financial amount associated with the withdrawal requested by the **clearing member**, **full trading participant**, **settlement participant**, or B3; and
2. The B3 Bank provides the redemption of the relevant shares and credits the corresponding financial amount to the current account indicated by the shareholder (**clearing member**, **full trading participant**, **settlement participant**, or B3).

Cash funds – Local currency

Local currency is withdrawn through the B3 Bank, in the **settlement window**, or via SPB messaging.

- Through the B3 Bank, cash funds are deposited in the bank/account indicated by the **participant** that registered the withdrawal request in the **clearinghouse collateral** management system.
- In the **settlement window**, cash funds are entered as a credit to the **multilateral net balances**, in local currency, of the **participants** involved (the **investor** to whom/which **collateral** underlying the withdrawal is intended, if applicable, the **full trading participant**, or **settlement participant**, and the **clearing member**), in order to be settled on the same day.

  The **participants** whose MNBs are credited are:

  (i) The **investor** and the corresponding **full trading participant**, or **settlement participant**, and **clearing member**, in the case of withdrawal of said **investor**'s **collateral**;

  (ii) The **full trading participant**, or **settlement participant**, and the corresponding **clearing member**, in the case of withdrawal of **collateral** posted by the **full trading participant**, or **settlement participant**; and

  (iii) The **clearing member**, in the case of withdrawal of **collateral** posted by the relevant **clearing member**.

Cash **collateral** is withdrawn upon confirmation of the relevant payment by the **clearinghouse** in the **settlement window**, in favor of the **settlement agent** of the **clearing member** responsible for the **participant(s)** involved.

- Via SPB messaging, the **full trading participant**, the **settlement participant**, or the **clearing member** requests, via the **clearinghouse collateral** management system, **message** LDL0015 to be sent in order to transfer the funds to the **Settlement account** or **Bank Reserves account** of the **settlement agent** of the relevant **clearing member**.

Cash funds – Foreign Currency

The cash funds denominated in the foreign currency are withdrawn by depositing the relevant cash funds to the **participant**, which may be made via the bank engaged by B3 overseas to that end, or, exclusively for US dollars, in the **settlement window**, which is used to settle **participant** obligations.

- Through the bank engaged by B3 abroad, cash funds are deposited in the **participant**'s foreign bank/account indicated in the B3 **participant registration** system.
- In the **settlement window**, cash funds are transferred to the **clearinghouse** settlement account with the bank engaged by B3 abroad. The amount credited to that account is used by the **clearinghouse** in the **settlement** process and any balance is:
  - (i) Returned to the **collateral** account held by the **clearinghouse** with the bank engaged overseas, requiring the **participant** to register the corresponding **collateral posting** request in the **clearinghouse collateral** management system; or
  - (ii) Credited to the **participant**'s foreign bank/account indicated in the B3 **participant registration** system.

US Treasury bonds, German Treasury bonds, French Treasury Bonds, Dutch Treasury Bonds, Mexican Treasury bonds, Canadian Treasury bonds, ADRs and shares of stock traded abroad

US Treasury bonds, German Treasury bonds and ADRs are withdrawn (i) by transferring the relevant **assets** from the **clearinghouse account** to the **participant account** indicated in the withdrawal request, said transfer being instructed by the **clearinghouse** in the **central depository** where the bonds are held in deposit; and (ii) upon confirmation of the transfer by the **participant**'s custodian.

6.6 Procedures for transferring and distributing collateral

A **collateral** transfer is characterized by the movement of **collateral** between **accounts** of the same **investor** and, therefore, applies only to **collateral** posted for **transaction** guarantee purposes.

In the case of a corporate action event (mergers, acquisitions, or spin-offs), **collateral** is transferred between the **accounts** of different **participants**—the existing **investor** involved in the event and the **investor** resulting from the event,—but only after B3 receives the documentation supporting the relevant corporate

action and also the identification of the **accounts** with the corresponding **central depositories** and banks held by the **investor** that will receive **collateral** underlying the transfer.

Collateral transfers are subject to the hours of operation of the corresponding **central depositories** and/or banks, in addition to the **clearinghouse** timetable for **position** transfers.

6.6.1 Transferring an investor's collateral

The transfer of an **investor**'s **collateral** involves:

(i) The movement of **collateral** in the **clearinghouse** between different **accounts** of the same **investor**; or

(ii) In the case of a corporate action event, the movement of **collateral** in the **clearinghouse** between the **accounts** of the **investors** directly involved in the event.

Let (C,P,CM) be the identification, for a given **collateral**, of **account** C held by an **investor**, under the responsibility of **full trading participant** or **participant settlement** P and **clearing member** CM, whose **positions** are covered by such **collateral**. By considering (C,P,CM) and (C',P',CM') as the origin and destination **accounts**, respectively, the following transfers are permitted:

1. Between the **investor**'s **accounts** under the same **full trading participant** or **participant settlement** and under the same **clearing member**, that is, **collateral** is transferred from (C,P,CM) to (C',P,CM);

2. Between the **investor**'s **accounts** under different **full trading participants** or **settlement participants**, but under the same **clearing member**, that is, **collateral** is transferred from (C,P,CM) to (C',P',CM);

3. Between the **investor**'s **accounts** under the same **full trading participant** or **settlement participant**, but under different **clearing members**, that is, **collateral** is transferred from (C,P,CM) to (C',P,CM'); and

4. Between the **investor**'s **accounts** under different **full trading participants** or **settlement participants**, and also under different **clearing members**, that is, **collateral** is transferred from (C,P,CM) to (C',P',CM').

In all the above cases, transfers may be carried out jointly with, or separately from the corresponding **positions** (open contracts and obligations to be settled).

- **Transferring collateral but not the corresponding positions**

The transfer of **collateral** without the transfer of the corresponding **positions** consists of the following steps:

1. The transfer request must be registered by the **full trading participant** or **settlement participant** of origin (P) in the **clearinghouse collateral** management system, stating the amount to be transferred, the **full trading participant** or **settlement participant** of destination (P or P'), the **clearing member** of destination (CM or CM') and the destination **account** of the **investor** (C');
2. The intention to receive **collateral** underlying the transfer must be confirmed by the **full trading participant** or **settlement participant** of destination, also through the **collateral** management system;
3. The **clearinghouse** reviews the request, according to the same criteria for **collateral** withdrawal; and
4. In case the **clearinghouse** review does not indicate any violation of risk or of other restrictions, **collateral** is transferred.

- **Transferring collateral and positions simultaneously**

  The transfer of **collateral** with the simultaneous transfer of the corresponding **positions** consists of the following steps:

  1. The **position** transfer request must be registered by the **full trading participant** or **settlement participant** of origin (P), according to the procedures referred to in the **clearinghouse** operating procedures manual;
  2. The **collateral** transfer request must be registered by the **full trading participant** or **settlement participant** of origin (P) in the **clearinghouse collateral** management system, stating the **position** transfer code obtained in the previous step;
  3. The intention to receive **collateral** underlying the transfer must be confirmed by the **full trading participant** or **settlement participant** of destination, also through the **collateral** management system;
  4. The **clearinghouse** reviews the requests, according to the same criteria for **collateral** withdrawal and for risk; and
  5. In case the **clearinghouse** review does not indicate any violation of risk or of other restrictions, both transfers are completed.

Collateral deposited for **transaction** guarantee purposes by **full trading participants**, **settlement participants**, or **clearing members**, when acting in the capacity of **investors**, cannot be transferred for any other purposes.

6.6.2 Transferring collateral deposited in the B3 central depository to coverage subaccounts for derivatives contracts and lending agreements

The **assets** that are posted as **collateral** for **investors** and are liable to be used as **coverage** for **derivatives** contracts and **lending** agreements can be transferred from the **collateral subaccount** to the **coverage subaccount** of the account held by an **investor** with the **B3 central depository**. To that end, the **full trading participant** or **settlement participant** responsible for said **investor** must register, in the **clearinghouse position** control system, the relevant transfer request, which will be accepted or not, according to the criteria applicable to **collateral** withdrawal requests described in subsection 6.5.2.

6.6.3 Transferring collateral deposited in the BCB-SELIC environment for coverage purposes of the federal government bond deposit account

The transfer of federal government bonds posted as **investor**'s **collateral** to a **federal government bond deposit account** for the **purposes** of covering **positions** or covering orders occurs through the execution of the **collateral** withdrawal procedure, described in subsection 6.5.2.3, and of the **coverage** procedure, discussed in the **clearinghouse** operating procedures manual.

6.6.4. Using assets deposited as collateral to settle multilateral net balances in assets and to enter a lending order

The **assets** that constitute **delivery** obligations and are posted as **collateral** for **investors** can be used by such **investors** in the **settlement** of their **multilateral net balances** in **assets**. To that end, the **full trading participant** or **settlement participant** responsible for the relevant **investor** must indicate the **collateral subaccount** in the **settlement** instruction, within the time frame defined in the **clearinghouse** operating procedures manual. When the **settlement** is processed, (i) the **asset** quantity corresponding to the **delivery** obligation is transferred from the **investor**'s **collateral subaccount** to the **clearinghouse asset settlement account**, and (ii) should the **asset** withdrawal result in a **margin** deficit, a **margin** call at the same amount of the deficit is entered into the **investor**'s **multilateral net balance** in local currency, to be settled on the same day.

The **assets** posted in the **B3 central depository** as **collateral** can also be used to enter a lending order in the **lending system**. To that end, the **full trading participant** or **settlement participant** responsible for the **lender investor** must follow the procedure described in subsection 6.5.2.3. Should the **asset** withdrawal result in a **margin** deficit by 1:00 PM, a **margin** call at the same amount of the deficit is entered into the **investor**'s **multilateral net balance** in local currency, to be settled on the same day.

6.6.5. Distributing collateral between accounts (distribution by command)

The **investor** holding more than one **account** with one or more **full trading participants** or **settlement participants** may request the distribution of **collateral** deposited under **participant** A for guarantee purposes of **transactions** held by the **investor** and registered under **participant** B.

Distribution allows for the use of **collateral** deposited in one **account** under a **full trading participant** or **settlement participant** in the coverage of **margin** associated with another **account** of the same **investor** under another **full trading participant** or **settlement participant**, without the actual transfer of **assets** between the accounts.

The withdrawal process of **collateral** distributed to other **accounts** must be conducted by the **full trading participant** or **settlement participant** responsible for the **account** where the **assets** are actually deposited.

In the event of **default** by the **investor**, the use of **collateral** distributed to the **investor**'s **account** under the **full trading participant** or **settlement participant** that declared the **default** does not depend on any authorization by the **full trading participant** or **settlement participant** responsible for the **investor**'s **account** where the **asset** is actually deposited.

6.7 Managing corporate actions associated with assets that constitute collateral

Corporate actions in **assets** may be issued in cash and/or **assets**. The corresponding events are issued in cash when interest or income is paid to the **asset** holder, whereas the events issued in **assets** involve changing the quantity of **assets** held by each individual.

Among the **assets** eligible to be accepted as **collateral**, the following may be subject to **corporate actions** issued in cash or **assets**: shares of stocks, units, debentures, federal government bonds, foreign bonds and shares of stock traded abroad.

6.7.1 Corporate actions in cash

Interest, dividend and bonus that are paid in cash by the **issuer** of the **assets** to the holders thereof.

Federal government bonds

The amount corresponding to the payment of interest on a given federal government bond posted as **collateral** is transferred to the **clearinghouse** by BCB-SELIC on the day of the event. The amount received by the **clearinghouse**, corresponding to all the bond units registered in its **accounts** with BCB-SELIC, is transferred to all those who hold the same bond units deposited as **collateral**, that is:

(i) To **participants**, by entering the relevant credit to their respective **multilateral net balances** in local currency;

(ii) To **guarantee issuing banks**, by transferring the relevant funds to their respective **settlement agents** via STR;

(iii) To **clearing members** whose bonds make up third-party **collateral**, either by entering the relevant credit to their respective **multilateral net balances** in local currency or by transferring the relevant funds to their respective **settlement agents** via STR, as the case may be; and

(iv) To **controlling guarantors**, by transferring the relevant funds to their respective **settlement agents** via STR, as applicable.

The **clearinghouse collateral** management system provides **participants** with a query interface for locating **participants** under their responsibility that were transferred interest payments by the **clearinghouse**.

US Treasury bonds, German Treasury Bonds, French Treasury Bonds, Dutch Treasury Bonds, Mexican Treasury Bonds and Canadian Treasury Bonds

Prior to any interest payments, **collateral** constituted by such bonds must be replaced by other **assets** by the **participants** that hold the relevant bonds, including in the case of foreign participants whose posted bonds constitute **collateral** for third parties. If said replacement does not take place and interest is paid to the **clearinghouse**, **participants** must submit a formal request, by letter, to be transferred the funds that were assigned to them, bearing the costs arising out of such transfer.

Shares of stocks, ADRs, BDRs, certificates of deposit of shares (units), investment fund shares traded at B3 and shares of stock traded abroad

Corporate actions in shares, BDRs, investment fund shares traded at B3 and units posted by a **participant** as **collateral** are recorded in the **collateral subaccount** of the **participant**'s **deposit account** with the **B3 central depository**, where the shares, BDRs and units are deposited.

The amounts associated with the payment of dividends, interest on equity and bonuses on the shares, BDRs, investment fund shares traded at B3 and units deposited as **collateral** are transferred to the **participants** that hold the relevant securities by crediting to their respective **multilateral net balances** the amounts due to each **participant**. In the case of ADRs or shares of stock traded abroad, **participants** must submit a formal request, by letter, to the **clearinghouse** to be transferred the funds that were assigned to them, bearing the costs arising out of such transfer. This means that the transfer of the relevant funds is subject to the criteria applicable to **collateral** withdrawal.

Debenture

Corporate actions in debentures posted by a participant as collateral are recorded in the **collateral subaccount** of the **participant**'s **deposit account** in the central depositary where the debenture is held. The **full trading participant** or **settlement participant** must request the **clearinghouse** to transfer the amount attributed to a **participant** under their responsibility, and this **participant** must

bear the costs arising from such transfer. This means that the transfer of the relevant funds is subject to the criteria applicable to **collateral** withdrawal.

6.7.2 Corporate actions in assets

Corporate actions may be issued in **assets** whenever there is an increase or decrease in the number of shares issued by a certain company. The relevant events may involve: share splitting, share grouping, bonus shares, mergers, spin-offs, and changes to legal form.

Among the **assets** eligible to be accepted as **collateral**, the aforementioned events may change the number of shares of stocks, ETF shares, ADRs, units, investment fund shares traded at B3 and shares of stock traded abroad. Adjustments resulting from any such **corporate action** event are processed by the **B3 central depository** and are automatically reflected on the **clearinghouse collateral** management system on *T*+3 of the date of the corresponding event, requiring no **participant** intervention.

6.8 Monetizing collateral not linked to events of default

The monetization of **collateral** not linked to events of **default** consists of the conversion into cash of the **assets** posted as **collateral** by a given nondefaulting **participant** and the utilization of the proceeds thereof in the **settlement** of said **participant**'s obligations.

This process of monetization requires **clearinghouse** authorization and covers solely **collateral** posted by **investors**, except **assets** posted by **participants** for third parties, which only admit liquidation in case of **default**.

The monetization process comprises the following steps:

1. The **full trading participant** or **settlement participant** responsible for the **transactions** to which **collateral** to be monetized is intended must submit a "request letter for **collateral** monetization" to the **clearinghouse**. That letter must contain information on the **asset** to be monetized and on the **investor** that owns the **asset**, exactly as registered in the **clearinghouse collateral** management system, and it must be signed and notarized (i) by two duly authorized representatives of the **full trading participant** or **settlement participant**, and (ii) by the **investor**;
2. The **clearinghouse** reviews the request by assessing, among others, the reasons why the monetization mechanism is being required (which reasons must be of an operational nature, but not recurrent, being such a characterization exclusively incumbent on the **clearinghouse**) and how much time there is for carrying out all the process stages, until completion of the **settlement** obligations;
3. If the request is approved by the **clearinghouse**, it will provide the monetization of the **assets** specified in the request and receive the proceeds resulting therefrom; for each **asset**, the deadline for the receipt of funds is contingent on the date on which the sale transaction was effected and on the settlement cycle of the relevant **asset**;

4. After receiving the proceeds, the relevant funds are registered in the **collateral** management system as cash **collateral** and entered into the same **investor**'s **account** where the monetized **asset** was registered; and

5. The funds registered in the previous step are withdrawn by the **full trading participant** or **settlement participant**, limited to the amount of the balance of free **collateral**, if positive, and provided that all the criteria for **collateral** withdrawal from the concerned **account** are met.

Chapter 7 - Risk calculation

7.1 Introduction to the CORE methodology

The CORE (*Closeout Risk Evaluation*) methodology was developed for the calculation of risk measures inherent in the B3 **central counterparty** activities for a multimarket and multi-asset environment. The issue of risk management for a central counterparty in the event of **default** by one or more **participants** resides in its ability to have enough resources to close out the **positions** held by the **defaulters** under adverse market conditions. The CORE methodology stands out for representing the closeout process in detail, evaluating the potential gains and losses incurred over time. Other important features of the methodology are:

- Providing not only risk measures, but also a strategy for the closeout of contracts and **assets** consistent with such risk measures;
- Recognizing the different liquidity conditions available for each contract and **asset**;
- Properly distinguishing market risk from the risks of cash flow mismatches occurring along the closeout process;
- Controlling the liquidity risks resulting from the payment flows of principal amounts associated with the **assets**;
- Assessing the **portfolio** closeout process jointly with the liquidation of related **collateral**;
- Incorporating into risk calculation, in a robust manner, the natural hedges that exist between the various instruments and **assets**, including those that make up **collateral**;
- Not incurring in pricing errors deriving from linearization techniques, by completely reassessing nonlinear instruments under each risk scenario (full valuation); and
- Allowing for efficient and scalable computational implementation and execution, by enabling the calculation of risk for all the **portfolios** on a timely basis.

It is noteworthy that the methodology is appropriate for computational optimization in high-performance infrastructures conducting quasi real-time calculations (near-time assessments). In such cases, the methodology is scalable not only for **portfolio** size and composition (vertical scalability), but also for the number of **portfolios** handled simultaneously (horizontal scalability).

7.2 Application of the CORE methodology

The definitions of the required **margin** amounts for **transaction** guarantee and operating balance purposes are based on the CORE methodology.

The **transactions** reviewed for both purposes may be distinguished by whether or not they are allocated and/or by their collateralization mode (by the **investor** or by the **full trading participant** or **settlement participant**,

as defined in chapter 1 (**Safeguard** structure) of this manual). Such distinct groups of **transactions** represent different risk exposures to the **clearinghouse**. Therefore, the CORE methodology is applied to three different calculation modules:

- CORE0: the risk calculation module for allocated **transactions** under the collateralization mode by the **investor**;
- CORE1: the risk calculation module for unallocated **transactions**; and
- CORE2: the risk calculation module for allocated **transactions** under the collateralization mode by the **full trading participant** or **settlement participant**.

Even though the principles of the CORE methodology apply in a like manner to the three modules, there are differences in the sequence of calculation, in the possibilities for netting **positions** and in the final risk calculation. A detailed description of each module is presented in sections 7.7, 7.8 and 7.9.

7.3 Components of the CORE methodology

To assess the risk of a **portfolio** and the corresponding **collateral**, the CORE methodology goes through three stages:

(i) It first determines an appropriate closeout strategy for the **portfolio** and related **collateral**;

(ii) It simulates the implementation of the closeout strategy under different risk scenarios, calculating the cash flows generated by the cash **settlements** resulting from the closeout process under each scenario; and

(iii) It calculates the risk measures based on the cash flows estimated in stage (ii).

The following diagram illustrates the stages of calculation, which are introduced in detail in sections 7.4, 7.5 and 7.6.

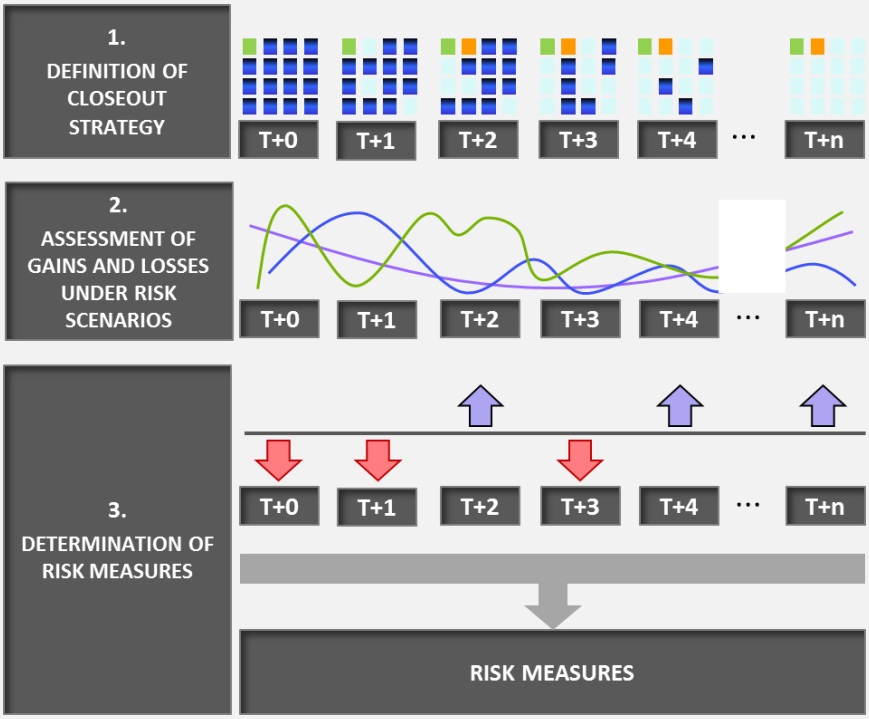


Figure 7.1 - Stages of calculation of the CORE methodology

The instruments listed in this chapter on section 7.10 are handled by CORE methodology in a different way from the other instruments, which may imply in changes to one or more of the three steps described above in the evaluation of the risk of **position** and **collateral** represented by such instruments. The specific treatments applied to these instruments are described in section 7.10.

7.4 Closeout strategy

7.4.1 Definition of the closeout strategy under the CORE methodology

Given a **portfolio** and corresponding **collateral**, the first stage of the CORE methodology must define a closeout strategy.

The appropriate closeout of a **portfolio** must meet all of the **portfolio**'s pending obligations and eliminate all of the **portfolio**'s potential obligations. To that end, it may make use of **portfolio** rights, which include, among others, the corresponding **collateral**.

The closeout may occur in different ways, depending on the set of **positions** belonging to the **portfolio** and the types of **collateral**. The CORE methodology assumes that the following may be part of the closeout process:

(i) The **settlement** of pending obligations;

(ii) The use of pending rights, including those to the **assets** that constitute **collateral** and those deriving from the **settlement** of **positions** belonging to the **portfolio**;

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

(iii) The early **settlement** of the contracts underlying the **positions**, as stipulated by contract or regulation; and

(iv) The execution of "closeout **transactions**."

Closeout **transactions** comprise ancillary **transactions** that are required to complete the closeout process or to minimize the risks incurred along the process. The following may include closeout **transactions**:

(i) The execution of **transactions** in the same instrument underlying a **position** belonging to the **portfolio**, but of an offsetting nature to that of the **position** subject to closeout; in the case of fungible contracts, such as listed futures and options contracts, the relevant **transactions** are called offsetting **transactions**, which are sufficient to eliminate **positions** by **netting** before the **clearinghouse**; in the case of nonfungible contracts, such as equities forward contracts and contracts in the **organized OTC market**, such **transactions** and the corresponding **position** remain in the **portfolio** until the settlement dates thereof;

(ii) The transfer of ownership of the contracts underlying **positions** belonging to the **portfolio**, which, among others, may occur during auction procedures for **positions**;

(iii) The execution of purchase **transactions**, in order to fulfill one or more pending **delivery** obligations arising from **portfolio positions**;

(iv) The execution of sale **transactions** in the remaining **assets**, derived from the **settlement** of **portfolio positions**;

(v) The execution of sale **transactions** in the **assets** available as **collateral**;

(vi) The execution of offsetting **transactions** to close out the **transactions** generated from options exercises;

(vii) The execution of structured **transactions**, in order to minimize risks resulting from instruments with low liquidity belonging to the **portfolio**, to preserve hedges along the closeout process or to mitigate the exposure to secondary risk factors; and

(viii) The execution of immunization **transactions**, meaning **transactions** in instruments that may not belong to the **portfolio**, defined as immunization instruments, in order to reduce the exposure to selected risk factors.

Determining a closeout strategy for the **portfolio** and related **collateral** under the CORE methodology is equivalent to setting a priori which procedures from among those listed above must be carried out each day, until the portfolio is completely closed out.

It should be noted that it is of fundamental importance that the closeout strategy determined by the CORE methodology is feasible, specifically under adverse market or operating conditions. Hence, strategies that assume the "worst case scenarios" for such conditions are often preferable when risk

is calculated. In particular, the model defines important parameters to restrict "closeout **transactions**" and help ensure the viability of the strategy under adverse conditions, as follows:

- The *minimum time for execution*, which indicates the future date from which a closeout **transaction** can be performed; this parameter varies with the instrument that underlies the **transactions**, and the definition thereof includes both functional aspects of each instrument and the very minimum time which is viable for a closeout process to begin as of the risk calculation date
- The *daily liquidity limit*, which indicates the maximum cumulative quantity liable to be executed each day on each instrument or structured **transaction** used in closeout **transactions**; the definition of this parameter includes liquidity measures of the underlying markets, in connection with their capacity of absorption of and sensitivity to new orders;
- The *liquidity transition* indicates, for a given contract, how many days, before the near month expires, are required for the transfer of the *daily liquidity limit* to the subsequent maturity; the instrument whose liquidity is transferred may also have its *daily liquidity limit* updated on the same date, immediately after the transfer; the value of this parameter varies according to the instrument and its definition is based on liquidity measures of the underlying markets, in connection with their capacity of absorption of and sensitivity to new orders;
- The *maturities with liquidity transition*, which indicates, for each contract, how many months of a given contract will have their *daily liquidity limits* modified pursuant to the contract's *liquidity transition*; the definition of the value of this parameter is based on liquidity measures of the underlying markets, in connection with their capacity of absorption of and sensitivity to new orders; and
- The *rollover day*, which indicates, for each futures contract, how many days, before the near month expires, are required for a structured rollover **transaction** to be carried out; the definition of the value of this parameter is also based on liquidity measures of the underlying markets during periods close to contract maturity.

Figure 7.2 illustrates the structure adopted by CORE to review any closeout strategy. Assuming that risk calculation occurs at the end of $T+0$, the methodology proposes to analyze the cash flows deriving from the closeout process between $T+1$ and maximum date $T+n$. All the "closeout **transactions**" are designed for that time range. Sometimes it is inevitable that remaining cash **settlements** be expected to occur after $T+n$; in such cases, the methodology presupposes specific procedures, whether by representing such **settlements** on date $T+n$ itself, after a few adjustments, or by excluding such **settlements** from risk calculation, depending on the type of **position** and underlying contract.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

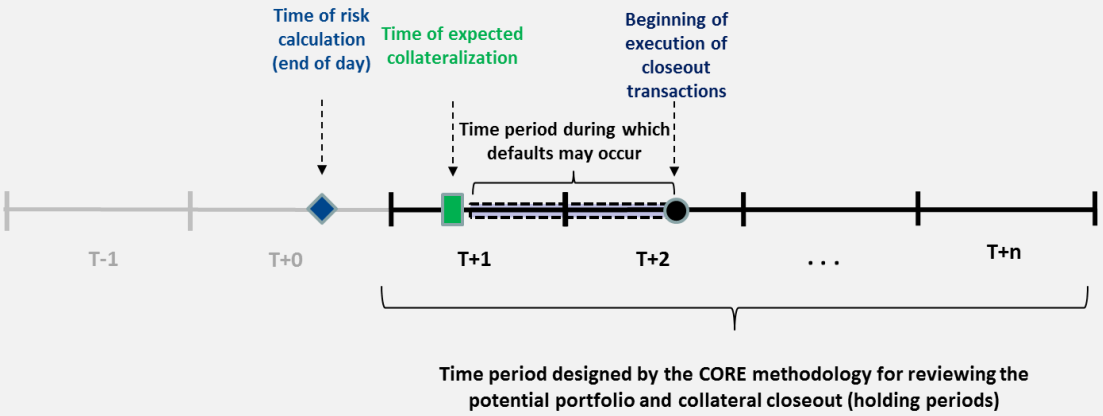


Figure 7.2 - Time period designed by the CORE methodology for closeout review

Typically, the end-of-day risk calculation defines the **margin** call to be met on $T+1$. The diagram indicates the time of the expected collateralization resulting from that **margin** call. The relevant **collateral** must be sufficient to cover the risk arising out of any **defaults** that may occur after that time through the afternoon of $T+2$ (note that if a **default** occurred as of $T+3$, **collateral** posted on $T+2$ would have to be enough to support it).

Consequently, it is prudent to assume that closeout **transactions** can always and only be initiated after the afternoon of $T+2$ (worst case scenario), even if, in case of **default** on $T+1$, they could have been initiated in advance.

7.4.2 Closeout strategies for different sets of positions

Different closeout strategies can be applied to different subsets of **portfolio positions** and related **collateral**. Some strategies, called naive, seek to close out each **position** and **collateral** as soon as possible. Other strategies, which can be determined by optimization techniques, seek to minimize the risks incurred along the **portfolio** closeout process, in order to identify and preserve hedges or carry out hedging **transactions**.

There are still strategies that can be applied to sets of **positions** whose **settlements** involve deliveries and receipts of **assets**, such as **positions** in the equities cash and forward markets and equities and government debt **securities lending** markets. Such strategies are based on **asset** flow projections resulting from those **settlements** each day along the holding period. They can take advantage of **asset** receipts, in order to meet subsequent **delivery** obligations on the same **assets**, and in general aspire to minimize **delivery failures**.

The closeout strategies that the CORE methodology adopts for each type of individual **position** and for **portfolios** of two or more **positions** are described below. The closeout of **positions** managed together in **portfolios** may differ from the simple accumulation of individual closeouts for each **position**, as explained in the examples. This is primarily so because **positions** that are reviewed as

a set may have different ways of netting each other, so that if this facility is utilized it can reduce the risks incurred along the closeout process.

7.4.2.1 Positions in exclusively cash-settled derivatives contracts

(a) Closeout of futures positions

Suppose a **portfolio** containing only one open **position** in a futures contract. In order to be closed out, as shown in figure 7.3, a closeout **transaction** is supposed to be executed on $T+2$, corresponding to an offsetting **position**, that is, a **transaction** on the same underlying contract at the same quantity, but opposite to the original side of the **position** (note that closeout **transactions** are only considered as of $T+2$, as explained in subsection 7.4.1).

Open **position** A_1's variation margin, which is calculated using settlement price P_1 simulated under risk scenarios, is settled on $T+2$. The last **settlement** on $T+3$, corresponding to A_2's variation margin resulting from the offsetting performed, is also considered. Both cash flows are accounted for in risk calculation under each scenario, and the worst cumulative cash need (possibly $Q\times A_1+Q\times A_2$), under the worst case scenario, must be covered by required **collateral**.

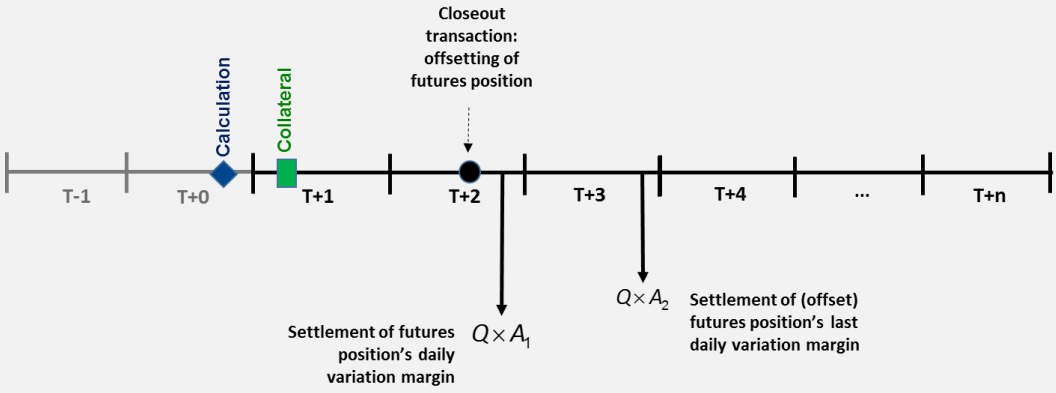


Figure 7.3 - Closeout of futures **position**

Suppose in the previous example that quantity Q was large enough to meet the *daily liquidity limit* parameterized for the concerned instrument. If, for example, this parameter were equal to $Q/2$, two closeout **transactions** to be executed on consecutive days would be required to complete quantity Q's closeout, as illustrated in figure 7.4. In this case, the three resulting **settlement** flows are included in risk calculation: the first one is associated with variation margin A_1 of the **position**'s quantity Q; the second one is associated with average variation margin

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

A_2 of the **position**'s quantity $Q/2$ and of the offset **position**'s quantity $Q/2$; the third one is associated with variation margin A_3 of the offset **position**'s remaining quantity $Q/2$.

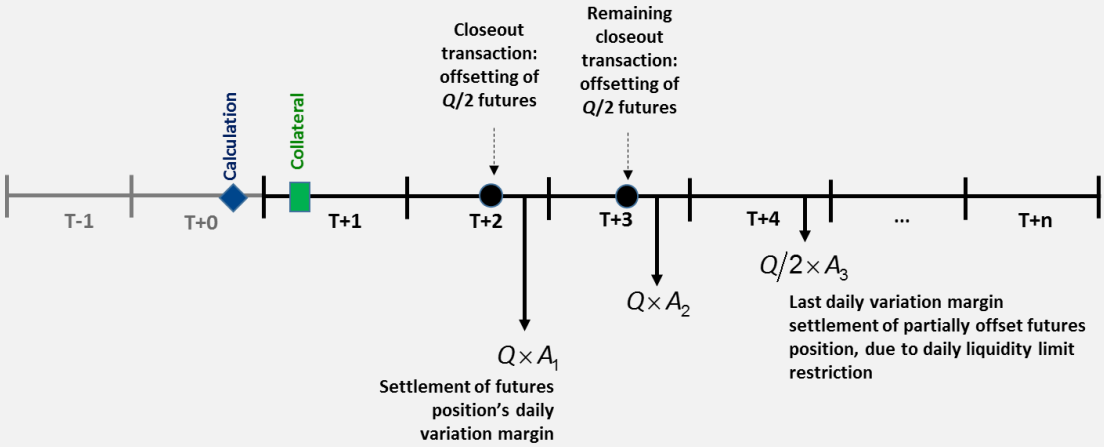


Figure 7.4 - Closeout of futures **position** at a quantity equivalent to twice the *daily liquidity limit*

(b) Closeout of listed option position

Suppose a **portfolio** containing only a short (written) **position** in a listed financial options contract, such as an option on an index or on a futures contract. For this **position** to be closed out, as illustrated in figure 7.5, a closeout **transaction** is supposed to have been executed after the *minimum time for execution* (in this example, $T+5$), corresponding to an offsetting **transaction**, that is, a purchase **transaction** of the same options contract at the same quantity. The premium **settlement** on $T+6$ is considered in risk calculation, and it is based on option price P_5 calculated on $T+5$ under risk scenarios using full-valuation techniques.

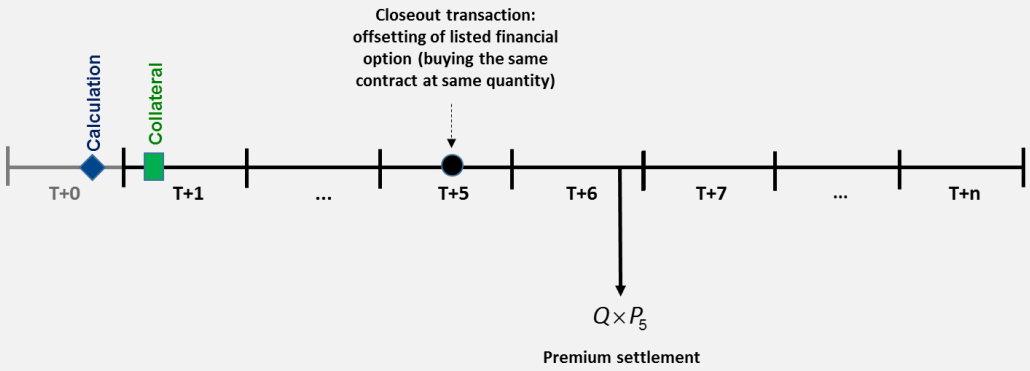


Figure 7.5 - Closeout of short **position** in listed financial option, such as index option or futures option

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Suppose in the previous example that quantity Q was large enough to reach the *daily liquidity limit* parameterized for the concerned instrument. If, for example, this parameter were equal to $Q/2$, two closeout **transactions** to be executed on consecutive days would be required to complete quantity Q's closeout, as illustrated in figure 7.6. In this case, the two resulting **settlement** flows are accounted for in risk calculation: the first one is associated with the payment of premium P_5 for the options' quantity $Q/2$; and the second one is associated with the payment of premium P_6 for the remaining quantity.

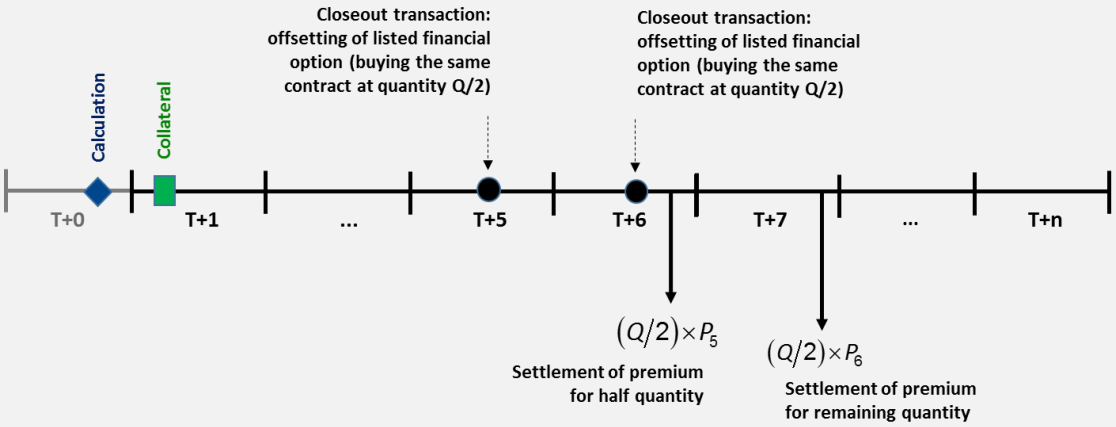
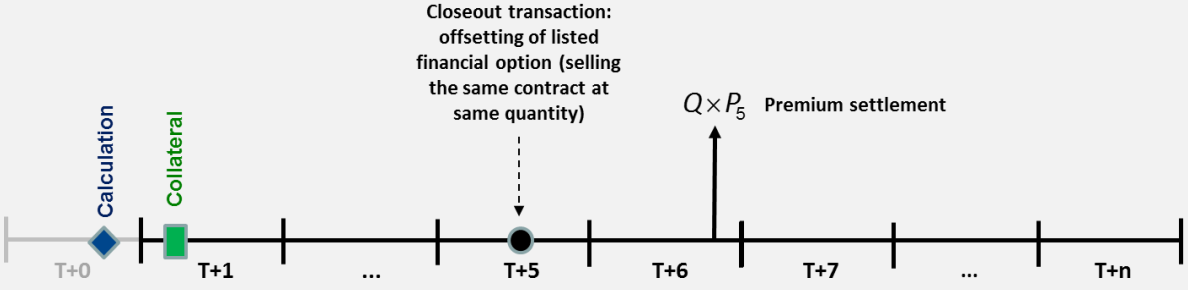


Figure 7.6 - Closeout of short **position** in listed financial option, such as index option or futures option, at a quantity equivalent to twice the *daily liquidity limit*

Suppose a **portfolio** containing only a long (holding) **position** in a listed financial options contract. For this **position** to be closed out, as illustrated in figure 7.7, a closeout **transaction** is supposed to have been executed after the *minimum time for execution* (in this example, $T+5$), corresponding to an offsetting **transaction**, that is, a sale **transaction** of the same options contract at the same quantity. The offsetting **transaction** is enough to eliminate the original **position** by netting. The receipt of the premium on $T+6$ is considered as a positive balance in risk calculation, and it is based on option price P_5 calculated on $T+5$ under risk scenarios using full-valuation techniques.



INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Figure 7.7 - Closeout of long **position** in listed financial option, such as index option or futures option

For a listed financial option expiring before the *minimum time for execution* of the closeout **transaction**, the relevant cash flow is considered in risk calculation on the expected **settlement** date and corresponds to the intrinsic value of the option on the expiration date, as estimated under risk scenarios. For a long **position**, a credit financial flow is generated in the event of exercise. Figure 7.8 illustrates this case for an option (quantity Q) expiring on $T+3$, with underlying asset price S_3 under risk scenario and multiplier M defined in the contract. For a short **position**, a debit financial flow is generated in the event of exercise. Figure 7.9 illustrates this case, where the option (quantity Q) expires on $T+4$, the underlying asset price under risk scenario is S_4 and the multiplier defined in the options contract is M.

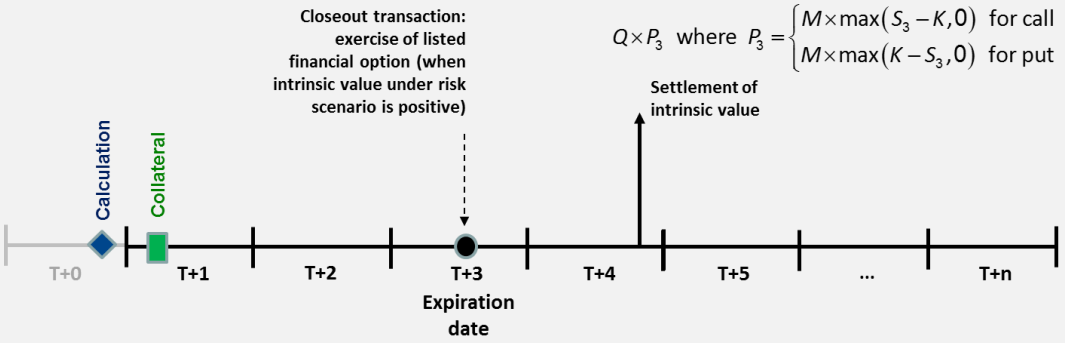


Figure 7.8 - Closeout of long **position** in near-expiration listed financial option, such as index option or futures option

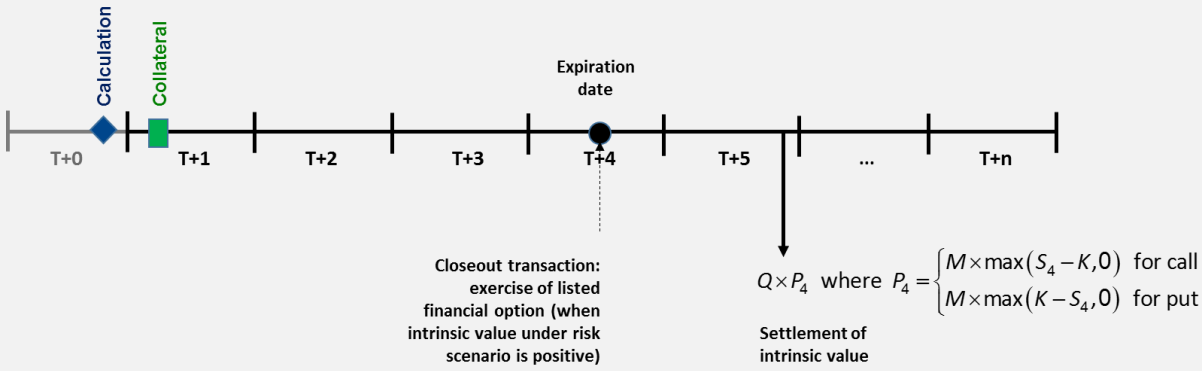


Figure 7.9 - Closeout of short **position** in near-expiration listed financial option, such as index option or futures option

(c) Position closeout in the organized OTC market – Cash settled swaps, flexible options and forwards

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Suppose a **portfolio** containing a **position** in a contract traded in the **organized OTC market**, such as a cash-settled long-maturity swap or forward. The closeout **transaction** for this **position** involves transferring the contract ownership through the exchange of a financial flow equal to the **position**'s market value (MtM) calculated under risk scenarios. In the example, the financial flow is entered on $T+n$ (maximum date in the holding period equivalent to the *minimum time for execution* of closeout **transactions** in such markets). Note that the financial flow can be either a credit or a debit, contingent on the contract parameters and risk scenarios. Figure 10.7 illustrates this case.

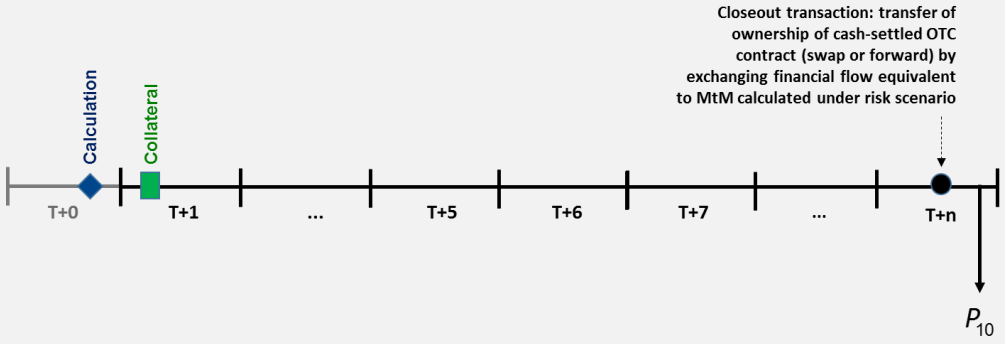


Figure 7.10 - **Position** closeout in long-maturity swap or forward contract with cash **settlement**

Suppose a **portfolio** similar to the previous one, containing a cash-settled short-maturity swap (or forward) contract **position**. The **position** closeout is equivalent to the contract maturity date, which generates a financial flow to be settled on the same day. The value of this financial flow is the difference between the values of rights and obligations defined in the contract, as calculated under risk scenarios. Note that said financial flow can be either a credit or a debit, depending on the contract parameters and risk scenarios. Figure 7.11 illustrates this case, with maturity date $T+6$.

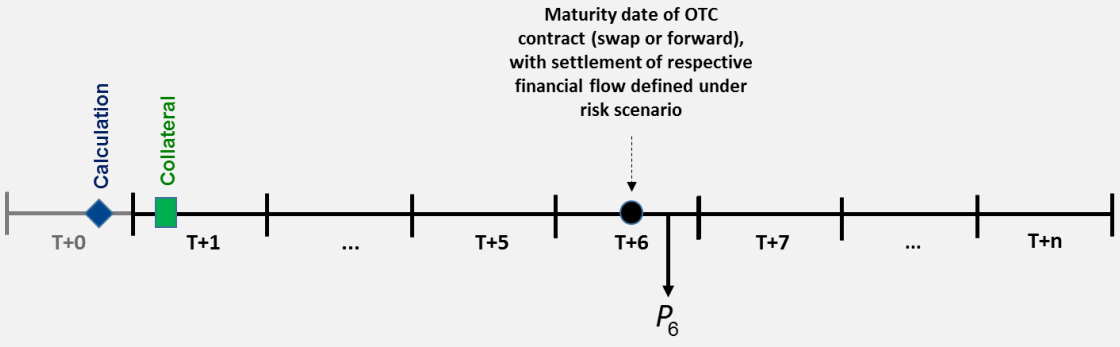


Figure 7.11 - **Position** closeout in short-maturity swap (or forward contract) with cash **settlement**

Suppose a **portfolio** with a long (holding) or short (written) flexible option **position**. The closeout of this **position** can occur in three different ways, as presented below.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

- The **position** may be closed out due to the activation of the knockout barrier price assessed under risk scenarios during the holding period under review, between $T+1$ and $T+n$. In this case, the **position** is closed out on the date the barrier price is breached, generating a financial flow for one-day settlement at the rebate value (in the example, R) defined in the contract. For a long **position** a credit financial flow is generated—figure 7.12 illustrates this case with the activation of the knockout barrier price on $T+6$. For a short **position** a debit financial flow is generated—figure 7.13 illustrates this case with the activation of the knockout barrier price on $T+5$.

