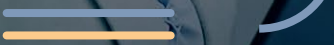




BSM Alerts

Guide



Version 3.0 – Sep-26





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The Alerts Guide was prepared by BSM in its mission to share its knowledge with the market and supervised entities and does not constitute professional or financial advice. The document presents suggestions and best practices for building alerts related to offers and transactions, with hypothetical and non-exhaustive examples.

The suggestions presented in the Alerts Guide do not exempt the regulated entities from their responsibilities and controls, nor does its application mean that the regulated entity has fulfilled all its monitoring obligations.

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Contents

DISCLAIMER	2
TERMINOLOGY USED	7
CONTEXT	11
BSM	12
GENERAL ASPECTS	13
ALERTS	17
1. Atypical Transfer of Funds	18
2. Insider Trading	30
3. Layering	43
4. Spoofing	56
5. Front Running	63
6. Day Trade Ranking	75
7. Operations with the Same Counterparty (OMC)	80
8. Operations with the Same Group (OMG)	88
9. Preferential	94
10. Monitoring of over-the-counter and organized market operations	102
11. Monitoring of Movements in the Central Securities Depository (Non-Cash Transactions)	120
PRACTICAL RECOMMENDATIONS	126
1. Use of Artificial Intelligence in Supervision and Monitoring Processes	127
2. Use of Participant Registration Information in the Identification of Coordinated Activity	133
3. Access to OTC Market Information in the NoMe System	137
REFERENCES	141

List of tables

TABLE 1 – Example of atypical transfer of funds between two investors	19
TABLE 2 – Counterparty concentration in transactions carried out by Investor 1	21
TABLE 3 – Counterparty concentration in transactions carried out by Investor 2	21
TABLE 4 – Transactions carried out between Participants	22
TABLE 5 – Concentration of transactions among Participants	22
TABLE 6 – Results of transactions carried out by Investor 1	23
TABLE 7 – Summarized result of transactions carried out by Investor 1	23
TABLE 8 – Example of marking the success ratio in transactions carried out by Investor 1	24
TABLE 9 – Example of success ratio in transactions carried out by Investor 1	24
TABLE 10 – Example of the success ratio in transactions carried out by Investor 1	25
TABLE 11 – Example of the loss ratio in transactions carried out by Investor 2	25
TABLE 12 – Example of time indicator in transactions carried out by Investor 1	26
TABLE 13 – Example of size indicator in transactions carried out by Investor 1	27
TABLE 14 – Example of benchmark calculation	29
TABLE 15 – Insider Trading: Example of calculating the financial result when there is an asset appreciation and the same amount traded in the buy and sell transaction	38
TABLE 16 – Insider Trading: Example of calculating the financial result when there is an asset appreciation and with different amounts traded in the purchase and sale	39
TABLE 17 – Insider Trading: example of calculating the financial result when there is asset devaluation	40
TABLE 18 – Insider trading: example of calculating the financial result when there is a reversal of position – pre-disclosure period	41
TABLE 19 – Insider Trading: example of calculating the financial result when there is a reversal of position – post-disclosure period	41
TABLE 20 – Order book before the action of the investor who supposedly carried out the layering practice	44
TABLE 21 – Order book after the investor cancels the orders that created the artificial liquidity	45
TABLE 22 – Order book at the time the market reacted to artificial liquidity	46
TABLE 23 – Order book at the time the investor carried out the trade	47
TABLE 24 – Order book after the investor cancels the orders that created the artificial liquidity	48
TABLE 25 – Order book before the action of the investor who supposedly carried out the layering practice	48

TABLE 26 – Order book at the time the investor entered the order initiating the layering practice	49
TABLE 27 – Order book at the time the investor created artificial liquidity by modifying the order for the first time	49
TABLE 28 – Order book at the time the investor created artificial liquidity by modifying the order for the second time	49
TABLE 29 – Order book at the time the market reacted to artificial liquidity	50
TABLE 30 – Order book at the time the investor carried out the trade	50
TABLE 31 – Order book before investor action	53
TABLE 32 – Order book at the time the investor carried out the trade	54
TABLE 33 – Order book before investor action	54
TABLE 34 – Order book at the time the investor carried out the trade	55
TABLE 35 – Order book before the action of the investor who allegedly carried out the practice of spoofing	57
TABLE 36 – Order book at the time the investor entered the order he/she wished to trade	58
TABLE 37 – Order book at the time the investor entered the order that generated the artificial liquidity	58
TABLE 38 – Order book at the time the investor carried out the trade	59
TABLE 39 – Example of calculating the price weighted moving average	66
TABLE 40 – Example of ramp price variation calculation	68
TABLE 41 – Example of trades carried out with positive fluctuation	69
TABLE 42 – Example of calculating the percentage of positive fluctuation	69
TABLE 43 – Example of aggressor business indicator	70
TABLE 44 – Example of comparing an investor's business with the market	71
TABLE 45 – Example of investor trades indicator	71
TABLE 46 – Example of investor financial result	73
TABLE 47 – Example of calculating the financial result using the FIFO method	78
TABLE 48 – Example of calculating the financial result using the average price method	79
TABLE 49 – Example of calculated financial result	79
TABLE 50 – Example of Operation with the Same Counterparty	81
TABLE 51 – OMC Representation by Investor	84
TABLE 52 – Example A – Operation with the Same Counterparty with positive price fluctuation	85
TABLE 53 – Example B – Operation with the Same Counterparty with negative price fluctuation	85

TABLE 54 – Example C – Operation with the Same Counterparty with order to attract the market	86
TABLE 55 – Example: Order book for the pre-OMC auction	86
TABLE 56 – Example: Order book at auction at the time of the OMC	87
TABLE 57 – Representation of OMG by Economic Group for the asset ABCD4	92
TABLE 58 – Representation of OMG by Economic Group for the asset ABCD4	92
TABLE 59 – Hypothetical Trades Executed Through a Temporary Account and Their Respective Allocations to Final Clients	97
TABLE 60 – Examples of operations at unusual prices	105
TABLE 61 – Example of full transaction with the same instrument	106
TABLE 62 – Example of calculation of the matched quantity	106
TABLE 63 – Example of calculation of Financial Result for Securities and Financial Assets	108
TABLE 64 – Example of Financial Result calculation considering the Corporate Event	109
TABLE 65 – Example of calculating the financial result for Derivatives (Options)	110
TABLE 66 – Example of Flexible Call Option operation	110
TABLE 67 – Example of Flexible Purchase Option operation with advance	111
TABLE 68 – Cluster suggestions for Alert analysis	115
TABLE 69 – Example of atypical transfer of funds between two Funds	116
TABLE 70 – Example of identification of beneficiaries	117
TABLE 71 – Example of summarization of transactions among identified beneficiaries	117
TABLE 72 – Example of identifying resource transfer operations	118
TABLE 73 – Example of Absolute Result Calculation	119
TABLE 74 – Example of a “Round-Trip” Scenario (Deposit and Withdrawal Between Registrar and Custodian)	123
TABLE 75 – Example of an Asset Outside Market Parameters (Non-Cash Movement with a Discrepant Value)	124

Terminology Used

The main terms referenced throughout this document and their respective definitions are presented below. These concepts have been developed for informational and educational purposes.

BSM also provides the [BSM Glossary](#) on its website, which serves as an additional source of updated information on the terms and concepts addressed in the Alerts Guide

TERM	DEFINITION
RBA	Risk-based approach.
Information asymmetry	Refers to situations where one party has more information about a product or service than the other party. Such asymmetry tends to cause a market imbalance.
Assets	Cover securities rights and other instruments and financial assets, including gold, and financial assets issued by public or private entities, except derivatives.
B3	B3 S.A. (Brasil, Bolsa, Balcão): Brazilian Stock Exchange and OTC. publicly held company listed in the Novo Mercado (New Market) segment, manager of organized securities markets; provider of central depository, registration, clearing and settlement services, in addition to custody, fungible and non-fungible goods, securities and any other physical and financial assets; among other assignments authorized by the Brazilian Securities and Exchange Commission (CVM), by the Central Bank of Brazil and by its Board of Directors.
Benchmark	Indicator used to compare a set of data with a benchmark or an established standard. It is used to identify possible anomalies or significant deviations from this standard.
BSM	BSM Market Supervision: non-profit legal entity responsible for exercising self-regulatory duties in organized markets, subject to its regulatory or contractual competence.
CDCA	“Agribusiness Credit Receivables Certificate” is a fixed income security issued by agribusiness companies, backed by credit receivables originating from commercial operations in the agricultural industry. It offers variable remuneration, may be exempt from Income Tax for individuals, and is used to raise funds to finance agricultural activities.
CFF	The “Closed-End Fund Share” is a closed-end investment fund with a fixed number of shares, where investors cannot redeem their shares at any time, only in specific periods or at the fund’s maturity. The shares of these funds can be traded on the secondary market. This format is ideal for long-term investments, such as real estate and infrastructure, offering advantages such as less need for liquidity for frequent redemptions.
COE	“Certificate of Structured Operations” is a hybrid investment product that couples fixed income and variable income, offering customization and the potential for attractive returns. It may include total or partial protection of the invested capital and allows portfolio diversification. However, its liquidity can be limited, with redemption generally only allowed on the maturity date.