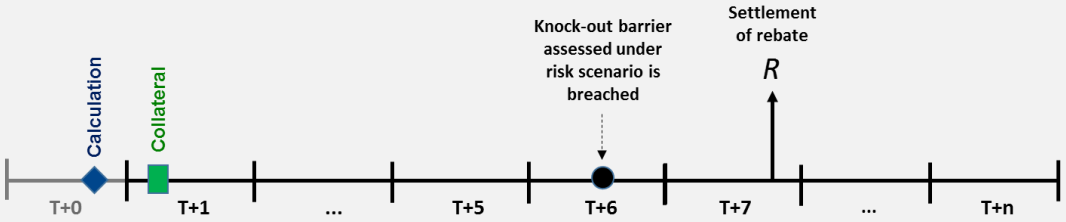


Figure 7.12 - Closeout of long **position** in flexible option breaching knockout barrier price

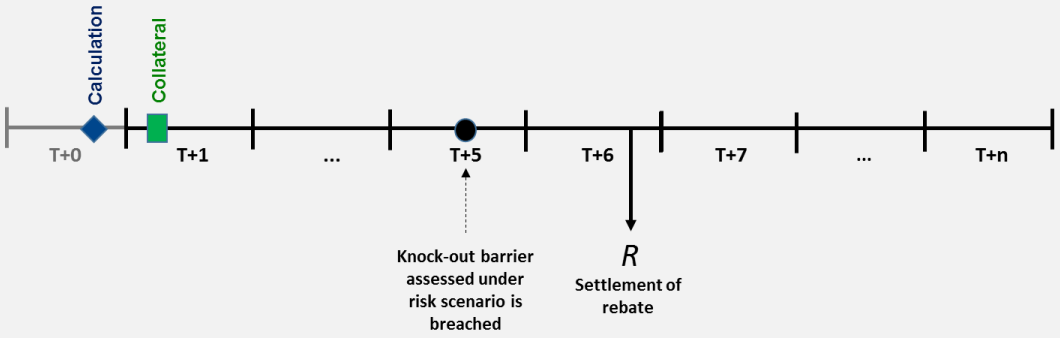


Figure 7.13 - Closeout of short **position** in flexible option breaching knockout barrier price

- The **position** may be closed out due to the option expiration during the holding period. In this case, the **position** closeout is the contract expiration date. If the knock-in barrier is not breached (including under risk scenario), a financial flow is generated for one-day **settlement** at the rebate value (in the example, R) defined in the contract. For a long **position** a credit financial flow is generated—figure 7.14 illustrates this case with an option expiring on $T+4$. For a short **position** a debit financial flow is generated—figure 7.15 illustrates this case with an option expiring on $T+5$. If the knock-in barrier is breached (including under risk scenario), a financial flow is generated for **settlement** one day after the expiration date at the intrinsic value of the option calculated under risk scenario. For a long **position** a credit financial flow is generated in the event of exercise—figure 7.16 illustrates this case with an option expiring on $T+7$, underlying asset price S_7 under risk

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

scenario and multiplier M defined in the options contract. For a short **position** a debit financial flow is generated in the event of exercise—figure 17.7 illustrates this case with an option expiring on $T+4$, underlying asset price S_4 under risk scenario and multiplier M defined in the options contract.

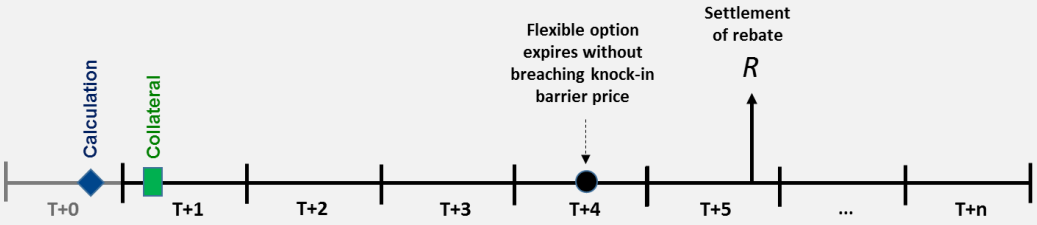


Figure 7.14 - Closeout of long **position** in flexible option upon expiration without breaching knock-in barrier price

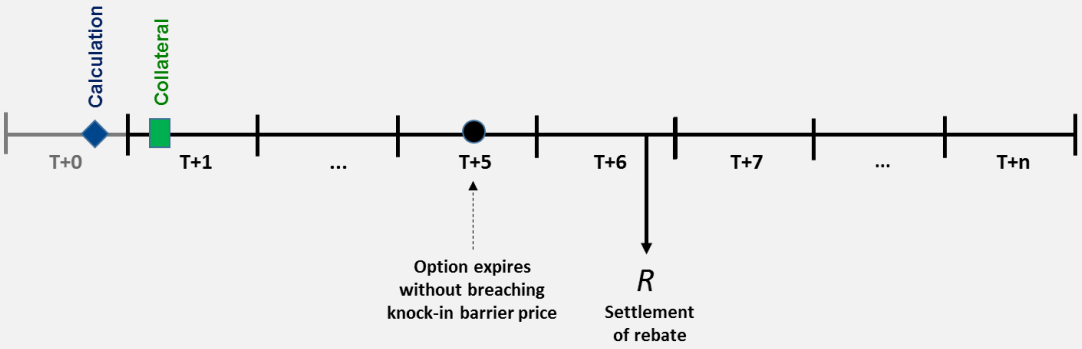


Figure 7.15 - Closeout of short **position** in flexible option upon expiration without breaching knock-in barrier price

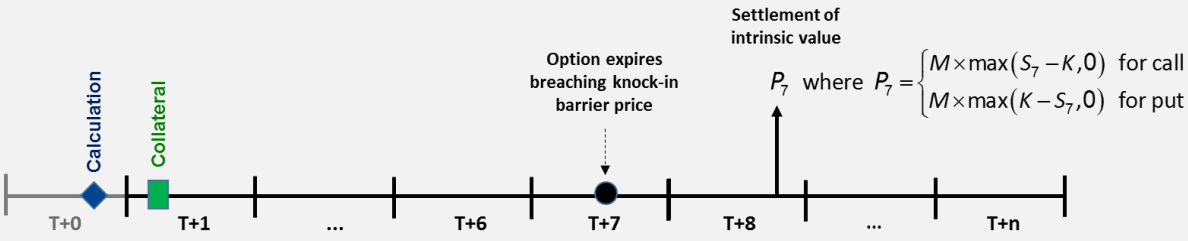


Figure 7.16 - Closeout of long **position** in flexible option upon expiration breaching knock-in barrier price

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

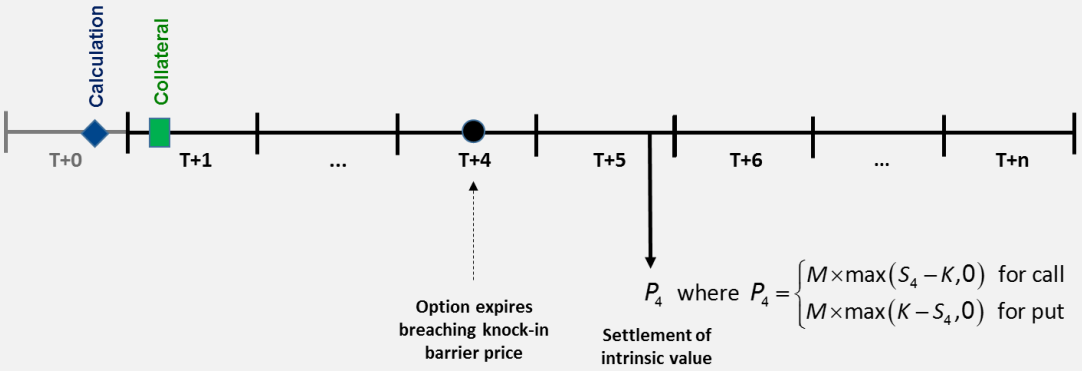


Figure 7.17 - Closeout of short **position** in flexible option upon expiration breaching knock-in barrier price

- If none of the aforementioned situations is observed, the **position** may be closed out via the transfer of contract ownership. In this case, the transfer of ownership occurs during the *minimum time for execution*, in this instance $T+n$, through the exchange of a financial flow at the option's market value (MtM) calculated under risk scenario. For a long **position** a credit financial flow is generated, as illustrated in figure 7.18. For a short **position** a debit financial flow is generated, as illustrated in figure 7.19.

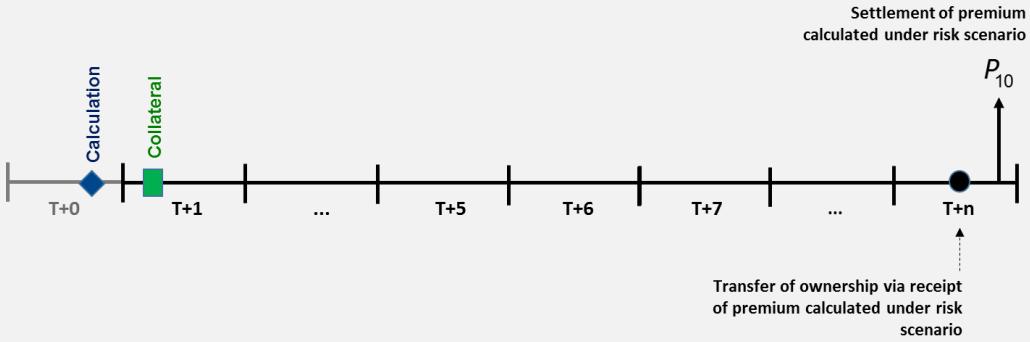


Figure 7.18 - Closeout of long **position** in flexible option on $T+n$ through transfer of ownership

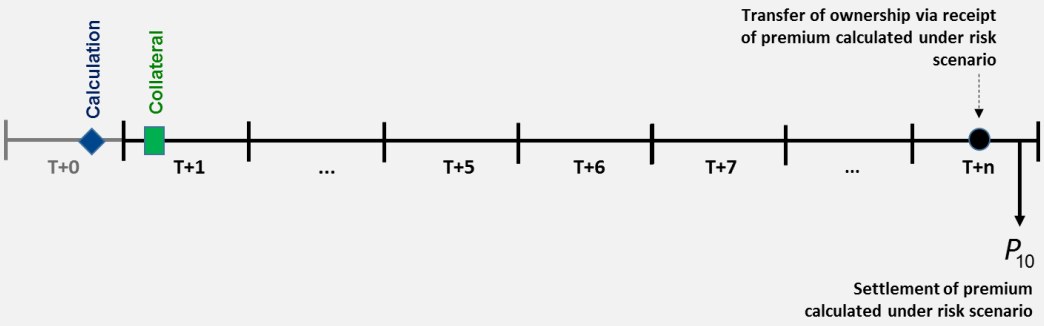


Figure 7.19 - Closeout of short **position** in flexible option on $T+n$ through transfer of ownership

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

7.4.2.2 Positions in the cash equities and fixed income ETF markets

(a) Closeout of long positions in the cash equities and fixed income ETF markets

Suppose a **portfolio** containing a long **position** in the cash equities or fixed income ETF market resulting from **transactions** executed on T+0 at average price P to be settled on $T+N$, where N assumes value 1 for cash fixed income ETF **positions** and value 2 for cash equities **positions** to reflect the number of days in their respective **settlement** cycles.

The closeout strategy anticipates the execution of a closeout **transaction** on $T+2$ (*minimum time for execution* of offsetting **positions** in cash equities and fixed income ETF shares), corresponding to a sale **transaction** of the same **asset** in the cash market at the same quantity of the original **position**, average price P_2 (to be calculated under risk scenarios) and settlement on $T+N+2$. The funds obtained from the sale **transaction** are intended to cover the deficit associated with the **payment** of the principal amount in the **settlement** of the long **position**. Thus, both cash flows (payment of $Q \times P$ on $T+N$ and receipt of $Q \times P_2$ on $T+N+2$) are included in risk calculation.

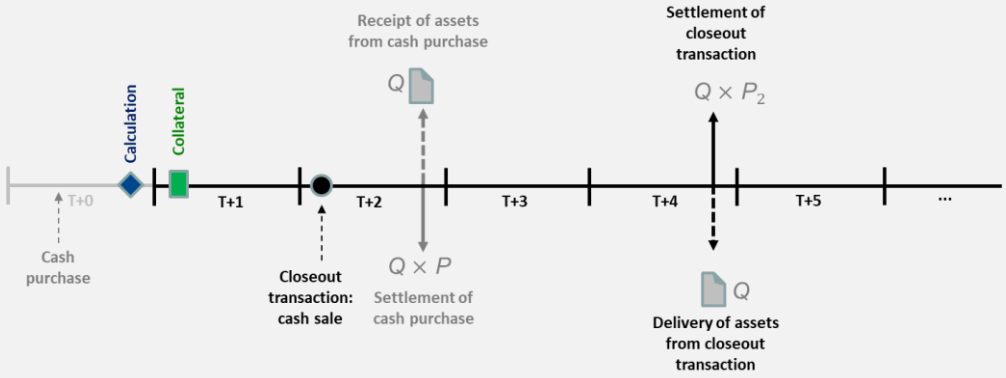


Figure 7.20a - Closeout of long **position** in cash equities market

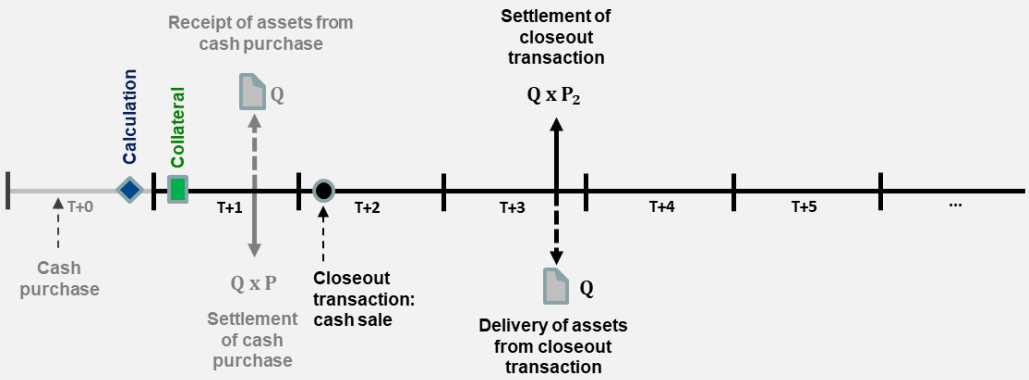
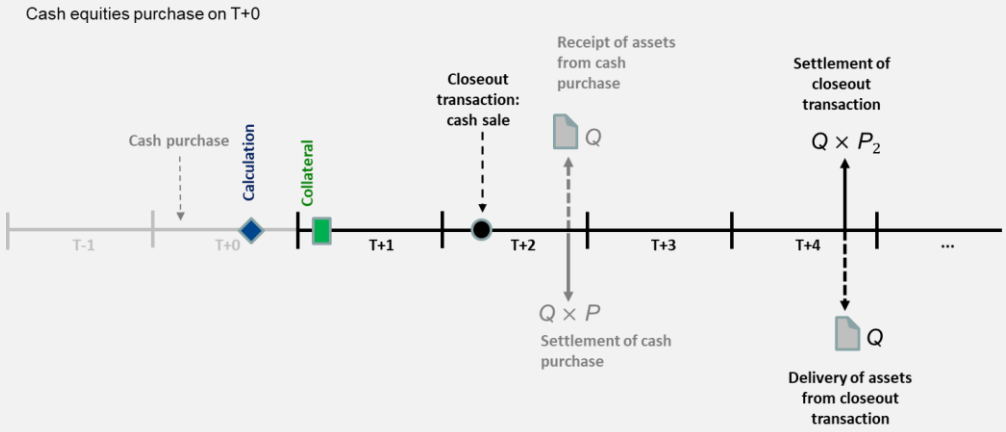


Figure 7.20b - Closeout of long **position** in cash fixed income ETF market

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Note that, when analyzing this **position**'s closeout risk, the CORE methodology considers the principal amount required for **payment** on $T+N$, but presupposes a limited availability of the liquidity resource (liquidity assistance facilities, among other examples) that will be used in supporting the fulfillment of part of that **payment** on $T+N$, until the date of recovery of the partial amount thereof on $T+N+2$, as a result of the sale of **assets**. Thus, the use of the liquidity resource must be limited to the recoverable amount, and the remaining part of the principal amount, which is not covered by the liquidity resource, must be covered by required **collateral**. Therefore, by assuming that the available liquidity resource is sufficient to cover the recoverable amount ($Q \times P_2$), the remaining risk will be $Q \times (P - P_2)$ (the uncovered portion of the principal amount), to be covered by required **collateral**. When the liquidity resource is not sufficient to cover the full recoverable amount, a larger risk value will be considered, still associated with the uncovered portion of the principal amount. The liquidity resource parameter in the CORE methodology is explained in detailed in section 7.6.

The closeout of long **positions** in the cash equities market resulting from **transactions** executed on $T-1$ is similar to the case of **transactions** executed on $T+0$, as shown in figure 7.21. This is because the closeout **transaction** might be performed as of $T+2$, regardless of the dates when the **positions** are executed, as explained in section 7.3.



INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

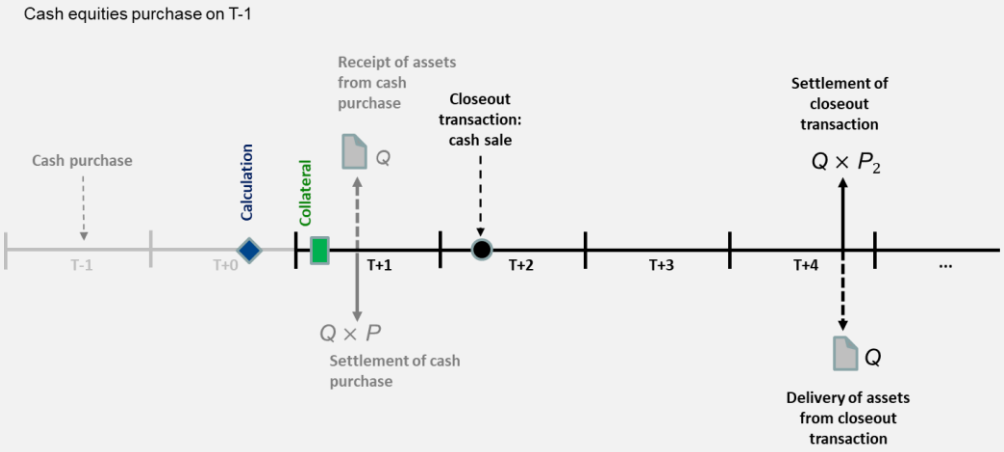


Figure 7.21 - Comparing closeouts of long **positions** in cash equities market resulting from **transactions** executed on $T-0$ or $T-1$

In the previous example, suppose now that quantity Q of **assets** was large enough to breach the *daily liquidity limit* parameter considered by the model. If, for instance, this parameter was equal to $Q/2$, two closeout **transactions** to be executed on consecutive days would be required to complete quantity Q's closeout, as illustrated in figure 7.22. In terms of related risk, the major consequence is that the amount recovered by the sale of **assets** is subject not only to price P_2 on $T+2$, stressed under risk scenarios, but also to price P_3, possibly even more stressed than P_2 under risk scenarios due to P_3's greater uncertainty. Moreover, the recovery of amounts occurs at a later stage than that in the situation where the *daily liquidity limit* is not breached.

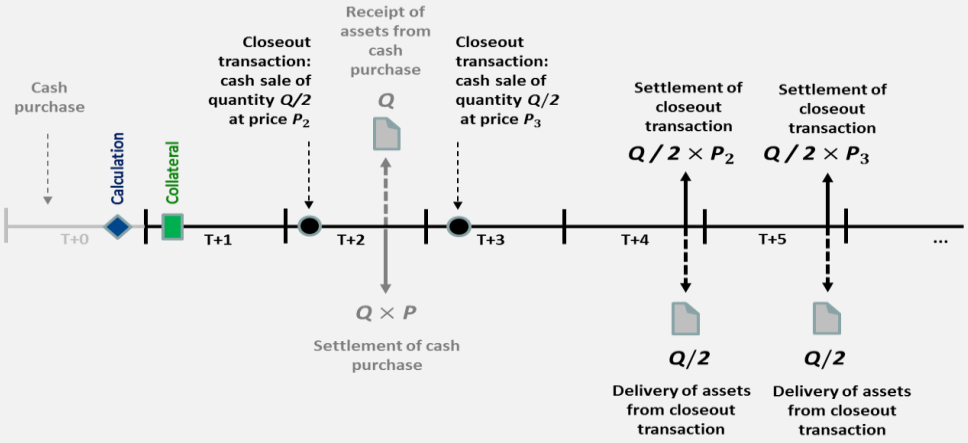


Figure 7.22a - Closeout of long **position** in cash equities market at a quantity greater than *daily liquidity limit*

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

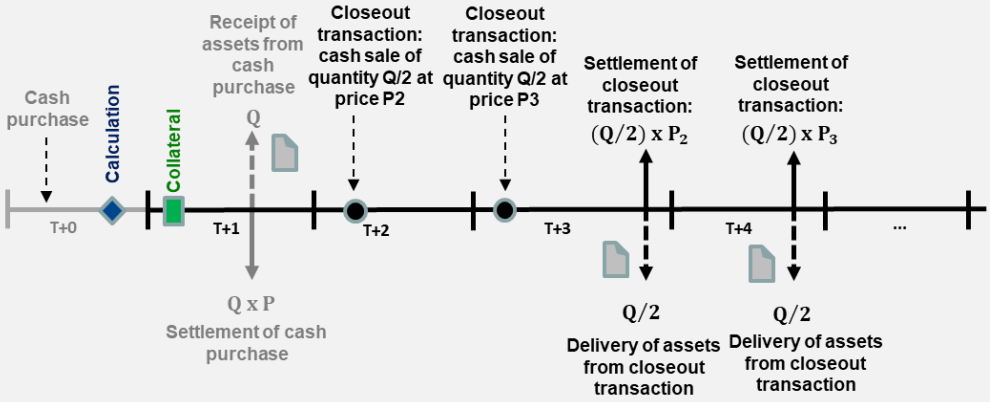


Figure 7.22b - Closeout of long **position** in cash fixed income ETF market at a quantity greater than *daily liquidity limit*

(b) Closeout of short positions

Whenever there are **delivery** obligations on **assets**, the closeout strategy adopts the principle of attempting to obtain the relevant **assets** as early as possible, in order to minimize possible events of **delivery failure**. To that end, the model assumes the possibility of carrying out purchase **transactions** in the cash market (where **settlement** is, by definition, short-termed), provided they are plausible under adverse conditions (subjecting the quantities involved to *daily liquidity limits*).

Suppose a **portfolio** containing a short **position** in the cash equities market, with no **coverage**, resulting from a **transaction** executed on $T+0$ to be settled on $T+2$. The closeout strategy presupposes the execution, on $T+2$, of a closeout **transaction** corresponding to a purchase **transaction** of the **assets** in the cash market, to be settled on $T+4$, at the same quantity of the original **position**, in order to make **delivery** of the **assets** owed since $T+2$, as shown in figure 7.23.

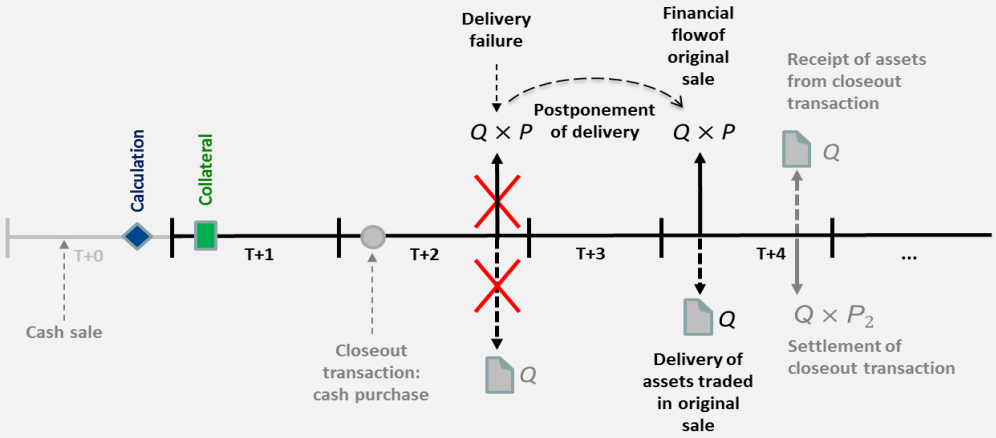


Figure 7.23 - Closeout of short **position** in cash equities market

In this case, the closeout strategy assumes:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

A. The declaration of the **investor**'s **default** to the **clearinghouse**, enabling the application of the special procedures for managing a **delivery failure**, as described in chapter 3 (Managing a **delivery failure** along the closeout process of the **defaulter participant**'s **positions**) of this manual;

B. The occurrence of a **delivery failure** on $T+2$;

C. The need to carry out a **transaction** to buy the **assets**; and

D. The possibility of postponing **asset delivery** to $T+4$, even after the failure that occurred on $T+2$, by considering the closeout completed after the $T+4$ settlement.

Assumptions B, C and D are explained below.

B. The methodology recognizes that, in some cases, the occurrence of a **delivery failure** is inevitable along the closeout process—for the **portfolio** containing short-term **delivery** obligations it may not be feasible to obtain the **assets** in time to meet such obligations.

C. After the failure that occurred on $T+2$, the procedures for managing the **delivery failure** automatically trigger the **securities lending** system, in search for the concerned **assets**. If successful, a new **securities lending** agreement is included in the **portfolio**. Otherwise, a **delivery failure position** is added to the **portfolio**. In both cases, the resulting risk would be calculated based on the same type of closeout, which would simply seek to obtain the **assets** as soon as possible by means of a purchase **transaction** in the cash market (in an attempt to cover the **delivery** obligation of the **lending** agreement or of the failing **position**), thus accounting for a negative flow to the value of the purchase **transaction** (the detailed explanation of how **lending** agreements and **delivery failure positions** are managed is presented ahead in this chapter). Therefore, it is not necessary for the model to make the emergence of the **lending** agreement or failing **position** explicit as a result of the failure. It is enough that the model simulates the purchase in the cash market for the **assets** (that is, the closeout **transaction** on $T+2$).

D. As explained in chapter 3 hereof, there are two distinct processes for managing the **delivery failure** of **assets**. The first one is the regular process, whereby, despite the **delivery failure**, the **investor** continues to meet financial and **margin** deposit obligations, with the **investor**'s **portfolio** not being closed out by the concerned **participant**. The second one is the special process, which is only triggered in the event the **investor** is formally declared a **defaulter** by the relevant **participant** to the **clearinghouse**, in which case the **investor**'s **positions** must be closed out in the market. The purpose of the special process for managing **delivery failures** of **assets** in the **equities market** is to allow the **participant** responsible for the **defaulter investor** to close out said **investor**'s **positions** more quickly than it would be possible should the regular process for managing failures be followed, thereby mitigating market risk. However, if the **participant** fails to perform the

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

closeout within the prescribed time frame, the **clearinghouse** may anticipate the buy-in order issuance in favor of the creditor counterparty (the creditor that did not receive the **assets**), in order to protect such **participant**'s rights.

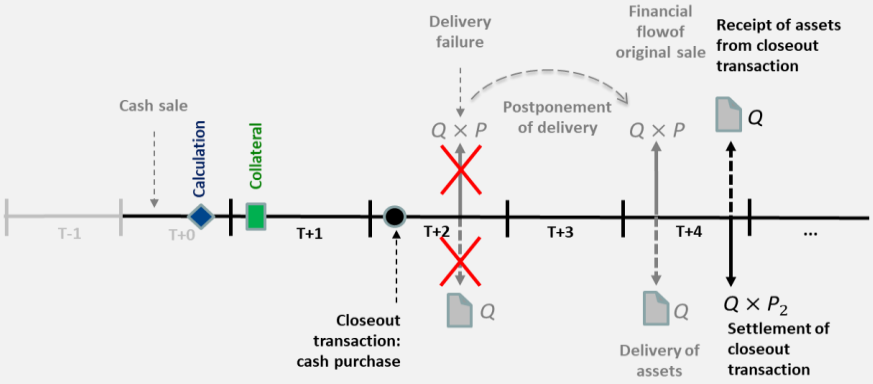
In summary, the special process for managing **delivery failures** in the cash equities market follows the steps laid out below:

1. Access to the **securities lending** system;
2. If **delivery** is not fully met with **assets** obtained via the **securities lending** system, then a failing **position** will be generated, in connection with the quantities still not delivered, to be settled in one day;
3. If **delivery** is still not fully met, steps 1 and 2 are repeated, but no more than ten times;
4. If, after ten repetitions, **delivery** still has not been fully met, the regular procedure for managing the **delivery failure** will proceed, whereby buy-in orders will be issued and, if necessary, a financial reversal will take place.

Hence, applied to the example under analysis, after searching for the **assets** in the **securities lending** system, the special procedure for managing the **delivery failure** might generate a failing **position** for $T+3$ (whose **delivery** obligation still cannot be met) and, if the **assets** are not available in the **lending** system on $T+3$, it might generate another failing **position** for $T+4$. The latter **position** is offset by the cash purchase executed on $T+2$ (to be settled on $T+4$). Upon **settlement** of the result of this offsetting **transaction**, the closeout is completed.

The closeout of short **positions** in the cash equities market with no **coverage**, resulting from **transactions** executed on $T-1$, is similar to the case of the position deriving from the **transactions** executed on $T+0$, as shown in figure 7.24. This is because the closeout **transaction** might be performed as of $T+2$, regardless of the dates when the **transactions** giving rise to the **position** are executed, as explained in section 7.3.

Cash equities sale on T+0



INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

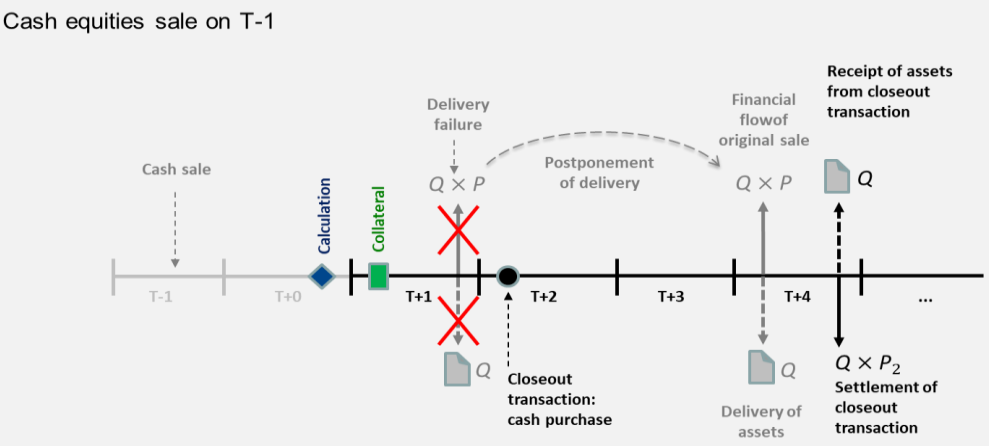


Figure 7.24 - Comparing closeouts of short **positions** in cash equities market resulting from **transactions** executed on $T+0$ or $T-1$

In the example above, suppose now that quantity Q of **assets** sold was large enough to breach the *daily liquidity limit* parameter considered by the model. If, for instance, this parameter were equal to $Q/2$, two closeout **transactions** to be executed on consecutive days would be required to complete quantity Q's closeout, as illustrated in figure 7.25. The major consequence to risk calculation is that the closeout **transactions** are subject not only to price P_2 on $T+2$, stressed under risk scenarios, but also to price P_3 on $T+3$, possibly even more stressed than P_2 under risk scenarios due to P_3's greater uncertainty.

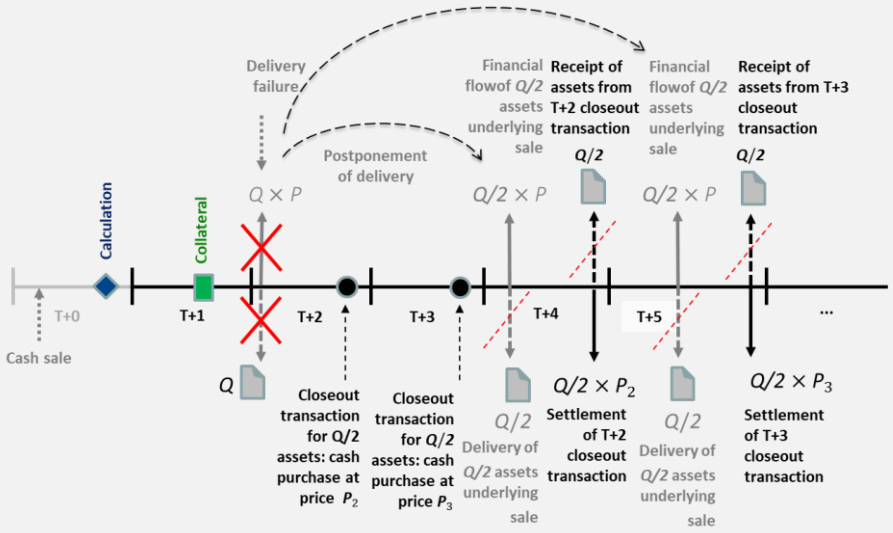


Figure 7.25 - Closeout of short **position** in cash equities market at a quantity greater than *daily liquidity limit*

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Assuming a short position with **coverage** in the cash equities market of quantity Q of **asset** A at average price P, the methodology presupposes the benefit of credit financial flow $Q \times P$ on the **settlement** date. In the example of figure 7.26, the sale was carried out on $T+0$ to be settled on $T+2$. Insofar as a closeout **transaction** is not required, this same result does not dependent on *daily liquidity limits* and risk scenarios.

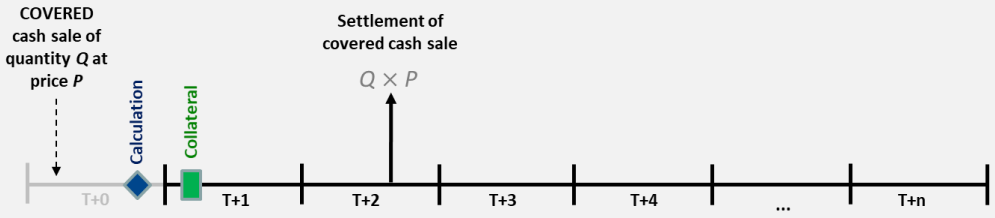


Figure 7.26 - Closeout of short **position** in cash equities market with **coverage**

(c) Closeout of short positions in the cash fixed income ETF markets

Suppose a **portfolio** containing a short **position** in the cash fixed income ETF market with no **coverage**, resulting from **transactions** executed on $T+0$ to be settled on $T+1$. The closeout strategy anticipates the execution of a closeout **transaction** on $T+2$, corresponding to a purchase **transaction** of the **assets** in the cash market at the same quantity of the original **position** and settlement on $T+3$, in order to make **delivery** of the **assets** owed since $T+1$, as shown in figure 7.27.

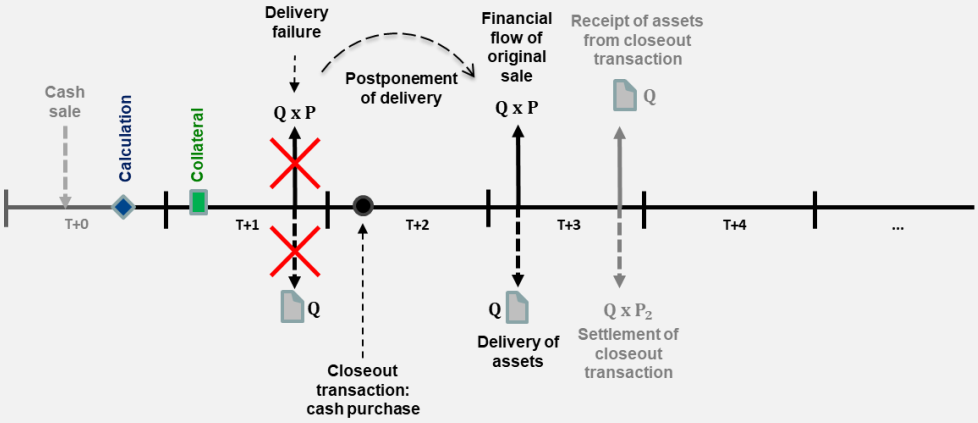


Figure 7.27 - Closeout of short **position** in cash fixed income ETF market

In this case, the closeout strategy assumes:

A. The declaration of the **investor**'s **default** to the **clearinghouse**, enabling the application of the special procedures for managing a **delivery failure**, as described in chapter 3

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

(Managing a **delivery failure** along the closeout process of the **defaulter participant**'s **positions**) of this manual;

B. The occurrence of a **delivery failure** on $T+1$ and the ensuing inclusion of the buy-in **position** in the **portfolio**;

C. The need to carry out a **transaction** to buy the **assets**; and

D. The possibility of postponing **asset delivery** to $T+3$, even after the failure that occurred on $T+1$, by considering the closeout completed after the $T+3$ settlement.

Assumptions B and D are explained below.

B. The methodology recognizes that, in some cases, the occurrence of a **delivery failure** is inevitable along the closeout process — for the **portfolio** containing short-term **delivery** obligations it may not be feasible to obtain the **assets** in time to meet such obligations. After the failure that occurred on $T+1$, the procedures for managing the **delivery failure** automatically trigger the **securities lending** system, in search for the concerned **assets**. If successful, a new **securities lending** agreement is included in the **portfolio**. Otherwise, a **delivery failure position** is added to the **portfolio**.

D. As explained in chapter 3 hereof, there are two distinct processes for managing the **delivery failure** of **assets**. The first one is the regular process, whereby, despite the **delivery failure**, the **investor** continues to meet financial and **margin** deposit obligations, with the **investor**'s **portfolio** not being closed out by the **participant** involved. The second one is the special process, which is only triggered in the event the **investor** is formally declared a **defaulter** by the relevant **participant** to the **clearinghouse**, in which case the **investor**'s **positions** must be closed out in the market.

In summary, the special process for managing **delivery failures** in the cash fixed income ETF market follows the steps laid out below:

1. Access to the **securities lending** system;

2. If **delivery** is not fully met with **assets** obtained via the **securities lending** system, then a buy-in **position** will be generated, in connection with the quantities still not delivered, to be settled in one day. At the sole discretion of the **clearinghouse**, the buy-in order may be executed by the **clearinghouse** itself, no request of the **full trading participant** or **settlement participant** responsible for the creditor **investor** being required;

3. If **delivery** is still not fully met, the cancellation of the quantities delivered will be calculated and carried out daily, but no more than ten times, with the **portfolio** holding the buy-in **positions** that were not cancelled;

4. If, after ten repetitions, **delivery** still has not been fully met, the buy-in **positions** that were not cancelled will be reversed.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Therefore, applied to the example under analysis, after searching for the **assets** in the **securities lending** system, this specific procedure for managing **delivery failures** might hold in the **portfolio** a buy-in **position** generated by the **delivery failure** until the underlying asset is obtained on $T+3$ by settling the cash purchase made on $T+2$.

In the example above, suppose now that quantity Q of **assets** sold was large enough to breach the *daily liquidity limit* parameter considered by the model. If, for instance, this parameter were equal to $Q/2$, two closeout **transactions** to be executed on consecutive days would be required to complete quantity Q's closeout, as illustrated in figure 7.28. The major consequence to risk calculation is that closeout **transactions** are subject not only to price P_2 on $T+2$, stressed under risk scenarios, but also to price P_3 on $T+3$, possibly even more stressed than P_2 under risk scenarios due to P_3's greater uncertainty.

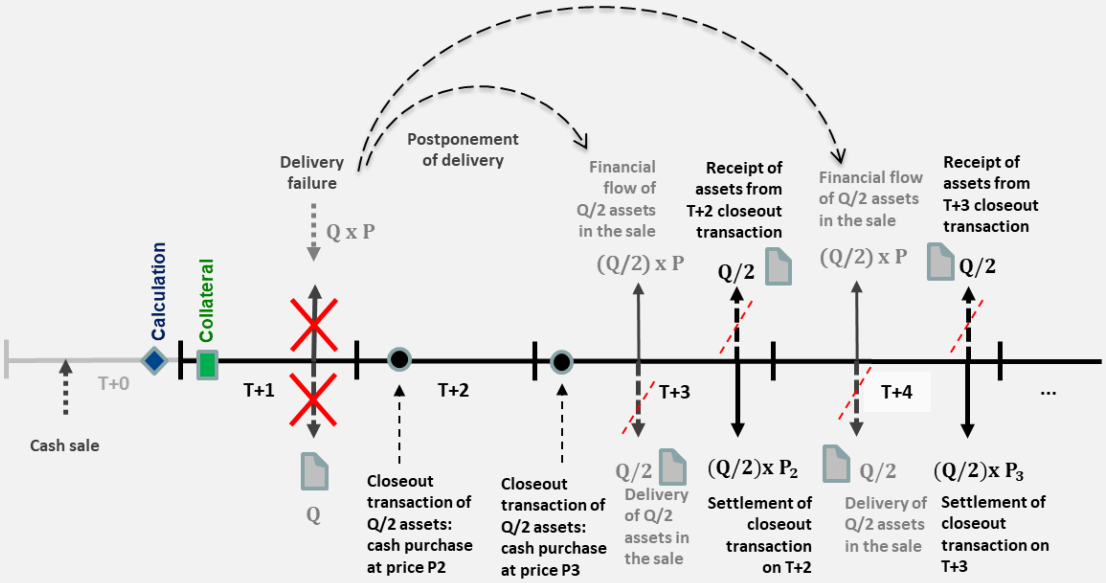


Figure 7.28 - Closeout of short **position** in cash fixed income ETF market at a quantity greater than *daily liquidity limit*

Assuming a short **position** with **coverage** in the cash fixed income ETF market of quantity Q of **asset** A at average price P, the methodology presupposes the benefit of credit financial flow $Q \times P$ on the **settlement** date. In the example of figure 7.29, the sale was carried out on $T+0$ to be settled on $T+1$. Insofar as a closeout **transaction** is not required, this same result does not dependent on *daily liquidity limits* and risk scenarios.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

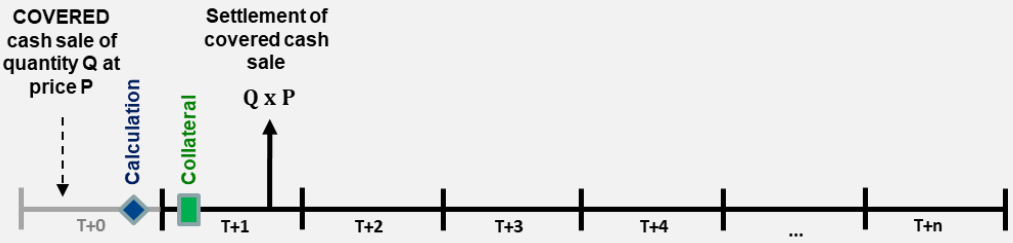


Figure 7.29 - Closeout of short position in cash fixed income ETF market at a quantity greater than daily liquidity limit

(d) Closeout of long and short positions in the cash equities and fixed income ETF markets

In the case of a **portfolio** containing long **positions** and short **positions** in the cash market for the same **assets**, the methodology considers it possible to utilize both rights to and obligations on such **assets**, before defining the necessary closeout **transaction**, as in the following example.

Example:

Suppose a **portfolio** consisting of the following **positions** in the cash equities market on the same underlying **asset**:

Settlement date	Position	Quantity (Q)	Average price (P)	Q x P
$T+1$	Purchase	20,200	BRL 12.89	BRL 260,378.00
$T+2$	Sale no **coverage**	30,100	BRL 13.01	BRL 391,601.00
$T+2$	Purchase	5,800	BRL 12.91	BRL 74,878.00

The positions are first reviewed in connection with **deliveries** and receipts of **assets** resulting therefrom. The purchase to be settled on $T+1$ presupposes a right to receive 20,200 **assets**, as illustrated in figure 7.30.

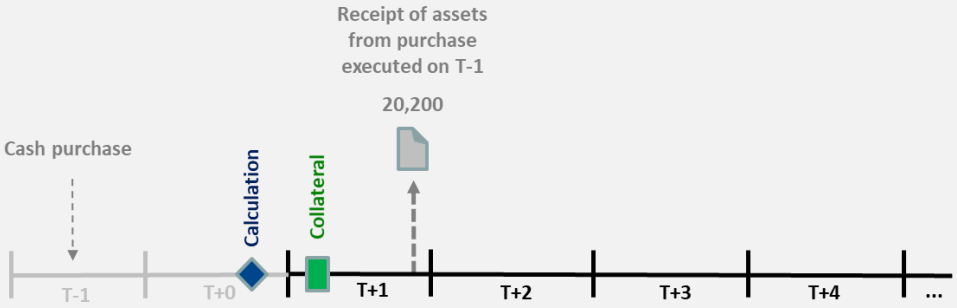


Figure 7.30 - Estimated receipt of **assets** associated with cash purchase to be settled on $T+1$, according to example

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The sale and purchase, both to be settled on $T+2$, assume a net obligation to deliver 24,300 **assets**, as illustrated in figure 7.31. Note that, on $T+0$, a day trade was also performed involving 5,800 **asset** units.

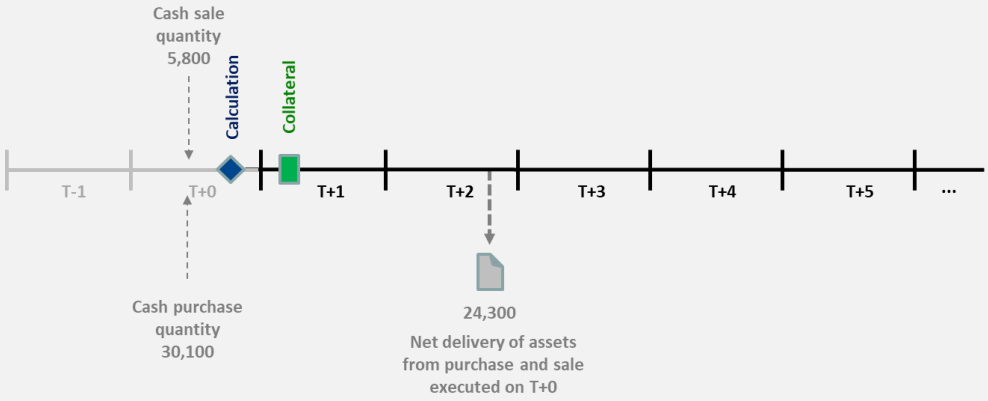


Figure 7.31 - Estimated net delivery of **assets** associated with cash purchase and sale of the same **assets** to be settled on $T+2$, according to example

The methodology considers the **asset** flow projected from the combination of **positions**, as illustrated in figure 7.32.