TERM	DEFINITION
Counterparty	Please verify “investor”.
Issuing Company	Companies whose securities are traded on B3’s organized markets.
Account	Form of identification of the assets, operations and positions of Participants with the clearing house and central depositories, according to their characteristics and situations.
CRA	“Agribusiness Receivables Certificate” is a fixed income security backed by agricultural receivables. It offers income tax exemption for individuals and the potential for good returns, but presents risks such as default and lower liquidity.
CRI	“Real Estate Receivables Certificate” is a fixed income security issued by securitization companies and backed by real estate receivables. It offers income tax exemption for individuals and the potential for good returns, but has risks such as default and lower liquidity.
Cross Market	Cross market transactions are those transactions where investors trade in different markets.
UNSC	The United Nations Security Council (UNSC) is a core body of the UN. The UNSC can investigate conflict situations, impose economic sanctions and authorize the use of military force when necessary.
CVM	Brazilian Securities and Exchange Commission: federal autarchy with legal personality and own net assets whose objective is to oversight, regulate, discipline and develop the securities market in Brazil
Day Trade	Strategy consisting of buying and selling an asset on the same day.
DEB	“DEB” is the abbreviation for “Debenture”. A debenture is a debt security issued by companies to raise funds directly from investors.
Derivatives	Instruments that have securities, financial assets, indices, indicators, rates, goods, currencies, energies, transport, commodities or any other variable as a reference or underlying object.
Material Fact	Material Fact is information that can significantly affect the decision making of investors in the market. It is a mandatory disclosure for publicly held companies, when there are relevant events that may influence the price of shares or the decision of investors. Such events may include acquisitions or mergers, changes in management, significant changes in operations or financial results, among others.
Market Group	Market in which the operations were performed: Spot or Derivatives.
HFT	High-Frequency Trading is a financial trading technique that uses algorithms and fast computers to perform many transactions in seconds, aiming for small profits. It is fast, high volume and controversial, with regulations to control it.
Ibovespa	Ibovespa is the main performance indicator for shares traded on B3. It is the result of a theoretical portfolio of assets prepared in accordance with established criteria and gathers companies representing the Brazilian capital market.

TERM	DEFINITION
Investor	Individual or legal entity, fund or collective investment entity or any similar entity, in Brazil or abroad, that participates as holder of transactions carried out on its own account and order, through a Participant, and settled through a Participant, using the services of a custody agent for the custody of its assets at B3's central depository, as well as a Selic Participant for the custody of federal government bonds at SELIC.
FB	"Financial Bill" is a long-term investment instrument issued by financial institutions, which offers potentially attractive remuneration, but also presents greater risk due to the absence of the Credit Guarantee Fund (FGC) guarantee and the impossibility of redemption before maturity.
LFP	"Public Financial Bill" is a fixed income security issued by public banks or financial institutions controlled by the government, with a minimum term of 24 months.
LFS	"Subordinated Financial Bill" is a fixed income security issued by financial institutions, with payments subordinated to preferential creditors in the event of liquidation.
LFSC	"Capital Subordinated Financial Bill" is a fixed income security issued by financial institutions, with payments subordinated to preferential creditors in the event of liquidation.
LFNS	"Non-Convertible Subordinated Financial Bill" is a fixed income security issued by financial institutions, with subordinated payments to preferential creditors in the event of liquidation and which cannot be converted into shares.
LFV	"Linked Financial Bill" is a fixed income security issued by financial institutions, linked to a specific operation.
LIG	"Guaranteed Real Estate Bill" is a fixed income security issued by financial institutions, backed by real estate credits.
Asset Liquidity	Highly liquid assets are those assets that have a high daily trading volume in the financial market; that is, they are easily bought or sold at any time. Low liquidity assets are those assets that have a low daily trading volume, thus making it difficult to buy or sell the asset in the financial market.
Order Book	Environment in which the buy and sell orders registered in the stock exchange trading system are centrally organized.
Secondary Market	The market where investors buy and sell financial securities, such as stocks and bonds, that have previously been issued in the primary market.
Money Pass	Illicit practice characterized by carrying out previously agreed buy and sell transactions in the securities market between two parties with the objective of facilitating the transfer of funds between them.
CN	"Credit Note". Document that formalizes credit operations, detailing the loan amount, interest rate, term, payment conditions and any collaterals offered.

TERM	DEFINITION
OFAC	The Office of Foreign Assets Control is an agency of the United States Department of the Treasury that manages and enforces economic and trade sanctions against foreign countries, entities and individuals.
Resting order and aggressor order	These are the terms used to describe both sides of a transaction. The resting order is the order that was available in the order book, while the aggressor order is the order that was entered later and generated the trade.
OMC	Transactions in which an investor is at both transaction sides (buy and sell).
Market Operator	Individual certified and linked to a Participant. Acting on behalf of the Participant in the processes of receiving orders and sending bids from investors, pursuant to applicable regulations. The market operator has an employment relationship or relationship as an independent investment agent with a Participant and necessarily works at the trading desk of that Participant.
OTC	Over-the-counter market, where securities, derivatives, currencies and other financial instruments are traded directly between two parties.
Party and Counterparty	Party and counterparty are terms used in transactions on the organized exchange and over-the-counter market to designate the two sides involved in a transaction. In other words, when a security purchase transaction takes place, the sale is the counterparty. The same occurs when a security is sold, where the purchase is the counterparty.
Participant	The trading participant comprises institutions that have the right to access B3's trading environments and systems.
PEP	Cover all people who exercise or have exercised in the last five years, in Brazil or abroad, any position, job or relevant public function or who have family members, representatives or people of their close relationship in such conditions.
Related Parties	Administrators, employees, operators and other agents of the intermediary or issuer.
AML/CFT	Anti-Money Laundering, Combating the Financing of Terrorism and the Financing of the Proliferation of Weapons of Mass Destruction.
RLP	The Retail Liquidity Provider (RLP) allows the brokerage firm, investment bank, multiple bank or other Participant contracted by the brokerage firm to be the counterparty for the buy and sell orders of securities of its retail clients, bringing greater liquidity to clients to carry out their trades on the markets operated by B3.
SEC	Securities and Exchange Commission is an independent agency responsible for regulating the US capital market.
Spread	The difference in price between the best ask and the best bid for an asset in the central order book.
Swing Trade	Different from Day Trade, the opening of a position with a given asset is carried out in one day and the closing of the transaction is carried out in another day, not necessarily consecutive.



Context

The capital market undergoes ongoing changes, such as: entry of new products and services, increase in the number of investors and volume of transactions, higher level of complexity, competitiveness and fragmentation

Such elements demand the improvement of the ongoing monitoring regarding the surveillance of offers and transactions, aiming to identify irregular market practices and guarantee a safe environment for investors and other agents.

This is a global challenge for regulators and other market participants, who must curb such practices using technology, data analysis science and innovative techniques to identify potential alerts and their effectiveness.

The BSM Alerts Guide was prepared in this context, aiming at fostering the pillar of Knowledge Exchange and Guidance to the market through the dissemination of good practices for identifying opportunities and developing alerts for monitoring and overseeing offers and transactions that capture indications of atypical situations.

Suggestions related to the Alerts Guide can be forwarded by the BSM Suggestion Channel. Questions can be submitted through the bsm@bsmsupervisao.com.br channel or its call center 55 (11) 2565-6200, option 9.

BSM

BSM is the entity responsible for supervising and overseeing the organized markets managed by B3. Aiming at keeping the market integrity and protecting investors and Participants, BSM acts on three pillars:



Knowledge and Guidance

Guides the market regarding the adoption of best practices in its processes and internal controls, besides sharing knowledge about the proper market transaction.



Market Integrity

Monitors, supervises and oversees offers and transactions in the markets for which it is responsible. It audits the Participants authorized to access the organized markets managed by B3 and acts with these Participants to curb irregular practices.



Protection of Investors and Participants

It manages the Loss Reimbursement Mechanism (MRP), which can be triggered when the investor feels harmed by the action or omission of a Participant in the intermediation of security trading on stock exchanges and in custody services.

It provides Participants, investors and regulators with specific service channels that expedite demands and dialogue between such agents.



General aspects

This Guide presents some of the main concepts related to potential atypical situations identified in the securities market, in addition to examples¹ and suggestions for the construction of alerts that indicate signs that help in the monitoring of operations and orders as provided for in CVM Resolution 62, which should not be confused with the monitoring of AML/CFT, as provided for in Resolution 50.

Thus, aiming to increase the assertiveness and effectiveness of the analyzes that must be performed by Market Participants, BSM recommends that the reader consider the suggestions that can strengthen such duties:

RECURRENCE: in capturing atypical situations, the “recurrence” factor can be an important indicator for assessing risk, making decisions and adopting preventive measures in the market. A recurrent situation consists of the repetition of a previously observed situation, which recurs periodically. In a practical example, if an investor acts alone in an operation with signs of irregularity, it must be thoroughly analyzed and investigated. Furthermore, if the operation involving different assets or market participants is repeated over time, thus characterizing recurrence, the hypothesis of irregularity is strengthened.

¹ The examples presented in the Alert Guide are hypothetical and, for a better understanding, stocks with a quotation factor equal to one (1) were considered as “assets” in the analyses.

SYSTEMATICITY: in addition to the recurrence factor, which by itself is not enough to determine an irregularity, the systematicity of an operation may indicate that the atypical situation in question was carried out deliberately and planned, and not as an isolated error or an exception.

MATERIALITY: materiality is related to what is substantial or relevant regarding an investor type, the type of operation, among other qualitative and quantitative variables capable of helping to guide the analyzes that show signs of irregularity. Once the materiality thresholds are established, greater analysis time can be devoted to operations that are relevant, thus saving efforts that would be directed to operations that would not be significant enough to impact the market or the decisions of other investors.

RBA: the Risk-Based Approach is a methodology that aims to assess and manage the risks associated with a given activity or situation. The Risk-Based Approach can be used in the capital market to identify potential problems and atypical situations that may affect the market safety and integrity. The adoption of RBA is an invitation to change the market's culture, and the criteria and metrics chosen by users must be very well described, justified and adequate to each reality. One of the RBA purposes is to concentrate resources and efforts in an efficient and assertive manner.

BENCHMARKS: benchmarks are indicators used to compare a set of data with a reference or observed standard, aiming to identify possible anomalies or significant deviations in relation to this standard. It is worth highlighting that it is important to evaluate other factors, such as recurrence, systematicity and materiality, and not just the benchmarks, to detect possible atypicality.