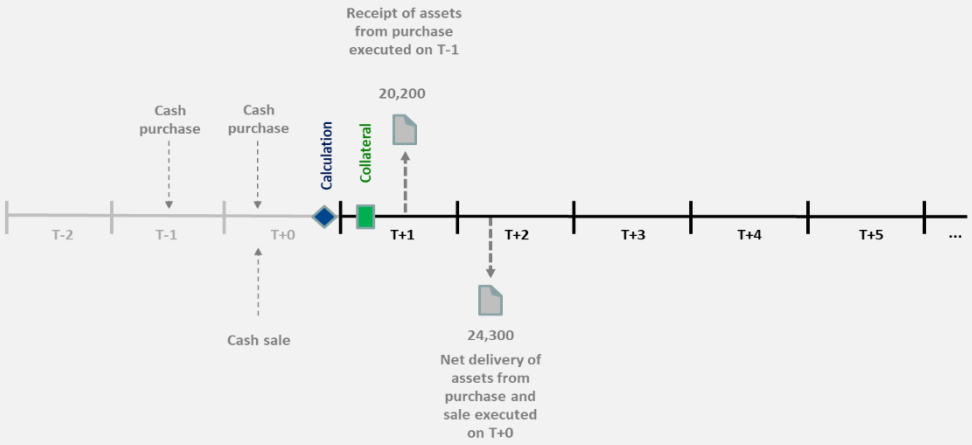


Figure 7.32 - **Asset** flow projection given by combination of **settlements** of **positions**, according to example

Note that there is a cumulative deficit of 4,100 **assets**. The closeout **transaction** corresponds, then, to a cash purchase **transaction** of 4,100 **assets**, aiming to cover the observed deficit of **assets**. Therefore, this single closeout **transaction** recognizes, along the closeout process, the possibility of using the 20,200 **assets** resulting from the purchase to be settled on $T+1$ to meet the **delivery** obligations scheduled to occur on the subsequent dates. After that **transaction** is settled, no more **asset deliveries** are due, as shown in figure 7.33.

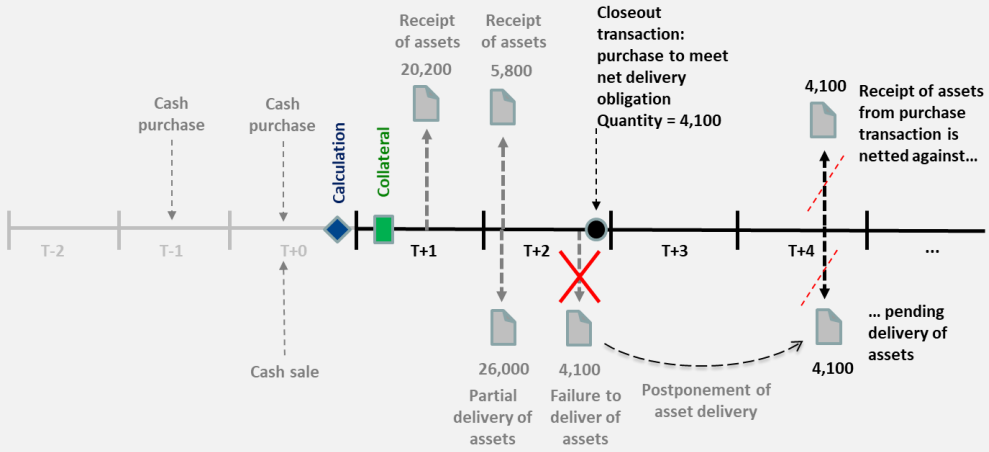


Figure 7.33 - **Asset** flow projection given by combination of **settlements** of **positions** with closeout **transaction**, according to example

After analyzing the asset flow and defining the closeout **transaction**, the methodology projects the resulting cash flows under each risk scenario. Assuming that the closeout **transaction** has been simulated at price P_2, or BRL16.76, on $T+2$ under a given risk scenario, the cash flows are those shown in figure 7.34.

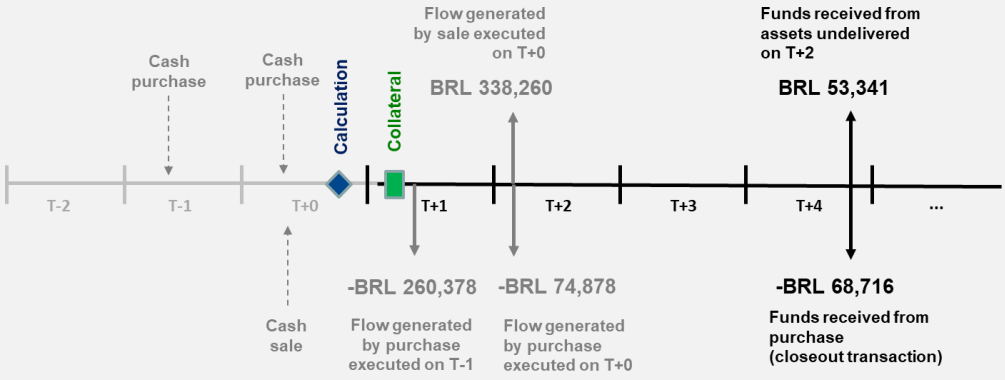


Figure 7.34 - Projection of cash flows obtained under risk scenarios, according to example

From the cash flow obtained under each risk scenario, the methodology proceeds towards the calculation of risk, as described in sections 7.5 and 7.6. In this example, the worst cumulative cash flow was –BRL260,378. From this amount, BRL188,331 are recovered until the end of the closeout procedures, resulting in a final cumulative loss of BRL37,994. Assuming an overall availability of BRL10 million as liquidity resource (liquidity assistance facilities, among other examples) temporarily supporting the payment of the principal amount of BRL226,275, the maximum value to be used of such funds is limited to the recoverable amount of BRL188,331. In this case, the portion of the principal amount that has not been financed, corresponding to

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

the difference between the two values and equal to BRL37,994, must be covered by required **collateral**.

(e) Closeout of positions generated by the delivery failure management process

As described in the **clearinghouse** operating procedures manual, during the implementation of a **delivery failure** management process both failing **positions** and buy-in **positions** might be generated, not only for the defaulter **investor**, but also for damaged creditor **investors** (meaning those who did not receive their **assets** as planned due to the fault committed by the seller). Such still not settled **positions** are considered in the risk model, as explained in the following examples.

Consider a **delivery failure position** registered on $T+0$ for the failing **investor**—originally the debtor of **assets** in the cash **equities market** on $T+0$,—which must be settled on $T+1$. The closeout of said **position** occurs exactly like that of a short cash **position** with no **coverage** to be settled on $T+1$. A closeout **transaction** corresponding to a cash purchase to obtain the underlying **assets** owed is executed on $T+2$ (*minimum time for execution*), to be settled on $T+4$.

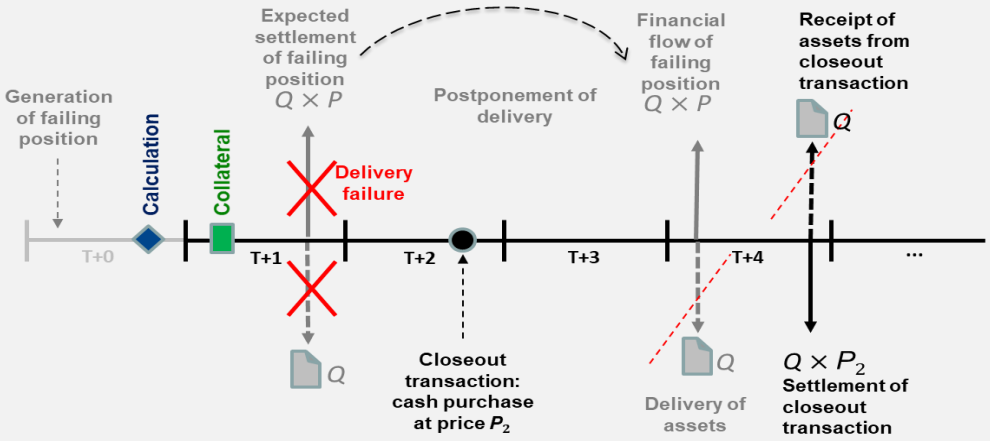


Figure 7.35 - Closeout of **delivery failure position** in the cash equities market generated for debtor of **assets**

Concurrently with the generation of a **delivery failure position** for the failing debtor **investor**, as discussed in the previous example, a corresponding **position** is generated for the creditor **investor** of the undelivered **assets**, with the effect of postponing the original **settlement** date to $T+1$. The closeout of said **position** occurs exactly like that of a cash purchase **position** to be settled on $T+1$. A closeout **transaction** corresponding to the sale of the **assets** in the cash market is executed on $T+2$ (*minimum time for execution*), to be settled on $T+4$. Exactly as with the long **position** in the cash market, the payment of the cash flow generated on $T+1$,

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

corresponding to the principal amount of the **position**, may be partially and temporarily covered by using the liquidity resource, as explained in paragraph (a) of this subsection 7.4.2.2.

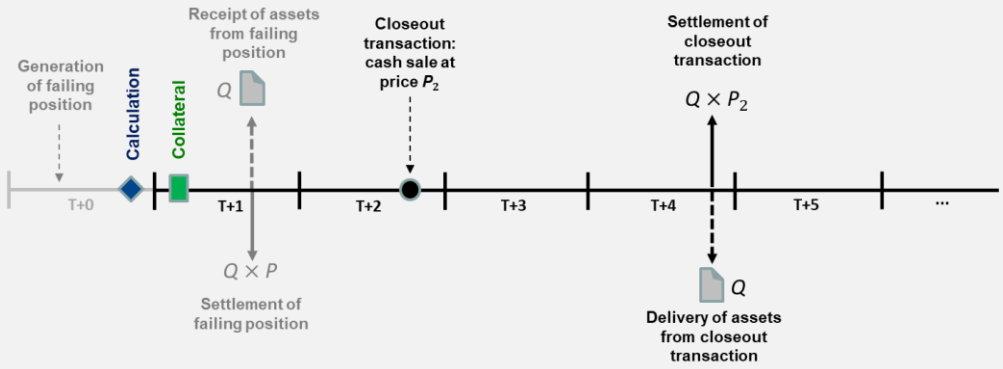
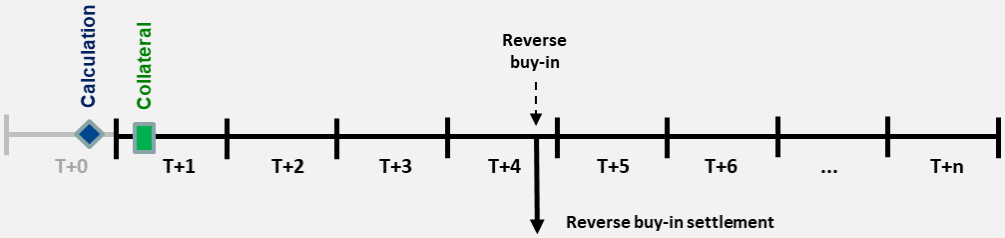


Figure 7.36 - Closeout of **delivery failure position** in the cash equities market generated for creditor of **assets**

Consider a buy-in **position** registered to the creditor of **assets** in the cash equities and fixed income ETF markets. In this case, considering that this creditor **investor** has been declared a **defaulter** and that the **investor**'s **positions** must, therefore, be closed out, the **participant** responsible for said **investor** may simply not execute the buy-in. Thus, said **position** could only have the effect of generating a credit or a null financial flow along the closeout process. Since the occurrence or nonoccurrence of a credit financial flow is a function of the risk scenario that will define the risk measures, which is still undetermined when the closeout strategy is defined, the **position** is not considered for risk calculation purposes.

In the case of a buy-in **position** registered to the debtor of **assets** in the cash equities and fixed income ETF markets, the **position** is included for risk calculation purposes, anticipating the occurrence of a debit financial flow. Figure 7.37a illustrates the expected flow for the buy-in **position** in the cash equities market registered on $T+0$ (deriving from the **delivery failure** occurred on $T-1$) and, therefore, offset on $T+4$. The debit flow is equivalent to the one generated when the reverse buy-in was executed, and according to reference price P_4 for the **assets**, simulated under risk scenarios on $T+3$. The resulting flow, V_{Debtor}, is projected as follows:

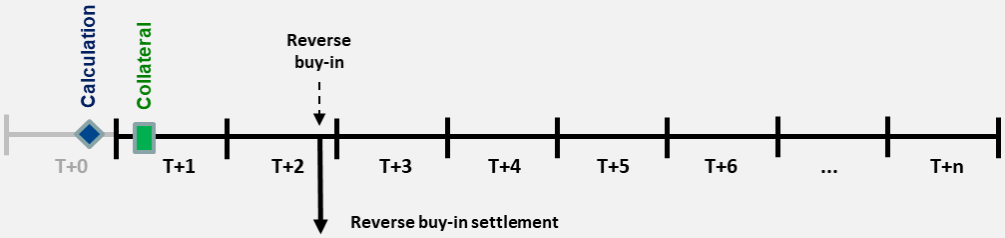
INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION



$$\mathbf{V_{Debtor} = Q\,x\,max(P_3 - P_{Debtor}; P_{Creditor} - P_{Debtor}; 0)}$$

Figure 7.37a - Expected flow at closeout of buy-in **position** registered to debtor of **assets** in the cash equities market on $T+0$

Figure 7.37b illustrates the expected flow in the case of a buy-in **position** in the cash fixed income ETF market registered on $T+0$ (deriving from the **delivery failure** occurred on $T+0$) and, therefore, offset on $T+2$. The debit flow is equivalent to the one generated when the reverse buy-in was executed, and according to reference price P_1 for the **assets**, simulated under risk scenarios on $T+1$. The resulting flow, V_{Debtor}, is projected as follows:



$$\mathbf{V_{Debtor} = Q\,x\,max(P_1 - P_{Debtor}; P_{Creditor} - P_{Debtor}; 0)}$$

Figure 7.37b - Expected flow at closeout of buy-in **position** registered to debtor of **assets** in the cash fixed income ETF market on $T+0$

7.4.2.3 Positions in the corporate debt market

Suppose a cash **position** in the **corporate debt market** to be settled on $T+1$. The risk model adopts the assumption that said **position** is closed out by an offsetting **transaction** in the same market at the same quantity and at the day's price obtained under risk scenario. Note that the financial flow depends on the traded price and risk scenarios. Figure 7.38 illustrates this case.

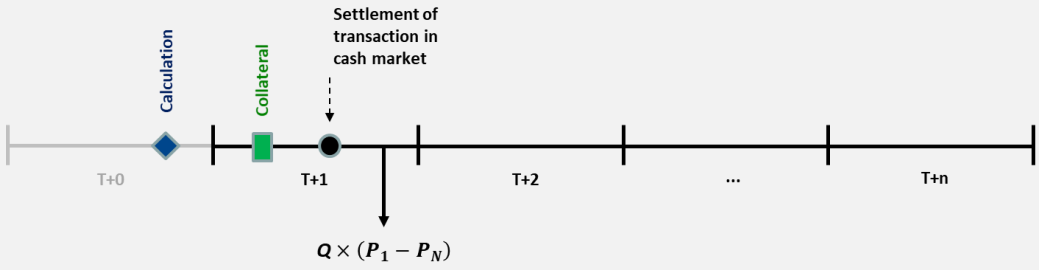


Figure 7.38 - Closeout of **position** in **corporate debt market**

7.4.2.4 Positions in derivatives contracts and securities lending agreements to be settled in cash and assets

(a) Closeout of equities options positions

Suppose a **portfolio** containing only a short (written) **position** in an equities options contract expiring after the *minimum time for execution* (in this example, $T+2$). In order to be closed out, as demonstrated in figure 7.39, a closeout **transaction** is supposed to have been executed as of the *minimum time for execution*, corresponding to an offsetting **position**, meaning a purchase **transaction** of the same option at the same quantity. The offsetting **position** is enough to eliminate the original **position** by netting. The premium **settlement** on $T+3$ is accounted for in risk calculation, and it is based on option price P_2 calculated on $T+2$ under risk scenarios using full-valuation techniques.

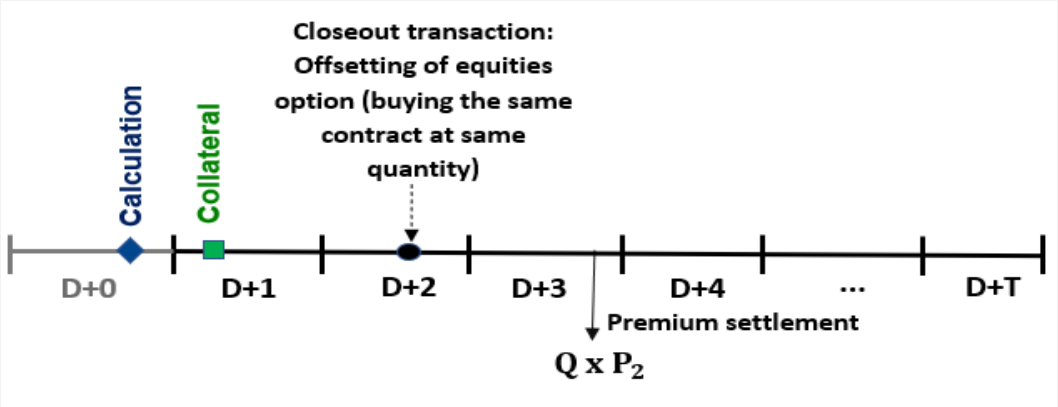


Figure 7.39 - Closeout of short **position** in long-expiration equities option

In the previous example, suppose that quantity Q was large enough to breach the *daily liquidity limit* parameterized for the concerned instrument. If, for example, this parameter were equal to $Q/2$, two closeout **transactions** to be executed on consecutive days would be required to complete quantity Q's closeout, as illustrated in figure 7.40. In this case, the two resulting

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

settlement flows are considered in risk calculation: the first one is associated with the payment of premium P_2 for quantity $Q/2$; and the second one is associated with the payment of premium P_3 for the remaining quantity.

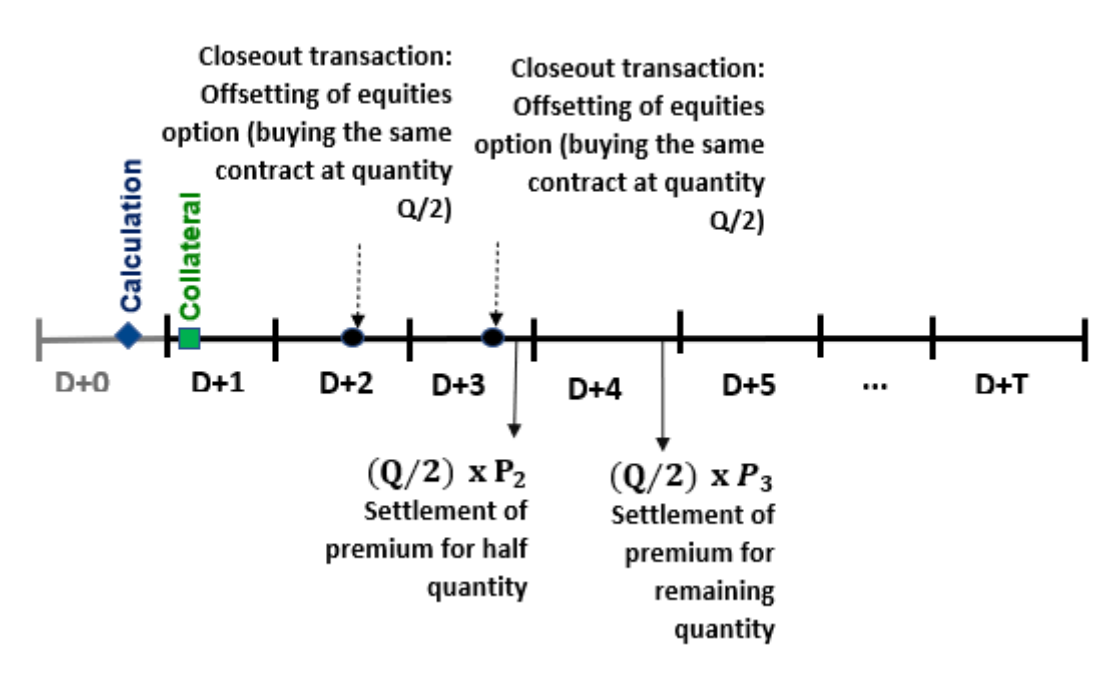


Figure 7.40 - Closeout of short **position** in equities option at quantity equivalent to twice the *daily liquidity limit*

Suppose a **portfolio** containing only a long (holding) **position** in a listed equities options contract expiring after the *minimum time for execution* (in this example, $T+2$). For this **position** to be closed out, as shown in figure 7.41, a closeout **transaction** is supposed to have been executed after the *minimum time for execution*, corresponding to an offsetting **position**, that is, a sale **transaction** of the same option at the same quantity. The offsetting **transaction** is enough to eliminate the original **position**. The receipt of the premium on $T+2$ is considered as a positive balance in risk calculation, and it is based on option price P_2 calculated on $T+2$ under risk scenarios using full valuation techniques.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

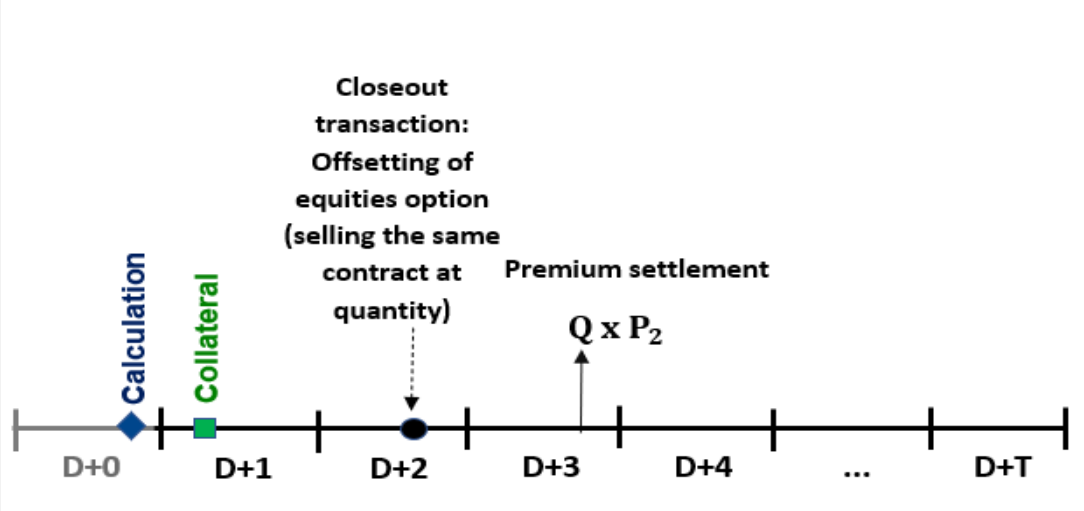
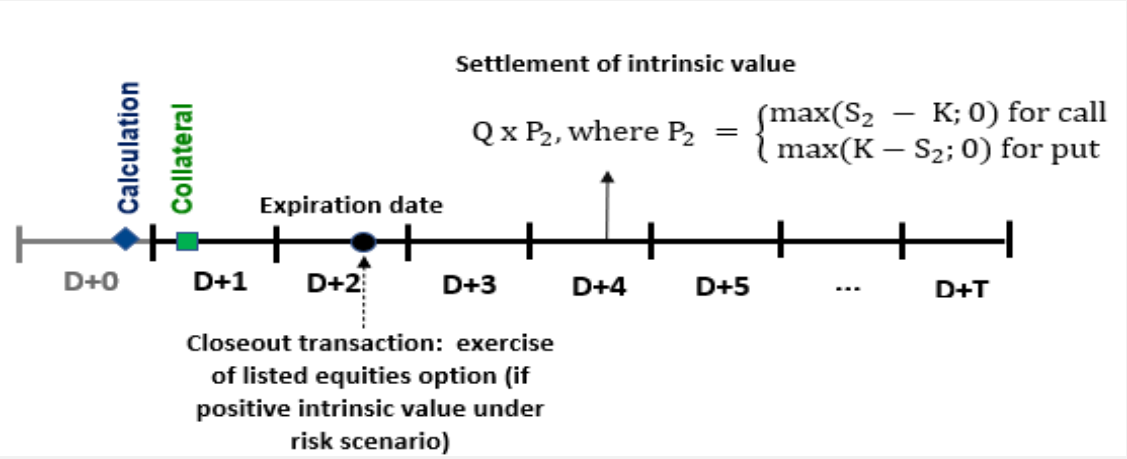


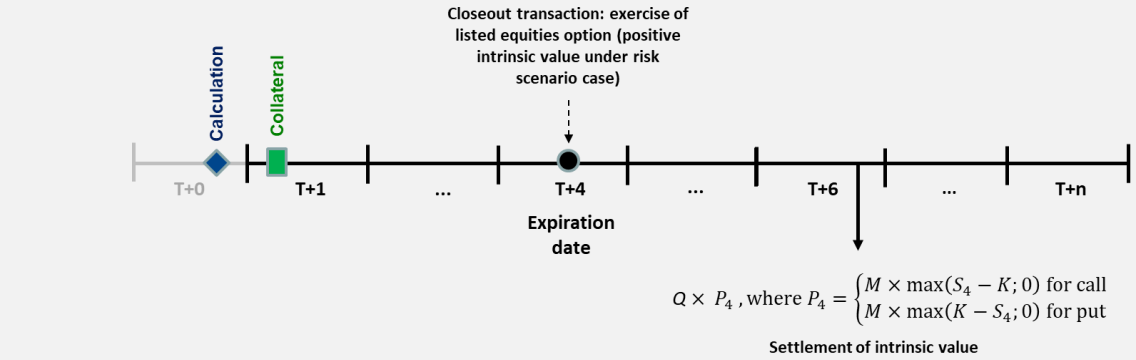
Figure 7.41 - Closeout of long **position** in long-expiration equities option

Even though the listed equities option is a **derivative** whose exercise involves a cash market **transaction** (and not only a cash **settlement**), said exercise, when it occurs util the *minimum time for execution*, including the closeout **transaction** (in this example, $T+2$), is managed in the same way as that applicable to **positions** in listed financial options, meaning that the exercise only generates a cash **settlement** for two days associated with the intrinsic value. Implicitly speaking, the way this exercise is handled takes the assumption that the **transaction** in the cash market generated when the option is exercised is closed out by another **transaction** in the cash market at the day's price obtained under risk scenario and at the same quantity. For a long **position** a credit flow is generated. Figure 7.42 illustrates the case where the option expires on $T+2$ and the underlying asset price under risk scenario is P_5. For a short **position** a debit flow is generated. Figure 7.43 illustrates the case where the option expires on $T+1$ and the underlying asset price under risk scenarios is S_1.



INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Figure 7.42 - Closeout of long **position** in short-expiration listed equities option



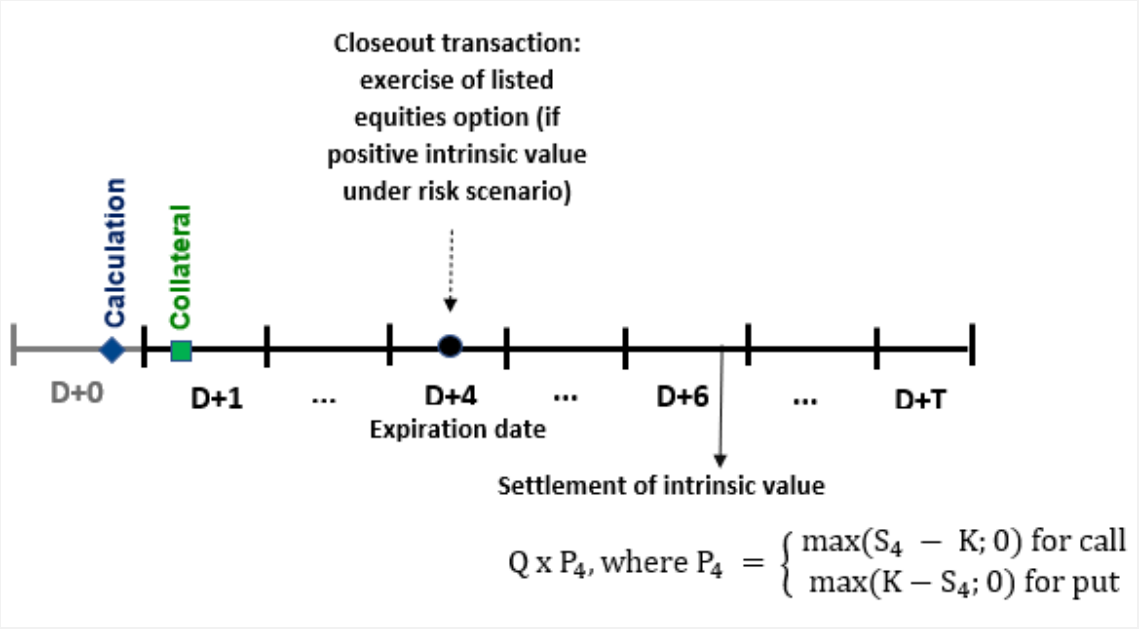


Figure 7.43 - Closeout of short **position** in short-expiration listed equities option

(b) Closeout of equities forward positions

A long **position** in the equities forward market may be subject to an early **settlement** under different modes, contingent on the time to **settlement** after the date of the early **settlement** request.

Thus, for the purpose of closing out a long forward **position** maturing after $T+4$, the request for an early **settlement** in two days and the execution of a closeout **transaction** (cash sale of the underlying asset at the same quantity) are both considered on $T+2$ (*minimum time for execution* of the closeout **transaction**). The effect of the combination of the two procedures is cash **settlement** on $T+4$, generating a cash flow associated with the difference between the

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

average price of the closeout **transaction** and the average price of the long forward **position**, according to the diagram that follows:

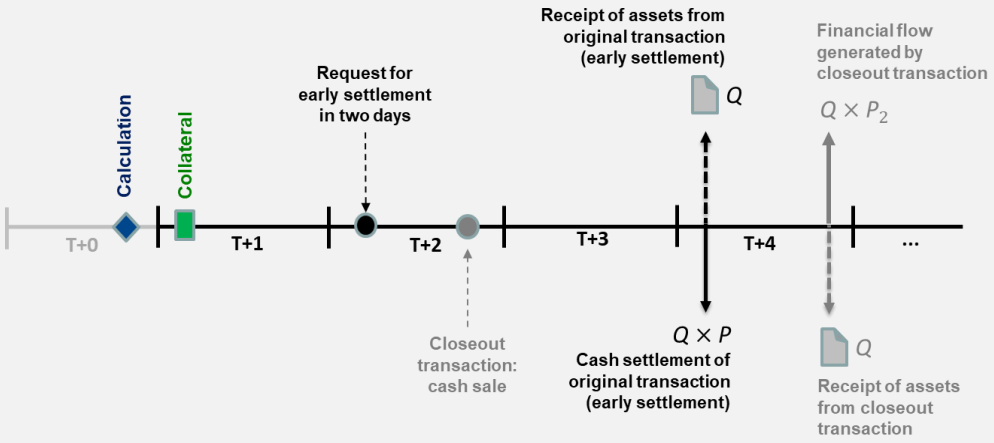


Figure 7.44 - Closeout of long **position** in equities forward market

For a long forward **position** maturing in up to $T+4$, the **payment** due is projected to the maturity date, but the receipt resulting from the closeout **transaction** will only occur on $T+4$. In the following example, the final cash flow shows that the principal amount needs to be paid on $T+3$, therefore competing for the use of the liquidity resource for the cash **positions**, among others, as explained in section 7.6.

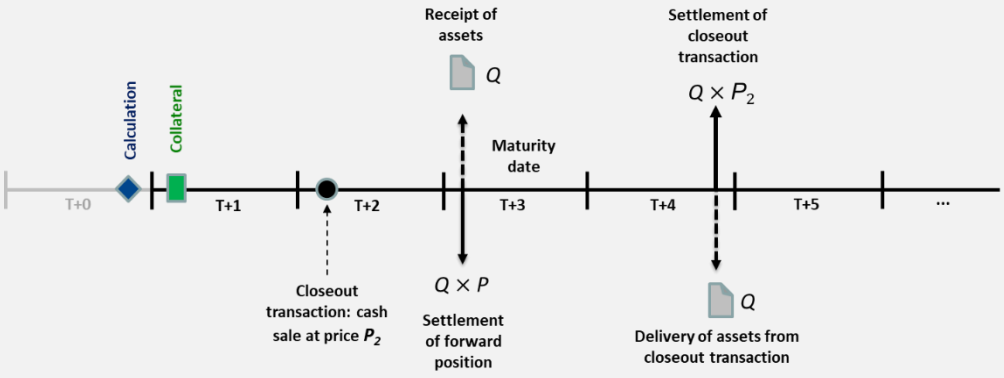


Figure 7.45 - Closeout of long **position** in short-maturity equities forward

For a short forward **position** with **coverage**, a credit financial flow is considered for risk calculation purposes only when the contract maturity is within the holding period, as shown in figure 7.46. The **positions** maturing out of the holding period are, then, fully disregarded for risk calculation purposes.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

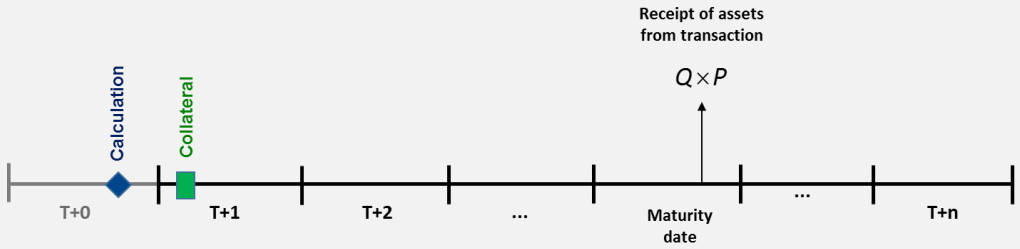
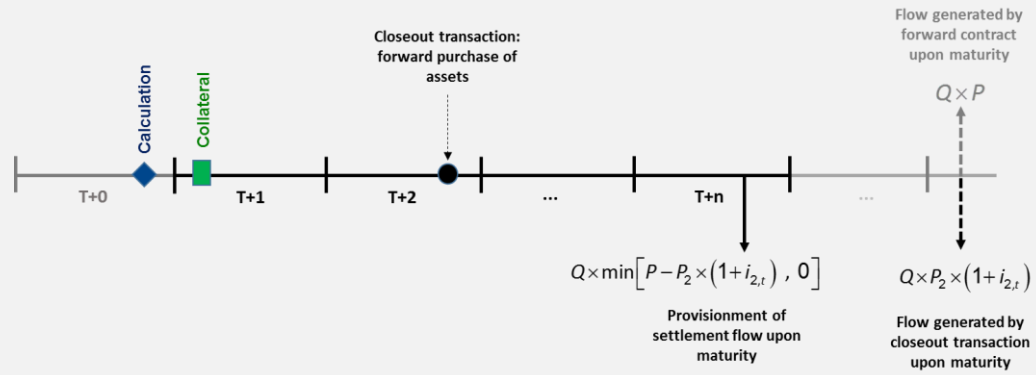


Figure 7.46 - Closeout of covered short **position** in short-maturity forward (within holding period)

For a short forward **position** still with no **coverage**, the closeout **transaction** corresponds to the purchase of the underlying **asset**, either in the cash market or in the forward market, depending on the maturity date of the contract underlying the **position**, in order to provide **coverage** for the short forward contract. In the particular situation of the **portfolio** closeout, if a forward purchase is executed, the **coverage** of the short position is supposed to have been made with the **assets** allocated as **coverage** by the selling party of said forward purchase. Preferably, in order to avoid the mismatch of cash flows, a purchase must be made so as to coincide the **settlement** thereof with that of the forward **position**. Where it is not possible to coincide maturities, it suffices for the new forward contract to have a later maturity to that of the original **position** and for an early **settlement** request to be registered so that the **settlement** dates of both **positions** coincide.

The following example shows the closeout of a short forward **position** still with no **coverage** and maturing after $T+n$. The closeout **transaction** is a forward purchase with the same maturity date. The cash flow considered for risk calculation purposes corresponds to a provision of the required funds for the **payment** of the net financial flow on the **settlement** date, if negative under the simulated risk scenario. The simulated price of the new forward contract, under the risk scenario, corresponds to **asset** price P_2 on $T+2$ discounted to future value on the maturity date at interest rate $i_{2,t}$ stressed for the period on $T+2$. The difference between the two flows upon maturity, when negative, is provisioned and entered on $T+n$, and the amount thereof under the worst case risk scenario must be covered by **collateral**.



INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Figure 7.47 - Closeout of short **position** in long-maturity forward contract with no **coverage**

For a short forward **position** still with no **coverage** maturing before $T+n$, the best closeout **transaction** to be implemented in order to meet the expected **delivery** obligation is a cash purchase of the underlying **asset**. So, the closeout **transaction** becomes similar to that of a short **position** in the cash market, as presented in figure 7.48.

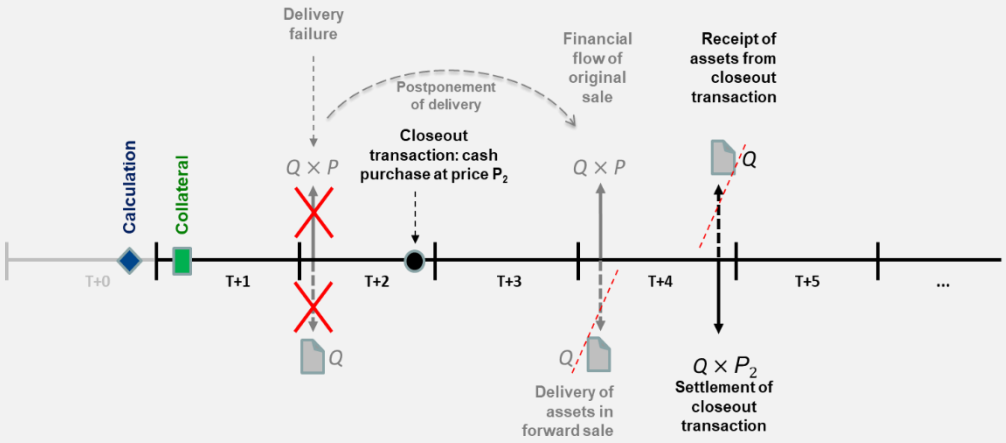


Figure 7.48 - Closeout of short **position** in short-maturity forward contract with no **coverage**

(c) Closeout of securities lending positions in equities and fixed income ETF shares

In general, the closeout of a borrowing **position** in a **securities lending** agreement based on equities and fixed income ETF shares with no **coverage** requires the coverage of **positions** from purchase **transactions** involving the underlying **assets** on the cash market. Suppose a long-maturity **position** within the early **settlement** period by the lender. The worst case scenario for **delivery** obligations in this case is when the lender registers a request for an early **settlement** on $T+1$. Such a request has the effect of generating a **delivery** obligation on $T+1+N$, where N takes value 1 for **securities lending** agreements on fixed income ETF shares and value 2 for **securities lending** agreements on equities to reflect the number of days in their respective **settlement** cycles. This obligation cannot be met, since a cash purchase can only be **executed** on $T+2$ (*minimum time for execution* of the closeout **transactions**) and, therefore, the **assets** can only be obtained on $T+2+N$. Analogously to other **delivery** obligations analyzed in this section, a **delivery failure** is generated. In the case of borrowing **positions**, it is worth noting that, whenever a **delivery failure** occurs, a value to be paid is entered, on the same day of the failure, to the debit of the barrower and to the credit of the lender, corresponding to the principal amount of the **assets** (estimated at closing price on the day preceding the failure). Thus, when simulating closeouts for risk calculation purposes, the new flow to be settled on the day of the failure is also estimated when a **delivery failure** occurs, pursuant to figures 7.49a and 7.49b.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

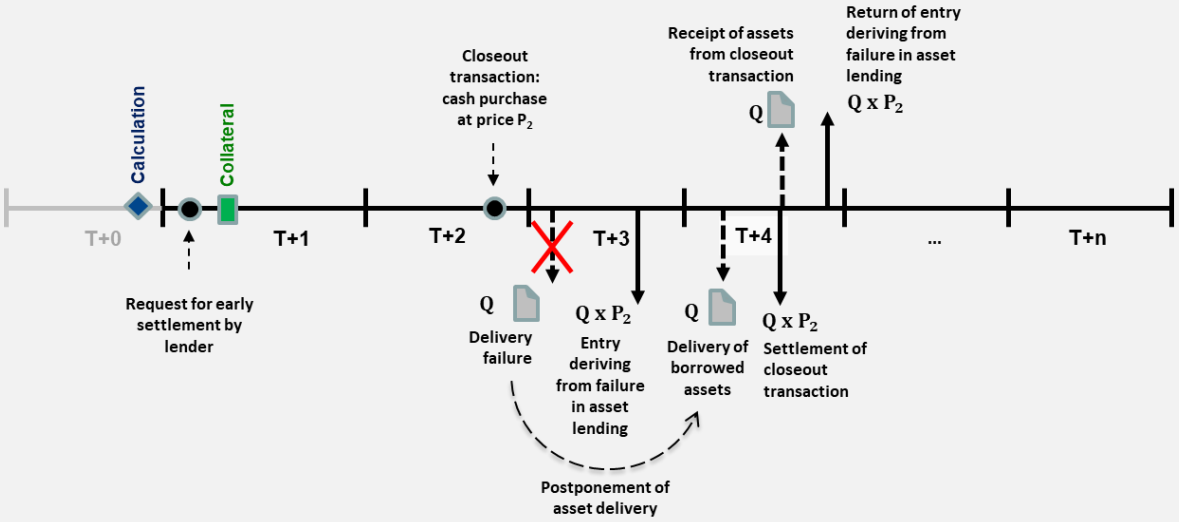


Figure 7.49a - Closeout of borrowing **positions** in **securities lending** agreements on equities with no **coverage** but with the possibility of being early settled by lender

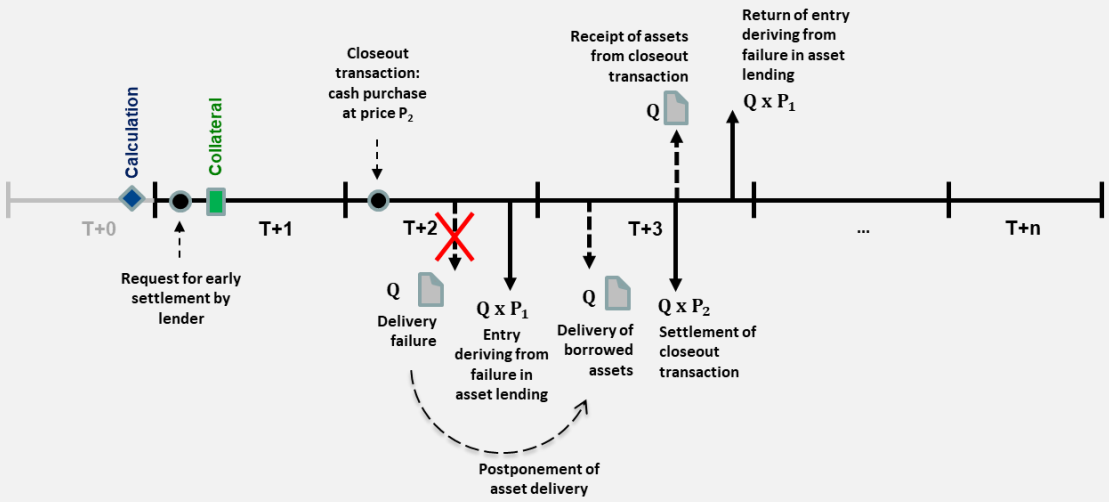


Figure 7.49b - Closeout of borrowing **positions** in **securities lending** agreements on fixed income ETF shares with no **coverage** but with the possibility of being early settled by lender

The model also assumes the possibility of **delivery** to be postponed. Similarly to the closeout of short cash **positions**, said assumption is valid because it presupposes that the **delivery failure** procedures will generate, in the case of **securities lending** agreements on equities, a failing **position** and, in the case of **securities lending** agreements on fixed income ETF shares, a buy-in **position** (for both the defaulting debtor **investor** and the creditor **investor**) which, when originated from the closeout of **positions** by **defaulter participants**, will follow the special procedures (according to which a new failing or buy-in **position** is generated daily for as long as the failure is not resolved, up to a certain deadline, as explained in paragraphs (b) and (c) of subsection 7.4.2.2 and described in chapter 3 (Managing a **delivery failure** along the closeout process of the **defaulter participant**'s **positions**) of this manual.

If the agreement is liable to be early settled by the lender, but is still within the grace period, the maturity date of the grace period is observed. When the grace period is within the range between T+1 and $T+n-N-1$, it is also worth considering that the worst case scenario for **delivery** is when the lender registers an early **settlement** request as soon as the grace period is over. So, a case similar to the one shown above is considered, but adjusting it to the **settlement** date of delivery ($N+1$ days after expiration of the grace period).

Assuming that the agreement underlying the borrowing **position** with no **coverage** of the previous example is close to maturity (maturing, for example, on $T+1$), the process is analogous to the ones illustrated in figures 7.49a and 7.49b, but in this case it is innocuous to suppose that the lender will register an early **settlement** request, as shown in figures 7.50a and 7.50b.

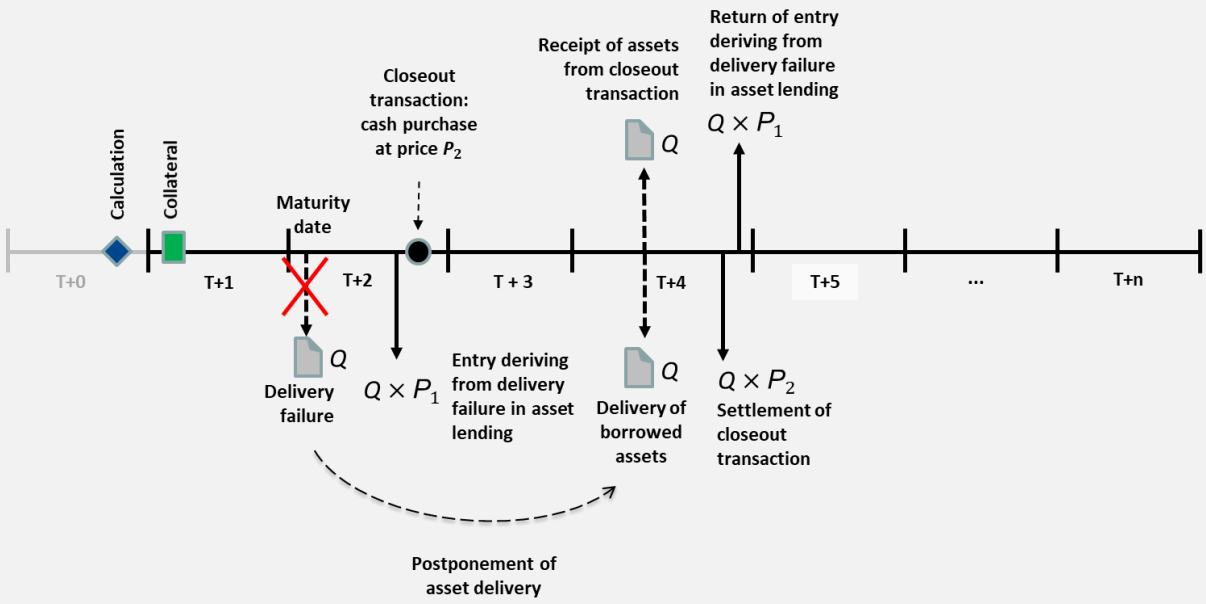


Figure 7.50a - Closeout of borrowing **positions** in **securities lending** agreements on equities with no **coverage** to be settled on $T+2$

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

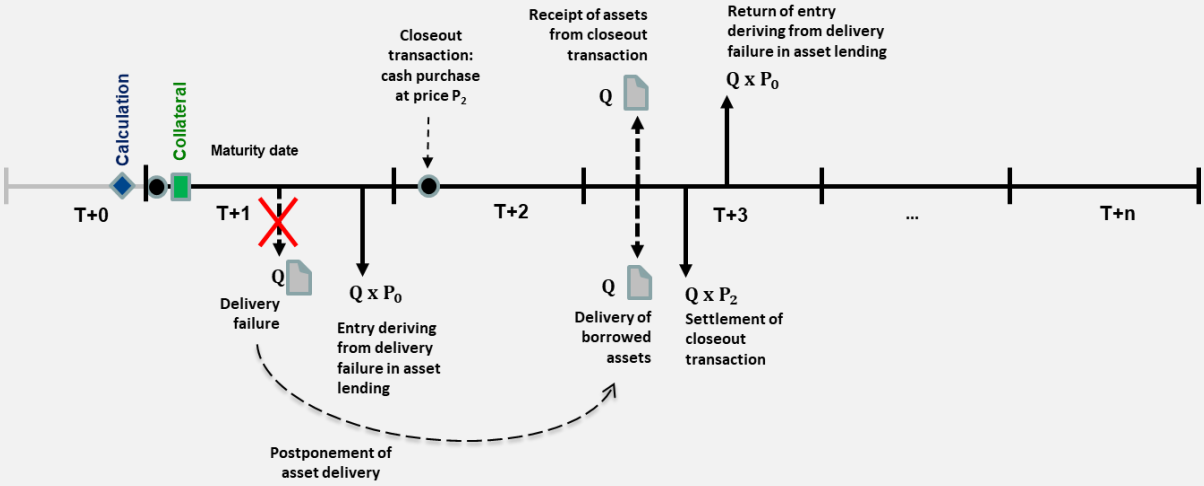


Figure 7.50b - Closeout of borrowing **positions** in **securities lending** agreements on fixed income ETF shares with no **coverage** to be settled on $T+1$

Suppose now borrowing **positions** with no **coverage**, maturing after $T+n$ and without possibility of being early settled by the lender before $T+n$. This case is also similar to the previous ones, which estimate the need for a closeout **transaction** by purchasing the underlying assets in the cash market for **delivery** as of $T+2$. Hence, for risk calculation purposes over the holding period, the **delivery** of **assets** is projected to $T+n$, as shown in the following diagram:

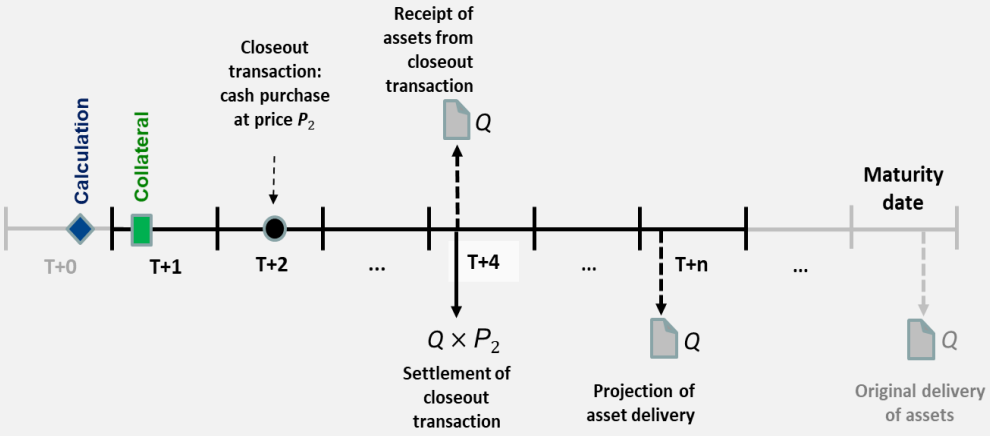


Figure 7.51a - Closeout of borrowing **positions** in **securities lending** agreements on equites with no **coverage**, maturing after $T+n$ and no possibility of being early settled by lender before $T+n$

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

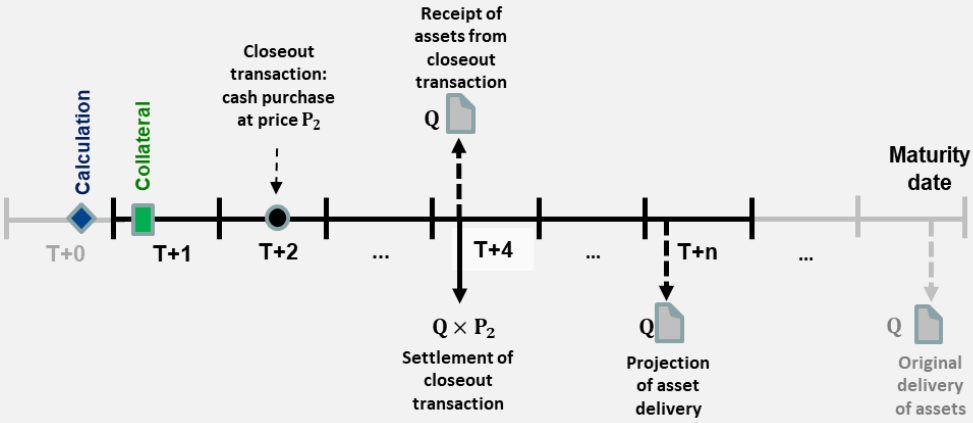


Figure 7.51b - Closeout of borrowing **positions** in **securities lending** agreements on fixed income ETF shares with no **coverage**, maturing after $T+n$ and no possibility of being early settled by lender before $T+n$

Under certain circumstances, lending **positions** in **securities lending** on equities may produce benefits to risk calculation and, consequently, save the amount of required **collateral**. In general, whenever the right to **assets** represented by the lending **position** can effectively support the closeout process over the holding period considered by the model, some benefit will result therefrom.

In the case of lending **positions** whose underlying asset is not accepted as **collateral**, for a benefit to apply the existence is required of other **positions** involving the same **asset** whose sum of **delivery** obligations (without **coverage**) exceeds the sum of receipt rights, regardless of the lending **positions**. The benefit thus generated will always be limited to the amount equivalent to this difference between obligations and rights.

However, lending **positions**, when so determined by the **participant** responsible for the **investor** or by the **clearinghouse**, through the definition of the **settlement** of the **securities lending** contract within the **subaccount** used for **asset** control purposes, shall not provide any benefit in the risk calculation.

Suppose a long-maturity lending **position** within the early **settlement** period by the lender. In this case, the early **settlement** request should be registered as of $T+2$ (when the implementation of closeout **transactions** begins) and the benefits provided by such right should be used. The early **settlement** request is supposed to having been registered in the afternoon of $T+2$, therefore to be settled on $T+N+3$ ($N+1$ days after the date of request). The closeout **transaction** consists of the sale of the **asset** in the cash market on $T+3$, so that the **settlement** thereof coincides with the **settlement** of the concerned lending **position**, as shown in figures 7.52a and 7.52b.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

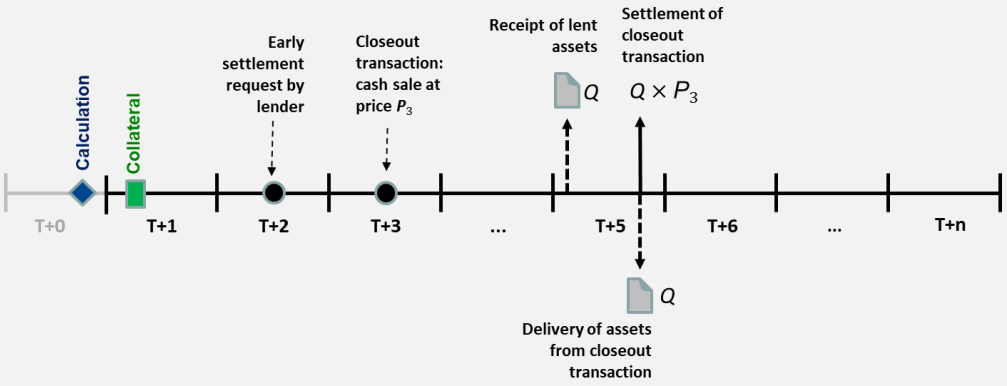


Figure 7.52a - Closeout of long-maturity lending **position** in **securities lending** agreements on equities (after T+5) within early **settlement** period by lender

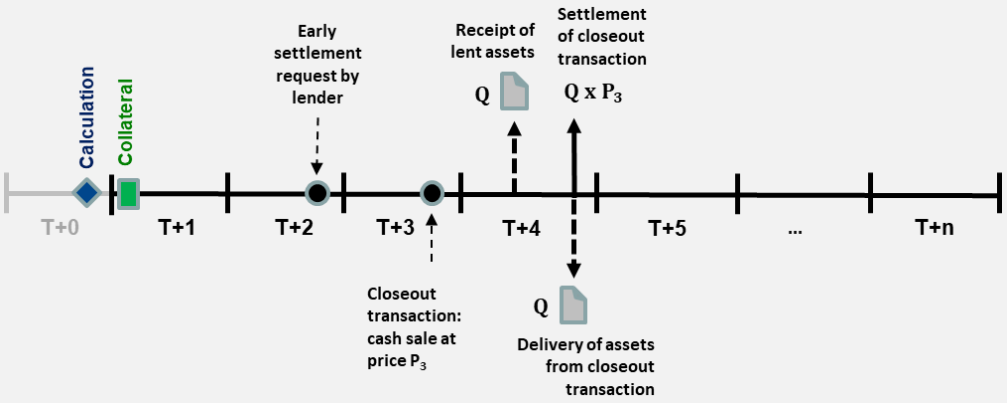


Figure 7.52b - Closeout of long-maturity lending **position** in **securities lending** agreements on fixed income ETF shares (after $T+4$) within early **settlement** period by lender

In the event the lending **position** is close to maturity, the **settlement** of the sale **transaction** of the **assets** in the cash market may not coincide with the **settlement** date of the lending **position**, as in the following example:

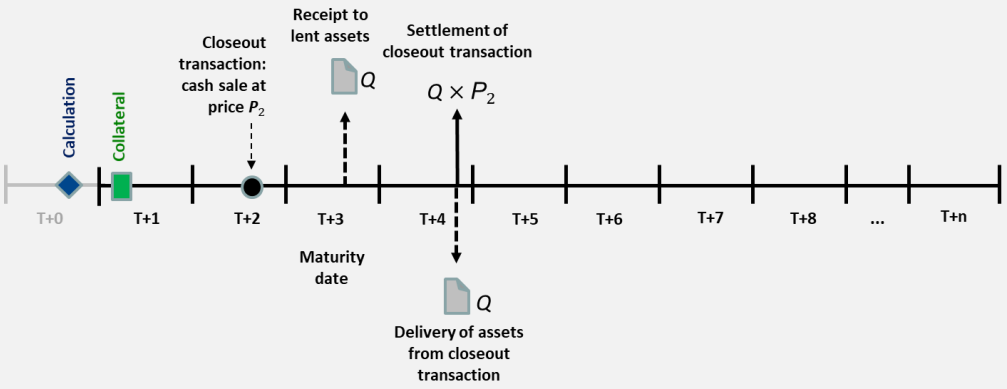


Figure 7.53 - Closeout of lending **position** in **securities lending** agreements on equities close to maturity (on T+2)

When the lending **position** is not subject to an early **settlement** and maturity is before $T+n$, a benefit is once again generated by the positive flow of the sale of the **assets** in the cash market (closeout **transaction**) executed N days before the maturity date, as illustrated in figure 7.54.

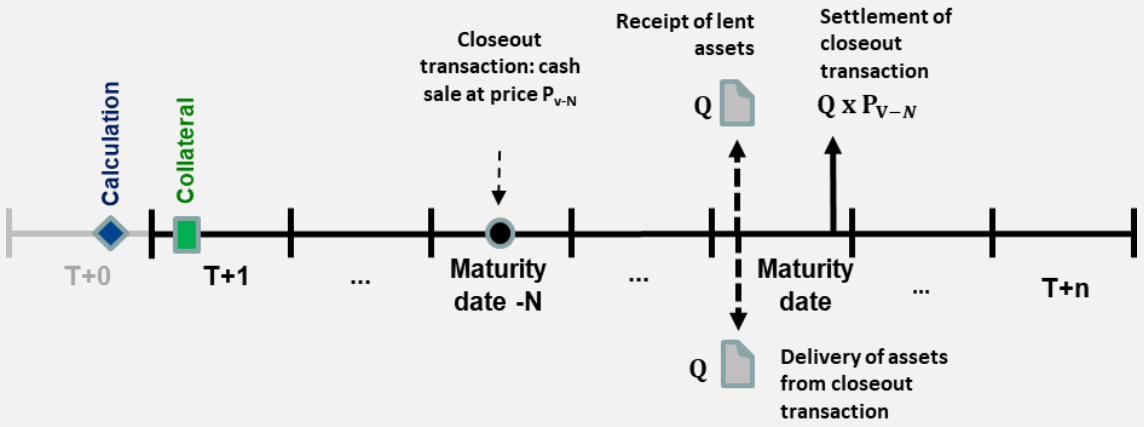


Figure 7.54 - Closeout of lending **position** in **securities lending** agreements on equities not liable to be settled until $T+n$

The cases of lending **positions** where the maturity of the underlying contracts occurs after $T+n$ and/or are liable to be early settled by the lender after $T+n-N-1$ are reviewed jointly with the borrowing **positions** without **coverage** also maturing after $T+n$ and/or liable to be early settled by the lender after $T+n-N$. The right to **assets** derived from the lending **position** on the expected **settlement** date thereof (either by early **settlement** by the lender or at maturity, whichever comes first) is assessed in order to determine whether or not it can be used in the performance of **delivery** obligations after that date, resulting from early **settlements** by the lender or from maturing borrowed **positions** (whichever comes first). In the example of figure 7.55, the receipt of lent **assets** occurs before the **delivery** obligation and thus it can be utilized, tending to alleviate the risk measures and save the amount of required **collateral**. Note that for full utilization lent quantities must be greater than or equal to borrowed quantities. Otherwise, a purchase **transaction** in the cash market will still be needed to cover the remaining borrowed quantity.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

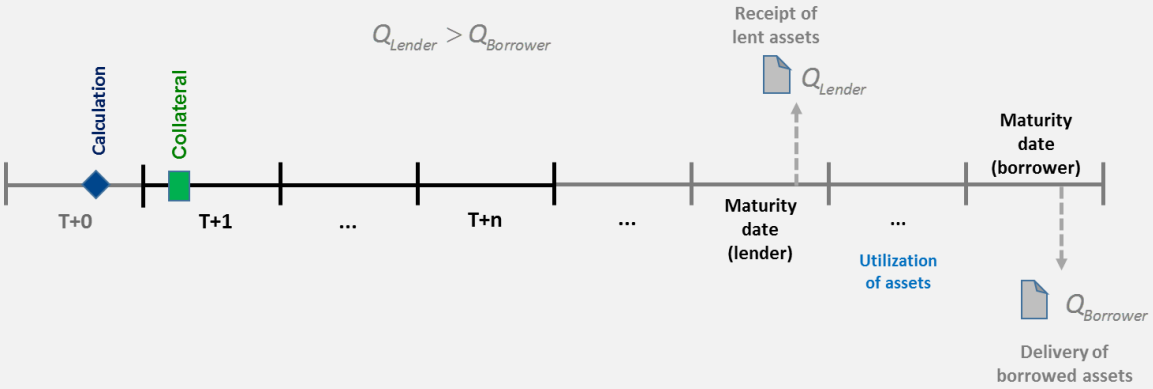


Figure 7.55 - Receipt of lent **assets** is utilized in later **delivery** obligation

In the example of figure 7.56, the **assets** can no longer be utilized, given that the receipt thereof occurs after the **delivery** obligation.

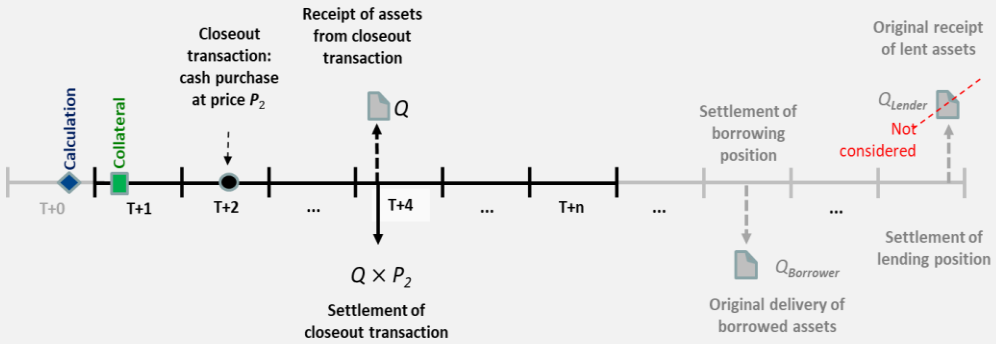


Figure 7.56 - Receipt of lent **assets** cannot be utilized in later **delivery** obligation; therefore, closeout process presupposes managing borrowing **position** and ignoring lending **position**

In case of incidence of **corporate event** in financial resources related to the **underlying asset** of the borrower **position** in **asset lending**, the corresponding financial flow will be represented in the closure process by a debit, the date closest to the date of payment of the **corporate event** by the **issuer** and D+T.

(d) Closeout of securities lending positions in equities in broker-dealer accounts

For broker-dealer **accounts**, the closeout of borrowing and lending **positions** in **securities lending** agreements on the same equities and at the same amounts is performed by the procedure of taking a contractual position, as described in the **clearinghouse** operating procedures manual. In order to reflect this different closeout procedure on risk calculation, the model disregards the possibility of the lender requesting early **settlement** for any borrowing **position**, so that no mismatch between **asset** flows occurs, as shown in figure 7.57.

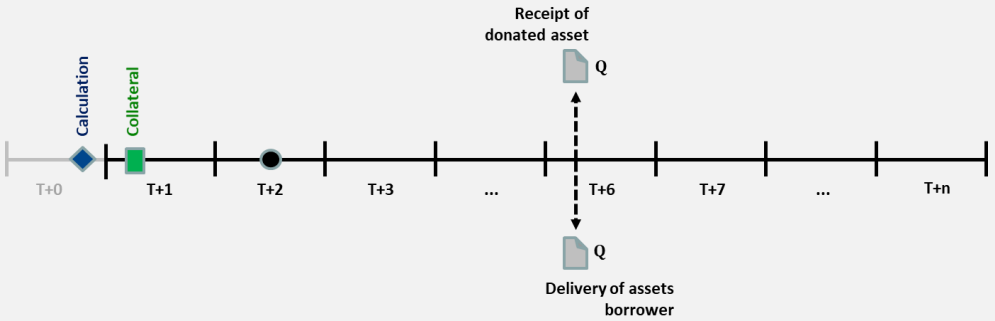


Figure 7.57 - Closeout of borrowing and lending **positions** in **securities lending** agreements on the same equities for **portfolio** in broker-dealer **account**, where the assumption of early **settlement** for borrowing **position** by lender is not adopted

(e) Closeout of securities lending positions in government debt

The closeout of a borrowing **position** in a **securities lending** agreement based on government debt with no **coverage** requires the purchase of **assets** to cover the **position**. In general, the worst case scenario for **delivery** obligations is when the lender registers a request for an early **settlement** on $T + 1$. Such a request has the effect of generating for the borrower a **delivery** obligation on $T + 5$. Purchases to close out the **position** are carried out as of $T + 2$ with **settlement** starting from $T + 3$, as shown in figure 7.58.

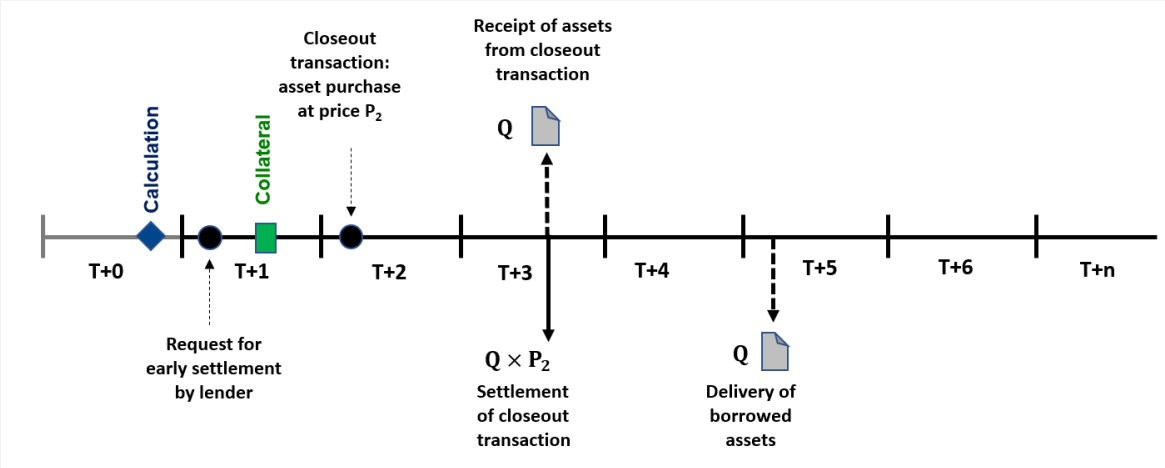


Figure 7.58 - Closeout of borrowing **position** in **securities lending** agreements on government debt with no **coverage** but with the possibility of being early settled by lender

The model assumes the possibility of postponing **delivery** if the **settlement** of the closeout **transaction** does not occur in its entirety before the date of the **delivery** obligation, by using the special **delivery failure** management process of **assets** in the **government bond market**, as explained in chapter 3 (Managing a **delivery failure** along the closeout process of the

defaulter participant's **positions**) of this manual. In this case, a buy-in is generated and the principal amount of the **assets** is debited to the **multilateral net balance**, as illustrated in figure 7.59.

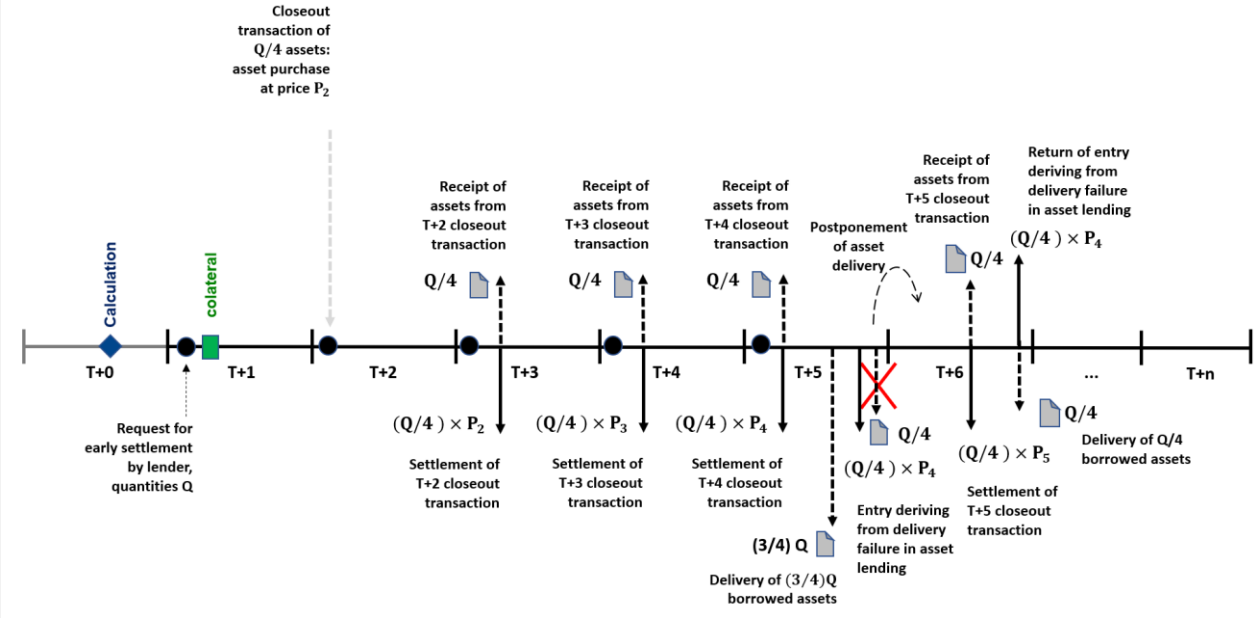
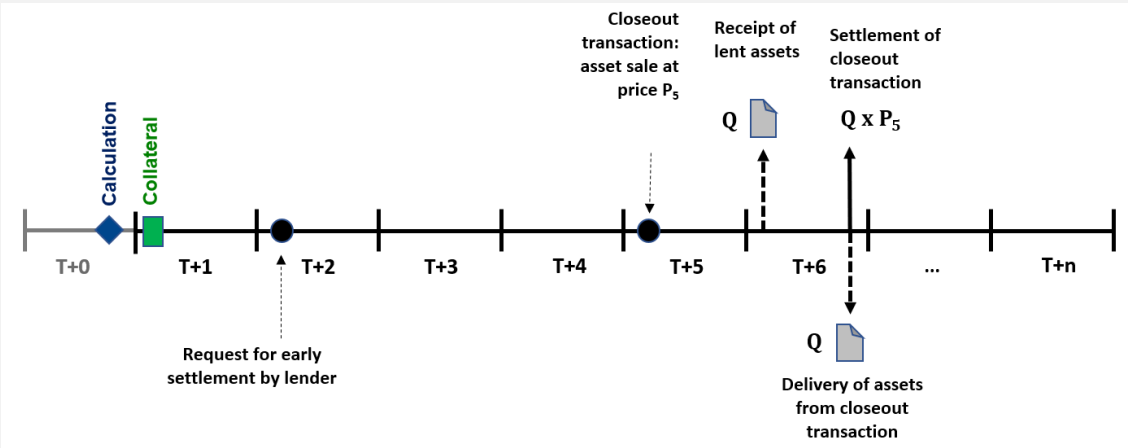


Figure 7.59 - Closeout of borrowing **position** in **securities lending** agreement on government debt with no **coverage** but with the possibility of being early settled by lender and with **delivery failure**, at a quantity greater than *daily liquidity limit*

In general, the closeout of a lending **position** in a **securities lending** agreement on government debt involves a possible early **settlement** request by the lender on $T+2$, with the receipt of **assets** on $T+6$. The sales that make up the closeout **transactions** occur as of $T+5$ as laid out in figure 7.60.



INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Figure 7.60 - Closeout of lending **position** in long-maturity (after $T+6$) **securities lending** agreement on government debt within early settlement period by lender

Grace dates are considered in the event of an early **settlement** request registration. The model also considers the use of **assets** derived from the **settlement** of receipt rights associated with lending **positions** in order to meet **delivery** obligations to be settled after the end of the holding period, as long as such **assets** are received before the **settlement** of the **delivery** obligation.

(f) Closeout of repo positions in government debt

The closeout of **positions** in government debt repos implies the early **settlement** of the agreement involving the **repo transaction** to be closed out, regardless of the parameters defined upon contracting. In general, the closeout of the repurchase **position** (belonging to the original securities seller) considers that an early **settlement** request is submitted on $T+2$, for **settlement** on $T+6$. Sales to close out the **position** are carried out from $T+5$ with their respective **settlements** taking place as of $T+6$, as presented in figure 7.61.

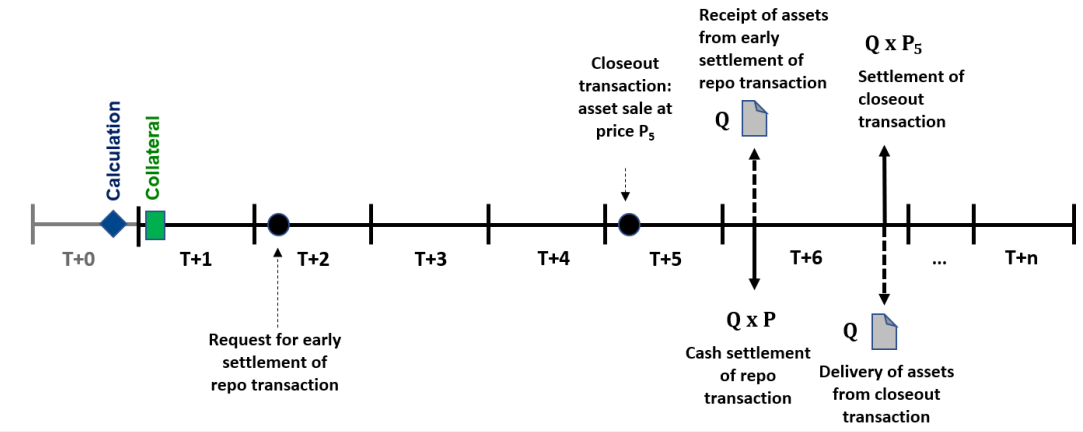


Figure 7.61 - Closeout of **position** in long-maturity (after $T+6$) repo

In general, the closeout of the reverse repo **position** (belonging to the original securities buyer) with no **coverage** presupposes that an early **settlement** request is submitted on $T+2$, generating a **delivery** obligation for $T+6$. The purpose of the closeout **transaction** is to reduce market risk as quickly as possible, thus generating purchases from $T+2$ with their respective **settlements** taking place as of $T+3$, as presented in figure 7.62.

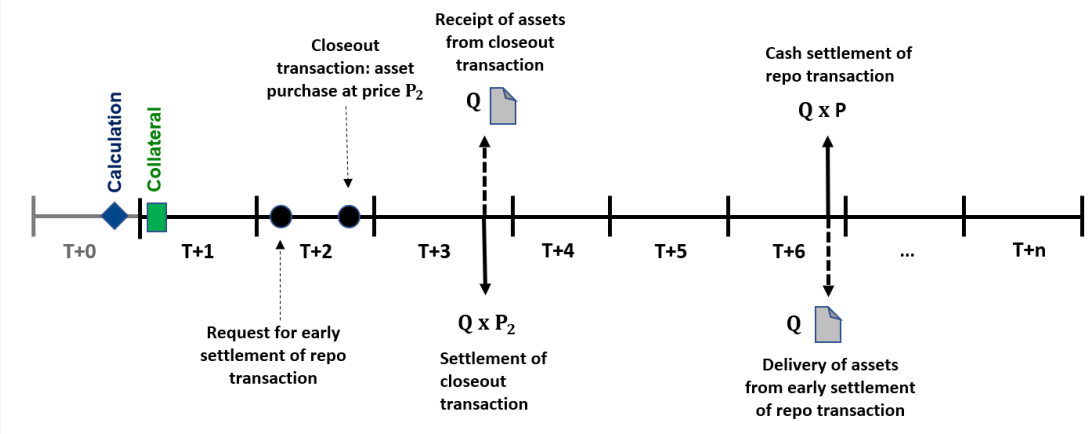


Figure 7.62 - Closeout of **position** in uncovered long-maturity (after $T+6$) reverse repo

The model presumes the possibility of postponing **delivery** if the **settlement** of the closeout **transaction** does not occur in its entirety before the date of the **delivery** obligation, by using the special **delivery failure** management process of **assets** in the **government bond market**, as explained in chapter 3 (Managing a **delivery failure** along the closeout process of the **defaulter participant**'s **positions**) of this manual.

Covered reverse repos are not considered by the CORE methodology.

7.4.2.5 Collateral closeout

Collateral closeout generates positive cash flows throughout the holding period. **Collateral** made up of **assets** may require closeout **transactions** for the **assets**' sale. As a consequence, such **transactions** are also subject to the parameters of *minimum time for execution* and *daily liquidity limit*, as shown in figure 7.63.

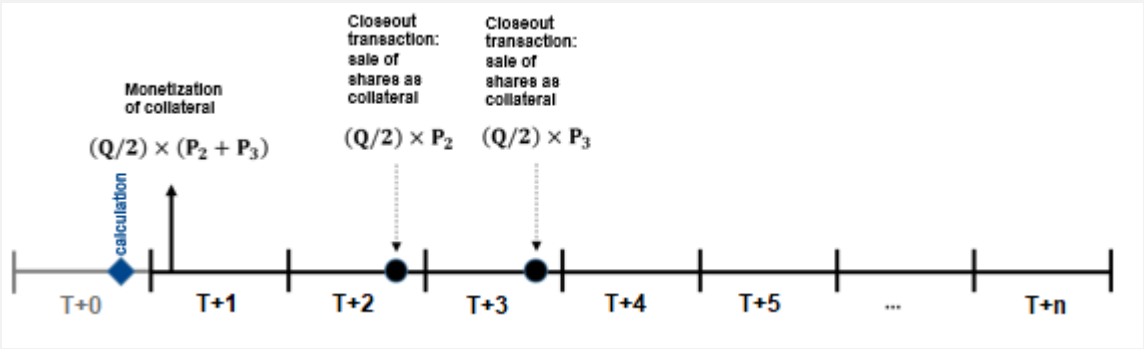


Figure 7.63 - Closeout of **collateral** with an amount greater than the daily liquidity limit

The positive cash flows are generated upon **settlement** of those **transactions**. When liquidity assistance facilities and other resources that facilitate the monetization of **collateral** are employed, the positive cash flows thereof will be entered on the first day of the holding period.

However, as described in subsection 6.3.5, the monetization of illiquid **collateral** may imply the use of limited amount liquidity assistance facilities. The representation of this limit on the closeout of illiquid **collateral** cash flow is a negative cash flow, also allocated on the first day of the closeout period, which refers to the excess of the sum of illiquid **collateral** cash flow in relation to this limit, as shown in figure 7.64.

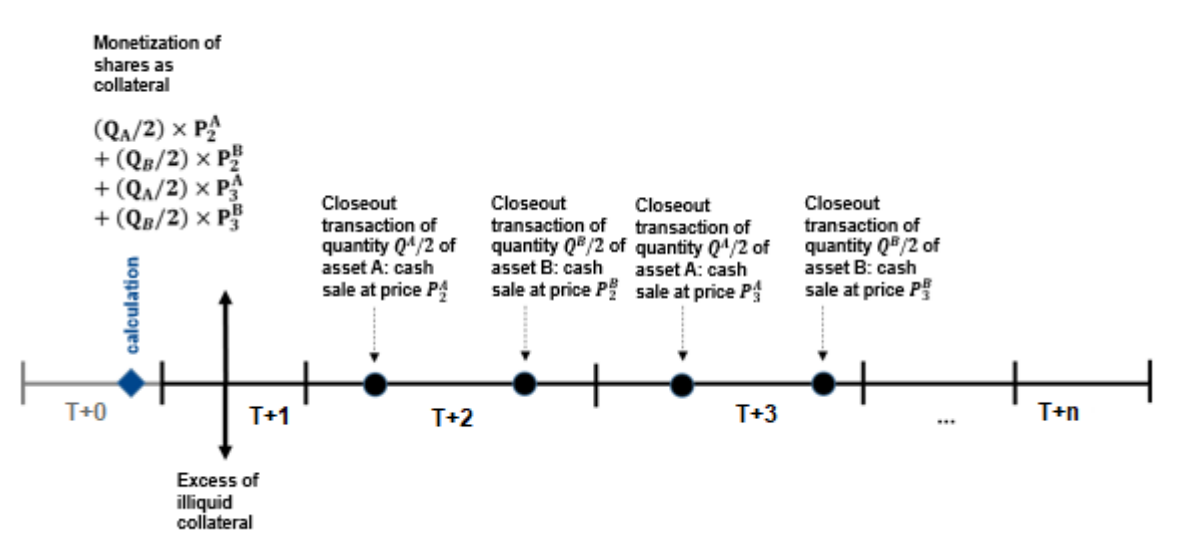


Figure 7.64 - Closeout of illiquid **collateral** (assets A and B), assuming that the sum of the corresponding financial value exceeds the liquidity assistance facilities limit, and that the quantity exceeds the respective *daily liquidity limits*.

When the closeout of **collateral** and **positions,** whose closeout **transactions** are the cash sale of a given **asset**, are carried out at the same time, the *daily liquidity limit* of the asset applies jointly until *T+n*, i.e. the sum of the quantities of the closeout **transactions** on the same day cannot exceed this limit. In this case, the **collateral** closeout is prioritized, as shown in figure 7.65. The figure shows the closeouts of a **collateral** and a cash purchase **position**, both on the same **asset**, with the sum of the quantities (both Q/2) equivalent to twice the *daily liquidity limit*.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

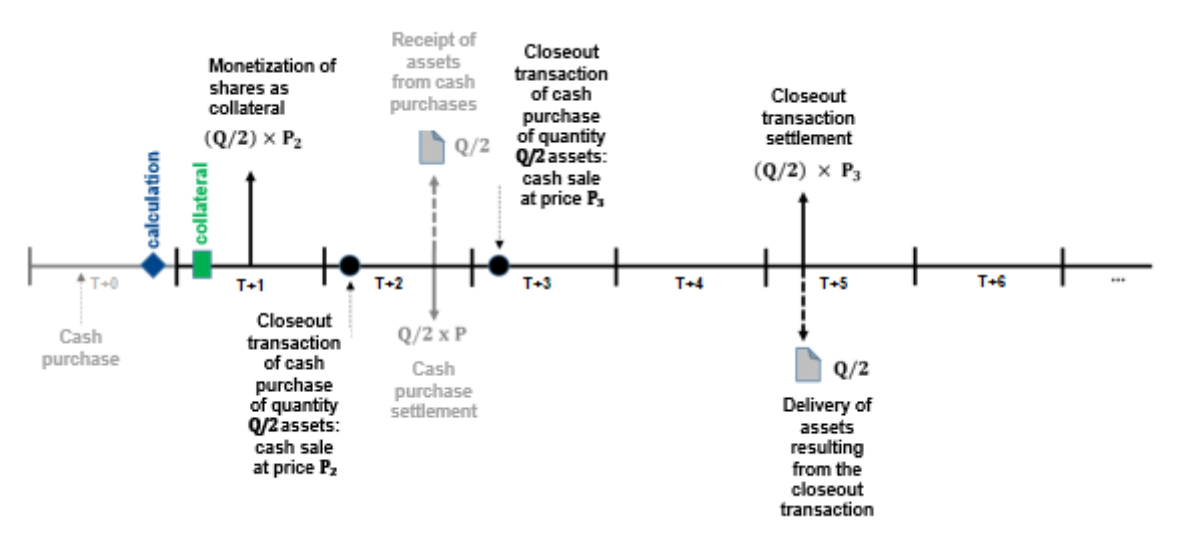


Figure 7.65 – Closeout of **collateral** and long **position** on the spot market on the same **asset**, with the total quantity to be closed out higher than the **asset**'s *daily liquidity limit*

7.4.2.6 Cash market positions combined with securities lending agreement and derivative contract positions with cash settlement or delivery of assets and deposited collateral

(a) Portfolio containing positions whose settlements involve the same underlying asset

For a **portfolio** of **positions** whose settlements involve the same underlying **asset**, the methodology considers the possible utilization of both rights to and obligations on said **asset** before defining the required "closeout **transactions**," as in the example that follows.

Example:

Suppose a **portfolio** containing the following **positions**, all in the same **asset** traded in the **equities market** accepted as **collateral**:

Settlement date	Positions and collateral	Quantity	Price
$T+1$	Lending **position** not subject to early **settlement**	31,000	
$T+1$	Cash sale no **coverage**	18,200	BRL12.80
$T+2$	Cash purchase	18,000	BRL15.63
$T+14$	Forward purchase	15,200	R$ 13.70
$T+15$	Borrowing **position** subject to early **settlement**	19,000	
$T+161$	Lending **position** not subject to early **settlement**	12,000	

Positions are first reviewed in connection with **asset deliveries** and receipts deriving therefrom.

The maturity of the lending **position** on $T+1$ gives right to 31,000 **assets** on that date:

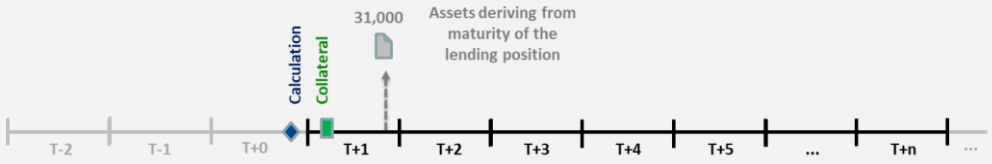


Figure 7.66 - Projection of receipt of **assets** in connection with maturity of lending **position**, according to example

The cash sale presupposes a **delivery** obligation of 18,200 **assets** on $T+1$:

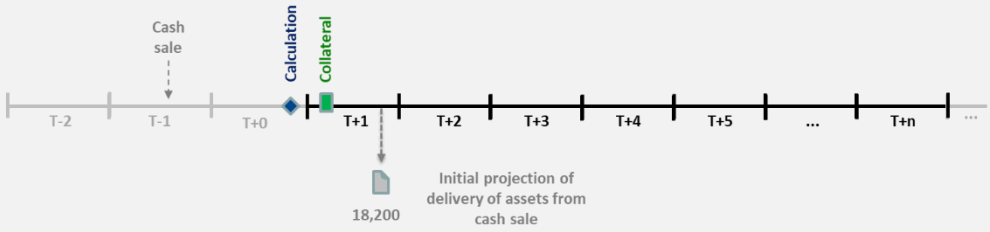


Figure 7.67 - Projection of **delivery** of **assets** in connection with cash sale, according to example

The cash purchase assumes a right to receive 18,000 **assets** on $T+2$:

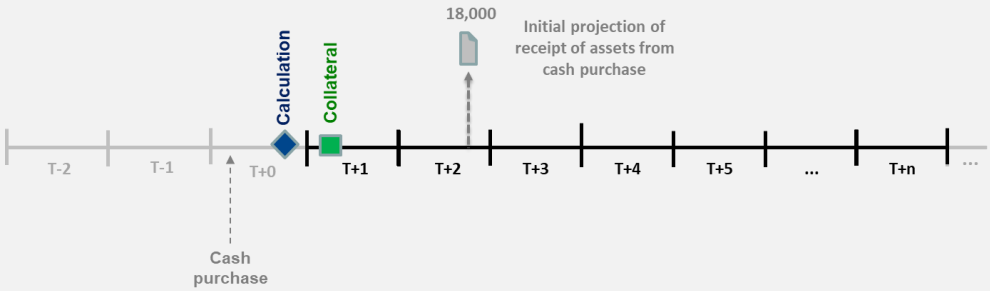


Figure 7.68 - Projection of receipt of **assets** in connection with cash purchase, according to example

The forward purchase allows for an early **settlement** request to be registered on $T+4$, when 15,200 **assets** will be received.

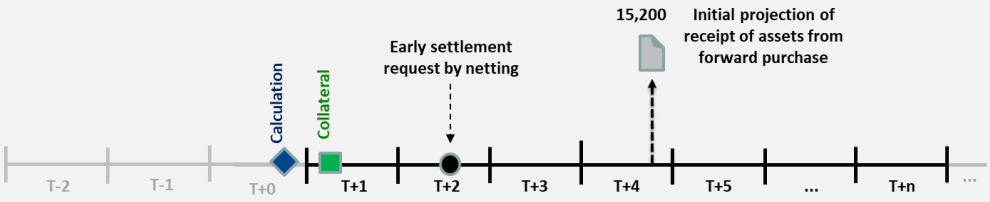


Figure 7.69 - Projection of receipt of **assets** in connection with early **settlement** of forward purchase, according to example

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The borrowing **position** in the **securities lending** agreement is within the early **settlement** period by the lender. As a precaution, the lender is supposed to register the early **settlement** request before 9:30 AM on $T+1$, generating a **delivery** obligation of the **assets** by the borrower on $T+3$, as shown in figure 7.70.

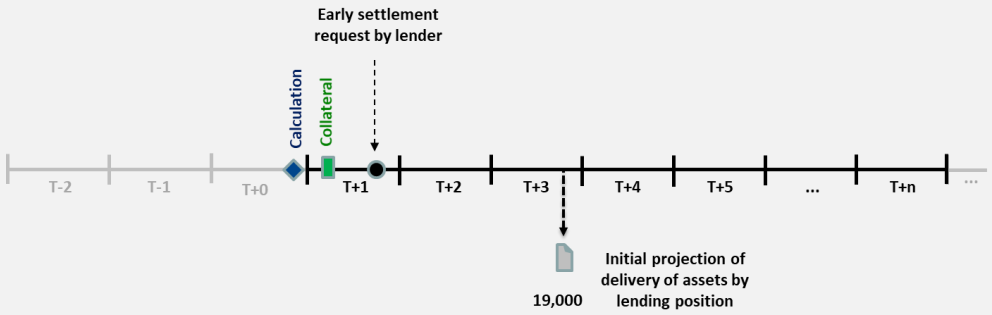


Figure 7.70 - Projection of **delivery** of **assets** by borrower in connection with early **settlement** request by lender, according to example

The lending **position** in **securities lending** refers to an agreement not subject to early **settlement**. The **position** corresponds to a right to **assets**, but, as there are no **delivery** obligations after the agreement expires, such right does not help the fulfillment of other obligations. As the **lending** agreement is long-termed, the **assets** cannot be sold during the holding period either, in time to support the performance of other financial obligations. Hence, in this case the right to **assets** resulting from the lending **position** is not considered for risk calculation purposes.

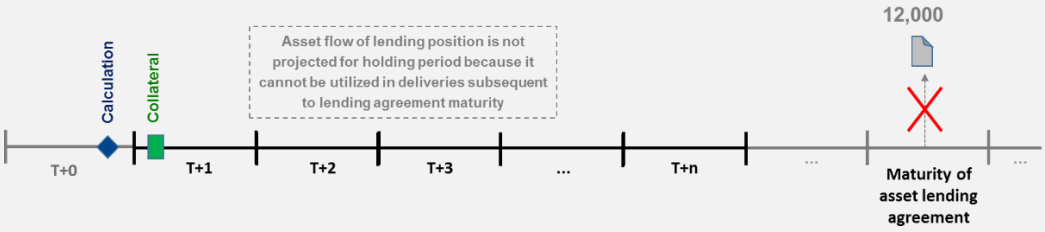


Figure 7.71 - Receipt of **assets** by lender outside of holding period, according to example

The methodology considers the projected **asset** flow resulting from the combination of **positions**, all of which are based on the same **asset**, as shown in figure 7.72.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

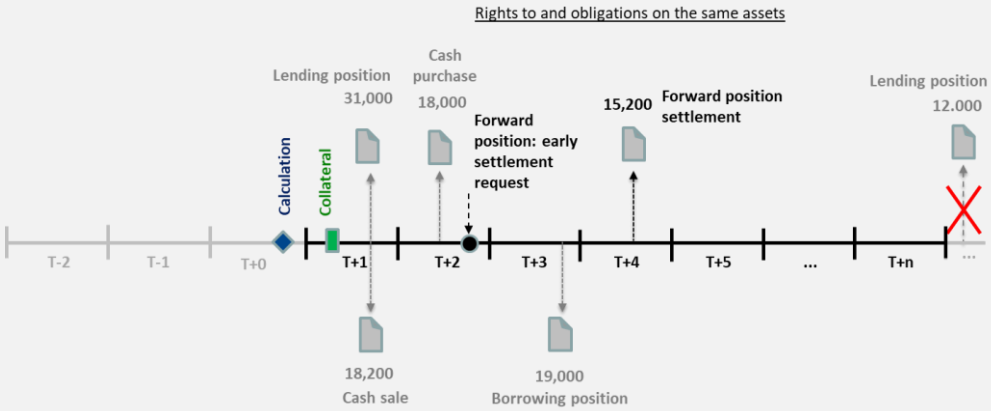


Figure 7.72 - **Asset** flow projection given by combination of **position settlements**, according to example

Note that there is a cumulative positive balance of 27,000 **assets**. Thus, the closeout **transaction** corresponds to a sale **transaction** of 27,000 **assets** in the cash market, aiming to zero the observed surplus of **assets** by converting it into funds. After the **settlement** of this transaction, there is no further surplus of **assets**, as demonstrated in figure 7.73.