BSM provides market benchmarks on its website that can be used as parameters for detecting atypical situations. The information is disclosed monthly to facilitate comparability and data processing. However, benchmarks can be calculated with the frequency that best fits the type of analysis to be carried out and according to the policy for overseeing operations and offers from each Participant.

INVESTOR CLUSTERIZATION: Clustering investors is a practice suggested in the context of this Alerts Guide, which consists of grouping data based on common characteristics, allowing the creation of differentiated profiles and customized approaches, helping to identify potential irregularities. Some suggestions that can help in this process are presented below, and are non-exhaustive examples that should be adapted to each case, profile and analysis objective:

1. Define segmentation criteria

Examples:

TYPE OF PERSON

Individual:

Example of subvariables: Resident Individual, Non-Resident Individual; Individual – Qualified Investor;

Legal entity:

Example of subvariables: Resident Legal Entity, Non-Resident Legal Entity, Financial Legal Entity, Non-Financial Legal Entity.

PARTICIPANTS

Example of subvariables: Portfolio Managers, Administrators, Brokers, Securitization Companies, Investment Funds (considering the over-the-counter market), Executing Participants, Liquidating Participants, Trading Participants, Custodians, among others;

INVESTOR REGISTRATION INFORMATION

Example of subvariables:

Individuals: Declared income, marital status (single, married, divorced), age, education (education level), residential location, identification of Qualified Investor, Single Shareholder etc.;

Legal Entities: Size (micro, small, medium, large), sector of activity, financial objectives (expansion, portfolio diversification etc.), location (address, city, country, residence); Investment Funds, Exclusive Investment Funds, Investment Club, Market Maker, HFT etc.

OPERATING CHARACTERISTICS

Example of subvariables: Start-up of operations, operating frequency (low, medium or high), investment objectives (short term, medium term, passive income), Investor Profile Analysis (Conservative, Moderate, Sophisticated), history of previous investments, etc.

OPERATING METRICS

Example of subvariables: Financial volume traded per day in the reference period, percentage of daily day trade in the reference period, number of different instruments traded by ID in the reference period, financial volume in the investor's custody at the end of each month or day during the reference period

ECONOMIC GROUPS OR MONITORING LISTS

Example of subvariables: Identify investors on sanctions lists (e.g.: UNSC, OFAC), trustees, Exclusive Funds or Single Shareholders and specific economic groups.

DEFINITION OF RELATED PARTIES

Example of subvariables: People associated with issuing companies or specific entities, family ties (direct relatives – spouses, children), family groups that invest jointly, business ties (partners or business partners who share investment decisions, employees, service providers, officers and board members), investment funds or clubs and their shareholders, managers or administrators.

2. Collect Data

Whenever possible, gather all relevant information from investors, both from the variables mentioned and from other data or complementary sources, such as data agencies, credit bureaus, financial reports and internal information.

3. Define Clustering Algorithm

With the data in hand, it is common to use algorithms such as K-Means, Hierarchical Clustering or DBSCAN to group investors based on the selected characteristics.

4. Interpretation and Refinement

It is recommended to ensure that clusters are consistent and applicable to the analyses performed and regulatory requests; Based on the clusters formed, it is possible to define the resulting profiles.

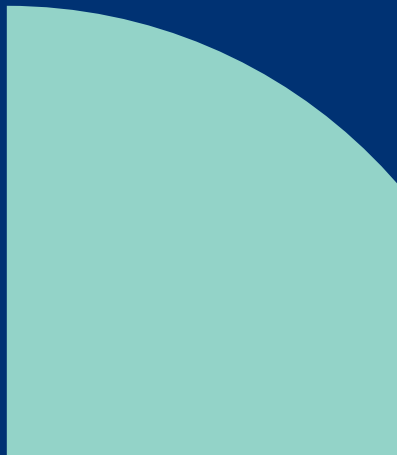


Alerts



ALERTS

1. Atypical Transfer of Funds



1.1 Main concepts related to the alert

Atypical transfer of funds is the term used to identify transactions between investors that have unusual and potentially irregular characteristics. Such transactions are generally coordinated and previously agreed between the parties, in which one is the winner and the other is the loser, in a systematic and recurrent manner.

⚠ Atypical transfers of funds are also known as **Money Pass**, and may be evidence of money laundering or concealment of assets, rights and values. It is worth highlighting that CVM Resolution 50 provides for anti-money laundering, combating the financing of terrorism and the financing of the proliferation of weapons of mass destruction (AML/CFT) within the scope of the securities market. This alert does not cover all the items in Article 30º of the referred Resolution, which must be observed when monitoring transactions.

The following table shows an example of a transfer of funds carried out between two investors, which resulted in a profit of R\$ 200,000.00 to one of the investors and a loss of the same amount to the other.

Table 1 – Example of atypical transfer of funds between two investors

Asset	Buyer	Seller	Price (\$)	Quantity	Volume (\$)
XYZ	Investor 1	Investor 2	10.00	100,000	1,000,000.00
XYZ	Investor 2	Investor 1	12.00	100,000	1,200,000.00

According to Table 1, Investor 1 paid R\$ 1,000,000.00 for the purchase of asset XYZ and received R\$ 1,200,000.00 for the sale of the same asset, achieving a positive result of R\$ 200,000.00, while Investor 2 received R\$ 1,000,000.00 for the sale of asset XYZ and paid R\$ 1,200,000.00 for the purchase of the same asset, achieving a negative result of R\$ 200,000.00.

⚠ **Counterparty** is the term used to identify the two sides of a trade. The investor who purchased a security has the investor who sold it as a counterparty. The same happens with the investor who sold a security, the counterparty was the investor who bought it. Knowing the counterparty is only possible for transactions that occur within the same Participant.

Some of the scenarios in which the atypical transfer of funds can be identified are presented below:

- Transactions carried out through the same Participant: in such cases, the Participant has access to the information from final counterparties, since both are clients, and are able to identify the atypical situation.
- When transactions are carried out through different Participants, the concentration of transaction between Participants can characterize a suspicious scenario.

The atypical transfer of funds can be identified in **day trade** transaction, when trades are carried out on the same day with the same asset and between the same investors, or **swing trade** transaction, when trades are carried out on different days, with the same asset and between the same investors.

⚠ It is also possible to identify the atypical transfer even if there is no economic logic or economic foundations for this. Apparently legitimate transaction, may have been used as a way to hide the illegal source of funds or to validate a transaction in a regulated market transaction.

1.2 Suggestions for building the alert

Identifying atypical transfers of funds requires a detailed analysis of several financial and transactional information. However, there are indicators and **benchmarks** that can help detect indications of irregularities.

Suggestions of indicators for building the alert will be described below, and then applicable benchmarks for the detection of possible atypical situations.

The following assumptions have been adopted for the examples:

- The indicators and benchmarks are calculated considering pairs of transactions ("Money Pass") between investors, as described in item 1.1.
- The indicators and benchmarks are calculated considering the knowledge of the counterparties' information. In other words,

these transactions have been carried out through the same Participant or the decision center is common among the investors, such as transactions between Funds of the same manager.

- Consider the allocated trades, that is, those in which the Participants responsible for trading have already identified the due accounts in each order.
- Transaction monitoring becomes more complex in situations where transactions are originated without identifying a final client, that is, with the use of interim accounts during trading. This means that it is necessary to consider the trading and post-trading flow when identifying and analyzing such transactions.

Calculation of atypicality indicators

Considering the assumptions described previously, the following indicators can help identify signs of atypical transfers of funds.

a. Counterparty concentration

The counterparty concentration is an indicator that defines the participation of each counterparty in the breakdown of investors' transactions, that is, it indicates with which counterparties the investor traded larger amounts or volumes of transactions.

⚠ In the case of the derivatives market, the "number of contracts" can be considered instead of the "volume" for the counterparty concentration calculation.

Let's assume that, during the analyzed period, Investor 1 carried out buy and sell transactions of a certain asset, identifying evidence of transfers of funds (Money Pass), with five (5) different counterparties (2, 3, 4, 5, 6), as presented in the following table:

Table 2 – Counterparty concentration in transactions carried out by Investor 1

Analyzed investor	Counterparty investor	Volume (\$)	Counterparty concentration
1	2	100,000.00	69.4%
1	3	20,000.00	13.9%
1	4	5,000.00	3.5%
1	5	4,000.00	2.8%
1	6	15,000.00	10.4%
TOTAL		144,000.00	100%



The counterparty concentration between Investors 1 and 2 seen from the perspective of Investor 1 is different from the counterparty concentration seen from the perspective of Investor 2, as the quantity traded by Investor 2 in transactions with other counterparties can be different, as presented in the example below:

Table 3 – Counterparty concentration in transactions carried out by Investor 2

Analyzed investor	Counterparty investor	Volume (\$)	Counterparty concentration
2	1	100,000.00	76.9%
2	5	25,000.00	19.2%
2	7	5,000.00	3.8%
TOTAL		130,000.00	100%

- ⚠ Although the assumption that there is knowledge of the information of the investors that operate with each other is adopted, that is, that the transactions were intermediated by the same Participant, the concentration of transactions between different Participants can also be an atypicality indicator.

In the example below, the concentration between Participants A and B (90%) indicates atypical transfer of funds, which would require additional analysis of such transactions. See below:

Table 4 – Transactions carried out between Participants

Analyzed Participant	Participant	Volume (\$)
A	B	175,000.00
A	C	7,200.00
A	B	7,500.00
A	A	8,200.00
A	B	15,000.00
A	B	12,300.00
A	C	5,000.00
A	F	5,000.00
A	B	8,000.00
Total		243,200.00

Table 5 – Concentration of transactions among Participants

Analyzed Participant	Participant	Counterparty concentration (\$)	Counterparty concentration (%)
A	A	8,200.00	3%
A	B	217,800.00	90%
A	C	12,200.00	5%
A	F	5,000.00	2%
Total		243,200.00	100%

b. Financial result transaction

The calculation of the financial result is important to measure the financial value transferred between the parties. Let's assume that, in a certain period, Investor 1 has carried out several transactions with other three (3) investors, as presented in the example below:

Table 6 – Results of transactions carried out by Investor 1

Analyzed investor	Counterparty investor	Quantity	Buying volume (\$)	Selling volume (\$)	Result (\$)
1	2	80,000	666,250.00	800,020.00	133,770.00
1	2	20,000	700,000.00	799,960.00	99,960.00
1	2	10,000	633,750.00	750,000.00	116,250.00
1	3	10,000	150,000.00	125,000.00	-25,000.00
1	3	60,000	1,055,930.00	1,055,930.00	0.00
1	4	20,000	198,840.00	199,990.00	1,150.00
1	4	30,000	3,324,550.00	3,356,220.00	31,670.00
1	4	10,000	162,900.00	132,040.00	-30,860.00

After calculating the result of each of the transactions between investors, the sum of the total result between the pairs is performed. Once the result is obtained, it is possible to compare it to a defined benchmark to

identify a possible atypicality.

Table 7 – Summarized result of transactions carried out by Investor 1

Analyzed investor	Counterparty investor	Result (\$)
1	2	349,980.00
1	3	-25,000.00
1	4	1,960.00

⚠ To calculate the financial result, the following characteristics have been considered:

- **Day trade:** opening and closing a position on the same day – to calculate the result, the “first in, first out” criterion is considered.
- **Swing trade:** opening and closing a position on different days (**not necessarily consecutive**) – the criterion of matching the previous balance with the current balance is considered, that is, excluding previous day trades and swing trades.

I.e.: 1st day (*): purchase of 10 quantities → 2nd day: sale of 10 quantities → 3rd day: purchase of 10 quantities = **1 Swing Trade**

1st day: purchase of 10 quantities → 2nd day: sale of 20 quantities → 3rd day: purchase of 10 quantities = **2 Swing Trades**

c. Success ratio transaction

The success ratio aims to verify how often the investor makes winning trades, that is, earns a profit in the transactions, which may strengthen the hypothesis of irregularity.

To calculate the indicator, one can assign the value one (1) to transactions that resulted in profit and the value zero (0) to transactions that resulted in loss or no result for the investor. Considering the example below, in which Investor 1 has carried out transactions with other three (3) counterparties, we have the following:

Table 8 – Example of marking the success ratio in transactions carried out by Investor 1

Analyzed investor	Counterparty investor	Quantity	Buying volume (\$)	Selling volume (\$)	Result (\$)	Winning trade
1	2	80,000	666,250.00	800,020.00	133,770.00	1
1	2	20,000	700,000.00	799,960.00	99,960.00	1
1	2	10,000	633,750.00	750,000.00	116,250.00	1
1	3	10,000	150,000.00	125,000.00	-25,000.00	0
1	3	60,000	1,055,930.00	1,055,930.00	0.00	0
1	4	20,000	198,840.00	199,990.00	1,150.00	1
1	4	30,000	3,324,550.00	3,356,220.00	31,670.00	1
1	4	10,000	162,900.00	132,040.00	-30,860.00	0
1	4	80,000	666,250.00	800,020.00	133,770.00	1

After assigning the values 1 (one) and 0 (zero) to the transactions that resulted in profit, loss or no result, the success ratio will be calculated, which is the ratio between the sum of all transactions carried out by the pair and the sum of all transactions carried out by the pair with a positive result.

Table 9 – Example of success ratio in transactions carried out by Investor 1

Analyzed investor	Counterparty investor	# of transactions	# of winning trades	Success ratio (%)
1	2	3	3	100%
1	3	2	0	0%
1	4	4	3	75%

⚠ It is worth highlighting that it is also necessary to consider whether any investor presented a high **loss ratio**. The suggestion for these cases is to use a ratio constructed in a similar way to the one presented for the success ratio.

For example: Investor 1 has a success ratio of 100% in relation to day trade transactions carried out with Investor 2 and a success ratio of less than 50% in relation to the other investors with whom it operates. On the other hand, Investor 2 did not present a positive result in his/her transactions, therefore, he/she will not have a success ratio.

Table 10 – Example of the success ratio in transactions carried out by Investor 1

Analyzed investor	Counterparty investor	Number of transactions	Success ratio (%)
1	2	12	100%
1	3	7	0%
1	4	5	50%
1	5	3	12%
1	6	11	7%

Considering the high success ratio of 1 in relation to 2, we found that 2 has a high loss ratio (100%) compared to A, which strengthens the indication of atypicality.

Table 11 – Example of the loss ratio in transactions carried out by Investor 2

Analyzed investor	Counterparty investor	Number of transactions	Loss ratio (%)
2	1	12	100%

d. Intentionality (time and size indicators) transaction

Time and size indicators seek to identify intentionality and coordination elements of transactions.

Time indicator

This indicator measures how long the **resting orders** remain at the **order book**. Thus, the longer the time the order remains in the book, the greater the chance that the order will be executed by the market, which reduces the chance of coordination in the order insertion.

We verified how long the order remained on the order book before being attacked by the counterparty. This indicator varies from 0 to 1, according to the distribution of time spent in the order book. The closer to 1, the longer the order remained on the book.

⚠ The terms **aggressor order** and **resting order** are used to describe the two sides of a trade. The resting order is the order that was available in the order book, while the aggressor order is the order that was entered later and generated the trade.

Table 12 – Example of time indicator in transactions carried out by Investor 1

Analyzed investor	Counterparty investor	Time of resting order	Time of aggressor order / Time of trade	Permanence of the resting order in the book	Time indicator (*)
1	2	13:00:00	13:00:00	00:00	0.00
1	3	14:30:00	15:00:00	00:30	0.50
1	4	15:00:00	16:00:00	01:00	1.00

⚠ (*) To rank time differences in an interval between 0 and 1, we suggest following these steps:

1. Determine the smallest time difference and the largest time difference in the interval you want to rank. For example, if you want to rank time differences between 0 and 60 minutes, the smallest time difference would be 0 and the largest time difference would be 60.
2. Divide the permanence time of the resting order in the order book by the largest time difference obtained in item 1.
3. The result obtained will be the ranking of the time difference within the 0 to 1 range. The closer to 0, the smaller the time difference, and the closer to 1, the greater the time difference.

For example, let's calculate the ranking of the time differences 12 min, 24 min, 36 min and 60 min within the 0 to 1 range, considering that the smallest time difference is 0 and the largest time difference is 60:

- Time difference 12 min = $12 / 60 = 0.2$
- Time difference 24 min = $24 / 60 = 0.4$
- Time difference 36 min = $36 / 60 = 0.6$
- Time difference 60 min = $60 / 60 = 1$

Thus, the ranking of the time differences would be as follows: 0.2 / 0.4 / 0.6 / 1.

Size indicator

In addition to the time indicator, the size indicator can be used to measure the coordination between transactions. For this purpose, it compares the size of the aggressor order and the size of the resting order that generated the trade. Orders with different sizes reduce the chance of coordination of transactions.

Therefore, the greater the difference between the size of bid and ask prices, the lower the likelihood of coordination intent. To calculate said indicator, we divide the minimum value between the quantity of aggressor orders and the quantity of resting orders by the maximum value between the quantity of aggressor orders and the quantity of resting orders, ranging from 0 to 1, where a ratio closer to 1 indicates that the sizes of bid and ask orders are similar, increasing the chance of coordination.

Table 13 – Example of size indicator in transactions carried out by Investor 1

Analyzed investor	Counterparty investor	Qty. of resting orders	Qty of. aggressor orders	Qty. of transactions	Size indicator (*)
1	2	10,000	10,000	10,000	1
1	3	1,000,000	100,000	100,000	0.1

(*) The calculation of the size indicator is obtained by dividing the lowest quantity order (be it aggressor or resting) by the largest quantity order (whether aggressor or resting).

⚠ There are investors who operate with high frequency in the stock market, called HFT's or **High-frequency Traders**. These are automated trades that use complex algorithms to carry out the purchase and sale of assets at high speed. Transactions are generally carried out in milliseconds. Therefore, they can impact the calculation of coordination indicators and make it

difficult to detect atypical activities, as well as market makers.

Thus, we suggest evaluating the impact of said investors' transactions and, if necessary, disregarding them when calculating indicators and benchmarks. The time and size benchmarks provided by BSM already disregard both types of investors.

1.3 Benchmark calculation suggestions

Considering the indicators presented, it is possible to calculate **benchmarks** and identify investors who showed signs of atypical situations in their transactions, comparing them to the market standard.

Before calculating the benchmark, it is recommended that transactions are segregated into groups to compare investors with the same profile, for example:

RLP: identify Investors who traded with **RLP**.

Market group: identify which market group the transactions fall into: Spot or Derivatives.

Type of person: target the type of person into: Individuals, Non-Resident Individual, Institutional Legal Entities, Financial Legal Entity, Non-Financial Legal Entity, Non-Resident Legal Entity.

Market: identify the types of securities within the market group:

- Stocks, forwards and options (Spot Market);
- Cash, options and futures (Derivatives Market).

Product group: group the products operated by the investor, using, for example, separations by: a) Agriculture; b) Financial; c) **Ibovespa** (securities whose underlying asset participates in or is related to the Ibovespa); and d) Non-Ibovespa (securities whose underlying asset does not participate in or is not related to the Ibovespa).

If, within the combination of groups, there is not a minimum number of investors to be assessed (which will depend on each universe analyzed), the suggestion is to remove one of the groups to increase the number of investors compared, as follows:

Level 1

RLP + Market Group + Type of Person + Market + Product Group

Level 2

RLP + Market Group + Type of Person + Market

Level 3

RLP + Market Group + Type of Person

Level 4

RLP + Market Group

Market benchmarks related to the atypical transfer of funds are calculated and made available by BSM monthly, segregated by the levels above. See link [benchmarks](#).

Considering the indicators presented, we demonstrate below the example of benchmark calculation using the mean and standard deviation statistical measures.