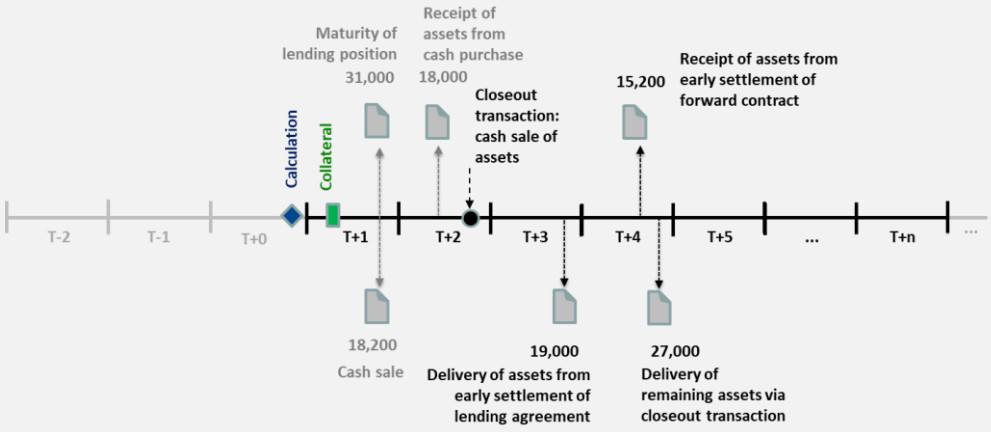


Figure 7.73 - **Asset** flow projection given by combination of **position settlements** with closeout **transaction**, according to example

After assessing the flow of assets and the definition of the closeout **transaction**, the methodology projects the resulting cash flows under each risk scenario. Assuming that the closeout **transaction** has been simulated at price P_2, or BRL9.02, on $T+2$ under a certain risk scenario, the cash flows are those given by figure 7.74.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

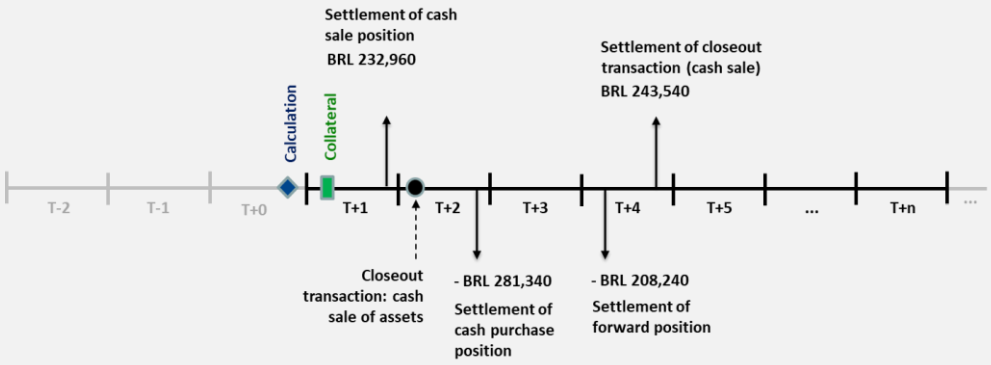


Figure 7.74 - **Asset** flow projection under risk scenario, according to example

From the cash flow resulting from each risk scenario, the CORE methodology proceeds as described in sections 7.5 and 7.6 for the calculation of both risk and required **collateral**. In this example, the cumulative cash flows are BRL232,960 (by $T+1$), –BRL48,380 (by $T+2$) and –BRL13,080 (as of $T+4$). Note that the worst cumulative cash need is –BRL48,380. When the liquidity resource is not available, that should be the related amount of required **collateral**. However, the amount recoverable by $T+4$ (BRL35,300) can be financed by the liquidity resource, if available. In this case, only the final cumulative loss of –BRL13,080 would be required as **collateral**. For more details on the application of the liquidity resource to the model, see section 7.6.

The previous example presented the methodology for determining the closeout strategy applied to sets of **positions** whose settlements involve **deliveries** or receipts of the same **asset** traded in the **equities market**. The methodology can be generalized as follows:

- Stage 1: Initial projection of rights to and obligations on **assets**

  At this stage, the **settlements** expected for each one of the **positions** is projected on the holding period.

- Stage 2: Closeout **transactions**

  At this stage, closeout **transactions** are defined based on the analysis of the cumulative balances of **assets** in the holding period, giving priority to avoiding **delivery failures**.

- Stage 3: Failures and flow displacements

  At this stage, the **delivery failures** generated in the holding period are identified and, therefore, the financial flows are postponed up to the date the **delivery** obligations are met.

Following the aforementioned stages, the closeout strategy is defined for each set of **positions** whose **settlements** involve **deliveries** or receipts of the same **asset**. Next, each stage is described in detail.

Stage 1: Initial projection of rights to and obligations on assets

This stage consists of an initial projection of the **settlement** of the **positions** submitted to the management of **asset** flows. It is noteworthy that the original **settlement** dates, as described below, are only considered as initial projections of **settlements**. In the next stage of the procedure, some of the **delivery** dates of the **assets** might be postponed due to the impossibility of being delivered.

The **positions** considered at this stage, along with **collateral**, are:

(i) Cash **positions**, **positions** related to option exercises, **positions** related to the settlement of the securtities lending agreements generated by electronic trading and failing **positions**, except **positions** with **coverage**;

(ii) Forward **positions**:

- Short; and
- Long without **coverage** and maturing before $T+5$;

(iii) **Positions** in **securities lending**:

- Lending **positions** in equities or fixed income ETF shares within the period subject to early **settlement** by the lender, or expiring before or on $T+n$;
- Lending **positions** in equities or fixed income ETF shares where the receipt of **assets** can be used to meet obligations of borrowing **positions** without **coverage** in **securities lending** after $T+n$;
- Lending **positions** in government debt within the period subject to early **settlement** by the lender or expiring before or on $T+n$;
- Lending **positions** in government debt where the receipt of **assets** can be used to meet obligations of borrowing **positions** without **coverage** in **securities lending** after $T+n$;
- Borrowing **positions** in equities or fixed income ETF shares without **coverage** but with the possibility of being early settled by the lender
- Borrowing **positions** in equities or fixed income ETF shares without **coverage** and without the possibility of being early settled by the lender;
- Borrowing **positions** in government debt **assets** without **coverage** but with the possibility of being early settled by the lender; and
- Borrowing **positions** in government debt **assets** without **coverage** and without the possibility of being early settled by the lender.

(iv) **Positions** in government debt **repo transactions**

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

- Repurchase; and
- Reverse repurchase without **coverage**.

Each one of the aforesaid **positions** is projected as described below:

(i) Cash **positions**, **operations** related to option exercises, **operations** related to the settlement of the securtities lending agreement generated by electronic trading and failing **positions**, except **positions** with **coverage**

Settlement is projected to the expected **settlement** date.

The assignment of an average price to the total sum of long **positions** and an average price to the sum of the short **positions** on each **settlement** date allows for day-trade results to be accounted for in risk calculation. For the purposes of calculating these average prices, a zero price is considered for **operations** related to the **settlement** of the opening of the **securities lending** contract generated by electronic trading.The **settlement** of the remaining **positions** (that is, which were not netted on the same date) is projected based on the **positions**' net balances of **assets** and funds, calculated at the **positions**' totalized average price.

(ii) Forward **positions**

- Long **positions**

  Early **settlement** is estimated for $T+2$ of the date of request, and early **settlement** requests are registered on $T+2$, so that **settlement** occurs on $T+4$. Thus, **settlements** of **positions** with maturity dates later than or the same as (earlier than) $T+4$ are projected to $T+4$ (the maturity date of the very **positions**).

- Short **positions** without **coverage** with maturity dates earlier than or the same as $T+n$

  The initial **settlement** projection is the expected **settlement** on the maturity date of the contract.

(iii) **Positions** in **securities lending**

- Lending **positions** in equities or fixed income ETF shares within the period subject to early **settlement** by the lender or expiring before or on $T+n$.

  For the **positions** that may be early settled by the lender (grace period ending three days before $T+n$ in the case of equities, and grace period ending two days before $T+n$ in the case of fixed income ETF shares), the early **settlement** request by the lender is considered on the early **settlement** date (the later date between $T+2$ and

one day after the end date of the grace period), after 9:30 AM. The expected **settlement** date, in this case, will be T+3 for equities and $T+2$ for fixed income ETF shares. The model considers for that date the expected positive balance of **assets**.

The lending **positions** whose expiration date is earlier than or the same as three days before the early **settlement** date in the case of equities, and earlier than or the same as two days before the early **settlement** date in the case of fixed income ETF shares have their **settlements** projected to their respective expiration dates, by considering the expected positive balance of **assets**.

- Lending **positions** in equities or fixed income ETF shares where the receipt of **assets** can be utilized to meet obligations of borrowing **positions** without **coverage** after $T+n$

  For each lending **position** not accounted for in the previous item, the possible use of the positive balance of **assets** thereof to meet a later **delivery** obligation deriving from borrowing agreements is considered. If said use is possible, the **settlement** of the concerned agreement is projected to $T+n$, at the quantity required to fulfill the relevant obligation.

- Lending **positions** in government debt within the period subject to early **settlement** by the lender or expiring before or on $T+n$

  For the **positions** that may be early settled by the lender (grace period ending four days before $T+n$), the early **settlement** request by the lender is considered on the early **settlement** date (the later date between $T+2$ and one day after the end date of the grace period). **Settlement** will occur after four days. The model considers for that date the expected positive balance of **assets**.

  The lending **positions** whose expiration date is earlier than or the same as four days before the early **settlement** date have their **settlements** projected to their respective expiration dates, by considering the expected positive balance of **assets**.

- Lending **positions** in government debt where the receipt of **assets** can be utilized to meet obligations of borrowing **positions** without **coverage** in **securities lending** after $T+n$

  For each lending **position** not accounted for in the previous item, the possible use of the positive balance of **assets** thereof to meet a later **delivery** obligation deriving from borrowing agreements is considered. If said use is possible, the **settlement** of the concerned agreement is projected to $T+n$, at the quantity required to fulfill the relevant obligation.

- Borrowing **positions** in equities or fixed income ETF shares without **coverage** but with the possibility of being early settled by the lender

  For the **positions** that may be early settled by the lender, the early **settlement** request (by the lender) is considered on the early **settlement** date (the later date between $T+1$ and one day after the end date of the grace period), before 9:30 AM (worst case scenario). So, **settlement** will occur after two days in the case of equities, and after one day in the case of fixed income ETF shares. The **positions** expiring before the **settlement** date will have their **settlements** projected to their respective expiration dates or $T+n$, whichever in the earlier date.

  In both cases, the negative balances of **assets** to be settled are projected to two days after the early **settlement** date in the case of equities, and one day after the early **settlement** date in the case of fixed income ETF shares, or to the expiration date, or to $T+n$, whichever is the earlier date.

- Borrowing **positions** in government debt **assets** without **coverage** but with the possibility of being early settled by the lender

  For the **positions** that may be early settled by the lender, the early **settlement** request (by the lender) is considered on the early **settlement** date (the later date between $T+1$ and one day after the end date of the grace period). Hence, **settlement** will occur after four days. The **positions** expiring before the **settlement** date will have their **settlements** projected to their respective expiration dates or $T+n$, whichever is the earlier date.

- Borrowing **positions** in equities or fixed income ETF shares without **coverage** and without the possibility of being early settled by the lender

  Such **positions** will have an initial **settlement** projection to the expiration date or to $T+n$, whichever is the earlier date. Said projection will have a corresponding negative balance of **assets**.

(iv) **Positions** in government debt **repo transactions**

- Repurchase **positions**

  Early **settlement** is estimated for four days after the date of request and early **settlement** requests are supposed to be registered on $T+2$, so that **settlement** occurs on $T+6$. Thus, **settlements** of **positions** with expiration dates later than or the same as (earlier than) $T+6$ are projected to $T+6$ (the expiration date of the very **positions**).

- Reverse repurchase **positions** without **coverage**

Early **settlement** is estimated for four days after the date of request and early **settlement** requests are supposed to be registered on $T+2$, so that **settlement** occurs on $T+6$. Thus, **settlements** of **positions** with expiration dates later than or the same as (earlier than) $T+6$ are projected to $T+6$ (the expiration date of the very **positions**).

Stage 2: Closeout transactions

Closeout **transactions** based on **asset** flows are determined by a procedure comprising five steps applied to each **asset**.

In order to meet all the pending obligations associated with **asset delivery** along the **portfolio** closeout process, pending rights may be used. If they are not enough, auxiliary closeout **transactions** may be required to obtain the **assets** needed. On the other hand, pending rights to **assets** can be converted into financial rights—through sale **transactions**—to support the financial obligations arising from other **positions**.

The closeout strategy is based on two principles:

Principle 1: Priority is given to avoiding **delivery failures**. To that end, the purchase of the **assets** required for pending or planned **deliveries** is anticipated as much as possible. The anticipation of purchases helps to reduce the exposure to uncertainty about future prices and market availability.

Principle 2: Provided *Principle 1* is met, the sale of the remaining **assets** can be carried out—that is, **assets** that no longer support the performance of future obligations—so that the results thereof can support the fulfillment of financial obligations. Such sales, which aim to reduce the exposure to uncertainty about future prices, are anticipated as much as possible.

The two principles lead to the following procedure on an **asset**-by-**asset basis**:

Step 1. Based on the initial projections of rights and obligations associated with each **asset**, as previously specified, calculate the cumulative **asset** balance projected to the holding period;

Step 2. Buy as early as possible an amount equal to the worst cumulative negative balance projected between the first possible **settlement** date of a purchase **transaction** and $T+n$;

Step 3. Recalculate the cumulative balance;

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Step 4. If there is a sequence of positive cumulative balances in the **asset** from a given date to $T+n$, sell a quantity equivalent to the smallest balance of said sequence, in order to prevent new **delivery** obligations from being generated;

Step 5. Repeat *Steps 3* and *4* until the remaining cumulative balance in the **asset** is null on $T+n$.

Note that the aforementioned procedure produces the minimum number of ancillary closeout **transactions** that are enough to zero the balances of **assets**, meaning that closeout does not generate unnecessary transactions, such as purchases and sales netting ones against the others.

Example:

Consider the following **portfolio**, with **positions** in the same underlying **asset** traded in the **equities market**:

Id	Position	Quantity	Settlement/Maturity
1	Lending **position** not subject to early **settlement**	5,000	$T+6$
2	Lending **position** not subject to early **settlement**	2,000	$T+8$
3	Cash sale	2,000	$T+2$

According to *Step 1*, the initial **settlement** projection for the **positions** in this **portfolio** is the following:

Id	T+1	T+2	T+3	T+4	T+5	T+6	T+7	T+8	T+9	T+10
1						5,000				
2								2,000		
3		-2,000								

Applying *Step 1* to that initial projection, the following cumulative balances along the holding period are:

	T+1	T+2	T+3	T+4	T+5	T+6	T+7	T+8	T+9	T+10
Cumulative balance	0	-2,000	-2,000	-2,000	-2,000	3,000	3,000	5,000	5,000	5,000

Under *Step 2*, a purchase of 2,000 units of the concerned **asset** is executed on $T+2$. The **settlement** of said purchase occurs on $T+4$, resulting in the following cumulative balances, according to *Step 3*:

	T+1	T+2	T+3	T+4	T+5	T+6	T+7	T+8	T+9	T+10
Cumulative balance	0	-2,000	-2,000	0	0	5,000	5,000	7,000	7,000	7,000

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The new cumulative balances show a sequence of positive balances as of $T+6$. Under *Step 4*, a sale of 5,000 units of the same **asset** is executed on $T+4$, with **settlement** on $T+6$, resulting in the following cumulative balances:

	T+1	T+2	T+3	T+4	T+5	T+6	T+7	T+8	T+9	T+10
Cumulative balance	0	-2,000	-2,000	2,000	0	0	0	2,000	2,000	2,000

As the cumulative balances still show a sequence of positive balances, under *Step 5* the procedure is repeated from *Step 3*. Again, following *Step 4* a sale of 2,000 units of the same **asset** is executed on $T+6$, with **settlement** on $T+8$, resulting in the following cumulative balances:

	T+1	T+2	T+3	T+4	T+5	T+6	T+7	T+8	T+9	T+10
Cumulative balance	0	-2,000	-2,000	-2,000	0	0	0	0	0	0

The procedure then comes to an end, since the cumulative balance is null on $T+n$ (in this case, $T+10$).

Stage 3: Delivery failures and flow displacements

Given that closeout **transactions** sometimes are not settled in time to meet **delivery** obligations on **assets**, **delivery failures** may occur along the closeout process. The last stage of the methodology identifies such failures, postponing the corresponding **settlements**. Therefore, this stage sets the final projection for **settlements** to feasible dates.

In the previous example, a failure occurs on $T+2$ due to the fact that the **settlement** of the purchase transaction, executed in order to obtain the **asset**s, occurs only on $T+4$.

(b) Portfolio containing any types of assets, contracts and collateral

For a **portfolio** with **positions** of different types, the methodology first identifies the sets of **positions** whose **settlements** involve the same underlying **asset**, segregating such sets from the other **positions**. In a simple way, it can be said that the methodology distinguishes between two sets A and B of **positions** and **collateral**, defined as follows:

A: The set of **positions** where the definition of the closeout strategy is based on **asset** flow projections; and

B: The set of **positions** where the definition of the closure strategy is based on other criteria.

Set A of **positions** is closed out as described in paragraph (a) of this subsection 7.4.2.6. Set B of **positions** may be closed out in various ways. In the current version of the methodology, such

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

positions follow precisely the criteria for closing out individual **positions** described in the previous items, which include all types of **positions**.

In general, the methodology for determining the full closeout strategy for a **portfolio** and related **collateral** can be represented as follows:

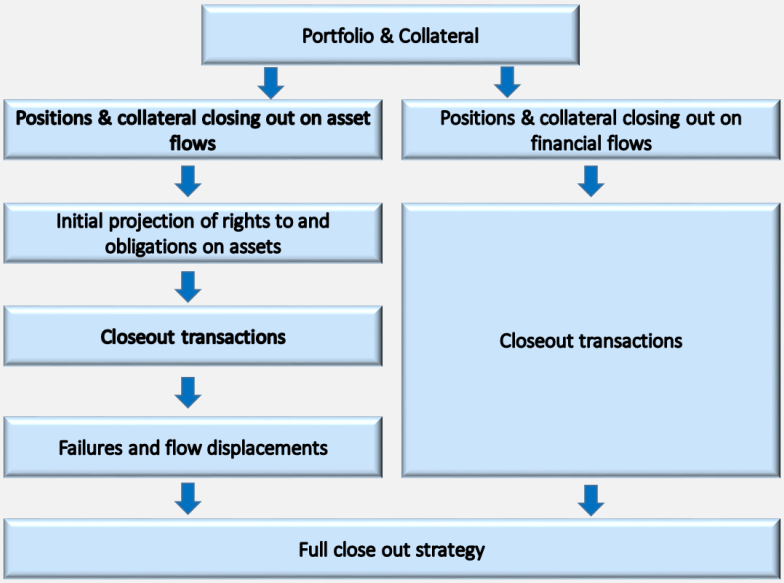


Figure 7.75 - Determining the full closeout strategy for the **portfolio** and related **collateral**

After determining the closeout strategy, the CORE methodology follows the course of the two subsequent stages, which evaluate the cash flows under risk scenarios and finally calculate the associated risk measures.

The following example illustrates the methodology applied to a generic **portfolio**, with different types of **positions**.

Example:

Consider the following **portfolio** and related **collateral**:

Settlement or maturity date	Position or collateral	Quantity	Details
$T+1$	Lending **position** in **assets** traded in **equities market** not subject to early **settlement**	31,000	
$T+1$	Cash sale in **equities market** no **coverage**	18,200	BR12.80
$T+2$	Cash purchase in **equities market**	18,000	BR15.63
$T+14$	Forward purchase	15,200	BR13.70

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Settlement or maturity date	Position or collateral	Quantity	Details
$T+15$	Borrowing **position** in **assets** traded in **equities market** subject to early **settlement**	19,000	
$T+161$	Lending **position** in **assets** traded in **equities market** not subject to early **settlement**	12,000	
$T+281$	**Collateral**: SELIC Treasury securities (LFTs)	20	
$T+107$	US dollar futures	-10	
$T+107$	US dollar options	10	Strike price: BRL3.40/USD
$T+107$	ID rate vs. USD spread swap	500,000	Long leg: 100% of CDI Short leg: US dollar

The first part of the **portfolio**, which includes the cash sale **position** without **coverage**, the cash purchase **position**, the forward purchase **position**, the borrowing **position** in **securities lending**, the lending **positions** in **securities lending**, all of which involving **asset** A traded in the **equities market**, is submitted to the methodology that manages **asset** flows. An example with an identical set of **positions** and **collateral** is detailed in subsection 7.4.2.6, under paragraph (a). The resulting cash flows under the risk scenario where price P_2 of **asset** A is worth BRL9.02 on $T+2$ were:

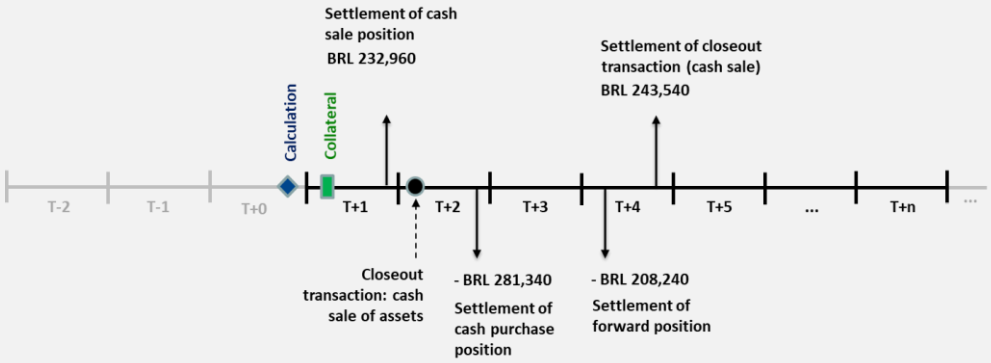


Figure 7.76 - Cash flows resulting from closeout of **positions** and **collateral** submitted to **asset** flow management, according to example, where **asset** A price P_2 equals BRL9.02 on $T+2$

The other **portfolio positions** and **collateral** follow specific procedures.

Collateral closeout is considered as of $T+2$. Assuming that the price of such bonds is BRL6,994.80 under the same risk scenario on which the previous example was based, the positive financial flow is BRL139,896 on $\boldsymbol{T+1}$:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

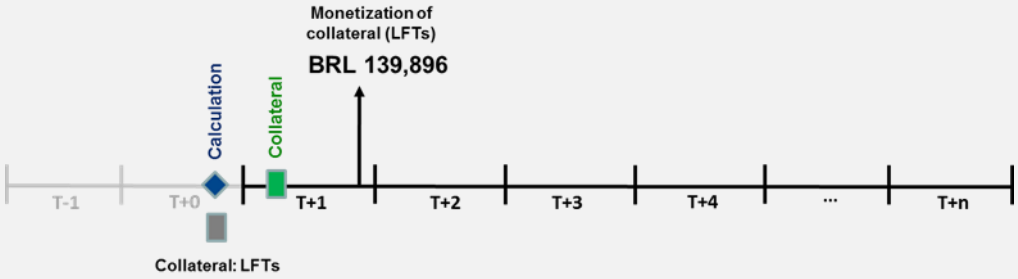


Figure 7.77 - Projection of the cash flow deriving from monetization of **collateral** made up of government bonds

The closeout of the US dollar futures **position** involves an offsetting **transaction** on $T+2$. Assuming that the variation margin was BRL109,651 and BRL113,009 on $T+1$ and $T+2$, respectively, under the same risk scenario, the **settlement** thereof is projected as shown in figure 7.78.

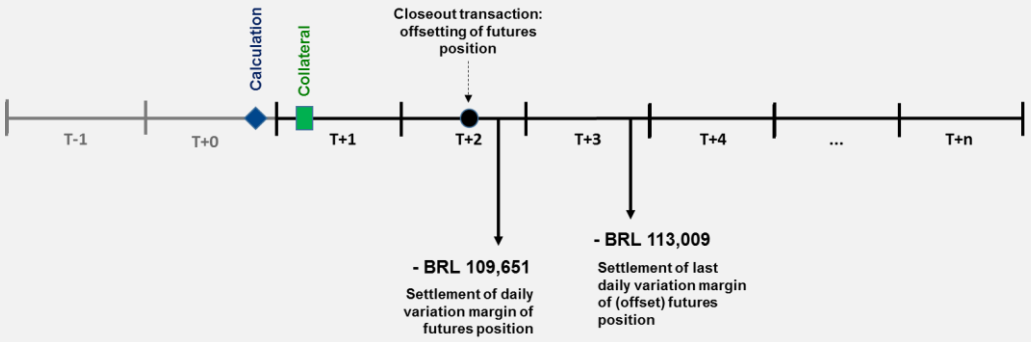


Figure 7.78 - Projection of variation margin **settlement** for US dollar futures **position**

The closeout of the US dollar option **position** also involves an offsetting **transaction** (options sale) on $T+5$, with the premium received being reflected on a positive cash flow on $T+6$. Under that specific risk scenario, suppose now that the total option premium was BRL124,610.

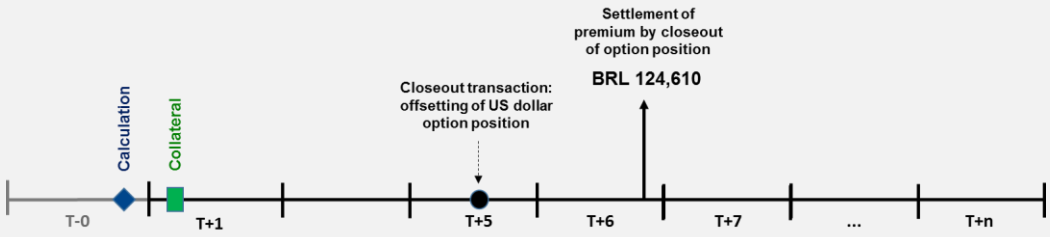


Figure 7.79 - Projections of premium to be received from options sale

The closeout of the swap contract **position** occurs via the transfer of ownership against the payment/receipt of the difference between the legs thereof assessed (MtM) under risk scenarios

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

on $T+n$. Assuming that the swap was valued at –BRL91,832 under the same risk scenario of the example, the swap **settlement** is projected as follows:

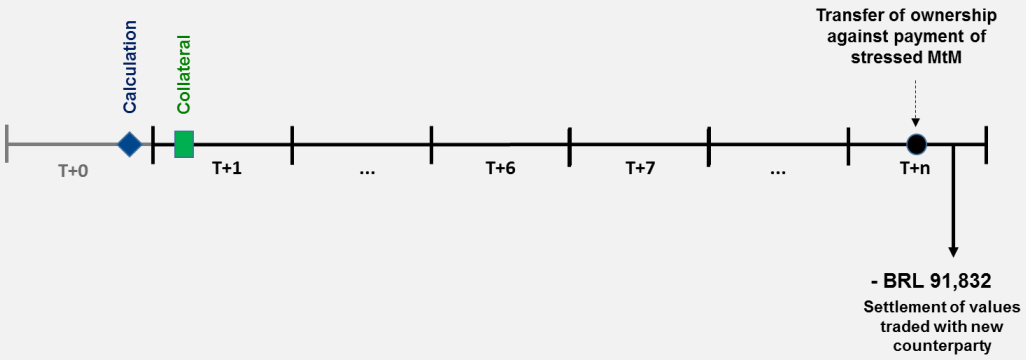


Figure 7.80 - Projection of swap **settlement** value

Under the risk scenario of the example, the cash flows deriving from the implementation of the closeout strategy for the **portfolio** and related **collateral** are thus projected:

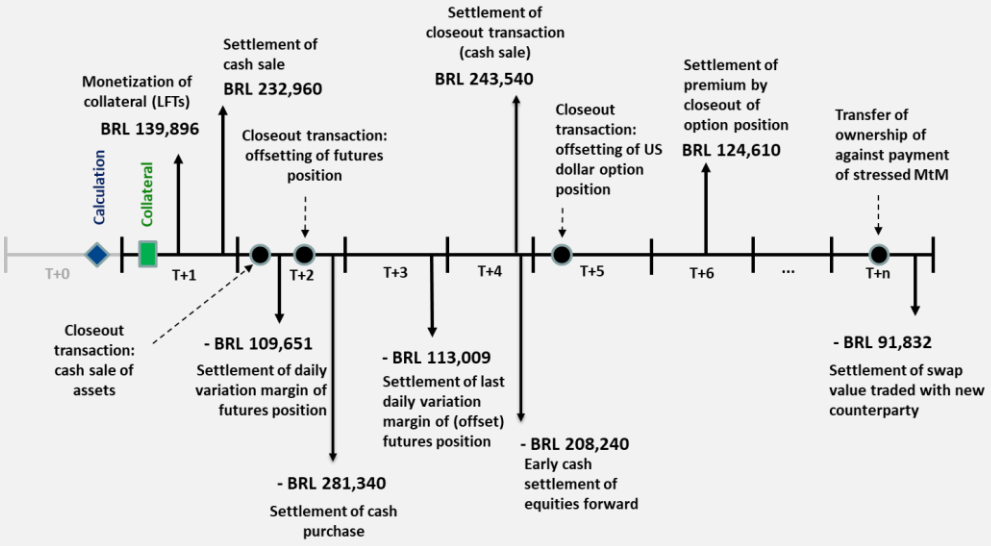


Figure 7.81 - Projection of cash flows deriving from implementation of closeout strategy for **portfolio** and related **collateral**

The resulting cumulative cash flows are:

+BRL372,856 up to $T+1$,

+BRL18,135 up to $T+2$,

–BRL131,144 up to $T+3$,

–BRL95,844 up to $T+5$,

+BRL28,766 up to $T+6$ and

–BRL63,066 up to $T+n$.

The greatest cumulative need for cash is –BRL131,144. Nevertheless, the model considers that it can be *partially* supplied with a temporary liquidity provision, deriving exclusively from the analysis of the flow resulting from the **positions** submitted to **asset** flow management (that is, from the analysis of figure 7.73). Risk calculation in this case requires the understanding of how liquidity resources are managed, as detailed in section 7.6.

7.4.2.7 Optimized closeout strategies

Optimized strategies are those that seek to minimize exposure to risk along the **portfolio** closeout process, seeking to preserve existing hedges or carry out hedging **transactions**, in accordance with the following guidelines:

(i) The selection of closeout **transactions** does not depend on the selection of the risk scenario under which the **portfolio** is to be closed out;

(ii) The strategy is defined for a given risk factor;

(iii) The strategy applies to the closeout of **positions** in a certain set of instruments and **assets** with relevant exposure to the risk factor referred to in (ii), which is selected as the main risk factor (MRF) for this set of instruments and **assets**;

(iv) The purpose of the selection of closeout **transactions** is to minimize **portfolio** exposure to the MRF, derived from **positions** in the instruments and **assets** defined in (iii), along the **portfolio** closeout process;

(v) The strategy may include immunization **transactions**, as defined in subsection 7.4.1, which can increase the number of instruments defined in (iii) in the **portfolio**, provided this increase leads to a reduction in the exposure of the set of instruments and **assets** defined in (iii) to the MRF;

(vi) Immunization **transactions** involve the purchase or sale of immunization instruments, meaning listed derivative contract instruments defined in (iii), as determined by B3;

(vii) Structured **transactions** can be carried out for purposes of reducing exposure to secondary risk factors, minimizing exposure mismatches due to **positions** maturities, or allowing for a faster closeout process on days approaching maturities of the contracts defined in (iii);

(viii) Structured rollover **transactions** in the instruments and **assets** defined in (iii) and approaching maturity may be included in the closeout strategy, according to the *rollover day* of each instrument, as defined in subsection 7.4.1;

(ix) Closeout and immunization **transactions** must comply with the parameters of each instrument and structured **transaction**, as defined in subsection 7.4.1; and

(x) The closeout of **portfolio positions** must take place as quickly as possible.

Optimized closeout strategies are exclusively used in risk calculation of **positions** allocated and under the collateralization mode by **investors** (module CORE0). Optimized strategies may need temporary liquidity due to the MRF exposure minimization throughout **portfolio** closure process, as described in 7.6 section. Therefore, **positions** for which the closure strategy is optimized may become eligible for liquidity provision. The instruments to which the optimized closeout strategy applies and the main related risk factors, as well as the immunization instruments, structured **transactions**, structured rollover **transactions**, the instrument groups eligible for liquidity provision when their closure strategy is optimized and their respective parameters, are listed on the risk model parameter table, available on the B3 website (www.b3.com.br).

Given the guidelines above, the closeout **transactions** that will make up an optimized strategy are defined using the procedure described below.

A. The main risk factor (MRF) and the group of instruments and **assets** with relevant exposure to this MRF are defined.

B. The optimized closeout strategy is established for the set of **positions** in the instruments and **assets** defined in A, by determining the **operations** to be taken each day of the holding period, based on the *minimum time for execution* of each instrument or **asset**, up to the day prior to the maximum date in the holding period, as follows:

   (i) Identify the instruments that will be used in immunization **transactions**, structured **transactions** and structured rollover **transactions**;

   (ii) Assess the need to adopt an optimized closeout strategy, based on the number of days required to close out the set of remaining **positions**. If all the **positions** are apt to be closed out on the current day of the holding period, there is no need to adopt an optimized closeout strategy and the procedure is completed. Otherwise, the next steps apply;

   (iii) Calculate the long and short exposures to the MRF of the set of **positions** in the instruments and **assets** defined in A. The exposure of a **position** is calculated by multiplying the quantity of the instrument or **asset** by its unit exposure. Unit exposure is the rate of change in the risk of a unit of the instrument or **asset** resulting from an infinitesimal change in the value of the MRF (derivative);

   (iv) Calculate the total exposure apt to be reduced on the day, through closeout **transactions**, subject to the *daily liquidity limits* of the instruments and **assets** defined in A;

   (v) Calculate the total directional exposure to the MRF of the set of **positions** in the instruments and **assets** defined in A;

(vi) Reduce the maximum possible directional exposure to the MRF through closeout **transactions**, subject to the *daily liquidity limit* of each instrument and **asset** defined in A;

(vii) Immunize the largest possible residual directional exposure through an immunization **transaction**, subject to the *daily liquidity limit* of the immunization instrument;

(viii) Jointly close out **positions** with long and short exposures to the MRF, subject to the *daily liquidity limit* of the instruments and **assets**;

(ix) Check the existence, in the **portfolio**, of **positions** that had been mapped to be closed out through structured **transactions**;

(x) Carry out the structured **transactions** referred to in step (ix), subject to the relevant *daily liquidity limits*;

(xi) Assess if the **positions** in the instruments and **assets** defined in A are close to maturity, according to the corresponding *rollover day* parameters, the need to carry out structured rollover **transactions**; and

(xii) Carry out structured rollover **transactions**, subject to the *daily liquidity limit* and *rollover day* of each contract underlying the **positions** involved, in order to preserve netting between long and short exposures to the MRF derived from the **positions** in the instruments and **assets** defined in A.

C. The **positions** remaining in the **portfolio** are closed out on the holding period maximum date.

The above procedure may imply the need to carry out immunization **transactions**, structured **transactions** and structured rollover **transactions** in instruments that are not part of the **defaulter investor**'s **portfolio**. Hedges introduced by means of any such **transactions** have the effect of protecting against price fluctuation risks immediately after the immunization **transaction** is executed. Such **transactions** will be part of the closeout strategy and the failure to carry them out, due to unfavorable market conditions, may lead to a loss greater than the amount of **margin** required from the **investor**.

The following example illustrates the methodology applied to a **portfolio** with **positions** in futures contracts with the same main risk factor (MRF) apt to be closed out pursuant to the optimized closeout strategy.

Example:

Consider a **portfolio** consisting of three futures contracts exposed to the MRF BRL/USD exchange rate (USD spot), as follows: two IDxUS dollar spread futures contracts (DDI) and one US dollar futures contract (DOL). Table 7.1 shows, for each **position**, the (positive sign for long **position** and negative sign for short **position**), maturity, the instrument's *daily liquidity limit* (*DLL*) and the unit exposure (*UnitExp*).

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Instrument	Quantity	Maturity (days)	*DLL*	*UnitExp* (BRL)
4th month DDI	-40,000	69	0	273,000
5th month DDI	10,000	91	0	272,000
2nd month DOL	15,000	26	5,000	274,000

Table 7.1 - **Portfolio positions**

Also suppose that:

I. In this example, the DOL near month expiration is 5 days and the *daily liquidity limit* is 50,000 contracts;

II. For the DOL contract, the *liquidity transition* is the day before the near month expires and the *number of maturities with liquidity transition* is equal to one. Thus, on T+4, the 2nd month DOL has its *DLL* changed from 5,000 to 50,000 (*DLL* of the near month DOL) and, in this example, immediately after such change, the near month DOL has its *daily liquidity limit* changed to zero; and

III. The instruments that can be used in immunization are:

Time in holding period	Immunization instrument	Maturity (days)	*DLL*	*UnitExp* (BRL)
Up to *T*+3	Near month DOL	5	50,000	273,000
As of *T*+4	2nd month DOL	26	50,000	274,000

Table 7.2 - Immunization instruments

Note that the immunization tool is modified on T+4.

IV. The structured **transactions** that can be executed are:

Structured transaction	Long leg of structured transaction	Long leg maturity (days)	*UnitExp* (BRL)	*DLL*
4th month FRC	4th month DDI	69	273,000	10,000
5th month FRC	5th month DDI	91	272,000	15,000

Table 7.3 - Structured **transactions**

Time in holding period	Short leg of structured transaction	Short leg maturity (days)	*UnitExp* (BRL)	*DLL*
Up to *T*+2	near month DDI	5	273,000	0

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Time in holding period	Short leg of structured transaction	Short leg maturity (days)	*UnitExp* (BRL)	*DLL*
As of *T*+3	2nd month DDI	26	273,000	0

Table 7.4 - Short leg instruments in structured **transactions**

Note that the short leg of the FRC structured **transactions** is modified two days before maturity (*T*+3), due to the contract features.

V. The structured rollover **transaction** that can be executed is:

Structured rollover transaction	*DLL*
DR1 (near and 2ndmonths)	30,000

Table 7.5 - Structured rollover **transaction**

Leg of structured rollover transaction	Instrument	Short leg maturity (days)	*UnitExp* (BRL)
Short	Near month DOL	5	273,000
Long	2nd month DOL	26	274.000

Table 7.6 - Instruments in structured rollover **transaction**

Assuming, for the US dollar futures contract (DOL), that the *rollover day* is two days before the near month contract expires, it is possible to carry out a structured rollover **transaction** on *T*+3.

The optimized closeout strategy for the **portfolio** in this example is defined as described below.

A. The main risk factor (MRF) and the group of instruments and **assets** with a relevant exposure to the MRF have been defined.

The MRF in this example is the USD spot, to which all the instruments in the **portfolio**, as well as the immunization instrument and the instruments in the structured and rollover **transactions**, have a significant exposure.

B. The optimized closeout strategy is established for the set of **positions** in the instruments and **assets** defined in A, by determining the **operations** to be taken each day in the holding period, based on the *minimum time for execution*, up to the day prior to the maximum date in the holding period.

In this example, all the **positions** in the **portfolio** are apt to be closed out according to the optimized closeout strategy, having a *minimum time for execution* of two days. The procedure is adopted for the period from *T*+2 to *T*+9.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Closeout on T+2:

(i) Identify the instruments for the immunization **transactions**, structured **transactions** and structured rollover **transactions**;

- For the immunization **transactions** the instrument is the near month DOL;
- For the structured **transactions**, the FRC (fourth and fifth months); and
- For the structured rollover **transaction**, the DR1 (first and second months rollover).

(ii) Assess the need to adopt an optimized closeout strategy.

In this case, not all the **positions** are apt to be fully closed out on the current day (T+2). For example, the 2nd month DOL has a *daily liquidity limit* of 5,000 contracts and the **position** is 15,000 contracts. Therefore, proceed to step (iii).

(iii) Calculate the long and short exposures to the MRF of the set of **positions** in the instruments and **assets** defined in A.

The table below shows the BRL value and market side of **position** exposures, calculated based on quantity and unit exposures presented on table 7.1. A **position** exposure is said to be on the long side of the market when its value has a positive sign or on the short side of the market when its value has a negative sign.

Instrument	Maturity (days)	*UnitExp* (BRL)	Quantity	Exposure (BRL billion)	Side of exposure
4th month DDI	69	273,000	-40,000	-10.92	Short
5th month DDI	91	272,000	10,000	2.72	Long
2nd month DOL	26	274,000	15.000	4.11	Long

Table 7.7 - Exposures of **positions** to MRF USD spot on T+2

The long and short exposures of the **portfolio** are then calculated:

Side of exposure	Instrument	Exposure (BRL billion)
Short	4th month DDI	-10.92
Long	5th month DDI	6.83
	2nd month DOL	

Table 7.8 - **Portfolio** exposures to MRF USD spot on T+2

(iv) Calculate the total exposure apt to be reduced on this day, through closeout **transactions**, subject to the *daily liquidity limits* of the instruments and **assets** defined in A.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

For each **position**, the number of contracts of the instrument apt to be closed out on the day is the minimum value between the absolute value of the instrument **position** and *daily liquidity limit* multiplied by the position sign.

The exposure apt to be closed out (*ExpDLL*) is obtained by multiplying the number of contracts apt to be closed out on the day by the unit exposure:

- 4th month DDI:

$$ExpDLL = \min(\text{abs}(-40{,}000), 0) \times \text{sgn}(-40{,}000) \times 273{,}000 = \text{BRL}0$$

- 5th month DDI:

$$ExpDLL = \min(\text{abs}(10{,}000), 0) \times \text{sgn}(10{,}000) \times 272{,}000 = \text{BRL}0$$

- 2nd month DOL:

$$ExpDLL = \min(15{,}000), 5{,}000) \times \text{sgn}(15{,}000) \times 274{,}000 = \text{BRL}1.37 \text{ billion}$$

Instrument	Maturity (days)	*DLL*	*UnitExp* (BRL)	Quantity	*ExpDLL* (BRL billion)	Side of exposure
4th month DDI	69	0	273,000	-40,000	0	Short
5th month DDI	91	0	272,000	10,000	0	Long
2nd month DOL	26	5,000	274,000	15,000	1.37	Long

Table 7.9 - Exposure to MRF USD spot apt to be closed out on *T*+2

The total long and short exposures apt to be reduced on the day are:

Side of exposure	Instrument	*ExpDLL* (BRL billion)
Short	4th month DDI	0
Long	5th month DDI	1.37
	2nd month DOL	

Table 7.10 - Long and short exposures to MRF USD spot apt to be reduced on *T*+2

(v) Calculate the total directional exposure to the MRF of the set of **positions** in the instruments and **assets** defined in A.

The total directional exposure corresponds to the sum of the **portfolio** long and short exposures calculated in (iii), that is:

$$\textit{Directional exposure} = -10.92 + 6.83 = -\text{BRL}4.09 \text{ billion}$$

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

(vi) Reduce the maximum possible directional exposure to the MRF through closeout **transactions**, subject to the *daily liquidity limit* of each instrument and **asset** defined in A.

Given that:

- The **portfolio** directional exposure is –BRL4.09 billion (short exposure), as obtained in (v); and
- The short exposure apt to be reduced is BRL0, as calculated in (iv),

Then the conclusion is that it is not possible to reduce the directional exposure **portfolio** directional exposure closeout **transactions**.

(vii) Immunize the largest possible residual directional exposure through an immunization **transaction**, subject to the *daily liquidity limit* of the immunization instrument.

The residual directional exposure is –BRL4.09 billion, as the exposure was not reduced in (vi).

The number of contracts in the immunization instrument, belonging to the immunization **transaction**, is obtained by dividing the residual directional exposure, in absolute value, by the unit exposure of the immunization instrument:

$$NC = \text{abs}(-\text{BRL4.09 billion}) / \text{BRL273,000} = 14{,}982$$

As this number is less than the *daily liquidity limit* of the immunization instrument (50,000), a purchase **transaction** (opposite to the directional exposure) in 14,982 1st month DOL contracts is executed.

(viii) Jointly close out **positions** with long and short exposures to the MRF, which can be offset against each other, subject to the *daily liquidity limit* of the instruments and **assets**.

As the long exposure apt to be reduced on the day by means of closeout **transactions** is BRL1.37 billion and the short exposure is null, the closeout of the set of **positions** with long and short exposures does not apply.

(ix) Check the existence, in the **portfolio**, of **positions** that had been mapped to be closed out by means of structured **transactions**.

As shown in table 7.3, the 4th and 5th month DDI **positions** had been mapped to require 4th and 5th month FRC structured **transactions** to close them out.

(x) Carry out the structured **transactions**, subject to the relevant *daily liquidity limits*.

After the **positions** are closed out and the immunization **transaction** is introduced, in accordance with steps (vi) thru (viii), the **portfolio** contains the **positions** indicated on table 7.11 and the exposures presented on table 7.12.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Instrument	Maturity (days)	*DLL*	*UnitExp* (BRL)	Previous Quantities	Transaction executed	Updated Quantities
4th month DDI	69	0	273,000	-40,000	-	-40,000
5th month DDI	91	0	272,000	10,000	-	10,000
2nd month DOL	26	5,000	274,000	15,000	-	15,000
1st month DOL	5	50,000	273,000	0	Purchase of 14,982	14,982

Table 7.11 - Quantities updated in **portfolio** after implementation of step (viii) on T+2

Side of exposure	Instrument	Exposure (BRL billion)
Short	4th month DDI	-10.92
Long	5th month DDI	10.92
	2nd month DOL	
	1st month DOL	

Table 7.12 - Exposures to MRF USD spot on T+2

It should be noted that, although the **positions** provide a hedge among themselves, the maturity of the near month DOL contract on T+5 implies a mismatch between long and short exposures, resulting in a directional exposure of –BRL4.09 billion.

As the short legs of the structured **transactions** also mature on T+5, such **transactions** can be introduced into the **portfolio** to reduce the mismatch.

The total exposure apt to be introduced into the **portfolio** by means of structured **transactions** (*StrTransExpDLL*) is calculated by considering only long legs, contingent on *daily liquidity limits* and **portfolio positions**. The calculation is similar to the one referred to in step (iv), but with the exposure on the opposite side of the market.

Side of exposure	*StrTransExpDLL* (BRL billion)
Short	-2.72
Long	2.73

Table 7.13 - Exposure to MRF USD spot apt to be introduced into **portfolio** through structured **transactions** on T+2

The exposures that will be introduced through structured **transactions** are calculated to reduce the mismatch, but limited to the exposure apt to be introduced:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

StrTransExpDLL = min(abs(–4.09), abs(2.73)) = BRL2.73 billion in long exposure

From this exposure, the number of contracts in the structured **transaction** is then calculated:

NC = abs(BRL2.73 billion) / BRL273,000 = 10,000

That is:

- Purchase of 10,000 4th month DDI contracts (long leg); and
- Sale of 10,000 near month DDI contracts (short leg).

(xi) Assess if maturity is approaching, according to the *rollover day* parameter, the need to carry out structured rollover **transactions**.

Knowing that the *rollover day* in the DOL futures contract is two days before the near month expires and that the near month DOL expires in five days, structured rollover **transactions** can only be executed on T+3.

(xii) Carry out structured rollover **transactions,** subject to their own *daily liquidity limits* and the *rollover day* of each contract underlying the **positions** in the instruments and **assets** defined in A, in order to preserve netting between long and short exposures to the MRF.

As determined in (xi), rollover **transactions** are not performed on T+2.

Closeout on T+3:

(i) Identify the instruments for the immunization **transactions**, structured **transactions** and structured rollover **transactions**;

- For immunization **transactions** the instrument is the 1near month DOL;
- For the structured **transactions**, the 4th month and 5th month FRC; and
- For the structured rollover **transaction**, the 1st and 2nd month DR1.

(ii) Assess the need to adopt an optimized closeout strategy.

The number of days required to close out **positions** is still greater than 1. For example, the 2nd month DOL has a *daily liquidity limit* of 5,000 contracts and the **position** is 15,000 contracts. Therefore, proceed to step (iii).

(iii) Calculate the long and short exposures to the MRF derived from the **positions** in the instruments and **assets** defined in A.

The table below shows the exposure of each **position**:

Instrument	Maturity (days)	*UnitExp* (BRL)	Quantity	Exposure (BRL billion)	Side of exposure
4th month DDI	69	273,000	-30,000	-8.19	Short
5th month DDI	91	272,000	10,000	2.72	Long
2nd month DOL	26	274,000	15,000	4.11	Long
1st month DOL	5	273,000	14,982	4.09	Long
1st month DDI	5	273,000	-10,000	-2.73	Short

Table 7.14 - Exposures to MRF USD spot on T+3

The total long and sort exposures in the **portfolio** are:

Side of exposure	Instrument	Exposure (BRL billion)
Short	4th month DDI	-10.92
	1st month DDI	
Long	5th month DDI	10.92
	2nd month DOL	
	1st month DOL	

Table 7.15 - **Portfolio** exposures to MRF USD spot on T+3

(iv) Calculate the total exposure apt to be reduced on this day, through closeout **transactions**, subject to the *daily liquidity limits* of the instruments and **assets** defined in A.