Table 14 – Example of benchmark calculation

Analyzed investor	Counterparty investor	Counterparty concentration	Success ratio	Result (\$)	Time indicator	Size indicator
1	2	69.4%	100%	349,980.00	1.00	1.00
1	3	13.9%	0%	-25,000.00	0.45	0.10
1	4	3.5%	50%	1,960.00	0.30	0.50
1	5	2.8%	20%	-155,900.00	0.95	1.00
1	6	10.4%	30%	-35,022.00	0.20	0.25
2	1	76.9%	0%	-349,980.00	1.00	1.00
2	3	19.2%	60%	54,500.00	0.30	0.20
2	7	3.8%	10%	-504,900.00	1.00	1.00
3	1	34.1%	100%	25,000.00	0.45	0.10
3	2	33.0%	40%	-54,500.00	0.30	0.20
3	6	32.0%	40%	-155,000.00	0.15	0.10
4	1	35.5%	50%	-1,960.00	0.30	0.50
4	5	20.2%	25%	-45,598.00	0.25	0.30
4	6	44.3%	65%	5,500.00	0.05	0.05
5	1	81.1%	80%	155,900.00	0.95	1.00
5	4	18.9%	75%	45,598.00	0.25	0.30
6	1	63.2%	70%	35,022.00	0.20	0.25
6	3	30.5%	60%	155,000.00	0.15	0.10
6	4	6.3%	35%	-5,500.00	0.05	0.05
7	2	100%	90%	504,900.00	1.00	1.00
Mean		35.0%	50%	133,336.00*	0.47	0.45
Standard deviation		28.1%	29.9%	159,652.75*	0.35	0.38

* For the mean and standard deviation of the Result, we consider absolute values.

⚠ Comparison by mean and standard deviation is often used to assess whether a set of data is within a range of values considered acceptable or whether there are values that deviate significantly, that is, whether there is atypicality in the data set. Factors such as market volatility and changes in the economic environment should also be considered in the analyses.

⚠ Benchmarks related to the indicators presented are calculated monthly by BSM, except the result benchmark, since the value to be considered will depend on the risk profile assigned to the different types of investors by the Participants that intermediate their transactions. See link [benchmarks](#).



ALERTS

2. Insider Trading

2.1 Main concepts related to the alert

Insider Trading consists of the undue use of privileged information related to the businesses of publicly held companies, that is, confidential and relevant information, which, once made public, can influence an investors decision making².

The practice exposes one of the main capital market concerns, called information asymmetry³.

! **Information asymmetry** is a term that refers to situations where one party holds more information on an asset than the other party. Such asymmetry tends to cause a market imbalance.

! The Insider can be segregated into two main types:

Primary Insider: Occurs when the investor who showed suspicious signs has direct access to privileged information of a Company. These are usually people who hold c-level positions, officers, members of the board of directors or key employees.

Secondary Insider: Occurs when the investor who showed suspicious signs obtains privileged information through connections or relationships with primary insiders, that is, there is no direct access to information.

Example of Insider Trading dynamics

See below an example of a possible Insider dynamic. In this case, the hypothesis is transactionthe expectation of a positive impact on the assets price when the relevant information was disclosed:

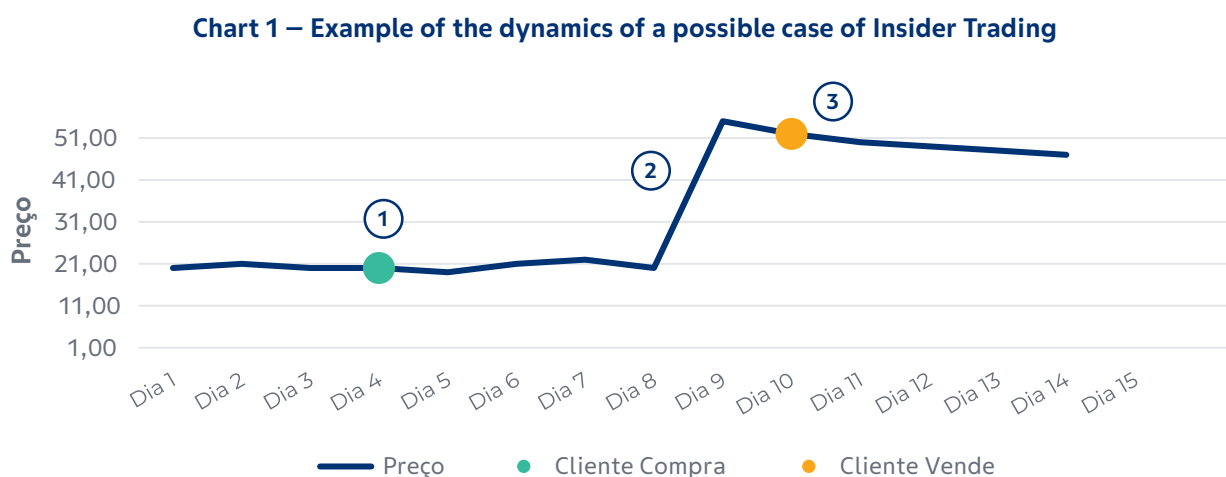
1. **Possibility of access to information:** in this hypothetical example, the investor purchased a security with the expectation that its price would be positively impacted when the information became public.

2 According to the wording of Article 2 of CVM Resolution 44

3 Economicsdiscussion.net. "[Joseph E. Stiglitz and his Works in Economics.](#)"

2. **Disclosure of information and market reaction:** a few days later, the **Issuing company** disclosed a material fact or information to the market. At this point, it is important to analyze what was the impact and the change in pattern presented by the asset after the company's disclosure. In this example, there was a positive impact on the asset price.
3. **Execution of the trade earning profit for the investor:** after the market reaction to the material fact or communication, the investor carried out the sale earning a profit. In this example, the investor sold the asset 6 days after the purchase and 2 days after the impact of the information on the asset price, which may vary in each case.

The aforementioned steps are represented in the chart below:



- ⚠ Identifying indications of insider trading and proving the irregularity of the practice are challenging tasks. The forms of transaction of an insider are countless. In addition to the example presented, in which the investor takes a buying position to supposedly benefit from the asset appreciation, there may be cases in which the investor takes a selling position, whether or not he/she has the asset in his/her portfolio, expecting a supposed asset devaluation, among other possibilities.

Furthermore, it is often difficult to distinguish between privileged information and public information. For example, an investor is considered an insider for having used information about the financial performance of a company that has not yet been disclosed to the public, which cannot be confused with an investor who has used information that is widely known in the industry and acted on opportunities for investments more accurately.

These are some of the reasons that justify that, for the construction of an effective and assertive alert, several factors and data must be considered, highlighting recurrence, systematicity, materiality and registration information (consider, for example, if the investor is a **related person** or if he/she has a relationship with people related to the Issuing Company).

2.2 Suggestions for building the alert

Some factors can be considered to increase assertiveness in identifying insider evidence. We will detail these factors in the next topics, with non-exhaustive examples and suggestions on how the alert can be constructed.

Identify disclosure of relevant information by the Issuing Company

The material facts or notices to the market, issued by the company in its disclosure channels, **which may influence the price of the asset or the investor's decision-making, are considered** relevant information⁴. It is worth highlighting that CVM Resolution 44 provides for the disclosure of such information.

⚠ Non-exhaustive examples of relevant information:

- changes in the company's shareholding control;
- acquisitions, incorporations, spin-offs, mergers involving the company and related companies;
- profit or loss of the company and allocation of cash proceeds;
- request for judicial or extrajudicial recovery; and/or
- change of projections disclosed by the company.

Define the analysis period

The suggestion is to segregate periods, adopting as a parameter the date of disclosure of the relevant information to the market, that is, the date on which the information used in the irregular practice has become public domain.

⚠ Examples for defining analysis periods:



Comparative period: period prior to the company's pre-disclosure period, used as a comparative historical basis for identifying atypical situations.

Pre-disclosure period: period prior to the disclosure of material facts or notices to the market.

Disclosure of material fact or notice to the market: date of disclosure of material fact or notice to the market, that is, when the information becomes public.

Company post-disclosure period: period following the disclosure made by the company.

⁴ Disclosures made by publicly held companies on B3 can be consulted at: <https://www.rad.cvm.gov.br/ENET/frnConsultaExternaCVM.aspx>.



It is worth highlighting that the definition of analysis periods will depend on the criteria and perception of who builds the alert, as well as the nature of the information being disclosed (which may be adjustable according to the model presented).

Identify the assets that showed a change in pattern or atypicality in transactions

It is important checking if there was any atypicality in the asset trading that could be related to a possible indication of insider trading, such as:

a. There has been a fluctuation in the asset price, which may be considered:

- **Intraday Fluctuation (IF):** price fluctuation in the same trading session, that is, the comparison between the opening and closing price of the same trading session (d-0):

$$IF = \frac{\text{Closing Price } D_0}{\text{Opening Price } D_0} - 1$$

In an example where the opening price of the day under analysis was R\$ 14.88 and the closing price of the day under analysis was R\$ 15.36, we would have an intraday fluctuation of 3.23%:

$$IF = \frac{15.36}{14.88} - 1 = 3.23\%$$

- **Interday Fluctuation (Inter Fluc):** fluctuation of the closing price of the previous day (d-1) in relation to the opening price of the session under analysis (d0):

$$IF = \frac{\text{Opening Price } D_0}{\text{Closing Price } D_{-1}} - 1$$

In an example where the closing price of the day before the analysis was R\$ 12.35 and the opening price of the day of analysis was R\$ 14.88, we would have an interday fluctuation of 20.49%:

$$IF = \frac{14.88}{12.35} - 1 = 20.49\%$$

b. Detection of changes in the asset's operating pattern in relation to a comparative period. For this purpose, some variables can be considered, such as:

- increase in traded quantity;
- increase in the number of trades;
- increase in volume of trades;
- increase in volatility; and/or
- changes in asset prices.