The table below presents each **position** exposure apt to be reduced:

Instrument	Maturity (days)	*DLL*	*UnitExp* (BRL)	Quantity	*ExpDLL* (BRL billion)	Side of exposure
4th month DDI	69	0	273,000	-30,000	0	Short
5th month DDI	91	0	272,000	10,000	0	Long
2nd month DOL	26	5,000	274,000	15,000	1.37	Long
1st month DOL	5	50,000	273,000	14,982	4.09	Long
1st month DDI	5	0	273,000	-10,000	0	Short

Table 7.16 - Exposure to MRF USD spot apt to be reduced on T+3

The total long and sort exposures apt to be reduced through closeout **transactions** on the day are:

Side of exposure	Instrument	*ExpDLL* (BRL billion)
Short	4th month DDI	0
	1st month DDI	
Long	5th month DDI	5.46
	2nd month DOL	
	1st month DOL	

Table 7.17 - Exposure to MRF USD spot apt to be reduced on T+3

(v) Calculate the total directional exposure to the MRF of the set of **positions** in the instruments and **assets** defined in A.

The total directional exposure corresponds to the sum of the **portfolio** long and short exposures calculated in (ii), that is:

Directional exposure = –10.92 + 10.92 = BRL0

(vi) Reduce the maximum possible directional exposure by means of closeout **transactions**, subject to the *daily liquidity limit* of each instrument and **asset** defined in A.

If the **portfolio** directional exposure is null, there is nothing to reduce.

(vii) Immunize the largest possible residual directional exposure through an immunization **transaction**, subject to the *daily liquidity limit* of the immunization instrument.

If the directional exposure is null, an immunization **transaction** is not required.

(viii) Jointly close out **positions** with long and short exposures to the MRF, which can be offset against each other, subject to the *daily liquidity limit* of the instruments and **assets**.

As the long exposure apt to be reduced on the day is BRL5.46 billion and the short exposure is null, the joint closeout of **positions** with long and short exposures does not apply.

(ix) Check the existence, in the **portfolio**, of **positions** in instruments that had been mapped to be closed out by means of structured **transactions**.

The 4th and 5th month DDI **positions** had been mapped to require 4th and 5th month FRC structured **transactions** to close them out, respectively.

(x) Carry out structured **transactions** subject to the relevant *daily liquidity limits*.

After the **positions** are closed out and the immunization **transaction** is executed, in accordance with steps (vi) thru (viii), the **portfolio** remains with the following **positions**:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Instrument	Maturity (days)	*DLL*	*UnitExp* (BRL)	Previous quantities	Transaction executed	Updated quantities
4th month DDI	69	0	273,000	-30,000	-	-30,000
5th month DDI	91	0	272,000	10,000	-	10,000
2nd month DOL	26	5,000	274,000	15,000	-	15,000
1st month DOL	5	50,000	273,000	14,982	-	14,982
1st month DDI	5	0	273,000	-10,000	-	-10,000

Table 7.18 - Updated **positions** on T+3

The long and short exposures updated in the **portfolio** are:

Side of exposure	Instrument	*ExpDLL* (BRL billion)
Short	4th month DDI	-10.92
	1st month DDI	
Long	5th month DDI	10.92
	2nd month DOL	
	1st month DOL	

Table 7.19 - Exposures to MRF USD spot on T+3

The total exposure apt to be introduced on the day through structured **transactions** is:

Side of exposure	*StrTransExpDLL* (BRL billion)
Short	-2.72
Long	2.73

Table 7.20 - Exposure to MRF USD spot apt to be introduced through structured **transactions** on T+3

It should be noted that, on T+3, the short leg of the structured **transactions** changes into the 2nd month DDI (table 7.4). This means that the execution of structured **transactions** does not reduce the mismatch between long and short exposures, as the maturity of the new short leg is no longer the same as that of the **positions** in the near month DOL and near month DDI instruments. Therefore, in order to provide as quick a closeout as possible, the maximum number of structured **transactions** is carried out, limited to their *daily liquidity limits* and number of contracts in **portfolio positions**. Hence, the total exposures introduced through structured **transactions** is:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Side of exposure	Exposure introduced (BRL billion)
Short	-2.72
Long	2.73

Table 7.21 - Total exposures arising from structured **transactions** that will be introduced, considering long legs only, on T+3

From this exposure, the number of contracts in the structured **transactions** is then calculated:

NC = abs(BRL2.73 billion) / BRL273,000 = 10,000 long 4th month FRC

NC = abs(–BRL2.72 billion) / BRL272,000 = 10,000 short 5th month FRC

That is:

- Purchase of 10,000 4th month DDI contracts (long leg);
- Sale of 10,000 5th month DDI contracts (long leg); and
- Sale of 37 2nd month DDI contracts (short leg).

(xi) Assess if maturity is approaching, according to the *rollover day* parameter defined for these instruments, as presented in subsection 7.4.1, the need to carry out structured rollover **transactions**.

The current day (T+3) precedes the 1st month DOL contract by two days and, therefore, structured rollover **transactions** can be adopted.

As the portfolio contains **positions** expiring on T+5 (1st month DDI and 1st month DOL), the introduction of structured rollover **transactions** is necessary to reduce the mismatch between long and short exposures after the T+5 maturities.

(xii) Carry out structured rollover **transactions**, subject to their own *daily liquidity limits* and the *rollover day* of each contract underlying the **positions** in the instruments and **assets** defined in A, in order to preserve netting between long and short exposures to the MRF.

The number of contracts required for the structured rollover **transaction** is obtained by dividing the exposure derived from the expiring **positions** by the unit exposure of the short leg of the rollover **transaction**:

NC = abs(BRL1.36 billion) / BRL273,000 = 4,982

The rollover **transaction** in 4,982 contracts is executed, on the same side as the exposure of the expiring **positions**, that is:

- Purchase of 4,982 2nd month DOL contracts; and

- Sale of 4,982 near month DOL contracts.

For the subsequent times in the holding period, up to $T+n-1$, the procedures described for $T+2$ and $T+3$ are repeated.

C. On the maximum date in the holding period, the **positions** remaining in the **portfolio** are closed out.

On $T+n$, all the **positions** remaining in the **portfolio** are closed out.

The number of contracts in **portfolio positions** at the beginning of each day in the holding period is shown on table 7.22.

Instrument	Initial quantity	Quantities at the beginning of each day							
		T+1	*T*+2	*T*+3	*T*+4	*T*+5	*T*+6	...	*T*+*n*
4th month DDI	-40,000	-40,000	-40,000	-30,000	-20,000	-10,000	0		0
5th month DDI	10,000	10,000	10,000	10,000	0	0	0		0
2nd month DOL	15,000	15,000	15,000	15,000	19,982	19,964	19,964		19,964
1st month DOL	0	0	0	14,982	10,000	10,000	0		0
1st month DDI	0	0	0	-10,000	-10,000	-10,000	0		0
2nd month DDI	0	0	0	0	-37	-10,037	-20,037		-20,037

Table 7.22 – Quantities at the beginning of each day in the holding period

The closeout strategy, after n days have elapsed in the holding period, is displayed on table 7.23.

Instrument	Initial quantity	Transactions executed each day in the holding period						
		T+1	*T*+2	*T*+3	*T*+4	*T*+5	...	*T*+*n*
4th month DDI	-40,000							
5th month DDI	10,000							
2nd month DOL	15,000							19,982 sale
1st month DOL (immunization)	0		14,982 purchase			10,000 expiring		
2nd month DOL (immunization)	0				18 sale			18 purchase
1st month DDI (FRC)	0		10,000 sale			10,000 expiring		
2nd month DDI (FRC)	0			37 sale	10,000 sale	10,000 sale		

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Instrument	Initial quantity	Transactions executed each day in the holding period						
		T+1	*T*+2	*T*+3	*T*+4	*T*+5	...	*T*+*n*
4th month DDI (FRC)	0		10,000 purchase	10,000 purchase	10,000 purchase	10,000 purchase		
5th month DDI (FRC)	0			10,000 sale				
1st month DOL (DR1)	0			4,982 sale				
2nd month DOL (DR1)	0			4,982 purchase				
2nd month DDI	0							20,037 purchase

Table 7.23 - Optimized closeout strategy

7.5 Cash flow evaluation under risk scenarios

After the closeout strategy is defined for a **portfolio** and corresponding **collateral** in the first stage of the CORE methodology, the financial results (gains and losses) that would be incurred in the holding period under each risk scenario are determined in the second stage of the methodology.

In this section, a set (Φ) is assumed consisting of M risk scenarios, denoted by Φ_k, $1 \leq k \leq M$, under which the risk measures for both **portfolios** and **collateral** are assessed. For each scenario Φ_k, the financial results at periods $T+1$, $T+2$,..., $T+n$ in the holding period are represented by a matrix, denoted by $V_{lxn}(\Phi_k)$. Each matrix element $v_{i,\tau}(\Phi_k)$ expresses a positive financial flow ($v_{i,\tau}(\Phi_k) \geq 0$) or a negative financial flow ($v_{i,\tau}(\Phi_k) < 0$) at period τ in the holding period (each column of the matrix corresponds to a date), resulting from an original **position** in the **portfolio** or from a closeout **transaction** (such as **transactions** to monetize **collateral**) under the *k*-th scenario. Hence:

$$V_{lxn}(\Phi_k) = \begin{bmatrix} v_{1,1}(\Phi_k) & v_{1,2}(\Phi_k) & \ldots & v_{1,n}(\Phi_k) \\ v_{2,1}(\Phi_k) & v_{2,2}(\Phi_k) & \ldots & v_{2,n}(\Phi_k) \\ \ldots & \ldots & \ldots & \ldots \\ v_{l,1}(\Phi_k) & v_{l,2}(\Phi_k) & \ldots & v_{l,n}(\Phi_k) \end{bmatrix}, \ \Phi_k \in \Phi \qquad (7.1)$$

Along each row of the matrix, the determination of financial flows $v_{i,\tau}(\Phi_k)$ depends on the formula for calculating the **settlement** values for the **position** or the corresponding closeout **transaction**. From the risk scenarios the values of the variables that are used in the calculation formulas, which are included in CORE – Formulas and Mappings, a document available on the B3 website (www.b3.com.br), can be defined.

The consolidated cash flow at period τ, denoted by $v_\tau(\Phi_k)$, is given by the sum of elements $v_{i,\tau}(\Phi_k)$ along column τ:

$$v_\tau(\Phi_k) = \sum_{i=1}^{I} v_{i,\tau}(\Phi_k) \tag{7.2}$$

The full cash flow from the closeout of **positions** and **collateral** under scenario Φ_k is represented by the vector of cash flows at each period:

$$\left[v_1(\Phi_k) \ , \ v_2(\Phi_k) \ , \ \ldots \ , \ v_n(\Phi_k) \right] \tag{7.3}$$

7.5.1 Scenarios for risk factors

The set of risk scenarios under which the cash flows deriving from the closeout of **positions** and **collateral** are evaluated makes up a key element of the CORE methodology, for it is through the scenarios that the treatment of uncertainty is incorporated.

A risk scenario is defined by the set of values that primitive risk factors can take over certain risk horizons, as obtained from the estimation of future changes (or returns) in the current values thereof. For the return path of a given primitive risk factor (PRF) to build a coherent term structure across increasing risk horizons (periods of 1 day, 2 days,..., *n* days), the return to be attributed to that PRF over a given risk horizon embeds the returns observed in the previous horizons.

In the governance structure for risk management adopted by B3 in the capacity of central counterparty, the definition of policy, parameters and methodology for setting up risk scenarios is the role of B3's Joint Board of Officers or, by delegation, the B3's Central Counterparty Risk Internal Committee. This committee meets regularly every week and also whenever deemed necessary. At the discretion of B3's Joint Board of Officers or, by delegation, the Central Counterparty Risk Internal Committee, risk scenarios may be modified on an intraday basis and without further notice. For all PRFs, the maximum and minimum changes considered plausible at all risk horizons are determined, working as an envelope, or a wrapper, for the returns of the relevant factor over its respective risk horizons. For a directional **position** in a particular risk factor, those envelopes determine the risk thereof.

The envelopes are determined prospectively, making use of quantitative models for the available historical returns and expert risk analysis to better estimate risks. As an example, the extreme value theory (EVT), t-distribution and asymmetric t-distribution are among the quantitative models employed in their various forms.

The risk scenarios, subject to the assumptions defined by the B3 Central Counterparty Risk Internal Committee, are built primarily using as generation strategies: (i) historical simulation, (ii) Monte Carlo simulation from quantitative models and (iii) prospective scenarios chosen by risk experts. If a return generated by historical simulation or from a quantitative model exceeds the maximum (minimum)

change defined by the B3 Central Counterparty Risk Internal Committee, the value thereof is made equal to this maximum (minimum) change. With regard to the number of scenarios, the relevant number for each PRF by type of scenario (generation strategy) is also defined by the B3 Central Counterparty Risk Internal Committee.

The different scenarios used in risk assessment represent a composition of historical, quantitative and prospective scenarios.

The scenario generation strategies adopted by the **clearinghouse** are described below.

- **Historical simulation**

  The purpose of using historical simulations is to reproduce in the risk scenarios the available historical changes verified in each PRF over the past few years, on each one of the days in the holding period under consideration. Subject to the risk factors' envelopes of return, both the idiosyncratic risks and the risk of a concerted **portfolio** movement, and corresponding **collateral**, are faithfully defined by the historical return movement in the sample.

- **Quantitative models**

  Under the scenario generation strategy via quantitative models, PRFs are jointly modeled using statistical models. The PRF risk is broken down into an idiosyncratic portion and the concerted movement risk. Both idiosyncratic and concerted movement risks are modeled so as to capture the stylized facts found in specialized literature.

  The concerted movement risk is modeled by breaking down risk into common factors by means of factor models. The joint distribution of common factors' returns is built from heavy-tailed marginal distributions and by using statistical techniques that allow for the joint occurrence of extreme events, such as t copula and grouped t copula.

  Idiosyncratic risks are modeled, in an independent manner, from heavy-tailed distributions.

  The quantitative models utilized to model future PRF returns can produce the desired number of scenarios through Monte Carlo simulation from the previously-described distributions for idiosyncratic and concerted movement risks. Since scenario generation through quantitative models is based on estimates obtained from historical data, the scenarios produced will reflect the characteristics of the individual risks and concerted movement risks existing in the sample. An advantage of such models is their ability to produce plausible scenarios, given history, but which did not necessarily occur in the period covered by the sample.

- **Prospective scenarios**

  In addition to the aforementioned historical return analysis and return model estimation, other aspects are the object of analysis in determining risk scenarios, such as: (i) the evolution of idiosyncratic and concerted movement risks over time, due to changes in fundamentals (countries

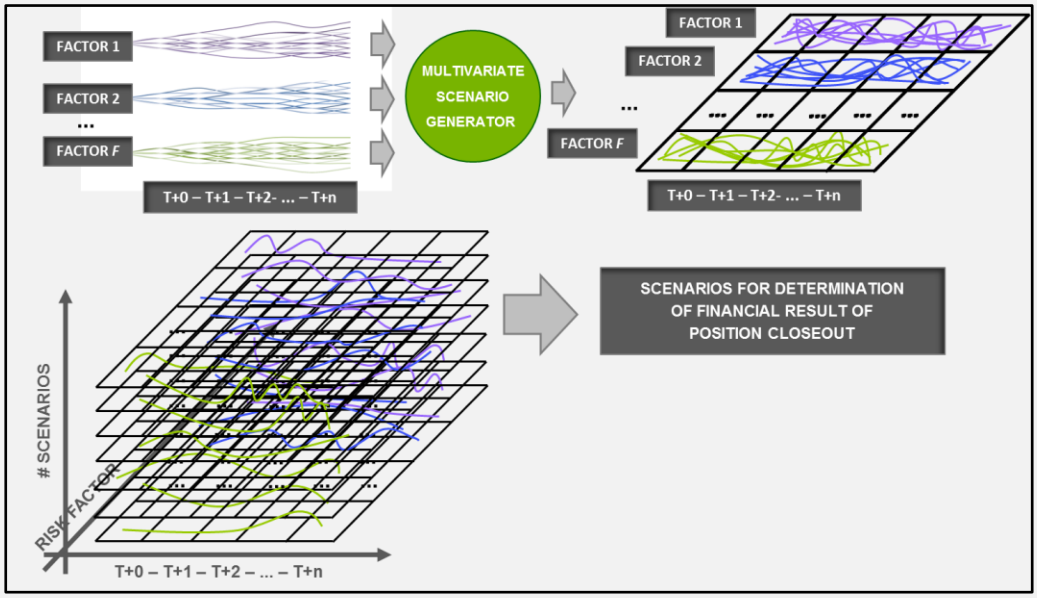
and businesses) and market microstructure; (ii) the absence of historical returns for new **assets** and new **asset** classes; (iii) the identification of the plausibility of severe events that never occurred; and (iv) sudden changes to national and/or international political and economic scenarios. In this sense, and as a way of aggregating prospective elements to its analysis, the B3 Central Counterparty Risk Internal Committee counts on regular political and economic reviews, which are conducted by the B3 professional team or by external members with a recognized reputation on the relevant topic, and also on the view of experts in risk management, in particular the members of the B3 Advisory Committee on Risk Analysis. Based on such a prospective risk analysis, it is possible to choose to include additional scenarios for risk factors that, even if considered plausible, are not included in the sample of historical or quantitative scenarios.

In a practical manner, a risk scenario maps a state of nature into a single set of realizations of the risk factors. Let *m* be a given state of nature, with $m \in \{1, 2, \ldots, M\}$, and $S_{f,\tau}(m)$ be a realization of the *f*-th PRF on date $T+\tau$, assessed under state *m*. Thus, the realization matrix of PRFs at each time in the holding period defines a risk scenario, as expressed by:

$$\Phi_m = \begin{bmatrix} S_{1,1}(m) & S_{1,2}(m) & \ldots & S_{1,n}(m) \\ S_{2,1}(m) & S_{2,2}(m) & \ldots & S_{2,n}(m) \\ \ldots & \ldots & \ldots & \ldots \\ S_{F,1}(m) & S_{F,2}(m) & \ldots & S_{F,n}(m) \end{bmatrix} \tag{7.4}$$

For each state of nature *m*, the *f*-th PRF assumes a potential path of realizations, $S_f(m) = \left(S_{f,1}(m), S_{f,2}(m), \ldots, S_{f,n}(m)\right)$. The combination of each path with the other PRFs results in a risk scenario associated with a potential world setting, Φ_m. The following figure illustrates this concept in a generic way, with each potential scenario combination between factors 1 thru *F* creating a new risk scenario.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION



Unlike the traditional risk measures, in the CORE methodology dominance of the scenario analysis is given by the cube formed by the M risk scenarios, the F risk factors and the n time horizons. Although the techniques to generate scenarios may vary according to the behavior of each PRF, or group of PRFs, the basic requirement for the methodology is that the set of risk scenarios displays the three dimensions of the analysis.

7.6 Determining risk measures

Given the cash flows resulting from the simulation of the closeout of a **portfolio** and corresponding **collateral** under each risk scenario, the potential losses are calculated. The following concepts are used in order to define such losses and the final risk measures.

7.6.1 Accumulated value of illiquid collateral

The accumulated value of illiquid **collateral** corresponds to the sum of the financial cash flows resulting from the closeout of such **collateral** under a given risk scenario Φ_k:

$$\boldsymbol{Coll_{Illiq}(\Phi_k) = \sum_{\tau}^{T}\left[\sum_{i \in CollIlliq} \nu_{i,\tau}(\Phi_k)\right]} \quad (7.5)$$

7.6.2 Temporary liquidity needs associated with monetization of collateral

As mentioned in subsections 7.4.2.5 and 7.4.2.6, there are situations in which, during the closeout process, there is a need for a temporary liquidity provision, either for closing **positions** or monetizing **collateral**. The **clearinghouse** has liquidity resources to cover these temporary needs and the use of

such resources is represented by the value of the liquidity resource. The maximum amount available for use as a liquidity resource is given by the parameter LR. The amount of liquidity resources used to monetize illiquid **collateral** during closeout under a given risk scenario Φ_k corresponds to the lowest between the accumulated value of illiquid **collateral** and the parameter LR:

$$LR_{CollIlliq}(\Phi_k) = min\left[Coll_{Illiq}(\Phi_k), LR\right] \quad (7.6)$$

The parameter LR considered differs between the CORE0, CORE1 and CORE2 modules and is limited according to the criteria established by B3. The **participant** may, based on its risk management criteria and on the sources of liquidity directly available to it, impose additional limits (more restrictive than those established by B3) to the values of liquidity resources used in the risk calculation of the **participants** under its responsibility.

7.6.3 Illiquid collateral excess

As mentioned in subsection 7.4.2.5, in cases where the accumulated value of illiquid **collateral** under a given risk scenario Φ_k exceeds the maximum available amount of liquidity resource, a negative cash flow equivalent to the excess is discounted on the first day of the closeout period, given by:

$$ExColl_{Illiq}(\Phi_k) = max\left[0, Coll_{Illiq}(\Phi_k) - LR\right] \quad (7.7)$$

7.6.4 Permanent loss

Permanent loss corresponds to the final loss incurred in the implementation of the closeout strategy under a given risk scenario. The relevant result considers the sum of cash flows at all the time periods in the closeout strategy. Therefore, the permanent loss under scenario Φ_k is defined as:

$$PL(\Phi_k) = min\left[\sum_{\tau=1}^{n} v_\tau(\Phi_k) - ExColl_{Illiq}(\Phi_k), 0\right] \quad (7.8)$$

7.6.5 Transitory loss

Transitory loss is the amount of additional funds needed to provide the flow of **payments** associated with the instruments on the expected **settlement** dates. Under certain scenarios, even when there is no permanent loss, there may be financial flow mismatches over the holding period generating a temporary need for cash. The calculation of the transitory loss under scenario Φ_k is given by:

$$TL(\Phi_k) = min\begin{bmatrix} 0\,, v_1(\Phi_k) - ExColl_{Illiq}(\Phi_k)\,, \left(v_1(\Phi_k) + v_2(\Phi_k) - ExColl_{Illiq}(\Phi_k)\right), \\ \ldots, \sum_{t=1}^{T} v_t(\Phi_k) - ExColl_{Illiq}(\Phi_k) \end{bmatrix} - PL(\Phi_k) \quad (7.9)$$

As an example of such concepts, consider the **portfolio** analyzed in subsection 7.4.2.6, paragraph (a), whose cash flow resulting from the closeout strategy under a specific risk scenario is the one shown in figure 7.73. The diagram below shows the cumulative cash flow and the identification of both permanent loss (PL) and transitory loss (TL).

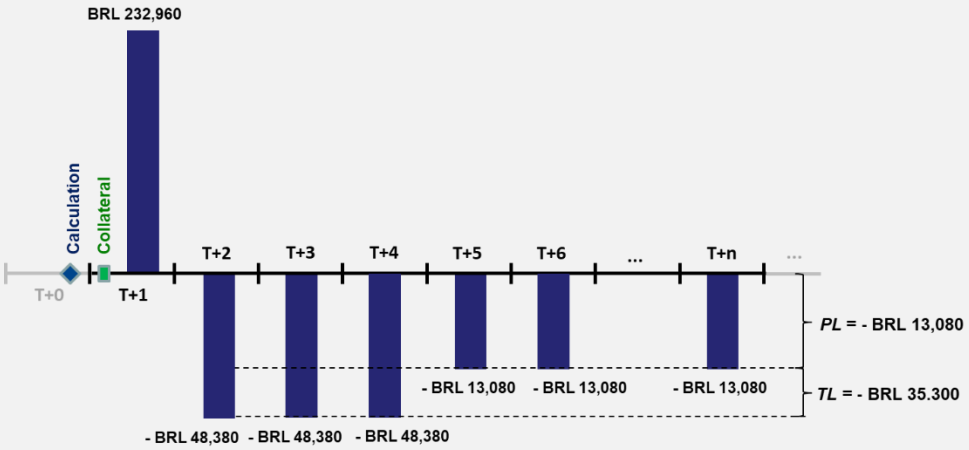


Figure 7.82 - Diagram of figure 7.73's cumulative cash flows and identification of permanent (PL) and transitory (TL) losses

As explained below, depending on the **positions** subject to closeout, transitory loss can be partially or totally cancelled against the use of the liquidity resource (LR).

7.6.5.1 Temporary liquidity needs associated with positions closeout

When calculating risk, the CORE methodology considers the availability of the liquidity resource in order to meet any temporary need of funds from closing out **positions** and **collateral** that are eligible to utilize the liquidity provision. In view of the fact that the closeout of the set of such **positions** could result in a negative financial flow, which might occur prior to the positive financial flows expected by the end of the holding period, the risk calculation methodology considers the availability of liquidity resource associated with **positions** closeout LR_{Pos} to cover of any such negative financial flow, thus reducing the need for collateralization by the **participant**.

The **positions** eligible to use the liquidity provision are divided into groups of **positions** without netting. The association of instruments with each group of eligible **positions** is listed on the risk model parameter table, available on the B3 website http://www.b3.com.br.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The use of the liquidity resource does not change the permanent loss resulting from the process, but it does imply a new measure for transitory loss, denoted by TL^*, which is lower than the transitory loss that would result from the process without the use of the liquidity resource and is given by:

$$TL^*(\Phi_k) = \min[TL(\Phi_k) + LR_{Pos}(\Phi_k)\,, 0] \tag{7.10}$$

Where:

$TL(\Phi_k)$: the transitory loss resulting from the closeout process under scenario Φ_k, without considering the use of the liquidity resource; and

$LR_{Pos}(\Phi_k)$: the liquidity resource associated with **positions** closeout to be used under scenario Φ_k.

The liquidity resource to be considered differs between modules CORE0, CORE1 and CORE2, and it is limited according to the criteria established by B3. The **participants** can, based on their respective risk management criteria and liquidity sources directly available to them, impose additional limits (with more restrictive values than those established by B3) to the amounts of the liquidity resource to be utilized in risk calculation of the **participants** under their responsibility.

7.6.6 Aggregate loss

The aggregate loss measures the total risk of the closeout process for the **portfolio** and related **collateral**, aggregating both the permanent loss and the transitory loss. By denoting by $AL(\Phi_k)$ the aggregate loss resulting from the closeout process under scenario Φ_k, then:

$$AL(\Phi_k) = PL(\Phi_k) + TL^*(\Phi_k) \tag{7.11}$$

Example:

Based on the cumulative flow of figure 7.80 and assuming that a liquidity resource of BRL70,000 applies, the new transitory loss becomes null after the liquidity resource, since:

$$TL^*(\Phi_k) = min[TL(\Phi_k) + LR_{Pos}(\Phi_k), 0] \; = min[-68{,}078 + 70{,}000\,, 0] = 0$$

In this case, the aggregate loss is equal to the permanent loss:

$$AL(\Phi_k) = PL(\Phi_k) + TL^*(\Phi_k) = -63{,}066 + 0 = -63{,}066$$

If the liquidity feature is not available, the aggregate loss is the sum of the permanent and transitory losses:

$$TL^*(\Phi_k) = -68{,}078 + 0 = -68{,}078$$

$$AL(\Phi_k) = PL(\Phi_k) + TL^*(\Phi_k) = -63{,}066 - 68{,}078 = -131{,}114$$

The aggregate loss is the key risk metric of the CORE methodology, as observed in the sections that describe modules CORE0, CORE1 and CORE2.

7.6.7 Subportfolio 1 procedure – Default on $T+1$ vs. default on $T+2$

Section 7.4 detailed the closeout process. One of the points explored therein, as illustrated in figure 7.2, was the time-length of exposure to an event of **default** to be covered by the model, which extends from $T+1$ to $T+2$, given that the collateralization cycle occurs at least on a daily basis.

An issue which naturally derives from that property refers to the difference in incurred risks should the **default** occur on either $T+1$ or $T+2$. As an example, consider the case of a **portfolio** containing a long **position** in the cash equities market to be settled on $T+1$ and a short **position** in the same market and **asset** at the same quantity to be settled on $T+2$. If a **default** occurs on $T+1$, the amount due on $T+1$ integrates the risk. However, the **asset** obtained from the **settlement** of the long **position** can be utilized to meet the **delivery** obligation arising from the short **position** on $T+2$, which in turn makes any closeout **transaction** unnecessary. Yet, if a **default** does not occur on $T+1$, only the risk of the short **position** to be settled on $T+2$ remains, in which case a closeout **transaction** associated with the **asset** purchase would be required, at a price simulated under risk scenarios.

Contingent on **asset** prices simulated under risk scenarios, average prices of **positions**, financial volumes involved and amount of the liquidity resource, the final risk can be greater either in the first case (**default** on $T+1$) or in the second case (**default** on $T+2$). For **portfolios** with greater diversity of **positions**, the uncertainty about the case where risk is higher is further enhanced.

In order to ensure sufficient collateralization to cover an event of **default** on either $T+1$ or $T+2$, the CORE methodology is applied at least twice, taking from the two results the one which represents the higher risk. The first risk calculation considers the full **portfolio** and corresponding **collateral.**, The second risk calculation disregards the **positions** to be settled on $T+1$,— except for the lending **positions** in **securities lending** with **settlement** date in $T+1$ and with **asset delivery** directly to B3 **collateral subaccount**.

7.6.8 Subportfolio 2 procedure – Offsetting risk between positions with short and long maturities

In certain situations, the maturity of a **position** may cause significant alterations in the risk measure, such as when **positions** in contracts close to maturity serve as a hedge for **positions** in longer-

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

maturity contracts. When determining the total risk value, any increase in risk due to maturing **positions** is anticipated. This process is called subportfolio 2 procedure.

During the period from the beginning of validity of the subportfolio 2 procedure up to and including the last day of risk of the short-maturity **position** (or contract), the risk measures are reviewed for two subsets of **positions** and **collateral**, that is:

(i) **Collateral** and all the **positions** (original **positions**); and

(ii) **Collateral** and the original **positions** without the **positions** in listed financial and commodity derivatives *X* days before maturity.

Hence, the risk metric used in the collateralization process is obtained from the worse value between the values calculated under the two subsets of **positions** and **collateral**.

During certain periods, the combination of subportfolio 1 and 2 procedures makes the CORE methodology to be applied four times to some **portfolios** and related **collateral**.

7.6.9 Minimum margin for options

Writing a large number of deep out-of-the-money options can be a way for market **participants** to obtain low-cost funding. And given the leverage power of this type of instrument, moderate changes to underlying **asset** prices have the potential to generate high losses for written **positions**. In order to mitigate such risk, the minimum **margin** procedure is applied to the **positions** in options contracts (on-exchange and off-exchange markets). In general, the minimum **margin** procedure seeks to increase the cost for this type of funding **transaction** by increasing **margin**, but without penalizing the **participants** that use option strategies to protect themselves against losses arising from written deep out-of-the-money option **positions**. Increased costs represent a disincentive for this type of funding, thus reducing the risk generated by such **transactions**.

The minimum **margin** procedure can be described as follows:

- Options **positions** from the **investor**'s **portfolio** are grouped into different sets by underlying asset, expiration date and type (calls or puts);
- The sets are selected when the aggregate short **positions** are larger than the aggregate long **positions**, where the aggregation level is the quantity; and
- For each selected set:
    1. Delta is calculated for each option **position**;
    2. For each written call option **position** i whose delta δ_{Call_i} is lower than the parameter defined as minimum delta ($\delta_{\min}$), the theoretical underlying **asset** price, S_{Call_i}, is calculated, corresponding to the minimum delta.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Each option premium is recalculated at the corresponding S_{Call_i};

3. For each written put option **position** i whose delta δ_{Put_i}, in absolute value, is lower than the parameter defined as minimum delta ($\delta_{\min}$), the theoretical underlying **asset** price, S_{Put_i}, is calculated, corresponding to a delta, in absolute value, equal to the minimum delta.

   Each option premium is recalculated at the corresponding S_{Put_i};

4. From step 2 the written call option **position** that has the lowest delta ($\delta^*_{Call_i} = \min_i\left(\delta_{Call_i}\right)$) and the corresponding theoretical underlying **asset** price, $S^*_{Call_i}$, are selected.

   For each purchased call option **position** j whose delta δ_{Call_j} is lower than the minimum delta parameter ($\delta_{\min}$), the premium is recalculated using $S^*_{Call_j}$;

5. From step 3 the written put option **position** that has the lowest delta in absolute value ($\delta^*_{Put_i} = \min_i\left(\delta_{Put_i}\right)$) and the corresponding theoretical underlying **asset** price, $S^*_{Put_i}$, are selected.

   For each purchased put option **position** j whose delta in absolute value ($abs\left(\delta_{Put_i}\right)$) is lower than the minimum delta parameter ($\delta_{\min}$), the premium is recalculated using $S^*_{Put_i}$;

6. Let:

   M' be the **margin** for the option **positions** disregarded in steps 2, 3, 4 and 5;

   M_{Call} be the **margin** for the **positions** selected in steps 2 and 4 calculated by using the original premiums;

   M^*_{Call} be the **margin** for the **positions** selected in steps 2 and 4 calculated by using the recalculated premiums;

   M_{Put} be the **margin** for the **positions** selected in steps 3 and 5 calculated by using the original premiums; and

   M^*_{Put} be the **margin** for the **positions** selected in steps 3 and 5 calculated by using the recalculated premiums.

   The minimum **margin** for the set of options **positions** is given by the following equation:

$$MM = M' + \min\left[M_{Call}, M^{*}_{Call}\right] + \min\left[M_{Put}, M^{*}_{Put}\right] \quad (7.12)$$

7.7 Module CORE0 – Risk calculation of allocated positions under the collateralization mode by investors

Module CORE0 provides:

(i) The closeout strategy for the **investors**' **positions** that were collateralized by the **investors** themselves (meaning the **positions** registered in the collateralization mode by the relevant **investor**) and related **collateral**; and

(ii) The worst balance for the **investors**' **collateral**, that is, the deficit or excess amount of **collateral** assessed under the scenario that generates the worst aggregate loss (considering the liquidity resource, the subportfolio procedures and the minimum option **margin** criteria) resulting from the closeout of **positions** and **collateral** in accordance with the strategy referred to in paragraph (i).

The closeout strategy is determined as described in section 7.4.

The worst balance of **collateral** defines the amount of **margin** to be called from any **investor**, pursuant to chapter 1 (**Safeguard** structure) of this manual, and it may affect the operating balance of the **full trading participant** or **settlement participant** responsible for the relevant **investor**, which is monitored on an intraday basis according to the methodology presented in chapter 3 (Intraday risk monitoring).

7.7.1 Investor's risk – Worst aggregate loss and worst risk scenario

The worst aggregate loss resulting from the closeout process (under the collateralization mode by the **investors**) of an **investor**'s **position** and **collateral** is defined as said **investor**'s residual risk, taking into consideration all of the risk scenarios. The scenario corresponding to such aggregate loss is called worst risk scenario for the **investor** and is denoted by Φ^{*}.

$$Risk_{Resid} = -\min_{1 \le k \le M}\left[AL\left(\Phi_k\right)\right] = AL\left(\Phi^{*}\right) \quad (7.13)$$

Aggregate losses $AL\left(\Phi_k\right)$, which define the **investor**'s risk values, are a function of the liquidity resource liable to be used to cover temporary needs of funds, associated with principal **payment** and monetization of illiquid **collateral**, according to expression (7.10) and (7.11). The amount of the liquidity resource, considering scenario Φ_k, is a direct result of the amount of the transitory loss associated with closeout under such a scenario for each group of **positions** eligible to use the liquidity resource, according to the following equation:

$$LR_{Pos}(\Phi_k) = min\left[-\sum_{\forall G_N} TL^{G_N}_{Elig}(\Phi_k), -TL_{NoCall}(\Phi_k), AMT_{CORE0} - LR_{CollIlliq}(\Phi_k)\right] \quad (7.14)$$

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Where:

$TL_{Elig}^{G_N}(\Phi_k)$: the transitory loss arising out of the closeout, under scenario Φ_k, of group G_N of **positions** eligible to use the liquidity resource;

$TL_{NoColl}(\Phi_k)$: the transitory loss arising out of the closeout, under scenario Φ_k, of the set of **positions** excluding **collateral**;

$LR_{CollIlliq}(\Phi_k)$: temporary liquidity needs associated with the monetization of illiquid **collateral**; according to equation (7.6); and

AMT_{CORE0}: the maximum amount allocated as liquidity resource to the **investor**, subject to the limit defined by B3.

The maximum amount allocated as liquidity resource to each **investor** (AMT_{CORE0}), is a parameter defined by the **full trading participant** or **settlement participant**, and it is equivalent to the availability of liquidity resources that the relevant **participant** has the ability to allocate in the event of closeout of the **investor**'s **portfolio** and **collateral**. The **clearinghouse** establishes a maximum value for this parameter, which is also the initial value thereof and which the relevant **participant** can reduce, at its discretion. The **participant** can also allocate different amounts of liquidity resource to each one of its **investors**.

The amount initially defined by the **clearinghouse** for AMT_{CORE0} (and also the upper limit thereof) is based on a partial allocation of the liquidity resources available to the **clearinghouse**. The fraction of partial allocations, as well as those amounts' determination and update, are carried out by the Central Counterparty Risk Internal Committee. Among the liquidity resources considered to be available to the **clearinghouse** to define that parameter are those described in chapter 1 (**Safeguard** structure) of this manual, namely the FILCB fund, the portion of the B3 capital formally and exclusively earmarked for the **clearinghouse**, and the liquidity assistance facilities to which the **clearinghouse** has access. Such liquidity resources are exclusively accessible by B3, and not by the **participants** when they are closing out their **investors**' **portfolios**. For this reason, a **participant** must establish the parameter value that reflects the access to the liquidity resources that it would have should the **portfolio** of an **investor** under said **participant**'s responsibility be closed out, and input the modification thereof into the system whenever the allocated portion is lower than the limit stipulated by the **clearinghouse**.

Example:

Suppose that the **portfolio** analyzed in subsection 7.4.2.6, paragraph (b), is subject to risk assessment by module CORE0 and that there is a single set of **positions** eligible to use the liquidity resource, which includes the cash sale **position** without **coverage**, the cash purchase **position**, the forward

purchase **position** and the borrowing and lending **positions** in **securities lending**, all of which based on the same **asset** A. This set of **positions** is precisely the one analyzed in subsection 7.4.2.6, paragraph (a), and its cumulative flow corresponds to the one presented in figure 7.81. Suppose that the maximum amount available as liquidity resource to the concerned **investor** (AMT_{CORE0}) is BRL30,000, considering the **investor**'s eligible **positions**. Thus, the liquidity resource applicable to the full **portfolio** must be:

$$LR_{Pos}(\Phi_k) = min\left[-TL_{Elig}(\Phi_k)\,, -TL_{NoColl}(\Phi_k)\,, AMT_{CORE0} - LR_{Collilliq}(\Phi_k)\right] =$$
$$= min[-(-35{,}300), -(-68{,}078)\,, 30{,}000] = 30{,}000$$

In this case, the liquidity resource to be applied to the **portfolio** is limited to the maximum amount available as liquidity resource to this **investor**.

The cumulative flow of the full **portfolio** is obtained from figure 7.78 and is shown below, with the identification of both transitory loss and permanent loss:

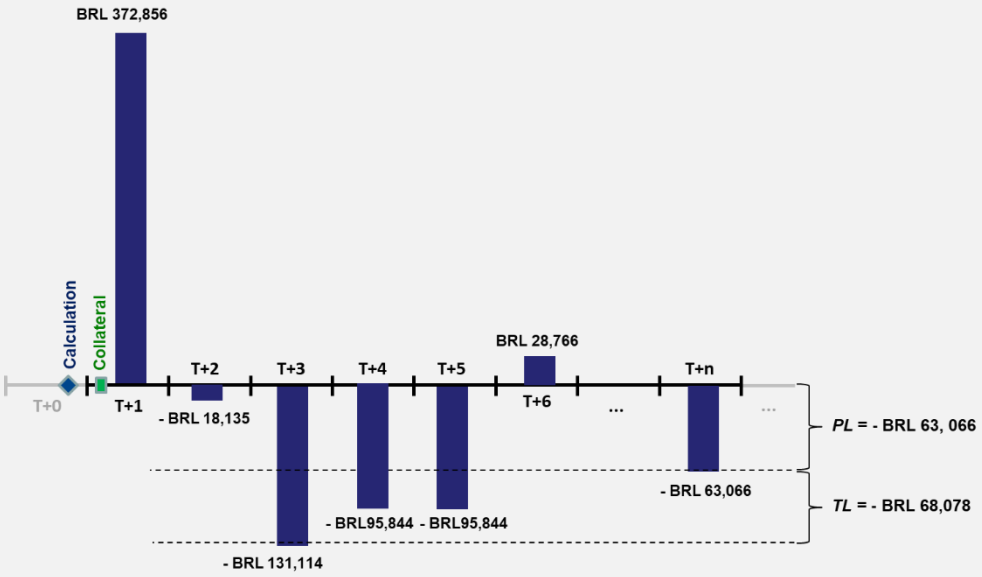


Figure 7.83- Diagram of cumulative cash flows of figure 7.79 and identification of permanent (PL) and transitory (TL) losses

After the liquidity resource is used, the transitory loss becomes:

$$TL^*(\Phi_k) = min[TL(\Phi_k) + LR_{Pos}(\Phi_k)\,, 0] = -68{,}078 + 30{,}000 = -38{,}078$$

The resulting aggregate loss (AL) is based on both permanent loss and transitory loss after the liquidity resource is used.

$$AL(\Phi_k) = PL(\Phi_k) + TL^*(\Phi_k) = -63{,}066 - 38{,}078 = -101{,}114$$

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

7.7.2 Collateral balance

The deficit or excess amount of **collateral** resulting from the risk calculation process receives the name of **collateral** balance. Denoted by $B\left(\Phi^*\right)$, this balance, when negative, corresponds to the amount of **margin** to be called from the **investor**.

Consider τ^* as the holding period that corresponds to the worst cumulative financial flow, defined as follows:

- If $AL\left(\Phi^*\right)<0$, τ^* is the period when the worst cumulative cash financial flow is observed, considering both **positions** and **collateral**;
- If $AL\left(\Phi^*\right)=0$, τ^* is the period when the worst negative cumulative financial flow resulting from the closeout of only **positions** under the worst case scenario is observed, that is, excluding **collateral**; if there is no such negative cumulative flow (meaning that the closeout process of only **positions** does not imply, for any period in the holding period, a negative cumulative flow), then $\tau^* = n$ (the last period in the holding period).

The balance of **collateral** is given by the following equation:

$$B(\Phi^*) = \begin{cases} min\begin{bmatrix} Coll(\Phi^*) - Risk_{NoColl}(\Phi^*) - ExColl_{Illiq}(\Phi^*) + LR_{Pos}(\Phi^*), \\ , Coll(\Phi^*) - ExColl_{Illiq}(\Phi^*) \end{bmatrix} & \text{se } \tau^* < T \\ min\begin{bmatrix} Coll(\Phi^*) - Risk_{NoColl}(\Phi^*) - ExColl_{Illiq}(\Phi^*), \\ , Coll(\Phi^*) - ExColl_{Illiq}(\Phi^*) \end{bmatrix} & \text{se } \tau^* = T \end{cases} \quad (7.15)$$

Where:

$Coll\left(\Phi^*\right)$: the cumulative **collateral** amount, up to τ^*, closed out under the worst case scenario, given by the sum of the daily financial flows, up to τ^*, generated by the closeout of **collateral**;

$Risk_{NoColl}\left(\Phi^*\right)$: the risk value attributed only to the **positions**, given by the cumulative cash flow, up to τ^*, resulting from the respective closeouts thereof under the worst case scenario;

$ExColl_{Illiq}(\Phi^*)$: excess of illiquid **collateral**, calculated according to equation (7.7); and

$LR_{Pos}(\Phi^*)$: the amount of the liquidity resource associated with **positions** closeout liable to be used in the closeout of **positions** and **collateral** under the worst case scenario, calculated according to equation (7.14).

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Denoting by $v_{\tau}^{Pos}\left(\Phi^{*}\right)$ and $v_{\tau}^{Coll}\left(\Phi_{k}\right)$ the financial flows of period τ resulting, respectively, from the closeout of positions and from the closeout of **collateral** under the worst case scenario, then:

$$Risk_{NoColl}\left(\Phi^{*}\right)=-\min\left(0,\ \sum_{\tau=1}^{\tau^{*}} v_{\tau}^{Pos}\left(\Phi^{*}\right)\right) \tag{7.16}$$

and

$$Coll\left(\Phi^{*}\right)=\sum_{\tau}^{\tau^{*}} v_{\tau}^{Coll}\left(\Phi^{*}\right) \tag{7.17}$$

7.7.3 Subportfolio procedures

As described in section 7.6, the subportfolio 1 procedure processes the calculation of risk for two sets of **positions** (whether including or not those to be settled on $T+1$). Additionally, during the periods when the subportfolio 2 procedure is applied, the calculation of risk must also be processed for two other sets of **collateral** and **positions** (whether including or not those close to maturity). Therefore, in certain periods, risk calculation is processed four times, once for each one of the following sets:

(i) Original **collateral** and **positions**;

(ii) Original **collateral** and **positions**, except for the **positions** close to maturity;

(iii) Original **collateral** and **positions**, except for the **positions** to be settled on $T+1$; and

(iv) Original **collateral** and **positions**, except for the **positions** to be settled on $T+1$ and for those close to maturity.

Finally, the processing to be considered is the one that results in increased risk, meaning the worst set of **positions** and **collateral**.

Hence, in those periods the risk of the **investor** is given by:

$$Risk_{Resid}=-\min\left[AL_{(i)}\left(\Phi^{*}\right),\ AL_{(ii)}\left(\Phi^{**}\right),\ AL_{(iii)}\left(\Phi^{***}\right),\ AL_{(iv)}\left(\Phi^{****}\right)\right] \tag{7.18}$$

Where Φ^{*}, Φ^{**}, Φ^{***} and Φ^{****} are, respectively, the worst case scenario for sets (i), (ii), (iii) and (iv) defined above, with the aggregate losses measured for the respective sets.

Denote by Φ_{Worst} the worst case scenario for the worst set of **positions** and **collateral**, that is:

$$\Phi_{Worst}=\arg\min\left[AL_{(i)}\left(\Phi^{*}\right),\ AL_{(ii)}\left(\Phi^{**}\right),\ AL_{(iii)}\left(\Phi^{***}\right),\ AL_{(iv)}\left(\Phi^{****}\right)\right] \tag{7.19}$$

The balance of **collateral** during the period when the subportfolio procedures are applied, given by equation (7.17), will correspond to the amount calculated under scenario Φ_{Worst} for the worst set of **positions** and **collateral**:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

$$B(\Phi_{Worst}) = \begin{cases} min\begin{bmatrix} Coll(\Phi_{Worst}) - Risk_{NoColl}(\Phi_{Worst}) - ExColl_{Illiq}(\Phi_{Worst}) + LR_{Pos}(\Phi_{Worst}), \\ Coll(\Phi_{Worst}) - ExColl_{Illiq}(\Phi_{Worst}) \end{bmatrix} & \text{if } \tau^* < T \\ min\begin{bmatrix} Coll(\Phi_{Worst}) - Risk_{NoColl}(\Phi_{Worst}) - ExColl_{Illiq}(\Phi_{Worst}), \\ Coll(\Phi_{Worst}) - ExColl_{Illiq}(\Phi_{Worst}) \end{bmatrix} & \text{if } \tau^* = T \end{cases} \quad (7.20)$$

7.7.4 Minimum margin for options

The minimum **margin** procedure is applied to option **positions** considering the closeout of **positions** and **collateral** under the worst case scenario, generating new risk measures and **collateral** balance.