Relate the asset fluctuation and the nature of investor transactions

- a. If the asset has presented a **positive fluctuation**, investors who would benefit from its appreciation could be selected for analysis. The following are non-exhaustive examples:
 - Investors who decided to buy the asset at a time close to the release of the company's information and, in the post-disclosure period, carried out sales trades, reversing the total or partial position acquired during the pre-disclosure period, and thus obtaining a positive financial result.
 - Investors who bought a call option close to the disclosure of the company's information and, in the post-disclosure period, carried out sales trades, reversing the position or exercising the call option.

- Investors who positioned themselves as buyers in a forward contract at a time close to the disclosure of company information and, in the post-disclosure period, settled the contract; and/or
 - Investors linked to the Company who decided to buy the asset at a time close to the release of relevant information.
- b.** Considering that the asset has presented a **negative fluctuation**, the investors who would benefit from the asset devaluation should be selected for analysis. The following are non-exhaustive examples:
- Investors who did not have custody and carried out share sales transactions in the pre-disclosure period of relevant company information (leasing shares on the market) and, in the post-disclosure period, carried out purchase transactions reversing the position previously acquired, in whole or in part, and obtaining financial benefits.
 - Investors who had custody of the share before the start of the pre-disclosure period and carried out sales orders, reversing the previously acquired position, aiming to avoid potential loss with the asset's devaluation.
 - Investors who bought a put option close to the disclosure of the company's information and, in the post-disclosure period, carried out sales trades, reversing the position or exercising the put option; and/or
 - Investors linked to the Company who were willing to sell the asset at a time close to the disclosure of the relevant information.

⚠ In this context, the following concepts are important:

Full reversal: full position reversal occurs when an investor fully settles his/her current position in a given asset.

Partial reversal: partial position reversal occurs when an investor reverses only a lower part of his/her current position in a given financial asset.

Identify investors who presented a change in transactional profile and/or atypical results

The next suggestions are related to the identification of investors who presented atypical situations in the transactions:

- a.** Identify a possible change in the investor's transactional profile, considering, for example:
- i. Investors who have changed the type of asset they usually trade. For example: the investor does not have a history of transactions with securities of a given company and starts to trade them. The change may not be an issue, but the alteration in the transactional profile may represent an indication of atypicality; and/or
 - ii. Investors that present an atypical increase in the average position or custody of the asset compared to the position of the period prior to the company's disclosure.

⚠ **Suggestion to identify the transactional profile change:** transactional profile change can be identified using different methods. One possibility is to use data comparison metrics, for example, the [Euclidean distance](#), which calculates the difference between two points projected onto a plan, as follows:

- **Custody of asset “C” (Axis “x”):**

C_{COMP} = Custody at the end of the comparative period

C_{PRE} = Custody at the end of the Company’s pre-disclosure period

- **Average position “P” (Axis “y”)**

P_{COMP}^C = Average quantity placed on BUY position during the comparative period

P_{COMP}^V = Average quantity placed on SELL position during the comparative period

P_{PRE}^C = Average quantity placed on BUY position during pre-disclosure period

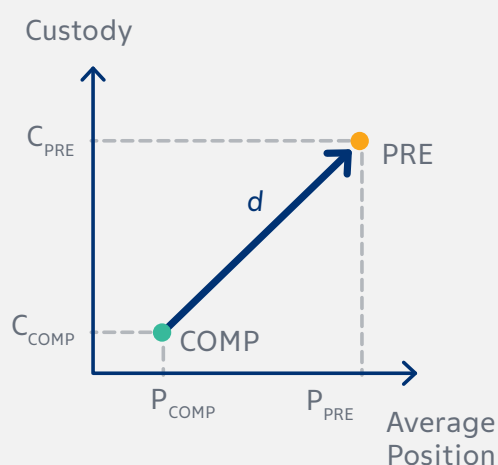
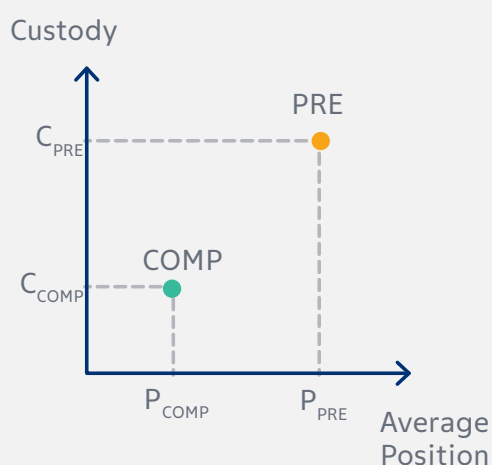
P_{PRE}^V = Average quantity placed on SELL position during pre-disclosure period

Calculation of Euclidean Distance (ED)

Given two points (x_1, y_1) and (x_2, y_2) , the distance between them can be calculated as follows:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}, \text{ i.e., } \sqrt{(C_{COMP} - C_{PRE})^2 + (P_{COMP} - P_{PRE})^2}$$

Graphic representation:



In a simplified and hypothetical example, considering that the information on transactions of three investors who acted in the same period is known, we would have the following:

Investor 1	Investor 2	Investor 3	
$C_{COMP} = 100$	$C_{COMP} = 100$	$C_{COMP} = 100$	
$C_{PRE} = 180$	$C_{PRE} = 500$	$C_{PRE} = 1.500$	$d_1 = \sqrt{(100 - 180)^2 + (150 - 200)^2} = 94$
$P_{COMP}^C = 150$	$P_{COMP}^C = 150$	$P_{COMP}^C = 600$	$d_2 = \sqrt{(100 - 500)^2 + (150 - 500)^2} = 531$
$P_{PRE}^C = 200$	$P_{PRE}^C = 500$	$P_{PRE}^C = 1.340$	$d_3 = \sqrt{(100 - 4000)^2 + (600 - 5200)^2} = 94$

The change of transactional profile was more significant for Investor 3, and, given his/her representativeness, he/she should be considered for further analysis in a potential insider case.

It is worth considering that the profile change can occur in different directions:

Vector	Type of change
	- Decreased average buy position. - Increased custody.
	- Increased average buy position. - Increased custody.
	- No change in the average buy position. - Increased custody.

b. Compare with the financial result of other investors:

- Consider whether any investor stood out by presenting statistically significant financial results compared to other investors of the same profile who operated in the same period.
- Investors who showed an atypical increase in the financial result when compared to the result obtained in the period prior to the company's disclosure.

Suggestion for calculating the Financial Result (FR)⁵

The proposal is to apply a metric that quantifies the financial result obtained by the investor:

When the asset appreciates

Calculate the profit that the investor obtained carrying out the sell transactions in the company's pre-disclosure period and the sales transactions in the company's post-disclosure period.

If the investor's buy and sell transactions have **different quantities**, we can use the following formula:

FR = MQ x (AP – BP), where:

- **MQ = Matched Quantity:** is the smallest quantity of the investor between sell transactions carried out in the pre-disclosure period and sales transactions carried out in the post-disclosure period:
 $\min(\sum \text{buy qty}, \sum \text{sell qty})$
- **AP = Ask Price:** average price weighted by the sales quantity in the investor's post-disclosure period:
 $(\sum (P \times \text{qty}) / \sum \text{qty})$
- **BP = Bid Price:** average price weighted by the buy quantity in the investor's post-disclosure period:
 $(\sum (P \times \text{qty}) / \sum \text{qty})$

Two examples demonstrating the calculation are presented below:

Table 15 – Insider Trading: Example of calculating the financial result when there is an asset appreciation and the same amount traded in the buy and sell transaction

Asset	Amount traded by the investor	Price (\$)	Volume traded by investor (\$)	Period	Type of transaction
XYZ	150,000	3.20	480,000.00	Pre-disclosure	Buy
Total investor purchase in the pre-disclosure period	150,000	3.20	480,000.00		
XYZ	70,000	3.60	252,000.00	Post-disclosure	Sell
XYZ	80,000	3.56	284,800.00	Post-disclosure	Sell
Total investor sales in the post-disclosure period	150,000	3.5787	536,800.00		

⁵ The examples consider the calculation of the average price obtained by dividing the total volume traded by the total quantity traded. There are other ways that can be used to calculate the financial result — for example, the FIFO (First in, First out) method.

Considering the formulas:

- $AP = (\sum(P \times qty) / \sum qty)$, we have
 $AP = ((3.60 \times 70,000 + 3.56 \times 80,000) / (70,000 + 80,000))$, that is,
 $AP = 3.5787$
- $BP = (\sum(P \times qty) / \sum qty)$, we have
 $BP = ((3.20 \times 150,000) / (150,000))$, that is, $BP = 3.20$
- $FR = MQ \times (AP - BP)$, we have
 $FR = 150,000 \times (\$ 3.5787 - \$ 3.20)$, that is, $FR = \$ 56,800.00$

Table 16 – Insider Trading: Example of calculating the financial result when there is an asset appreciation and with different amounts traded in the purchase and sale

Asset	Amount traded by the investor	Price (\$)	Volume traded by investor (\$)	Period	Type of transaction
XYZ	150,000	3.20	480,000.00	Pre-disclosure	Buy
XYZ	120,000	3.22	386,400.00	Pre-disclosure	Buy
Total investor purchase in the pre-disclosure period	270,000	3.208889	866,400.00		
XYZ	70,000	3.60	252,000.00	Post-disclosure	Sell
XYZ	90,000	3.56	320,400.00	Post-disclosure	Sell
Total investor sales in the post-disclosure period	160,000	3.5775	572,400.00		

Considering the formulas:

- $AP = (\sum(P \times qty) / \sum qty)$, we have
 $AP = ((3.60 \times 70,000 + 3.56 \times 90,000) / (70,000 + 90,000))$, that is,
 $AP = 3.5775$
- $BP = (\sum(P \times qty) / \sum qty)$, we have
 $BP = ((3.20 \times 150,000 + 3.22 \times 120,000) / (150,000 + 120,000))$, that is, $BP = 3.208889$
- $FR = MQ \times (AP - BP)$, we have
 $FR = 160,000 \times (\$ 3.58 - \$ 3.208889)$, that is, $FR = \$ 58,997.78$

When the asset depreciates

Calculate the profit that the investor obtained carrying out sales trades in the company's pre-disclosure period and purchase trades in the company's post-disclosure period.