The minimum **margin** procedure for options is applied after the adoption of the subportfolio procedures.

Comparing the new risk measures to those obtained without the application of the minimum **margin** procedure, the worst measures are selected as the end result of module CORE0:

$$Risk_{Resid}^{CORE0} = \max\left[Risk_{Resid} \ , \ Risco_{Resid}^{MM} \right] \quad (7.21)$$

and

$$Balance_{C}^{CORE0} = \min\left[B \ , \ B^{MM} \right] \quad (7.22)$$

Where:

$Risk_{Resid}$: the **investor**'s risk resulting from the subportfolio procedures, according to equation (7.18) (and, therefore, without the minimum **margin** procedure);

$Risco_{Resid}^{MM}$: the **investor**'s risk calculated according to equation (7.13) and considering the minimum **margin** procedure and scenario Φ_{Worst};

B: the balance of **collateral** considering scenario Φ_{Worst} without the minimum **margin** procedure; and

B^{MM}: the balance of **collateral** considering scenario Φ_{Worst} and including the minimum **margin** procedure.

7.7.5 Potential liquidity resource

As previously discussed, the CORE methodology anticipates the possible use of liquidity resources during a **portfolio** closeout. Thus, within the scope of eligible **positions**, positive financial flows have

the potential to aid negative financial flows, even if the latter occur before the first. In some cases, when calculating the risk of a **portfolio** in the closeout simulation, there may be excess eligible positive flows still not used in the concerned closeout. However, it is known that such excess eligible positive flows could be used when including new eligible **positions** that might generate negative financial flows in risk calculation, thus compensating for certain risk increases bore by the **investor**. Although the excess portion is not reflected in **collateral** balance variable $B\left(\Phi_{Worst}\right)$, the **participant** is informed thereof by means of the potential liquidity resource metric, which is defined as follows:

$$LR_{Potential}(\Phi_{Worst}) = min\begin{bmatrix} PG_{Elig}(\Phi_{Worst}), PG(\Phi_{Worst}), \\ \max\begin{bmatrix} EG_{Post\ \tau^*}(\Phi_{Worst}) + AL_{Post\ \tau^*} - LR_{Pos}(\Phi_{Worst}) - LR_{GarIlliq}(\Phi_{Worst}), \\ 0 \end{bmatrix}, \\ AMT_{CORE0} - LR_{Pos}(\Phi_{Worst}) - LR_{GarIlliq}(\Phi_{Worst}) \end{bmatrix} \quad (7.20)$$

Where:

$PG_{Elig}\left(\Phi_{Worst}\right)$: the permanent gain (defined according to equation (7.24)) in the worst case scenario, considering only eligible **positions**; and

$PG\left(\Phi_{Worst}\right)$: the permanent gain (defined according to equation (7.24)) in the worst case scenario, considering all the **positions** and **collateral**.

$EG_{Post\ \tau^*}\left(\Phi_{Worst}\right)$: gain from elegible **positions** (defined according to equation (7.26)) in the worst case scenario after the period when it is observed the worst accumulated cash flow, considering eligible **positions**; and

$AL_{Post\ \tau^*}\left(\Phi_{Worst}\right)$: aggregate loss (defined according to equation (7.27)) in the worst case scenario after the period when it is observed the worst accumulated cash flow, considering **positions** and **collateral** and disregarding the gain from eligible **positions**.

The permanent gain metric is defined as:

$$PG_{Elig}(\Phi_k) = max\left[\sum_{\tau=1}^{T} v_{\tau}^{Elig}(\Phi_k)\ , 0\right] \quad (7.24)$$

Where $v_{\tau}\left(\Phi_k\right)$ is the cash flow generated on τ by eligible **positions**, under the scenario Φ_k, according to equation (7.2).

The permanent gain metric considering all the **positions** and **collateral** is defined as:

$$PG(\Phi_k) = max\left[\sum_{\tau=1}^{T}[v_{\tau}(\Phi_k)] - ExColl_{Illiq}(\Phi_k)\ , 0\right] \quad (7.25)$$

The metric of gain from eligible **positions** after the period when the worst accumulated cash flow is observed is defined as:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

$$EG_{Post\ \tau^*}\left(\Phi_k\right)=\begin{cases}\sum_{t=\tau^*+1}^{T}\max\left[v_t^{Eleg}\left(\Phi_k\right),0\right] & \text{if } \tau^*<T\\ 0 & \text{otherwise}\end{cases} \quad (7.26)$$

Where $v_t^{Elig}\left(\Phi_k\right)$ is the cash flow generated on t by considering all the eligible **positions** under the scenario Φ_k.

The metric of aggregate loss after the period when it is observed the worst accumulated cash flow disregarding the gain from eligible **positions** is defined as:

$$AL_{Post\ \tau^*}\left(\Phi_k\right)=\begin{cases}\min\left[\begin{array}{l}0,\ \sum_{t=\tau^*+1}^{\tau^*+1}\left(v_t^{PosCol}\left(\Phi_k\right)+\min\left[v_t^{Eleg}\left(\Phi_k\right),0\right]\right),\ldots,\\ \sum_{t=\tau^*+1}^{T-1}\left(v_t^{PosCol}\left(\Phi_k\right)+\min\left[v_t^{Eleg}\left(\Phi_k\right),0\right]\right),\\ \sum_{t=\tau^*+1}^{T}\left(v_t^{PosCol}\left(\Phi_k\right)+\min\left[v_t^{Eleg}\left(\Phi_k\right),0\right]\right)\end{array}\right] & \text{if } \tau^*<T\\ 0 & \text{otherwise}\end{cases} \quad (7.27)$$

where $v_t^{PosCol}\left(\Phi_k\right)$ is the cash flow genereted on t by **collateral** and ineligible **positions**, under scenario Φ_k.

7.8 Module CORE1 – Risk calculation for unallocated transactions

In connection with unallocated **transactions** under the responsibility of a **full trading participant** or **settlement participant**, module CORE1 provides:

(i) The closeout strategy for the set of unallocated **transactions** not assigned to an eligible **master account**;

(ii) For each eligible **master account** among N_i higher-risk eligible **master accounts** under the i-th **full trading participant** or **settlement participant**, where N_i must be equal or greater than 2, the closeout strategy for the set of unallocated **transactions** assigned to the relevant **master account**; and

(iii) The risk calculation for the set of all the unallocated **transactions**, excluding **collateral**.

A **master account** is considered eligible for the treatment described in this section if all account holders with active links to such **master account** meet the following criteria:

(i) They belong to one of the types of investors disclosed on the B3 website (www.b3.com.br); and

(ii) They are not holders of accounts with active link to any other **master account**, in the same **chain of responsibilities**.

Only one **master account** belonging to each **master account** holder under the responsibility of each **full trading participant** or **settlement participant** may be eligible for the treatment described in this section.

The risk of unallocated **transactions** (which is monitored throughout the day, as presented in chapter 4 (Intraday risk monitoring) of this manual) affects the operating balance of the **full trading participant** or **settlement participant** and determines, at end-of-day processing, the amount of **margin** to be called from the **participant** (as described in chapter 1 (**Safeguard** structure)). The risk measurement algorithm for unallocated **transactions** is based on the assumption of no netting between winning and losing **positions**, since it is not possible to state a priori if they will be allocated to a single **investor** or to different **investors**.

In module CORE1, each **position** created from an unallocated **transaction**, except the **positions** eligible to use the liquidity resource, and the **positions** arising from structured operations has a closeout strategy reviewed on an individual basis.

The **positions** arising from structured **transaction** are jointly evaluated by structure. The **positions** eligible to use the liquidity resource are assessed separately from the other **positions**, as if belonging to a single portfolio.

Let $A = \left\{a_j, a'_j, s_j, s'_j, B\right\}$ be the set of the following **positions** resulting from unallocated **transactions**:

- For each instrument j, a long **position** whose size Q_j^{Long}, with $Q_j^{Long} \geq 0$, is given by the sum of the quantities of the instrument in unallocated purchase **transactions** not and not belonging to the subset B;
- For each instrument j, a short **position** of size Q_j^{Vendas}, with $Q_j^{Vendas} \leq 0$, given by the sum of the of the instrument in the unallocated sale operations and not belonging to the subset B;
- For each structured **operation** type j, N_j positions whose size Q_j^i, with $i = 1, \ldots, N_j$, derived from the long position in the structure when dismembered in instruments that make up the structured **operation**;
- For each structured **operation** type j, N_j positions whose size Q_j^i, with $i = 1, \ldots, N_j$, derived from the short position in the structure when dismembered in instruments that make up the structured **operation**; and
- The subset B, made up of long **positions** on the variable income spot and forward markets and lending positions on the variable income asset lending market, fixed income ETF quotas and public fixed income in all instruments, long and eligible for the use of liquidity resources.

  Let $v_{j,\tau}\left(\Phi_k\right)$, $v'_{j,\tau}\left(\Phi_k\right)$, $v_{s_j,\tau}\left(\Phi_k\right)$, $v_{s'_j,\tau}\left(\Phi_k\right)$ and $v_{B,\tau}\left(\Phi_k\right)$ be the financial flows of the closeout process on $T+\tau$, under scenario Φ_k, for **position** a_j, **position** a'_j, structured **position** s_j, structured **position** s'_j and subset B of **positions**, respectively. The aggregate losses resulting from

the closeout of said **positions** under Φ_k, respectively $AL(a_j,\Phi_k)$, $AL(a'_j,\Phi_k)$, $AL(s_j,\Phi_k)$, $AL(s'_j,\Phi_k)$ and $AL(B,\Phi_k)$, and are given by:

$$AL(a_j,\Phi_k)=\min\left[0\ ,\ f_1(\Phi_k)\ ,\ f_2(\Phi_k)\ ,\ \ldots\ ,\ f_n(\Phi_k)\ \right],\ f_t=\sum_{\tau=1}^{t}v_{j,\tau}(\Phi_k) \tag{7.28}$$

$$AL(a'_j,\Phi_k)=\min\left[0\ ,\ f_1(\Phi_k)\ ,\ f_2(\Phi_k)\ ,\ \ldots\ ,\ f_n(\Phi_k)\ \right],\ f_t=\sum_{\tau=1}^{t}v'_{j,\tau}(\Phi_k) \tag{7.29}$$

$$AL(s_j,\Phi_k)=\min\left[0\ ,\ f_1(\Phi_k)\ ,\ f_2(\Phi_k)\ ,\ \ldots\ ,\ f_n(\Phi_k)\ \right],\ f_t=\sum_{\tau=1}^{t}v_{s_j,\tau}(\Phi_k) \tag{7.30}$$

$$AL(s'_j,\Phi_k)=\min\left[0\ ,\ f_1(\Phi_k)\ ,\ f_2(\Phi_k)\ ,\ \ldots\ ,\ f_n(\Phi_k)\ \right],\ f_t=\sum_{\tau=1}^{t}v_{s'_j,\tau}(\Phi_k) \tag{7.31}$$

and

$$AL(B,\Phi_k)=\min\left[0\ ,\ g_1(\Phi_k)\ ,\ g_2(\Phi_k)\ ,\ \ldots\ ,\ g_n(\Phi_k)\ \right]$$

$$g_t=\begin{cases}LR(\Phi_k)+\sum_{\tau=1}^{t}v_{B,\tau}(\Phi_k) & \text{if } t<T\\ \sum_{\tau=1}^{t}v_{B,\tau}(\Phi_k) & \text{if } t=T\end{cases}, \tag{7.32}$$

The amount of the liquidity resource necessary to cover temporary financial needs resulting from eligible **positions** and **collateral** is a function of the corresponding transitory loss, according to the following equation:

$$LR(\Phi_k)=\min\left[-TL_B(\Phi_k)\ ,\ AMT_{CORE1}\right] \tag{7.33}$$

Where:

$TL_B(\Phi_k)$: the transitory loss arising from the closeout of subset B of **positions** under scenario Φ_k; and

AMT_{CORE1}: the maximum amount available for use as liquidity resource for unallocated **transactions**, subject to the limit defined by B3.

The aggregate loss of subset A of **positions** under scenario Φ_k is the sum of the aggregate losses from the closeout of all **positions** A, that is:

$$AL_A(\Phi_k)=AL(B,\Phi_k)+\sum_j\left[AL(a_j,\Phi_k)+AL(a'_j,\Phi_k)\right] \tag{7.34}$$

For each **full trading participant** or **settlement participant**:

(i) Let *CM* be the set of all eligible master accounts N_{cm} under the **full trading participant** or **settlement participant**, with each account $A_m \in CM$ containing unallocated **transactions** assigned to them; and

(ii) Let A_{nm} be the set of unallocated **transactions** not assigned to any eligible master account.

The risk of the unallocated **positions** under the responsibility of the **full trading participant** or **settlement participant** is given by the largest sum, in absolute value, of (i) the risk of unallocated **positions** not assigned to any eligible master account (i.e. the set A_{nm} of **transactions'** risk) and (ii) the N_i higher-risk eligible **master accounts**, (i) and (ii) are evaluated under the same scenario, according to the following equation.

$$Risk_{A,NoColl}^{CORE1} = -\min_{1\le k\le M}\left[AL_{A_{nm}}(\Phi_k) + \sum_{m=1}^{N_i} AL_{A_m}(\Phi_k) \right] \tag{7.35}$$

7.9 Module CORE2 – Risk of allocated positions collateralized by full trading participants or settlement participants

Module CORE2 calculates the risk of a set of **positions** allocated to **investors** under the collateralization mode by a **full trading participant** or **settlement participant** and provides:

(i) The closeout strategy for the **positions** allocated to each **investor**;

(ii) The risk of the set of such **positions**, excluding **collateral**;

(iii) The amount of **collateral**; and

(iv) The worst balance of **collateral** of the **full trading participant** or **settlement participant**, that is, the deficit or excess amount of **collateral** (considering the liquidity resource and the subportfolio 1 procedure) resulting from the closeout strategy of **positions** and **collateral**.

The closeout strategies are determined as described in section 7.4.

The worst balance of **collateral** defines the amount of **margin** to be called from the **full trading participant** or **settlement participant**, as described in chapter 1 (**Safeguards** structure), and it affects the operating balances of the relevant **participant**, which is monitored on an intraday basis, according to the methodology presented in chapter 4 (Intraday risk monitoring).

7.9.1 Risk calculation

For each **full trading participant** or **settlement participant** P, module CORE2 calculates the risk associated with the **default** of a subset of N **investors**, where N is a parameter established by B3 at a number equal to or greater than 2, and it can also be differentiated by **full trading participant** or

settlement participant. The risk measure assumes the subset with the highest risk, being considered for each **investor** only the **positions** under the collateralization mode by **participant** P. The achievement of this metric is described below.

For each **participant** P, denote by A the set of portfolios of each of **participant** P's **investors**. Each portfolio $a \in A$, for which a closeout strategy is defined as detailed in section 7.4, is made up of the **investor**'s **positions** under the collateralization mode by **participant** P.

For each scenario Φ_k and for each portfolio $a \in A$, the permanent and transitory losses are determined without considering the liquidity resource (which is only taken into account at a later stage, when it is applied to the accumulation of transitory losses deriving from multiple portfolios closing out simultaneously).

To determine the subset of N portfolios with the highest risk under a given scenario Φ_k, it is necessary to define the aggregate loss of a subset of N portfolios. Let A_N be any subset of N portfolios of A. The aggregate loss of subset A_N considers the permanent and transitory losses of each portfolio $a \in A_N$ and the maximum amount of the liquidity resource available for use in the closeout of **investors**' **positions** under **participant** P in module CORE2 (AMT_{CORE2}). Under scenario Φ_k, the aggregate loss of subset A_N is thus computed:

$$AL_{A_N}(\Phi_k) = \min\left[\left(\sum_{a \in A_N} TL_a(\Phi_k)\right) + AMT_{CORE2}\ ,\ 0\right] + \sum_{a \in A_N} PL_a(\Phi_k) \qquad (7.36)$$

Where:

A_N: the subset of N portfolios of A, $A_N \subset A$;

$TL_a(\Phi_k)$: the transitory loss deriving from the closeout of portfolio a belonging to A_N under scenario Φ_k, without considering the liquidity resource;

$PL_a(\Phi_k)$: the permanent loss deriving from the closeout of portfolio a belonging to A_N under scenario Φ_k;

AMT_{CORE2}: the maximum amount available for use as liquidity resource for allocated **transactions** collateralized by **participant** P, subject to the limit defined by B3.

The aggregate loss of a subset of **investors** can be understood as the sum of the permanent and transitory losses of the portfolios making up that subset, with the accumulation of transitory losses liable to be mitigated through the liquidity resource. Under the assumption of simultaneous **defaults** by N **investors**, the liquidity resource represents the resources available to the party making the closeout of N portfolios. Hence the importance of representing said resources as a single amount that simultaneously mitigates the transitory losses of N portfolios taken together.

Therefore, the worst subset $A_N \subset A$ of N portfolios, under scenario Φ_k, is the one which shows the worst aggregate loss under scenario Φ_k. The resulting value is defined as **participant** P's aggregate loss under scenario Φ_k:

$$AL\left(\Phi_k\right) = \min_{A_N \subset A}\left[AL_{A_N}\left(\Phi_k\right)\right] \tag{7.37}$$

Participant P's risk thus corresponds to its aggregate loss under the worst risk scenario:

$$Risk_{P,NoColl}^{CORE2} = -\min_{1\le k\le M}\left[AL\left(\Phi^*\right)\right] = -AL\left(\Phi^*\right) \tag{7.38}$$

With Φ^* denominated as the worst case scenario for the allocated **positions** under the collateralization mode by **participant** P.

A computational difficulty is observed when calculating the aggregate loss according to equation (7.3), given that it covers all the combinations of N portfolios which define subsets A_N. In order to eliminate that difficulty, a rule of thumb can be applied: the worst subset $A_N \subset A$ (that is, the subset with the highest risk) will always be the one comprising (i) the N portfolios with the worst permanent losses, or (ii) the N portfolios with the worst aggregate losses without considering the liquidity resource. The mathematical proof of the validity of this rule of thumb is presented in Annex 4 of this manual.

So, to calculate **participant** P's risk it suffices to select two specific subsets of portfolios under scenario Φ_k, namely:

- Subset A_N^{PL}, consisting of N portfolios of **investors** with the worst permanent losses; and
- Subset A_N^{AL}, consisting of N portfolios of **investors** with the worst aggregate losses, calculated without considering the liquidity resource (that is, according to equation (7.7), with $LR = 0$).

The aggregate loss of each of these two groups of **investors**, considering the utilization of the liquidity resource, is given by equation (7.36), with A_N as subset A_N^{PL} or subset A_N^{AL}, that is:

$$AL_{A_N^{PL}}(\Phi_k) = \min\left[\left(\sum_{a \in A_N^{PL}} TL_a(\Phi_k)\right) + AMT_{CORE2} \ , \ 0\right] + \sum_{a \in A_N^{PL}} PL_a(\Phi_k) \qquad (7.36.A)$$

$$AL_{A_N^{AL}}(\Phi_k) = \min\left[\left(\sum_{a \in A_N^{AL}} TL_a(\Phi_k)\right) + AMT_{CORE2} \ , \ 0\right] + \sum_{a \in A_N^{AL}} PL_a(\Phi_k) \qquad (7.36.B)$$

Participant P's aggregate loss under scenario Φ_k is then given by:

$$AL(\Phi_k) = \min\left[AL_{A_N^{PL}}(\Phi_k) \ , \ AL_{A_N^{AL}}(\Phi_k)\right] \qquad (7.39)$$

With the application of this rule of thumb, equation (7.39) above replaces equation (7.37) for the aggregate loss under a certain scenario, and the risk assigned to **participant** P is still given by equation (7.38), which identifies the worst risk scenario.

7.9.2 Differentiation of parameter N by full trading participant or settlement participant

The definition of size N for the subset of **investors** assumed as **defaulters** in the calculation of **full trading participant** or **settlement participant** P's risk is based on the concentration of risk under the relevant **participant**.

The risk under **participant** P is considered to be "concentrated" when the average percentage that the sum of the 2 (two) largest risks represents in connection with the risk of all the **investors** is higher than a certain level established by B3. Otherwise, the risk of cash market **positions** collateralized by **participant** P is considered to be "pulverized," and the value of N will be reviewed periodically.

Established at a number equal to or greater than 2 for the **participant** with concentrated risk, parameter N will be increased for the **participant** with pulverized risk, so that the risk calculated for the subset of N **investors** is, for a given time period, greater than or equal to the ninety-ninth (99^{th}) percentile of the daily risks of the portfolio composed of the **positions** collateralized by **participant** P.

7.9.3 Collateral balance

Under CORE2, **collateral** deposited by **participant** P to collateralize **positions** under the collateralization mode by a **full trading participant** or **settlement participant** is valued according to

the minimum credit value (MCV) criterion. Pursuant to this criterion, the value assigned to a certain **asset** deposited as **collateral** in period τ corresponds to the smallest value from among the values attributed to the same **asset** under each scenario. Thus, the value of the set of all **collateral** posted by **participant** P for this purpose is given by:

$$COLL_P = \sum_{i=1}^{n} Coll_{i,\tau_i}^{MCV} \tag{7.40}$$

$$Coll_{i,\tau}^{VCM} = \min\left[Coll_{i,\tau}^{MCV}\left(\Phi_1\right) , Coll_{i,\tau}^{MCV}\left(\Phi_2\right) , \ldots , Coll_{i,\tau}^{MCV}\left(\Phi_M\right)\right] \tag{7.41}$$

Where:

τ_i : the minimum time period required for closing out **collateral** i; and

$Coll_{i,\tau}^{MCV}\left(\Phi_k\right)$: the value assigned to **asset** i deposited as **collateral** by P for **transaction** guarantee purposes in period τ under scenario Φ_k.

The balance of **collateral** indicates the sufficiency or otherwise of **collateral** posted by **participant** P to cover the risk of default of N **investors** whose **positions**, under the collateralization mode by the **full trading participant** or **settlement participant**, correspond to highest risk values. Denoted by $Balance_P^{CORE2}$, the **collateral** balance is given by the following equation, with the insufficiency of **collateral** given by negative values:

$$Balance_P^{CORE2} = COLL_P - Risk_{P,NoColl}^{CORE2} \tag{7.42}$$

Where:

$COLL_p$: the amount of **collateral** deposited by **participant** P for **transaction** guarantee purposes; and

$Risk_{P,NoColl}^{CORE2}$: the risk associated with the **positions** of N **investors** corresponding to the highest risk values.

7.9.4 Subportfolio 1 procedure

Risk calculation is processed for two sets of **positions**:

(i) Original **collateral** and **positions**; and

(ii) Original **collateral** and **positions**, except for the **positions** to be settled on $T+1$ by taking the worst result.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Hence, during that period the risk subject to collateralization by **participant** P is given by:

$$Risk_{P,NoColl}^{CORE2} = -\min\left[AL\left(\Phi^{*}\right) , AL\left(\Phi^{**}\right)\right] \tag{7.43}$$

Where Φ^{*} and Φ^{**} are, respectively, the worst case scenario for set (i) of **positions** and the worst case scenario for set (ii) of **positions**.

If $AL\left(\Phi^{*}\right) < AL\left(\Phi^{**}\right)$, that is, if the exclusion of **positions** to be settled on $T+1$ results in increased risk, then the balance of **collateral** given by equation (7.38) will be reduced by the same extent.

7.10 Instruments with different treatment in CORE

7.10.1 Instruments with independent cash flows of risk scenarios

In this subsection, the different treatments applied to instruments to which CORE methodology attributes cash flows that are independent of risk scenarios are described.

As presented in this chapter on section 7.5, the cash flow on a certain date τ , associated with the closeout of certain instrument i , under certain scenario Φ_k , is the element $v_{i,\tau}(\Phi_k)$ of the financial results matrix of the portfolio closeout in the refered scenario, denoted by $V_{lxT}(\Phi_k)$ (see matrix (7.1)). Therefore, assigning to instrument i cash flows that are independent of risk scenarios means assigning the same value to the element $v_{i,\tau}$ of all matrices M, that is $v_{i,\tau}(\Phi_k) = \alpha_{i,\tau}$, $k = 1, 2, ..., M$.

7.10.1.1 Options with single-scenario exercise

This subsection describes the cash flow information for options in which only a single strike can be exercised on the expiration date.

- **Long positions**

  The cash flow associated with long **positions** for the single-scenario exercise options is always null.

- **Short positions**

  Let $Q_{S_1,v}, Q_{S_2,v}, \ldots, Q_{S_N,v}$ be the quantities of short **positions** in options with same expiration date v, and strike prices $S_1, S_2, ..., S_N$, belonging to the **portfolio** at the time of risk calculation,

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The cash flow during period τ is null for all these short **positions,** except for the **position** with the largest quantity in the **portfolio**. For this **position**, the cash flow (negative) is equal to the payoff of the option, that is:

$$\alpha_{i,\tau} = \begin{cases} -abs\left(Q_{S^*,v}\right) \times C \times N & \text{if } S = S^* \\ 0 & \text{otherwise} \end{cases} \quad (7.44)$$

Where:

i: the single-scenario exercise option with expiration date V and strike price S;

S^*: the strike price of the single-scenario exercise option with expiration date V and the largest quantity in the **portfolio**. That is, S^* is such that $Q_{S^*,v} = \max\left(Q_{S_1,v}, Q_{S_2,v}, \ldots, Q_{S_N,v}\right)$;

C: the contract size, in points; and

N: the point value, in Brazilian Reais. If the option is negotiated in a different currency, the variable N is defined as the currency exchange rate along with its risk factor, based on the worst-case scenario of the portfolio.

7.10.1.1.2 Continuous Exercise Options

This subsection defines the cash flow information for options for which, on the expiration date, more than one strike can be exercised simultaneously.

▪ Long positions

The cash flow associated with long **positions** in continuous exercise options is always null.

▪ Short positions

Let $Q_{s_1,v}, Q_{s_2,v}, \ldots, Q_{s_n,v}$ be the quantities of short **positions** in options with the same expiration date v, and strike prices $S_1, S_2, \ldots, S_n$, respectively, belonging to the portfolio at the time of risk calculation.

The cash flow (negative) during period τ is equal to the sum of the payoffs of the options closed on the previous day $(\tau - 1)$, that is:

$$\alpha_{N,\tau} = \sum_1^N -abs\left(Q_{S_i,v}\right) \times C \times N$$

Where:

C: the contract size, in points; and

N: the point value, in Brazilian reais. If the option is negotiated in a different currency, the variable N includes the exchange rate component and assumes the value of the exchange rate risk factor corresponding to the worst-case scenario of the portfolio

7.10.2 Instruments mapped to independent risk factors

7.10.2.1 Independent primitive risk factors

Subsection 7.5.1 of this chapter defines a methodology used in determining risk scenarios under which the cash flows deriving from the closeout of **positions** and **collateral** are evaluated.

As described by matrix 7.4, a risk scenario Φ_m maps a state of nature into a single set of realizations of the risk factors. Therefore, a risk scenario defines a realization of the joint movement of all primitive risk factors (PRF) contained therein.

Let *m* be a given state of nature, with $m \in \{1, 2, \ldots, M\}$, and $S_{f,\tau}(m)$ be a realization of the *f*-th PRF on date $T+\tau$, evaluated under state *m*. A PRF is defined as independent of other PRFs when its realization is invariant to the state of nature, that is, $S_{f,\tau}(m) = \omega_{f,\tau}$ for all $m \in \{1, 2, \ldots, M\}$.

The value assigned to $\omega_{f,\tau}$ is defined, for each **portfolio**, based on the positive or negative exposure of all instruments mapped by *f*-th independent PRF, so that:

$$\omega_{f,\tau} = \begin{cases} \omega^{env}_{\min_{f,\tau}} & \text{if } \text{Exp}_{f,\tau} > 0 \\ \omega^{env}_{\max_{f,\tau}} & \text{if } \text{Exp}_{f,\tau} \leq 0 \end{cases} \tag{7.45}$$

Where:

$\omega^{env}_{\min_{f,\tau}}$: minimum price change (envelope) of *f*-th independent PRF on date $T+\tau$ defined according to the methodology described in subsection 7.5.1;

$\omega^{env}_{\max_{f,\tau}}$: maximum price change (envelope) of *f*-th independent PRF on date $T+\tau$ defined according to the methodology described in subsection 7.5.1; and

$\text{Exp}_{f,\tau}$: net exposure of the **portfolio** to instruments mapped by *f*-th independent PRF on date $T+\tau$

Considering the instruments mapped in the f-th independent FPR, the **portfolio** exposure value, $\text{Exp}_{f,\tau}$, is calculated based on the exposure of **positions** in futures contracts. This value is determined by the remaining quantity of each instrument, with a positive exposure value indicating a long **position** and a negative value indicating a short **position** on each date $D+\tau$. Furthermore, it encompasses the exposure from the set of **collateral** and **positions** on other instruments,

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

represented as the quantity to be net bought (resulting in a negative exposure value) or sold (resulting in a positive exposure value) on each date $D+\tau$, in accordance with the **portfolio** closure strategy detailed in section 7.4 of this chapter.

7.10.2.2 Independent Set of Primitive Risk Factors

As defined in section 7.5.1 of this chapter, a risk scenario Φ_m maps a state of nature into a unique set of realizations of risk factors, under which cash flows resulting from the closure of **positions** and **collateral** are evaluated.

Let m and n be two states of nature, with m,n∈{1,2,...,M}, and Φ_m and Φ_n be risk scenarios defined for two sets of PRFs. A set of F PRFs is defined as independent from the other PRFs when the scenario Φ_n is evaluated in the M states of nature independently of the scenario Φ_m.

As defined in section 7.5, the consolidated cash flow in period τ, denoted by $v_\tau(\Phi_k)$, is determined by summing the elements $v_{i,\tau}(\Phi_k)$ along the τ column of matrix (7.1) for the set I of **positions** or closure **operations** of a **portfolio**. Let J be a subset of **positions** or **operations** mapped into an independent set of PRFs; this results in a consolidated cash flow independent of that calculated for the other PRFs of the **portfolio**, such that:

(7.46)

$$v_\tau(\Phi_m) = \sum_{i=1}^{I-J} v_{i,\tau}(\Phi_m)\,, i \in \{1,2,\dots,I-J\}$$

and

$$v_\tau(\Phi_n) = \sum_{j=1}^{J} v_{j,\tau}(\Phi_n)\,, j \in \{I-J+1, I-J+2,\dots,I\}$$

The risk measures for the subset of **positions** J are calculated as described in section 7.6, implying measures that are independent of those calculated for other PRFs in the **portfolio**. The prices from scenario Φ_n that lead to the worst aggregate loss resulting from the closure process of the subset of **positions** J are used for the risk calculation of these **positions** and **operations**.

7.10.2.3 Instruments Eligible for Mapping to Independent Risk Factors or Sets of Independent Risk Factors

The following instruments may be mapped into independent risk factors:

- **Assets** underlying cash equities, corporate debt and fixed income ETF market **positions**;
- **Assets** underlying equities forward **positions**;

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

- **Assets** underlying **securities lending positions**;
- **Assets** eligible to be accepted as **collateral**;
- **Assets** underlying futures **positions**; and
- **Assets** underlying option positions.

The identification of instruments mapped into primitive risk factors that are ranked as independent and independent sets are included in the Mapping of Standardized Instrument Groups file, available on the B3 website (www.b3.com.br).

Appendix 1 - Assigning the amount of a participant's financial failure to the participants under its responsibility

A1.1 Criteria to assign the amount of a trading participant or foreign participant's failure to investors

In the event that **trading participant** or **foreign participant** P fails to a **full trading participant** and the **investor** that caused **trading participant** or **foreign participant** P's failure is not identified, the amount of the failure is assigned to the **investors** under the responsibility of the **trading participant**, in proportion to their **multilateral net** debit **balances**.

The portion of the amount of **participant** P's failure attributable to its **investors** corresponds to the amount of the failure in excess of the balance due by **participant** P's proprietary **positions**, that is:

$$AFV = \min\left[FV - MNB_{P,Investor} \ , \ 0 \right] \tag{A1.1}$$

Where:

the amount of **participant** P's cash **settlement** failure ($FV < 0$); and

$MNB_{P,Investor}$: the **multilateral net** debit **balance** of **participant** P in the capacity of an **investor** ($MNB_{P,Investor} < 0$).

Let $MNB(i)$ be the **multilateral net balance** of the i-th **investor** under **participant** P's responsibility, except for **participant** P in the capacity of an **investor**. The portion of AFV allocated to the i -th **investor**, denoted by $AFV(i)$, is given by:

$$AFV(i) = \min\left[MNB(i) \ , \ 0 \right] \times \frac{1}{MNB_{CD}} \times AFV \tag{A1.2}$$

$$MNB_{CD} = \sum_{i=1}^{N} \min\left[MNB(i) \ , \ 0 \right] \tag{A1.3}$$

Where N is the number of **investors** under **participant** P's responsibility, except for **participant** P in the capacity of an **investor**.

A1.2 Criteria to assign the amount of a full trading participant's or a settlement participant's failure to investors

In the event that **full trading participant** or **settlement participant** P fails to a **clearing member** and neither the **trading participant** or **foreign participant** nor the **investor** that caused **participant** P's failure are identified, the amount of the failure is assigned to the **investors** under the responsibility of **participant** P, in proportion to their **multilateral net** debit **balances**.

The portion of the amount of **participant** P's failure attributable to its **investors** corresponds to the amount of the failure in excess of the balance due by **participant** P's proprietary **positions**, that is:

$$AFV = \min\left[FV - MNB_{P,Investor} \ , \ 0 \right] \tag{A1.4}$$

Where:

FV: the amount of **participant** P's cash **settlement** failure ($FV < 0$); and

$MNB_{P,Investor}$: the **multilateral net** debit **balance** of **participant** P in the capacity of an **investor** ($MNB_{P,Investor} < 0$).

Let $MNB(i)$ be the **multilateral net balance** of the i-th **investor** under **participant** P's responsibility, except for **participant** P in the capacity of an **investor**. The portion of AFV allocated to the i-th **investor**, denoted by $AFV(i)$, is given by:

$$AFV(i) = \min\left[MNB(i) \ , \ 0 \right] \times \frac{1}{MNB_{CD}} \times AFV \tag{A1.5}$$

$$MNB_{CD} = \sum_{i=1}^{N} \min\left[MNB(i) \ , \ 0 \right] \tag{A1.6}$$

Where N is the number of **investors** under **participant** P's responsibility, except for **participant** P in the capacity of an **investor**.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

A1.3 Criteria to assign the amount of a clearing member's failure to full trading participants and settlement participants

In the event that **clearing member** CM fails and the **full trading participant** or the **settlement participant** that caused **clearing member** CM's failure is not identified, the amount of the failure is assigned to the **full trading participants** and **settlement participants** under the responsibility of **clearing member** CM, in proportion to their **multilateral net** debit **balances**.

The portion of the amount of the failure attributable to **full trading participants** and **settlement participants** corresponds to the amount of the failure in excess of the balance due by **clearing member** CM's proprietary **positions**, that is:

$$AFV = \min\left[FV - MNB_{CM,Investor} \ , \ 0 \right] \tag{A1.7}$$

Where:

FV : the amount of **clearing member** CM's cash **settlement** failure ($FV < 0$); and

$MNB_{CM,Investor}$: the **multilateral net** debit **balance** of **clearing member** CM in the capacity of an **investor** ($MNB_{CM,Investor} < 0$).

Let $MNB(i)$ be the **multilateral net balance** of the i-th **full trading participant** or **settlement participant** under **clearing member** CM, regardless of the **multilateral net balance** of **clearing member** CM in the capacity of an **investor** under the responsibility of such i-th **full trading participant** or **settlement participant**. The portion of AFV allocated to the i-th **full trading participant** or **settlement participant**, denoted by $AFV(i)$, is given by:

$$AFV(i) = \min\left[MNB(i) \ , \ 0 \right] \times \frac{1}{MNB_{PD}} \times AFV \tag{A1.8}$$

$$MNB_{PD} = \sum_{i=1}^{N} \min\left[MNB(i) \ , \ 0 \right] \tag{A1.9}$$

Where N is the number of **full trading participants** and **settlement participants** under **clearing member** CM's responsibility.

The amount thus assigned to a **full trading participant** or **settlement participant** can be attributed to the **investors** under the responsibility of any such **participant**, in accordance with the criteria described in section (A1.2) of this appendix.

Appendix 2 - Numerical examples on intraday risk monitoring

The examples in this appendix show illustrative values, and the parameters used herein do not necessarily represent current values adopted by B3.

Example A2-1 - Calculating the operating balance in the absence of allocated transactions

Consider BRL50 million to be the value of the **intraday risk limit** assigned to a **full trading participant** or **settlement participant** (**participant** P) in connection with said **participant**'s activities under **clearing member** CM. **Participant** P's operating balance is:

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P$$

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ Inv} + Add\ margin_P$$

Consider that, at the time **participant** P's operating balance is calculated, the **transactions** registered by **participant** P are still not allocated to the **accounts** of **investors** under its responsibility, meaning that said **transactions** are all unallocated. Assuming that the risk of the unallocated **transactions**, calculated under module CORE1 of the CORE methodology, is BRL75,500,000, then:

$$Risk_P = 0 + 75{,}500{,}000 + 0 + 0 = 75{,}500{,}000$$

Assuming there is no **collateral** deposited by **participant** P or by its **clearing member** for operating balance purposes, the result of **participant** P's operating balance is:

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P = 50{,}000{,}000 + 0 + 0 - 75{,}500{,}000 = -25{,}500{,}000$$

That is, **participant** P violates its **intraday risk limit** by BRL25,500,000, and it must either deposit **collateral** for operating balance purposes or **allocate** the **transactions** to **investors** with sufficient **collateral**.

Example A2-2 - Calculating the operating balance in the presence of allocated transactions under the collateralization mode by investors

Consider a **full trading participant** or **settlement participant** (**participant** P) with an **intraday risk limit** of BRL50 million and **collateral** deposited for operating balance purposes adding up to BRL10 million. **Participant** P's intraday risk is given by:

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ inv} + Add\ margin_P$$

Considering that, at the time **participant** P's operating balance is calculated, all the **transactions** registered under **participant** P's responsibility are allocated to four different **investors** whose **transactions** are under the collateralization mode by the **investors** themselves, then:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = \sum_{j \in \Omega_P} ResidRisk_C^j$$

Where $ResidRisk_C^j$ is the j-th worst residual risk from among the residual risks of **investors** under **participant** P's responsibility, and each **investor**'s residual risk is given by:

$$ResidRisk_C = \min\left[Balance_C^{CORE0} - Add\ margin_C\ ,\ 0 \right]$$

The following table shows the amounts of **collateral** deficit, calculated under module CORE1 of the CORE methodology, the additional **margin** values for the **investors** who/which were allocated **transactions**, and in the last column the residual risk associated with each **investor**.

Investor	$Risk_{Position}$	*Additional margin*	$Risk_{Investor}$
1	62,000,000	0	62,000,000
2	63,000,000	0	63,000,000
3	55,000,000	2,000,000	57,000,000
4	8,000,000	0	8,000,000

Table A2-1 - **Positions** collateralized by **investors**' **collateral**

Assuming that the residual risk of the **positions** collateralized by **investors**' **collateral** corresponds to the two highest residual risks of **investors**, that is, considering $N_P = 2$, then:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = ResidRisk_C^1 + ResidRisk_C^2 = 63{,}000{,}000 + 62{,}000{,}000 = 125{,}000{,}000$$

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P = 50{,}000{,}000 + 0 + 10{,}000{,}000 - 125{,}000{,}000 =$$
$$= -65{,}000{,}000$$

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

The intraday risk violation reaches BRL65 million. Pursuant to the provisions of chapter 4 (Intraday risk monitoring) hereof, the **participant** must provide the adjustment of its operating balance level. In this case, zeroing **investor** 1's risk and/or **investor** 2's risk is not sufficient to provide said adjustment, given the **collateral** deficit of **investors** 3 and 4 (after zeroing the risks of **investors** 1 and 2, the intraday risk would amount to BRL65 million and the **participant**'s operating balance would be negative by BRL5 million).

Example A2-3 - Calculating the operating balance in the presence of (a) allocated transactions under the collateralization mode by full trading participants or settlement participants, and (b) allocated transactions under the collateralization mode by investors

Consider a **full trading participant** or **settlement participant** (**participant** P) with an **intraday risk limit** of BRL50 million and **collateral** of BRL20 million posted for operating balance purposes. **Participant** P's intraday risk is given by:

$$Risk_{P} = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ inv} + Add\ margin_{P}$$

Participant P's risk is given by:

$$Risk_{Alloc\ trans\ coll\ P} = Risk_{P}^{CORE2}$$

Assuming that **participant** P's risk calculated under module CORE2 of the CORE methodology is equal to BRL10 million and additional **margin** is zero, then:

$$Risk_{Alloc\ trans\ coll\ P} = 10{,}000{,}000$$

Considering that, at the time **participant** P's operating balance is calculated, the **transactions** in the collateralization mode by **investors** registered under **participant** P's responsibility are allocated to four different **investors**, then:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = \sum_{j \in \Omega_{P}} ResidRisk_{C}^{j}$$

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Where $ResidRisk_C^j$ is the j-th worst residual risk from among the residual risks of **investors** under **participant** P's responsibility, and each **investor**'s residual risk is given by:

$$ResidRisk_C = \min\left[Balance_C^{CORE0} - Add\ margin_C\ ,\ 0 \right]$$

The following table shows the amounts of **collateral** deficit, calculated under module CORE1 of the CORE methodology, the additional **margin** values for the **investors** who/which were allocated **transactions**, and in the last column the residual risk associated with each **investor**.

Investor	$-\ Balance_C^{CORE0}$	$Add\ margin_C$	$ResidRisk_C$
1	62,000,000	0	62,000,000
2	63,000,000	0	63,000,000
3	55,000,000	2,000,000	57,000,000
4	8,000,000	0	8,000,0000

Table A2-2 - **Positions** collateralized by **investors**' **collateral**

Assuming that the residual risk of the **positions** collateralized by **investors**' **collateral** corresponds to the two highest residual risks of **investors**, that is, considering $N_P = 2$, then:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = ResidRisk_C^1 + ResidRisk_C^2 = 63{,}000{,}000 + 62{,}000{,}000 = 125{,}000{,}000$$

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ inv} + Add\ margin_P$$
$$Risk_P = 10{,}000{,}000 + 0 + 125{,}000{,}000 + 0 = 135{,}000{,}000$$

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P$$
$$OB_P = 50{,}000{,}000 + 0 + 10{,}000{,}000 - 135{,}000{,}000 = -75{,}000{,}000 \qquad = -65{,}000{,}000$$

The intraday risk violation reaches BRL75 million. Pursuant to the provisions of chapter 4 (Intraday risk monitoring) hereof, the **participant** must provide the adjustment of its operating balance level. In this case, zeroing **investor** 1's risk or **investor** 2's risk is not sufficient to provide said adjustment, given the **collateral** deficit of investors 3 and 4 (after zeroing the risks of **investors** 1 and 2, the intraday risk would amount to BRL75 million and the **participant**'s operating balance would be negative by BRL15 million).

Example A2-4 - Calculating the operating balance in the presence of unallocated transactions and allocated transactions under the collateralization mode by investors

Consider a **full trading participant** or **settlement participant** (**participant** P) with an **intraday risk limit** of BRL30 million, with no **collateral** deposited for operating balance purposes, holding unallocated **transactions** and having three **investors**. **Participant** P's operating balance and intraday risk are:

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P$$

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ inv} + Add\ margin_P$$

With:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = \sum_{j \in \Omega_P} ResidRisk_C^j$$

Suppose that the risk of allocated **transactions** is zero and of unallocated **transactions** is BRL8,700,000, and also that the residual risks of the **investors** are those displayed on the following table:

Investor	$ResidRisk_C$
1	7,200,000
2	8,100,000
3	0

Table A2-3 - **Investors**' **positions**

Assuming that the residual risk of the **investors** that is collateralized by proprietary **collateral** is given by the two worst **collateral** deficits, then:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = ResidRisk_C^1 + ResidRisk_C^2 = 8{,}100{,}000 + 7{,}200{,}000 = 15{,}300{,}000$$

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ inv} + Add\ margin_P$$
$$Risk_P = 0 + 8{,}700{,}000 + 15{,}300{,}000 + 0 = 24{,}000{,}000$$

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P = 30{,}000{,}000 + 0 + 0 - 24{,}000{,}000 = 6{,}000{,}000$$

In this example, the **participant**'s operating balance is positive by BRL6 million, therefore not requiring any action to adjust its **intraday risk limit**.

Example A2-5 - Calculating the operating balance in the presence of (a) unallocated transactions, (b) allocated transactions under the collateralization mode by full trading participants or settlement participants, and (c) allocated transactions under the collateralization mode by investors

Consider a **full trading participant** or **settlement participant** (**participant** P) with an **intraday risk limit** of BRL45 million, with no **collateral** posted for operating balance purposes, holding unallocated **transactions** and having three **investors**. **Participant** P's operating balance and intraday risk is given by:

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P$$

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ inv} + Add\ margin_P$$

With:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = \sum_{j \in \Omega_P} ResidRisk_C^j$$

Suppose that the risk associated with allocated **transactions** under the collateralization mode by the **full trading participant** or **settlement participant** is BRL10 million, that the risk of unallocated **transactions** is BRL8,700,000 and also that the residual risks of the **investors** are those presented on the following table:

Investor	$ResidRisk_C$
1	7,200,000
2	8,100,000
3	0

Table A2-4 - **Investors**' **positions**

Assuming that the residual risk of the **investors** that is collateralized by proprietary **collateral** is given by the two worst **collateral** deficits, then:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = ResidRisk_C^1 + ResidRisk_C^2 = 8{,}100{,}000 + 7{,}200{,}000 = 15{,}300{,}000$$

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ inv} + Add\ margin_P$$
$$Risk_P = 10{,}000{,}000 + 8{,}700{,}000 + 15{,}300{,}000 + 0 = 34{,}000{,}000$$

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P = 45{,}000{,}000 + 0 + 0 - 34{,}000{,}000 = 11{,}000{,}000$$

In this example, the **participant**'s operating balance is positive by BRL11 million, therefore not requiring any action to adjust its **intraday risk limit**.

Example A2-6 - Calculating intraday risk in the presence of a master account

Consider a **full trading participant** or **settlement participant** (**participant** P) with an **intraday risk limit** of BRL5 million holding only one **master account** (MA_1) with an **intraday risk limit** of BRL500,000, such that, at the time the intraday risk is calculated, **participant** P has:

(i) **Positions** assigned to **master account** MA_1 and still not allocated to **investors**; and

(ii) **Investors** holding **positions** collateralized by proprietary **collateral**, all such **investors** linked to **master account** MA_1.