If the investor's buy and sell transactions have **different quantities**, we can use the following formula: $FR = MQ \times (AP - BP)$, where:

- **MQ = Matched Quantity:** is the smallest amount of the investor between purchase transactions carried out in the post-disclosure period and sales transactions carried out in the pre-disclosure period: $\min(\sum \text{buy qty}, \sum \text{sell qty})$
- **AP = Ask Price:** average price weighted by quantity sold in the investor's pre-disclosure period: $(\sum(P \times \text{qty}) / \sum \text{qty})$
- **BP = Bid Price:** average price weighted by the purchase quantity in the investor's post-disclosure period: $(\sum(P \times \text{qty}) / \sum \text{qty})$

An example demonstrating the calculation is presented below:

Table 17 – Insider Trading: example of calculating the financial result when there is asset devaluation

Asset	Amount traded by the investor	Price (\$)	Volume traded by investor (\$)	Period	Type of transaction
XYZ	40,000	6.30	252,000.00	Pre-disclosure	Sell
XYZ	50,000	6.41	320,400.00	Pre-disclosure	Sell
Total investor sales in the pre-disclosure period	90,000	6.36	572,400.00		
XYZ	45,000	5.10	229,500.00	Post-disclosure	Buy
XYZ	45,000	5.05	227,250.00	Post-disclosure	Buy
Total investor purchase in the post-disclosure period	90,000	5.075	456,750.00		

Considering the formulas:

- $AP = (\sum(P \times \text{qty}) / \sum \text{qty})$, we have
 $AP = ((6.30 \times 40,000 + 6.41 \times 50,000) / (40,000 + 50,000))$, that is,
 $AP = 6.36$
- $BP = (\sum(P \times \text{qty}) / \sum \text{qty})$, we have
 $BP = ((5.10 \times 45,000 + 5.05 \times 45,000) / (45,000 + 45,000))$, that is,
 $BP = 5.075$
- $FR = MQ \times (AP - BP)$, we have
 $FR = 90,000 \times (\$ 6.36 - \$ 5.075)$, that is, $FR = \$ 115,650.00$

Cases in which there was a reversal of position

For cases in which the investor carried out a partial reversal of a position acquired in a period prior to the company's pre-disclosure period, a simulated result can be calculated with the purpose of measuring the value that the investor stopped losing by making sales before information disclosure, using the following formula: $FR = QS \times (AP - MP)$, where:

- **QS = Quantity Sold:** is the quantity sold by the investor in the pre-disclosure period: $\sum \text{sales qty}$
- **AP = Ask Price:** average price weighted by quantity sold in the investor's pre-disclosure period: $(\sum(P \times \text{qty}) / \sum \text{qty})$
- **MP = Average Market Price:** average price weighted by the quantity in the post-disclosure period: $(\sum(P \times \text{qty}) / \sum \text{qty})$

An example demonstrating the calculation is presented below:

Table 18 – Insider trading: example of calculating the financial result when there is a reversal of position – pre-disclosure period

Asset	Amount traded by the investor	Price (\$)	Volume traded by investor (\$)	Period	Type of transaction
XYZ	40,000	6.30	252,000.00	Pre-disclosure	Sell
XYZ	50,000	6.41	320,400.00	Pre-disclosure	Sell
Total investor sales in the pre-disclosure period	90,000	6.36	572,400.00		

Table 19 – Insider Trading: example of calculating the financial result when there is a reversal of position – post-disclosure period

Asset	Total amount traded on the market	Average price (\$)	Total volume traded on the market (\$)	Period
XYZ	1,731,000	5.59	9,676,290.00	Post-disclosure
Total traded on the market	1,731,000	5.59	9,676,290.00	

Considering the formulas:

- **AP = $(\sum(P \times \text{qty}) / \sum \text{qty})$** , we have
 $AP = ((6.30 \times 40,000 + 6.41 \times 50,000) / (40,000 + 50,000))$, that is,
 $AP = 6.36$
- **MP = 5.59**
- **FR = QS x (AP – MP)**, we have
 $FR = 90,000 \times (\$ 6.36 - \$ 5.59)$, that is,
 $FR = \$ 69,300.00$

Selection of investors

After calculating the indicators, it is possible to select the investors that showed the greatest evidence of atypicality and include registration information that helps assessing a possible irregularity, such as:

- Segmentation: identify whether the investor is a resident or non-resident individual, financial or non-financial legal entity, institutional investor, etc.;
- Economic activity;
- Registration information of **account(s)** used, such as opening date and account number;
- Information whether the investor is a **PEP (Politically Exposed Person)**;
- Registration address;
- Registration email;
- **Related parties**: identify investors who have a direct relationship with the Issuing Company and consequent privileged access to confidential information, such as employees, service providers, officers and members of the board of directors.

⚠ Selection of investors for analysis

A suggestion to identify investors who show signs of profile change and/or atypical results, and thus be able to analyze such cases, is to create a graphical visualization by quadrants that separates the results into four groups, aiming to group these investors according to the highest degree of influence among the suggested indicators.

The transactional profile breakdown information (previously calculated by the Euclidean distance) can be allocated on the X axis and the financial result on the Y axis, applying the following formulas to define the quadrants of the chart:

- Half of the Y-Axis = (maximum financial result of all investors + minimum financial result of all investors) / 2
- Half of the X Axis = (maximum result obtained in the formula for breaking down the transactional profile of all investors + minimum result obtained in the formula for breaking down the operating profile of all investors) / 2

Suggested metrics:

Financial Result

$RF = \text{Financial result}$

$\overline{RF} = \text{Financial result average}$

Euclidean Distance

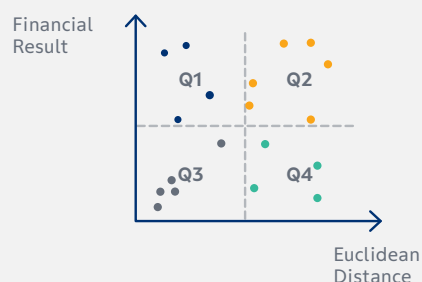
$DE = \text{Euclidean Distance}$

$\overline{DE} = \text{Euclidean Distance average}$

Limits and graphic representation: thus, it is possible to verify that the investors who are in the 4th quadrant (Q4) are the ones that stood out the most in the indicators compared to the others. It is worth highlighting that this comparison can only be made with knowledge of the information on operation transactions and custody of investors.

Limits:

- $Q_2: RF \geq \overline{RF} \text{ and } DE \geq \overline{DE}$
- $Q_1: RF \geq \overline{RF} \text{ and } DE \leq \overline{DE}$
- $Q_4: RF \leq \overline{RF} \text{ and } DE \geq \overline{DE}$
- $Q_3: RF \leq \overline{RF} \text{ and } DE \leq \overline{DE}$





ALERTS

3. Layering

3.1 Main concepts related to the alert

Layering is a form of price determination that occurs when an investor inserts or modifies supposedly fictitious orders with the purpose of creating artificial liquidity in the asset's order book.

In layering, the investor inserts or modifies purchase or sale orders without the real intention of executing them, thus forming layers in the book with the purpose of doing trades on the opposite side at better prices. The layer can be canceled before or after the trade is executed,

Such practice is considered irregular as it harms fair competition and may lead other investors to make investment decisions based on artificially created information. Two examples of layering dynamics will be described below, one with order insertion and the other with order modification.

⚠ CVM Resolution 62 defines as **artificial conditions of demand, supply or price of securities** “those created as a result of negotiations by which its Participants or intermediaries, by intentional action or omission, directly or indirectly cause changes in the flow of purchase or sale orders of securities.”

Examples of layering dynamics

a. Example of layering with insertion of orders:

The following table shows the order book for an asset before the action of the investor who allegedly carried out the layering practice:

Table 20 – Order book before the action of the investor who supposedly carried out the layering practice⁶

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.59	100	E	11:12:35.874
11:13:31.431	B	100	19.02	19.59	100	E	11:12:38.786
11:13:15.209	D	200	19.01	19.60	100	F	11:13:24.726
11:12:04.756	C	500	18.93	19.64	200	G	10:18:26.293
10:29:30.996	G	5,000	18.75	19.68	200	D	09:45:01.064

⁶ Orders are ranked according to the best price priority principle. In the case of purchase, the higher the price, the higher the priority, and in the case of sale, the lower the price, the higher the priority. Orders with equal prices are sorted according to the registration or modification time, that is, previously inserted or modified orders have priority.

At the time shown, the spread of the asset was R\$ 0.57 (the difference between the best ask price in the amount of R\$ 19.59 and the best bid price in the amount of R\$ 19.02).

⚠ **Spread** is the term used to refer to the difference the best ask and the best bid for an asset in the order book.

Through Participant C, the investor entered several put sell orders that reduced the asset's spread to R\$ 0.25. The following table shows the moment after insertion of the investor's sell orders, highlighted in grey.