Suppose that the risk of **transactions** is collateralized by **participant** P, that the risk of **transactions** assigned to the **master account** and still not allocated is BRL4,400,000, and also that the residual risks of **investors**' **positions** are those displayed on the following table:

Investor	Master account	$ResidRisk_C$
10	MA_1	2,000,000
20	MA_1	120,000
30	MA_1	4,600,000

Table A2-5 - **Positions** allocated to **investors** linked to **master account**

- According to the model that does not differentiate **master accounts**, the intraday risk of **participant** P is:

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ inv} + Add\ margin_P$$

With:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = \sum_{j \in \Omega_P} ResidRisk_C^j$$

By considering $N_P = 2$, then:

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + Risk_{Unalloc\ trans} + ResidRisk_{Alloc\ trans\ coll\ inv} + Add\ margin_P$$
$$Risk_P = 0 + 4{,}400{,}000 + 6{,}600{,}000 + 0 = 11{,}000{,}000$$

- According to the complementary model used in intraday risk calculation, which determines the balance associated with **master accounts** separately, the intraday risk of **participant** P is:

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + ResidRisk_{Alloc\ trans\ coll\ inv} + Risk_{Unalloc\ trans} + ResidRisk_{Master\ acct}$$

In the absence of **investors** not linked to **master accounts** and of unallocated **transactions** other than those assigned to **master accounts**, and there only being one **master account**, then:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

$$ResidRisk_{Master\ acct} = -\sum_{k=1}^{N_{MA}} \min\left[OB^{k}_{Master\ acct}\ ,\ 0 \right] = -\min\left[OB_{Master\ acct}\ ,\ 0 \right]$$

With:

$$OB_{Master\ acct}\left(MA_1\right) = IRL_{Master\ acct}\left(MA_1\right) - Risk_{Master\ acct}\left(MA_1\right)$$

$$Risk_{Master\ acct}\left(MA_1\right) = Risk_{Unalloc\ trans}\left(MA_1\right) + \sum_{j\in\Omega} ResidRisk^{j}_{C}\left(MA_1\right)$$

By assuming $N_{Inv} = 2$, that is, by considering in risk computation for the **master account** the two worst risks of **investors** linked to said **master account**, then:

$$Risk_{Master\ acct}\left(MA_1\right) = 4{,}400{,}000 + \left(4{,}600{,}000 + 2{,}000{,}000\right) = 11{,}000{,}000$$

$$OB_{Master\ acct}\left(MA_1\right) = 500{,}000 - 11{,}000{,}000 = -10{,}500{,}000$$

Participant P's intraday risk and operating balance are:

$$Risk_P = ResidRisk_{Master\ acct} = 10{,}500{,}000$$

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P$$
$$OB_P = 5{,}000{,}000 + 0 + 0 - 10{,}500{,}00 = -5{,}500{,}000$$

Therefore, **participant** P violates its operating balance level by BRL5,500,000. Additional **collateral posting** at an amount at least equivalent to the amount of the violation, total or partial **allocation** of the **positions** assigned to **master accounts** and **collateral posting** by **investors** for **transaction** guarantee purposes are among the alternatives available to **participant** P to adjust the **intraday risk limit** it was assigned.

Example A2-7 - Calculating operating balance in the presence of allocated and unallocated transactions and master account

Consider a **full trading participant** or **settlement participant** (**participant** P) with an **intraday risk limit** of BRL60 million, with no **collateral** deposited for operating balance purposes, but with two **master accounts** (MA_1 and MA_2) under its responsibility, each **master account** with an **intraday risk limit** of BRL5 million.

Suppose also that, at the time the operating balance is calculated, **participant** P has:

(i) Unallocated **transactions** (and not assigned to **master accounts**);

(ii) Allocated **transactions** under the collateralization mode by the **full trading participant** or **settlement participant**;

(iii) **Transactions** assigned to **master accounts** MA_1 and MA_2 and not allocated to **investors**;

(iv) **Investors** not linked to **master accounts** holding **positions** collateralized by proprietary **collateral**; and

(v) **Investors** linked to **master accounts** MA_1 and MA_2 holding **positions** collateralized by proprietary **collateral**.

According to the complementary model used in intraday risk calculation, which determines the risk associated with **master accounts** separately, the intraday risk of **participant** P is:

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + ResidRisk_{Alloc\ trans\ coll\ inv} + Risk_{Unalloc\ trans} + ResidRisk_{Master\ acct}$$

With:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = \sum_{j \in \Omega_P} ResidRisk_C^j$$

$$ResidRisk_{Master\ acct} = -\sum_{k=1}^{N_{MA}} \min\left[OB_{Master\ acct}^k\ ,\ 0 \right]$$

$$OB_{Master\ acct}\left(MA\right) = IRL_{Master\ acct}\left(MA\right) - Risk_{Master\ acct}\left(MA\right) \qquad (4.9)$$

$$Risk_{Master\ acct}\left(MA\right) = Risk_{Unalloc\ trans}\left(MA\right) + \sum_{j \in \Omega} ResidRisk_C^j\left(MA\right)$$

Consider the following risk values for the allocated and unallocated **transactions**:

- Unallocated **transactions** not assigned to **master accounts**:
  $ResidRisk_{Alloc\ trans\ coll\ inv} = 4{,}900{,}000$
- Allocated **transactions** in the collateralization mode by **participant** P:
  $ResidRisk_{Alloc\ trans\ coll\ P} = 10{,}000{,}000$
- Unallocated **transactions** assigned to **master account** MA_1:
  $Risk_{Unalloc\ trans}\left(MA_1\right) = 13{,}500{,}000$
- Unallocated **transactions** assigned to **master account** MA_2:
  $Risk_{Unalloc\ trans}\left(MA_2\right) = 8{,}400{,}000$

- Allocated **transactions** in the collateralization mode by the **investor**:

Investor	Master account	$ResidRisk_C$
1	--	7,200,000
2	--	8,100,000
3	--	1,200,000
10	MA_1	1,400,000
20	MA_1	630,000
30	MA_1	21,000,000
40	MA_2	6,200,000

Table A2-6 - **Investors' positions**

- Residual risk of **positions** collateralized by **investors**' **collateral** and not linked to **master accounts**: by considering $N_{Inv} = 2$, then:

$$ResidRisk_{Alloc\ trans\ coll\ inv} = \sum_{j \in \Omega_P} ResidRisk_C^j = 8{,}100{,}000 + 7{,}200{,}000 = 15{,}300{,}000$$

- Residual risk associated with **master accounts**: by considering $N_{MA} = 2$ and $N_{Inv} = 2$, then:

$$OB_{Master\ acct}\left(MA_1\right) = IRL_{Master\ acct}\left(MA_1\right) - Risk_{Unalloc\ trans}\left(MA_1\right) - \sum_{j \in \Omega} ResidRisk_C^j\left(MA_1\right) =$$
$$= 5{,}000{,}000 - 13{,}500{,}000 - \left(21{,}000{,}000 + 1{,}400{,}000\right) = -30{,}900{,}000$$

$$OB_{Master\ acct}\left(MA_2\right) = IRL_{Master\ acct}\left(MA_2\right) - Risk_{Unalloc\ trans}\left(MA_2\right) - \sum_{j \in \Omega} ResidRisk_C^j\left(MA_2\right) =$$
$$= 5{,}000{,}000 - 8{,}400{,}000 - 6{,}200{,}000 = -9{,}600{,}000$$

$$ResidRisk_{Master\ acct} = -\sum_{k=1}^{N_{MA}} \min\left[OB_{Master\ acct}^k\ ,\ 0\right] = 30{,}900{,}000 + 9{,}600{,}000 = 40{,}500{,}000$$

Participant P's intraday risk and operating balance are:

$$Risk_P = Risk_{Alloc\ trans\ coll\ P} + ResidRisk_{Alloc\ trans\ coll\ inv} + Risk_{Unalloc\ trans} + ResidRisk_{Master\ acct}$$
$$= 10{,}000{,}000 + 15{,}300{,}000 + 4{,}900{,}000 + 40{,}500{,}000 = 70{,}700{,}000$$

$$OB_P = IRL_P + Collateral_{CM,P} + Collateral_P - Risk_P = 5{,}000{,}000 + 0 + 0 - 70{,}700{,}00 = -20{,}700{,}000$$

Therefore, **participant** P violates its operating balance by BRL10,700,000. Additional **collateral posting** at an amount at least equivalent to the amount of the violation, total or partial **allocation** of the **positions** still not allocated, including those assigned to **master accounts**, and **collateral posting** by **investors** for **transaction**

guarantee purposes are among the alternatives available to **participant** *P* to adjust the **intraday risk limit** it was assigned.

Appendix 3 - Numerical examples on position limits

In this appendix, the **clearing member**, **full trading participant** and **settlement participant** are denoted, respectively, by CM, FTP and SP.

Example A3-1 - Calculating position limits and checking for violations – Futures market

Consider the **positions** outstanding at a given maturity of a futures contract, as shown on the following table. Said maturity defines an instrument, denoted by i.

Participants				Position	
CM	FTP/SP	Investor (name/ID)	Group of investors	Side	Number of contracts
1	12	Z/0001	X	Short	7,000
2	4	A/0002	Y	Short	9,000
3	5	B/0003	X	Short	5,000
4	12	D/0004	Y	Long	4,000
5	5	G/0005	X	Long	3,000
6	12	A/0002	Y	Long	14,000

Table A3-1 - **Positions** outstanding in instrument i

The total outstanding **position** in the market for this instrument is 21,000 contracts (21,000 contracts bought and 21,000 contracts sold).

Suppose that the values of parameters P and L that define the **position** limits for instrument i are the following:

Limit	Parameter P	Parameter L
1	$P(i,1)=20\%$	$L(i,1)=5{,}000$
2	$P(i,2)=30\%$	$L(i,2)=9{,}000$

Table A3-2 - Parameters for the **position** limits

Limit 1 and limit 2 are:

$$Limit_{i,1}=\max\left[P(i,1)\times Q_i^{Total}\ ,\ L(i,1)\right]=\max\left[0.2\times 21{,}000\ ,\ 5{,}000\right]=5{,}000\ \text{contracts}$$

$$Limit_{i,2}=\max\left[P(i,2)\times Q_i^{Total}\ ,\ L(i,2)\right]=\max\left[0.3\times 21{,}000\ ,\ 9{,}000\right]=9{,}000\ \text{contracts}$$

The **position** limit violations are displayed per **investor,** for the aggregation level Agg_2 on the following table:

Investor (name/ID)	Position (absolute value)	Excess position	
		In connection with limit 1 (5,000 contracts)	In connection with limit 2 (9,000 contracts)
Z/0001	7,000	2,000	-
A/0002	5,000	-	-
B/0003	5,000	-	-
D/0004	4,000	-	-
G/0005	3,000	-	-

Table A3-3 - **Position** limit violations for the aggregation level Agg_2

- The **position** of **investor** Z violates limit 1.
- The **positions** of the other **investors** adhere to both limits.

Regarding the groups of **investors** X and Y, the total **positions** are:

Group of investors	Long position (absolute value)	Short position (absolute value)
X	3,000	12,000
Y	18,000	9,000

Table A3-4 - Aggregation of open **positions** by group of **investors**

In relation to the consolidation of **positions** by FTP/SP, the total **positions** are:

FTP/SP	Long position (absolute value)	Short position (absolute value)
4	0	9,000
5	3,000	5,000
12	18,000	7,000

Table A3-5 - Aggregation of open **positions** by FTP/SP

Example A3-2 - Calculating position limits and checking for violations – Futures options market

Consider that, on a certain date, the **positions** in put options contracts based on a specific underlying for a particular expiration date are those given on the following table. Said options define an instrument, denoted by i.

Participants				Put option		Position	
CM	FTP/SP	Investor (name/ID)	Group of investors	Series (k)	Delta	Side	Number of contracts
1	5	A/0001	X	UFMJ (k_1)	-0.3466	Long	4,500
2	10	B/0002	Y	UFMJ (k_1)	-0.3466	Short	4,500
3	8	C/0003	X	UFMD (k_2)	-0.1256	Long	3,300
3	20	D/0004	Y	UFMD (k_2)	-0.1256	Short	7,500
4	6	E/0005	X	UFMD (k_2)	-0.1256	Long	1,700
3	8	F/0006	Y	UFMD (k_2)	-0.1256	Long	4,200
4	6	G/0007	X	UFMD (k_2)	-0.1256	Short	1,700
5	4	H/0008	Y	UFM6 (k_3)	-0.2831	Long	10,000
2	10	B/0002	Y	UFM6 (k_3)	-0.2831	Short	10,000

Table A3-6 - **Positions** outstanding in instrument i

The delta-equivalent **position** outstanding in the market on instrument i is 5,546 contracts. The range of strike prices for instrument i is $SP = \{k_1 , k_2 , k_3\}$. Hence:

$$Q_i^{Total} = \frac{1}{2} \times \sum_{k \in SP} Q_i^{Total}(k) \times abs(\Delta_i(k)) =$$

$$= \frac{1}{2} \times \left[Q_i^{Total}(k_1) \times abs(\Delta_i(k_1)) + Q_i^{Total}(k_2) \times abs(\Delta_i(k_2)) + Q_i^{Total}(k_3) \times abs(\Delta_i(k_3)) \right] =$$

$$= \frac{1}{2} \times \left[(9{,}000 \times 0.3466) + (18{,}400 \times 0.1256) + (20{,}000 \times 0.2831) \right] = 5{,}546$$

Suppose that the values of parameters P and L that define the **position** limits for instrument i are the following:

Limit	Parameter P	Parameter L
1	$P(i,1) = 20\%$	$L(i,1) = 1{,}000$
2	$P(i,2) = 35\%$	$L(i,2) = 2{,}900$

Table A3-7 - Parameters for **position** limits

Limits 1 and 2 for the instrument are:

$$Limit_{i,1} = \max\left[P(i,1) \times Q_i^{Total} \ , \ L(i,1) \right] = \max\left[0.2 \times 5{,}546 \ , \ 1{,}000 \right] = 1{,}109 \text{ contracts}$$

$$Limit_{i,2} = \max\left[P(i,2) \times Q_i^{Total} \ , \ L(i,2) \right] = \max\left[0.35 \times 5{,}546 \ , \ 2{,}900 \right] = 2{,}900 \text{ contracts}$$

The delta-equivalent **positions** held by each **investor** are:

$$Q_i^{Investor} = Q_i\left(k_1\right) \times abs\left(\Delta_i(k_1)\right) + Q_i\left(k_2\right) \times abs\left(\Delta_i(k_2)\right) + Q_i\left(k_3\right) \times abs\left(\Delta_i(k_3)\right)$$

$$Q_i^{001} = 4{,}500 \times 0.347 = 1{,}560$$

$$Q_i^{002} = 4{,}500 \times 0.347 - 10{,}000 \times 0.2831 = -4{,}391$$

$$Q_i^{003} = 3{,}300 \times 0.126 = 414$$

$$Q_i^{004} = -7{,}500 \times 0.126 = -942$$

$$Q_i^{005} = 1{,}700 \times 0.126 = 214$$

$$Q_i^{006} = 4{,}200 \times 0.126 = 528$$

$$Q_i^{007} = -1{,}700 \times 0.126 = -214$$

$$Q_i^{008} = 10{,}000 \times 0.2831 = 2{,}831$$

The **position** limit violations are displayed per **investor,** for the aggregation level Agg_2**,** on the table that follows:

Investor	Delta-equivalent position (absolute value)	Excess position	
		In connection with limit 1 (1,109 contracts)	In connection with limit 2 (2,900 contracts)
A	1,560	451	-
B	4,391	3,282	1,491
C	414	-	-
D	942	-	-
E	214	-	-
F	528	-	-
G	214	-	-
H	2,831	1,722	-

Table A3-8 - **Position** limit violations for the aggregation level Agg_2

- The **positions** of **investors** A, B and H violate limit 1.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

- The **position** of **investor** B violates limit 2.
- The **positions** of the other **investors** adhere to both limits.

FTP/SP	Investor	Group of investors	Long delta-equivalent position	Short delta-equivalent position
5	A/0001	X	1,560	0
10	B/0002	Y	0	-4,391
8	C/0003	X	414	0
20	D/0004	Y	0	-942
6	E/0005	X	214	0
8	F/0006	Y	528	0
6	G/0007	X	0	-214
4	H/0008	Y	2,831	0

Table A3-9 - Delta-equivalent **positions** segregated by long and short **positions**

Concerning the groups of **investors** X and Y, the total **positions** are:

Group of investors	Long delta-equivalent position (absolute value)	Short delta-equivalent position (absolute value)
X	2,188	214
Y	3,359	5,333

Table A3-10 - Aggregation of open **positions** by group of **investors**

In respect to the consolidation of **positions** by FTP/SP, the total **positions** are:

FTP/SP	Long delta-equivalent position (absolute value)	Short delta-equivalent position (absolute value)
4	2,831	0
5	1,560	0
6	214	214
8	942	0
10	0	4,391
20	0	942

Table A3-11 - Aggregation of open **positions** by FTP/SP

Regarding the **position** limit for a group of instruments, that is, consisting of options of the same type and underlying, consider the following example, where two **investors** belonging to the same group hold options of the same type (calls) on the same underlying for three different expiration dates.

Investor	Delta-equivalent position	Expiration dates				
		Sep'19	Oct'19	Nov'19	Long delta-equivalent position (absolute value)	Short delta-equivalent position (absolute value)
Investor 1	Net **position**	50	150	-15	200	15
Investor 2	Net **position**	50	-100	-15	50	115
Group of **Investors**	Long	100	150	0	250	NA
	Short	0	-100	-30	NA	130

Table A3-12 - Aggregation of open **positions** for all expiration dates by group of **investors**

Example A3-3 - Calculating position limits and checking for violations – Forward contracts and securities lending agreements traded in the equities and corporate debt markets

Forward and **securities lending positions** are assessed in the same way in terms of **position** limits and calculation of aggregate quantities. Therefore, consider that, on a certain date, the **positions** in **securities lending** agreements based on a specific underlying, denoted by i, are given according to the following table:

Participant				Position	
CM	FTP/SP	Investor (name/ID)	Group of investors	Type of position	Number of contracts (absolute value)
1	10	A/001	X	Borrowing	5,000
2	5	B/002	Y	Borrowing	2,000
1	10	C/003	X	Borrowing	6,000
4	20	D/004	Y	Lending	5,000
1	10	A/001	X	Lending	1,600
2	5	E/005	Y	Lending	6,000

Table A3-13- **Positions** outstanding in **securities lending** on instrument i

Consider that the values of parameters P and L, which define the **position** limits for instrument i, are as follows:

Limit	Type of position	Parameter P_{Outst}	Parameter P_{Trd}	Parameter L
1	Lending	$P_{Outst}(i,1) = 3.0\%$	$P_{Trd}(i,1) = 30\%$	$L(i,1) = 3{,}000$

Limit	Type of position	Parameter P_{Outst}	Parameter P_{Trd}	Parameter L
2	Borrowing	$P_{Outst}(i,2) = 3.5\%$	$P_{Trd}(i,2) = 40\%$	$L(i,2) = 3{,}500$

Table A3-14 - Parameters for the **position** limits

Assuming that the outstanding quantity of underlying asset i is $Outst_i = 100{,}000$ and also that the quantity of underlying asset i associated with the median of the quantity traded over the time period defined by B3 is $Q_i^{Trd} = 13{,}000$, limits 1 and 2 are:

$$Limit_{i,1} = \min\left[P_{Outst}\ i,1 \times Outst_i\ ,\ \max\left[P_{Trd}\ i,1 \times Q_i^{Trd}\ ,\ L\ i,1\right]\right]$$
$$= \min\left[0.03 \times 100{,}000\ ,\ \max\ 0.3 \times 13{,}000\ ,\ 3{,}000\right] = 3{,}000 \text{ contracts}$$

$$Limit_{i,2} = \min\left[P_{Outst}\ i,2 \times Outst_i\ ,\ \max\left[P_{Trd}\ i,2 \times Q_i^{Trd}\ ,\ L\ i,2\right]\right]$$
$$= \min\left[0.035 \times 100{,}000\ ,\ \max\ 0.4 \times 13{,}000\ ,\ 3{,}500\right] = 3{,}500 \text{ contracts}$$

The **position** limit violations by **investor** are those presented on the table below:

Investor	Type of position	Position (absolute value)	Excess position	
			In connection with limit 1 (3,000 contracts)	In connection with limit 2 (3,500 contracts)
A/001	Borrowing	5,000	2,000	1,500
A/001	Lending	1,600	-	-
B/002	Borrowing	2,000	-	-
C/003	Borrowing	6,000	3,000	2,500
D/004	Lending	5,000	2,000	1,500
E/005	Lending	6,000	3,000	2,500

Table A3-15 - Aggregation of open **positions** by **investor**

- The **positions** of **investors** 001 and 003 violate limits 1 and 2 only for borrowing **position**.
- The **positions** of **investors** 004 and 005 violate limits 1 and 2 only for lending **position**.
- The **positions** of **investor** 001 for lending **position** adhere to both limits.
- The **positions** of **investor** 002 for borrowing **position** adhere to both limits.

In respect to the groups of **investors** X and Y, the total **positions** are:

Participant 5

$$Q_{L} = \max\left[6{,}000 - 2{,}000 - 0\ ,\ 0\right] = 4{,}000$$

$$Q_{B\ Uncovered} = \min\left[6{,}000 - 2{,}000\ ,\ 0\right] = 0$$

$$Q_{B\ Covered} = \min\left[\max\left[0\ ,\ 6{,}000 - 2{,}000 - 0\right]\ ,\ 0\right] = 0$$

Participant 10

$$Q_{L} = \max\left[1{,}600 - \left(5{,}000 + 6{,}000\right) - 0\ ,\ 0\right] = 0$$

$$Q_{B\ Uncovered} = \min\left[1{,}600 - \left(5{,}000 + 6{,}000\right)\ ,\ 0\right] = -9{,}400$$

$$Q_{B\ Covered} = \min\left[\max\left[0\ ,\ 1{,}600 - \left(5{,}000 + 6{,}000\right) - 0\right]\ ,\ 0\right] = 0$$

Participant 16

$$Q_{L} = \max\left[\left(10{,}000 + 5{,}000\right) - \left(1{,}000 + 10{,}000\right) - \left(4{,}000 + 4{,}000\right)\ ,\ 0\right] = 0$$

$$Q_{B\ Uncovered} = \min\left[\left(10{,}000 + 5{,}000\right) - \left(1{,}000 + 10{,}000\right)\ ,\ 0\right] = 0$$

$$Q_{B\ Covered} = \min\left[\max\left[\begin{matrix}-\left(4{,}000 + 4{,}000\right)\ , \\ \left(10{,}000 + 5{,}000\right) - \left(1{,}000 + 10{,}000\right) - \left(4{,}000 + 4{,}000\right)\end{matrix}\right]\ ,\ 0\right] = -4{,}000$$

Participant 20

$$Q_{L} = \max\left[5{,}000 - 0 - 0\ ,\ 0\right] = 5{,}000$$

$$Q_{B\ Uncovered} = \min\left[5{,}000 - 0\ ,\ 0\right] = 0$$

$$Q_{B\ Covered} = \min\left[\max\left[0\ ,\ 5{,}000 - 0 - 0\right]\ ,\ 0\right] = 0$$

The **position** limit violations at aggregation level Agg_3 are presented on the following table:

Group of investors	Lending position (absolute value)	Borrowing position (absolute value)
X	1,600	11,000
Y	11,000	2,000

Table A3-16 - Aggregation of open **positions** by group of **investors**

In relation to the consolidation of **positions** by FTP/SP, the total **positions** are:

FTP/SP	Lending position (absolute value)	Borrowing position (absolute value)
5	6,000	2,000
10	1,600	11,000
20	5,000	0

Table A3-17 - Aggregation of open **positions** by FTP/SP

Example A3-4 - Calculating position limits and checking for violations – Securities lending agreements and repo transactions on assets traded in the government bond market

Securities lending agreements and **repo transactions** on **assets** traded in the **government bond market** are assessed in the same way in terms of **position** limits and calculation of aggregate quantities. Thus, consider that, on a certain date, the **positions** in **securities lending** agreements based on a specific underlying, denoted by i, are given according to the following table:

Participants				Position	
CM	FTP/SP	Investor (name/ID)	Group of investors	Side	Number of contracts (absolute value)
1	10	A/001	X	Borrowing	5,000
2	5	B/002	Y	Lending	2,500
1	10	C/003	X	Borrowing	3,500
4	20	D/004	Y	Lending	5,000
4	10	B/002	Y	Borrowing	7,000
2	5	E/005	Y	Lending	3,500

Table A3-18 - **Positions** outstanding in **securities lending** on **asset** i

Consider that the values of parameters P and L, which define the **position** limits for instrument i, are as follows:

Limit	Parameter P_{Trd}	Parameter L
1	$P_{Trd}(i,1) = 30\%$	$L(i,1) = 2{,}000$
2	$P_{Trd}(i,2) = 40\%$	$L(i,2) = 3{,}000$

Table A3-19 - Parameters for **position** limits

Assuming that the quantity of underlying asset i associated with the median of the quantity traded over the time period defined by B3 is $Q_{Trd} = 10{,}000$, limits 1 and 2 are:

$$Limit_{i,1} = \max\left[P_{Trd}(i,1) \times Q_i^{Trd} \ , \ L(i,1)\right] \text{ contracts}$$
$$= \max[0.3 \times 10{,}000 \ , \ 2{,}000] = 3{,}000$$

$$Limit_{i,2} = \max\left[P_{Trd}(i,2) \times Q_i^{Trd} \ , \ L(i,2)\right] \text{ contracts}$$
$$= \max[0.4 \times 10{,}000 \ , \ 3{,}000] = 4{,}000$$

The **position** limit violations by **investor** are those shown on the table below:

Investor	Type of position	Position (absolute value)	Excess position	
			In connection with limit 1 (3,000 contracts)	In connection with limit 2 (4,000 contracts)
A/001	Borrowing	5,000	2,000	1,000
B/002	Lending	2,500	-	-
B/002	Borrowing	7,000	4,000	3,000
C/003	Borrowing	3,500	500	-
D/004	Lending	5,000	2,000	1,000
E/005	Lending	6,000	3,000	2,000

Table A3-20 - Aggregation of open **positions** by **investor**

- The **positions** of **investors** 001 and 002 violate limits 1 and 2 for borrowing **position**.
- The **positions** of **investors** 004 and 005 violate limits 1 and 2 only for lending **position**.
- The **positions** of **investor** 003 violate limit 1 for borrowing **position**.

The **position** limit violations at aggregation level Agg_3 are presented on the following table:

Group of investors	Lending position (absolute value)	Borrowing position (absolute value)
X	0	8,500
Y	11,000	7,000

Table A3-21 - Aggregation of open **positions** by group of **investors**

In relation to the consolidation of **positions** by FTP/SP, the total **positions** are:

FTP/SP	Lending position (absolute value)	Borrowing position (absolute value)
5	6,000	0
10	0	15,500
20	5,000	0

Table A3-22 - Aggregation of open **positions** by FTP/SP

Example A3-5 - Calculating position limits and checking for violations – Options contracts on assets traded in the equities and corporate debt markets

Consider that, on a certain date, the **positions** in options contracts based on a specific underlying for expiration on date *T* are given according to the following table:

Participant			Put options			Call options		
CM	FTP/SP	Investor (name/ID)	Series	Side	Qty of contracts	Series	Side	Qty of contracts
3	8	A/0001	UFMJ(K_1)	Long	4,500	UFMJ(K_1)	Short	-5,000
2	10	B/0002	UFMJ(K_1)	Short	-4,500	UFMJ(K_1)	Short	-3,000
3	8	C/0003	UFMD(K_2)	Long	3,300	UFMD(K_2)	Long	1,000
3	20	B/0002	UFMD(K_2)	Short	-7,500	UFMD(K_2)	Short	-4,500
4	6	C/0003	UFMD(K_2)	Long	1,700	UFMD(K_2)	Short	-3,700
3	8	A/0001	UFMD(K_2)	Long	4,200	UFMD(K_2)	Long	1,000
4	6	C/0003	UFMH(K_3)	Short	-1,700	UFMH(K_4)	Long	2,000
3	20	A/0001	UFM6(K_4)	Long	10,000	UFM6(K_5)	Short	-8,000
2	10	B/0002	UFM6(K_4)	Short	-10,000	UFM6(K_5)	Long	4,000

Table A3-23 - **Positions** outstanding in options contracts on asset *i*

Assume that the values of parameters P_{Outst} , P_{Trd} and L, which define the **position** limits for instrument i at the aggregation levels of an **investor** under various **participants** and of a **full trading participant** or **settlement participant**, are the same for all the types of total **position** (potential delivery or potential receipt), as indicated on the following table:

Limit	Aggregation level	Parameter P_{Outst}	Parameter P_{Trd}	Parameter L
1	Agg_2	$P_{Outst}(i,1) = 3.0\%$	$P_{Trd}(i,1) = 30\%$	$L(i,1) = 6{,}000$
2		$P_{Outst}(i,2) = 3.5\%$	$P_{Trd}(i,2) = 40\%$	$L(i,2) = 7{,}000$
1	Agg_5	$P_{Outst}(i,1) = 5.0\%$	$P_{Trd}(i,1) = 50\%$	$L(i,1) = 10{,}000$
2		$P_{Outst}(i,2) = 6.5\%$	$P_{Trd}(i,2) = 55\%$	$L(i,2) = 11{,}000$

Table A3-24 - Parameters for the **position** limits

Assuming that the outstanding quantity of underlying asset i is $Outst_i = 200{,}000$ and also that the quantity of underlying asset i associated with the median of the quantity traded over the time period defined by B3 is $Q_i^{Trd} = 20{,}000$, the following limits apply, in quantities of underlying i:

- At aggregation level Agg_2:

$$\begin{aligned} Limit_{i,1} &= \min\left[P_{Outst}\ i,1 \times Outst_i\ ,\ \max\left[P_{Trd}\ i,1 \times Q_i^{Trd}\ ,\ L\ i,1\right]\right] \\ &= \min\left[0.03 \times 200{,}000\ ,\ \max\ 0.3 \times 20{,}000\ ,\ 6{,}000\right] = 6{,}000 \end{aligned}$$

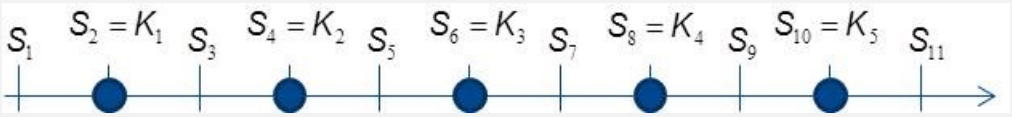
$$\begin{aligned} Limit_{i,2} &= \min\left[P_{Outst}\ i,2 \times Outst_i\ ,\ \max\left[P_{Trd}\ i,2 \times Q_i^{Trd}\ ,\ L\ i,2\right]\right] \\ &= \min\left[0.035 \times 200{,}000\ ,\ \max\ 0.4 \times 20{,}000\ ,\ 7{,}000\right] = 7{,}000 \end{aligned}$$

- At aggregation level Agg_3:

$$\begin{aligned} Limit_{i,1} &= \min\left[P_{Outst}\ i,1 \times Outst_i\ ,\ \max\left[P_{Trd}\ i,1 \times Q_i^{Trd}\ ,\ L\ i,1\right]\right] \\ &= \min\left[0.05 \times 200{,}000\ ,\ \max\ 0.5 \times 20{,}000\ ,\ 10{,}000\right] = 10{,}000 \end{aligned}$$

$$\begin{aligned} Limit_{i,2} &= \min\left[P_{Outst}\ i,2 \times Outst_i\ ,\ \max\left[P_{Trd}\ i,2 \times Q_i^{Trd}\ ,\ L\ i,2\right]\right] \\ &= \min\left[0.065 \times 200{,}000\ ,\ \max\ 0.55 \times 20{,}000\ ,\ 11{,}000\right] = 11{,}000 \end{aligned}$$

Supposing that the five strike prices indicated in the open **positions** table obey order $K_1 < K_2 < K_3 < K_4 < K_5$, let $\{S_1\ ,\ S_2\ ,\ \ldots\ ,\ S_{11}\}$ be the set of the underlying asset prices used to estimate the potential quantities for delivery or receipt, that is, which obey the relationships on the following diagram:



The quantities for delivery or receipt by a given **investor** for each S_j, j = 1, 2, …, 11 are given by:

$$Q_j = R_j - D_j$$

$$D_j = -\sum_{K \le S_j} \min\left[Q_{Call}^K\ ,\ 0\right] + \sum_{K \ge S_j} \max\left[Q_{Put}^K\ ,\ 0\right]$$

$$R_j = \sum_{K \le S_j} \max\left[Q_{Call}^K\ ,\ 0\right] - \sum_{K \ge S_j} \min\left[Q_{Put}^K\ ,\ 0\right]$$

Where Q_{Call}^K and Q_{Put}^K are the total quantities of call and put options, respectively, on underlying asset i with strike price K and expiration date T.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Hence, for **investor** A/001: $Q_1 = 0 - \left[-0 + \left(4{,}500 + 4{,}200 + 10{,}000\right)\right] = -18{,}700$

$$Q_2 = \left[0 - 0\right] - \left[-\left(-5{,}000\right) + \left(4{,}500 + 4{,}200 + 10{,}000\right)\right] = -23{,}700$$

$$Q_3 = \left[0 - 0\right] - \left[-\left(-5{,}000\right) + \left(4{,}200 + 10{,}000\right)\right] = -19{,}200$$

$$Q_4 = \left[1{,}000 - 0\right] - \left[-\left(-5{,}000\right) + \left(4{,}200 + 10{,}000\right)\right] = -18{,}200$$

$$Q_5 = \left[1{,}000 - 0\right] - \left[-\left(-5{,}000\right) + 10{,}000\right] = -14{,}000$$

$$Q_6 = \left[1{,}000 - 0\right] - \left[-\left(-5{,}000\right) + 10{,}000\right] = -14{,}000$$

$$Q_7 = \left[1{,}000 - 0\right] - \left[-\left(-5{,}000\right) + 10{,}000\right] = -14{,}000$$

$$Q_8 = \left[1{,}000 - 0\right] - \left[-\left(-5{,}000\right) + 10{,}000\right] = -14{,}000$$

$$Q_9 = \left[1{,}000 - 0\right] - \left[-\left(-5{,}000\right) + 0\right] = -4{,}000$$

$$Q_{10} = \left[0 - 0\right] - \left[-\left(-5{,}000 - 8{,}000\right) + 0\right] = -12{,}000$$

$$Q_{11} = \left[0 - 0\right] - \left[-\left(-5{,}000 - 8{,}000\right)\right] = -12{,}000$$

Considering that, for a certain **investor**, the quantities for delivery and receipt are given, respectively, by:

$$Q_{D,i} = \begin{cases} \min\limits_j \left(Q_j\right) & \text{if } \min\limits_j \left(Q_j\right) < 0 \\ 0 & \text{otherwise} \end{cases} \qquad Q_{R,i} = \begin{cases} \max\limits_j \left(Q_j\right) & \text{if } \max\limits_j \left(Q_j\right) > 0 \\ 0 & \text{otherwise} \end{cases}$$

$Q_{D,i} = -23{,}700$ and $Q_{R,i} = 0$ applies to **investor** A/001.

By performing the same procedure for the other **investors**, then:

Investor B/002				
Receipt (R_j)		**Delivery (D_j)**		**Balance ($Q_j = R_j - D_j$)**
S_1	22,000	S_1	0	22,000
S_2	22,000	S_2	3,000	19,000
S_3	17,500	S_3	3,000	14,500
S_4	17,500	S_4	7,500	10,000
S_5	10,000	S_5	7,500	2,500
S_6	10,000	S_6	7,500	2,500
S_7	10,000	S_7	7,500	2,500
S_8	10,000	S_8	7,500	2,500
S_9	0	S_9	7,500	-7,500
S_{10}	4,000	S_{10}	7,500	-3,500
S_{11}	-4,000	S_{11}	7,500	-11,500

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Investor B/002		
Receipt (R_j)	Delivery (D_j)	Balance ($Q_j = R_j - D_j$)
$Q_{D,i} = -11{,}500$		
$Q_{R,i} = 22{,}000$		

Table A3-25 - Quantity for delivery or receipt – **Investor** B/002

Investor C/003				
Receipt (R_j)		Delivery (D_j)		Balance ($Q_j = R_j - D_j$)
S_1	1,700	S_1	5,000	-3,300
S_2	1,700	S_2	5,000	-3,300
S_3	1,700	S_3	5,000	-3,300
S_4	1,700	S_4	7,700	-6,000
S_5	1,700	S_5	2,700	-1,000
S_6	1,700	S_6	2,700	-1,000
S_7	0	S_7	2,700	-2,700
S_8	2,000	S_8	2,700	-700
S_9	2,000	S_9	2,700	-700
S_{10}	2,000	S_{10}	2,700	-700
S_{11}	2,000	S_{11}	2,700	-700
$Q_{D,i} = -6{,}000$				
$Q_{R,i} = 0$				

Table A3-26 - Quantity for delivery or receipt – **Investor** C/003

The **position** limit violations at aggregation level Agg_2 are shown on the following tables:

Investor (name/ID)	Potential quantity for delivery	Excess position	
		In connection with limit 1 (delivery of 6,000)	In connection with limit 2 (delivery of 7,000)
A/001	23,700	17,700	16,700
B/002	11,500	5,500	4,500
C/003	6,000	0	0

Table A3-27 - **Position** limit violations at aggregation level Agg_2

Investor (name/ID)	Potential quantity for receipt	Excess position	
		In connection with limit 1 (receipt of 6,000)	In connection with limit 2 (receipt of 7,000)
A/001	0	0	0
B/002	22,000	16,000	15,000
C/003	0	0	0

Table A3-28 - **Position** limit violations at aggregation level Agg_2

- The **positions** of **investor** 001 violate limits 1 and 2 for delivery.
- The **positions** of **investor** 002 violate limits 1 and 2 for delivery and receipt.
- The **positions** of **investor** 003 adhere to both limits.

Consider the example for the aggregation level of a group of **investors** under all the **full trading participants** (Agg_4) and also for the aggregation level of the **full trading participant** (Agg_5). In these cases, there is no **netting**, that is, the methodology does not allow long quantities (receipt) and short quantities (delivery) held by different **investors** to be netted against each other. The same applies to the aggregation level of the **full trading participant**.

Participant		Group of investors	Potential quantity for delivery	Potential quantity for receipt
FTP/SP	Investor (name/ID)			
8	A/0001	X	-5,000	0
10	B/0002	Y	-3,000	3,000
8	C/0003	Y	-4,000	3,000
20	B/0002	Y	-1,000	1,000
6	C/0003	Y	-3,000	5,000
8	D/0004	X	-1,500	1,000
10	C/0003	Y	-2,000	0
20	A/0001	X	-1,000	3,000
10	D/0004	X	-2,000	5,000

Table A3-29 - Largest deliveries and receipts segregated by group of **investors** and FTP/SP

Group of investors	Potential quantity for delivery	Potential quantity for receipt

X	-9,500	9,000
Y	-13,000	12,000

Table A3-30 - Largest deliveries and receipts segregated by group of **investors** at aggregation level Agg_4

Group of investors	Potential quantity for delivery	Potential quantity for receipt
6	-3,000	5,000
8	-10,500	4,000
10	-7,000	8,000
20	-2,000	4,000

Table A3-31 - Largest deliveries and receipts segregated by FTP/SP at aggregation level Agg_5

Example A3-6 - Calculating the use of position limits and checking for violations – Groups of contracts exposed to a certain PRF

Consider that, on a certain date, the **positions** in different types of contracts are given according to the following table. Such **positions** belong to the same group of instruments, denoted by *GF*.

Participants				Instrument		Position	
CM	FTP/SP	Investor (name/ID)	Group of instruments	Instrument	Delta	Side	Number of contracts
1	2	A/0001	GF	UFMJ	1.20	Long	1,500
1	2	A/0001	GF	UFMK	1.90	Short	1,500
1	2	A/0001	GF	UFML	-2.50	Long	3,300
1	2	A/0001	GF	UFMD	-0.95	Short	7,500
1	3	B/0005	GF	UFMJ	1.20	Short	1,700
1	3	B/0005	GF	UFMK	1.90	Long	4,200
1	3	B/0005	GF	UFMD	-0.95	Short	1,700

Table A3-32 - **Positions** outstanding in group

Given the group's limits 1 and 2:

$$Limit_{GF,1} = 5{,}000$$

$$Limit_{GF,2} = 10{,}000$$

The Agg_1 aggregate **positions** of each **investor** are:

$$Q_{GF}^{Agg_1}(Inv, P) = \sum_{c \in Inv} \left(Q_c^{Agg_1}(Inv, P) \times \Delta_{GF,c} \right)$$

$$Q_{GF}^{Agg_1}(0001, 2) = 1{,}500 \times 1.20 + 1{,}500 \times 1.90 + 3{,}300 \times (-2.50) + 7{,}500 \times (-0.95)$$
$$= -10{,}725.00$$

$$Q_{GF}^{Agg_1}(0005, 3) = 1{,}700 \times 1.20 + 4{,}200 \times 1.90 + 1{,}700 \times 0.95 = 8{,}405.00$$

The **position** limit violations at aggregation level Agg_2 are presented by **investor** on the following table:

Investor	Aggregate position (absolute value)	Excess position	
		In connection with limit 1 (5,000)	In connection with limit 2 (10,000)
A	10,725.00	5,000.00	725.00
B	8,405.00	3,405.00	-

Table A3-33 - **Position** limit violations at aggregation level Agg_2

- The **positions** of **investor** A violate limits 1 and 2.
- The **positions** of **investor** B violate limit 1.

Regarding **position** consolidation by FTP/SP, the total **positions** are:

FTP/SP	Long position (absolute value)	Short position (absolute value)
2	-	10,725.00
3	8,405.00	-

Table A3-34 - Aggregation of open **positions** by FTP/SP

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

Appendix 4 - Proof of the validity of the rule of thumb applicable to risk calculation in module CORE2

In this appendix, proof is given to the fact that the worst subset $A_N \subset A$ under scenario Φ_k will always be the subset that is made up of N portfolios with the worst permanent losses or of N portfolios with the worst aggregate losses, calculated without taking into account the liquidity resource (that is, with $LR = 0$). To that end, it is demonstrated that solution (7.37) is equivalent to solution (7.39) for calculating the aggregate loss of participant P under scenario Φ_k , that is, it is shown that:

$$\min_{A_N \subset A}\left[AL_{A_N}\left(\Phi_k\right)\right] = \min\left[AL_{A_N^{PL}}\left(\Phi_k\right), AL_{A_N^{AL}}\left(\Phi_k\right)\right] \tag{A4.1}$$

Where:

A_N : any subset of A $\left(A_N \subset A\right)$ made up of N portfolios;

A_N^{PL} : the subset of A made up of N portfolios with the worst permanent losses; and

A_N^{AL} : the subset of A made up of N portfolios with the worst aggregate losses, calculated without taking into account the liquidity resource (that is, with $LR = 0$).

To simplify the notation, it is assumed that all the aforementioned losses are always measured under the same scenario Φ_k . Thus, whenever losses refer to losses on subsets, the following is adopted:

$$AL\left(A_N\right) = AL_{A_N}\left(\Phi_k\right)$$
$$AL\left(A_N^{PL}\right) = AL_{A_N^{PL}}\left(\Phi_k\right)$$
$$AL\left(A_N^{AL}\right) = AL_{A_N^{AL}}\left(\Phi_k\right)$$

And whenever losses refer to losses on specific portfolios a , the following is adopted:

$$AL\left(a\right) = AL_a\left(\Phi_k\right)$$
$$PL\left(a\right) = PL_a\left(\Phi_k\right)$$
$$TL\left(a\right) = TL_a\left(\Phi_k\right)$$

Apart from the above notations, the same simplified notation is used for any other losses referred to in this appendix. Therefore, for any subset A_N of N portfolios, the following is defined:

- $PL\left(A_N\right)$: the permanent loss of subset A_N , defined as the sum of the permanent losses of all portfolios a belonging to A_N , that is: $PP\left(A_N\right)$:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

$$PL(A_N) = \sum_{a \in A_N} PL(a) \tag{A4.2}$$

- $TL(A_N)$: the transitory loss of subset A_N, defined as the sum of the transitory losses of all portfolios a belonging to A_N, calculated without the liquidity resource, that is:

$$TL(A_N) = \sum_{a \in A_N} TL(a) \tag{A4.3}$$

- $AL^{NoRL}(A_N)$: the aggregate loss of subset A_N without applying the liquidity resource, defined as the sum of the permanent and transitory losses (no liquidity resource) of all portfolios a belonging to A_N, that is:

$$AL^{NoLR}(A_N) = PL(A_N) + TL(A_N) \tag{A4.4}$$

- $AL(A_N)$: the aggregate loss of subset A_N after using the liquidity resource, which is equivalent to equation (7.36) in section 7.9.1:

$$AL(A_N) = AL^{NoLR}(A_N) + \min\left[-TL(A_N)\ ,\ AMT_{CORE2}\right] \tag{A4.5}$$

Under the new notation, equation (A4.1) to be demonstrated becomes:

$$\min_{A_N \subset A}\left[AL(A_N)\right] = \min\left[AL\left(A_N^{AL}\right)\ ,\ AL\left(A_N^{PL}\right)\right] \tag{A4.6}$$

Once the notation is defined, the next step is the demonstration itself, which takes the form of a proof by contradiction:

Given that $A_N^{AL} \subset A$ and $A_N^{PL} \subset A$, hence $\min_{A_N \subset A}\left[AL(A_N)\right] \leq AL\left(A_N^{AL}\right)$ and $\min_{A_N \subset A}\left(AL(A_N)\right) \leq AL\left(A_N^{PL}\right)$.

Therefore, $\min_{A_N \subset A}\left[AL(A_N)\right] \leq \min\left[AL\left(A_N^{AL}\right)\ ,\ AL\left(A_N^{PL}\right)\right]$.

Thus, for equality (A4.6), it suffices to prove that $\min_{A_N \subset A}\left[AL(A_N)\right] \geq \min\left[AL\left(A_N^{AL}\right)\ ,\ AL\left(A_N^{PL}\right)\right]$:

Suppose by contradiction that:

$$\min_{A_N \subset A}\left[AL(A_N)\right] < \min\left[AL\left(A_N^{AL}\right)\ ,\ AL\left(A_N^{PL}\right)\right] \quad \text{(hypothesis } H\text{)}$$

Hypothesis *H* is equivalent to assuming:

$\exists A_N^* \subset A$, such that:

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION

(*i*) $AL\left(A_N^*\right) < AL\left(A_N^{AL}\right)$ and

(*ii*) $AL\left(A_N^*\right) < AL\left(A_N^{PL}\right)$.

However:

$$(i) \Rightarrow AL^{NoLR}\left(A_N^*\right) + \min\left[-TL\left(A_N^*\right), AMT_{CORE2}\right] < AL^{NoLR}\left(A_N^{AL}\right) + \min\left[-TL\left(A_N^{AL}\right), AMT_{CORE2}\right]$$

$$\Rightarrow \min\left[-TL\left(A_N^*\right), AMT_{CORE2}\right] - \min\left[-TL\left(A_N^{AL}\right), AMT_{CORE2}\right] < AL\left(A_N^{AL}\right) - AL\left(A_N^*\right) \leq 0$$

[for A_N^{AL} corresponds to the portfolios with the most severe aggregate losses]

$$\Rightarrow \min\left[-TL\left(A_N^*\right), AMT_{CORE2}\right] < \min\left[-TL\left(A_N^{AL}\right), AMT_{CORE2}\right]$$

$$\Rightarrow \min\left[-TL\left(A_N^*\right), AMT_{CORE2}\right] < AMT_{CORE2}$$

[for $\min\left[-TL\left(A_N^{AL}\right), AMT_{CORE2}\right] \leq AMT_{CORE2}$]

$\Rightarrow -TL\left(A_N^*\right) < AMT_{CORE2}$, that is, $\min\left[-TL\left(A_N^*\right), AMT_{CORE2}\right] = -TL\left(A_N^*\right)$

$$\Rightarrow PL\left(A_N^*\right) = AL\left(A_N^*\right)$$

[by definitions (A4.4) and (A4.5)]

$$\Rightarrow PL\left(A_N^*\right) = AL\left(A_N^*\right) < AL\left(A_N^{PL}\right)$$

[by (ii)]

$\Rightarrow PL\left(A_N^*\right) < PL\left(A_N^{PP}\right) + TL\left(A_N^{PL}\right) + \min\left[-TL\left(A_N^{PL}\right), AMT_{CORE2}\right]$ [by definitions (A4.4) and (A4.5)]

$$= PL\left(A_N^{PL}\right) + \min\left[0\ ,\ AMT_{CORE2} + TL\left(A_N^{PL}\right)\right]$$

$\leq PL\left(A_N^{PL}\right)$ [for $\min\left[0\ ,\ AMT_{CORE2} + TL\left(A_N^{PL}\right)\right] \leq 0$]

$\Rightarrow PL\left(A_N^*\right) < PL\left(A_N^{PL}\right)$, which is a contradiction, for A_N^{PL} corresponds to the portfolios with the most severe permanent losses.

Therefore, equality (A4.6), or equivalently (A4.1), is hereby demonstrated.

INFORMAÇÃO PÚBLICA – PUBLIC INFORMATION