Table 21 – Order book after the investor cancels the orders that created the artificial liquidity

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.27	100	C	11:13:48.213
11:13:31.431	B	100	19.02	19.28	400	A	11:13:47.801
11:13:15.209	D	200	19.01	19.29	100	C	11:13:47.796
11:12:04.756	C	500	18.93	19.31	100	C	11:13:46.820
11:12:41.018	D	100	18.90	19.33	100	C	11:13:46.621
10:29:30.996	G	5,000	18.75	19.35	100	C	11:13:46.412
10:10:11.916	H	200	18.60	19.37	100	C	11:13:46.230
10:10:11.916	H	300	18.58	19.37	100	D	11:13:46.234
10:12:06.963	E	200	18.53	19.38	100	C	11:13:45.693
10:12:06.964	B	300	18.52	19.39	100	C	11:13:44.197
10:12:06.964	D	200	18.51	19.40	100	C	11:13:43.493
10:10:11.916	F	300	18.50	19.50	100	C	11:13:41.572
10:12:06.964	G	200	18.50	19.58	100	C	11:13:39.389
10:14:39.977	H	900	18.50	19.59	100	E	11:12:35.874

⚠ Participants intermediate transactions of several investors. Therefore, it is important to be clear that information about the analyzed investors must be known to identify atypical situations.

After inserting the investor's order, which supposedly created artificial liquidity, the market's reaction can be seen, with the insertion of a sell order at the price of R\$ 19.26 (highlighted in blue), as presented in the table below.

Table 22 – Order book at the time the market reacted to artificial liquidity

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.26	400	A	11:13:48.218
11:13:31.431	B	100	19.02	19.27	100	C	11:13:48.213
11:13:15.209	D	200	19.01	19.29	100	C	11:13:47.796
11:12:04.756	C	500	18.93	19.31	100	C	11:13:46.820
11:12:41.018	D	100	18.90	19.33	100	C	11:13:46.621
10:29:30.996	G	5,000	18.75	19.35	100	C	11:13:46.412
10:10:11.916	H	200	18.60	19.37	100	C	11:13:46.230
10:10:11.916	H	300	18.58	19.37	100	D	11:13:46.234
10:12:06.963	E	200	18.53	19.38	100	C	11:13:45.693
10:12:06.964	B	300	18.52	19.39	100	C	11:13:44.197
10:12:06.964	D	200	18.51	19.40	100	C	11:13:43.493
10:10:11.916	F	300	18.50	19.50	100	C	11:13:41.572
10:12:06.964	G	200	18.50	19.58	100	C	11:13:39.389
10:14:39.977	H	900	18.50	19.59	100	E	11:12:35.874

After the market's reaction, the investor, with the apparent purpose of buying the asset at a lower price, entered an order at the price of R\$ 19.26 (highlighted in grey) and carried out the trade.

Table 23 – Order book at the time the investor carried out the trade

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:13:49.624	C	400	19.26	19.26	400	A	11:13:48.218
11:12:38.431	B	100	19.02	19.27	100	C	11:13:48.213
11:13:31.431	B	100	19.02	19.29	100	C	11:13:47.796
11:13:15.209	D	200	19.01	19.31	100	C	11:13:46.820
11:12:04.756	C	500	18.93	19.33	100	C	11:13:46.621
11:12:41.018	D	100	18.90	19.35	100	C	11:13:46.412
10:29:30.996	G	5000	18.75	19.37	100	C	11:13:46.230
10:10:11.916	H	200	18.60	19.37	100	D	11:13:46.234
10:10:11.916	H	300	18.58	19.38	100	C	11:13:45.693
10:12:06.963	E	200	18.53	19.39	100	C	11:13:44.197
10:12:06.964	B	300	18.52	19.40	100	C	11:13:43.493
10:12:06.964	D	200	18.51	19.50	100	C	11:13:41.572
10:10:11.916	F	300	18.50	19.58	100	C	11:13:39.389
10:12:06.964	G	200	18.50	19.59	100	E	11:12:35.874

⚠ In this example, the order of the investor who supposedly carried out the layering practice was aggressive, that is, it was inserted after Participant C's order and generated the trade at a price of R\$ 19.26. One of the possible variations would be for the investor to have entered the order first and have his/her order attacked by the market.

Next, the investor canceled all the sell orders that he/she had previously entered:

Table 24 – Order book after the investor cancels the orders that created the artificial liquidity

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.37	100	D	11:13:46.234
11:13:31.431	B	100	19.02	19.59	100	E	11:12:35.874
11:13:15.209	D	200	19.01	19.59	100	E	11:12:38.786
11:12:04.756	C	500	18.93	19.60	100	F	11:13:24.726
10:29:30.996	G	5,000	18.75	19.64	200	G	10:18:26.293

⚠ One of the possible practice variations is, instead of canceling the order that generated the apparent liquidity, the investor changes the order for a worse price.

For cases in which the investor **cancels** or **changes** the order, the cancellation or changing can be identified both before and after the investor's trade is carried out.

b. Example of layering with order modification:

The following table shows the order book for an asset before the action of the investor who allegedly carried out the layering practice:

Table 25 – Order book before the action of the investor who supposedly carried out the layering practice⁷

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.59	100	E	11:12:35.874
11:13:31.431	B	100	19.02	19.59	100	E	11:12:38.786
11:13:15.209	D	200	19.01	19.60	100	F	11:13:24.726
11:12:04.756	C	500	18.93	19.64	200	G	10:18:26.293

At the time shown, the asset spread was R\$ 0.57 (the difference between the best ask price in the amount of R\$ 19.59 and the best bid price in the amount of R\$ 19.02).

The investor, through Participant C, entered a sell order and modified it several times to supposedly change the asset price. The following table shows the moment when the investor entered the buy order, highlighted in grey.

⁷ Orders are ranked according to the best price priority principle. In the case of purchase, the higher the price, the higher the priority, and in the case of sale, the lower the price, the higher the priority. Orders with equal prices are sorted according to the registration or modification time, that is, previously inserted or modified orders have priority.

Table 26 – Order book at the time the investor entered the order initiating the layering practice

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.58	100	C	11:13:39.389
11:13:31.431	B	100	19.02	19.59	100	E	11:12:35.874
11:13:15.209	D	200	19.01	19.59	100	E	11:12:38.786
11:12:04.756	C	500	18.93	19.60	100	F	11:13:24.726
11:12:41.018	D	100	18.90	19.64	200	G	10:18:26.293

A few moments later, the investor changed the order price from R\$ 19.58 to R\$ 19.45, as shown in the following table.

Table 27 – Order book at the time the investor created artificial liquidity by modifying the order for the first time

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.45	100	C	11:13:40.445
11:13:31.431	B	100	19.02	19.59	100	E	11:12:35.874
11:13:15.209	D	200	19.01	19.59	100	E	11:12:38.786
11:12:04.756	C	500	18.93	19.60	100	F	11:13:24.726
11:12:41.018	D	100	18.90	19.64	200	G	10:18:26.293

Moments later, the investor again modified the order price from R\$ 19.45 to R\$ 19.30, as presented in the following table.

Table 28 – Order book at the time the investor created artificial liquidity by modifying the order for the second time

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.30	100	C	11:13:41.572
11:13:31.431	B	100	19.02	19.59	100	E	11:12:35.874
11:13:15.209	D	200	19.01	19.59	100	E	11:12:38.786
11:12:04.756	C	500	18.93	19.60	100	F	11:13:24.726
11:12:41.018	D	100	18.90	19.64	200	G	10:18:26.293

After modifying the investor's order, one can see the market's reaction, with the insertion of a sell order at a price of R\$ 19.29 (highlighted in blue), as presented in the following table.

Table 29 – Order book at the time the market reacted to artificial liquidity

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.29	400	A	11:13:43.218
11:13:31.431	B	100	19.02	19.30	100	C	11:13:41.572
11:13:15.209	D	200	19.01	19.59	100	E	11:12:35.874
11:12:04.756	C	500	18.93	19.59	100	E	11:12:38.786
11:12:41.018	D	100	18.90	19.60	100	F	11:13:24.726

After the market's reaction, the investor, with the apparent purpose of buying the asset at a lower price, entered a bid offer at the price of R\$ 19.29 (highlighted in grey) and carried out the trade.

Table 30 – Order book at the time the investor carried out the trade

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:13:45.456	C	400	19.29	19.29	400	A	11:13:43.218
11:12:38.431	B	100	19.02	19.30	100	C	11:13:41.572
11:13:31.431	B	100	19.02	19.59	100	E	11:12:35.874
11:13:15.209	D	200	19.01	19.59	100	E	11:12:38.786
11:12:04.756	C	500	18.93	19.60	100	F	11:13:24.726

Subsequently, the investor canceled the sales order that he/she had entered.

3.2 Suggestions for building the alert

We will detail some suggestions on how to identify indications of atypicality. For this purpose, four steps will be segregated which, when identified, form a **layering cycle**.

- An investor **creates artificial liquidity** in the order book, on the opposite side to the one he/she wants to trade, by inserting or modifying what we will call “artificial orders”.
- **Market reaction** (other investors) to artificial liquidity created by the investor.
- Investor **carries out the trade**.
- Investor **cancels orders** that generated artificial liquidity or **changes orders** for worse prices.

- ⚠ The four phases of the **layering cycle** do not necessarily need to be carried out in the same order as presented above. An alert can be generated if one or more cycles are identified, depending on the risk approach and criteria used in the alert.

Creation of artificial liquidity

As previously mentioned, liquidity creation can occur by inserting or modifying an order (on the opposite side to the one where one really wants to execute the trade), aiming to reduce the spread.

For cases of layering with insertion of orders, the suggestion is to consider creating two or more layers of orders inserted in the first price levels, aiming to obtain the spread reduction.

For cases of layering indications with order modification, the suggestion is to consider orders that have been modified to the first price levels and with better prices before executing the trade on the opposite side of the order book.

- ⚠ In example a presented in item 3.1, the investor who supposedly carried out the practice entered orders at 11 different price levels (between R\$ 19.58 and R\$ 19.27) and better than the price of the best sell order available on the book before the beginning of the creation of apparent liquidity (R\$ 19.59). It is worth recalling that the order layers may contain other price levels filled with orders from other Participants or investors.

- ⚠ In example b presented in item 3.1, the investor who supposedly carried out the practice entered an order at a better price level (R\$ 19.58) than the best sell order available in the book before the beginning of the creation of apparent liquidity (R\$ 19.59) and modified the order until reaching the price of R\$ 19.30.

- ⚠ The definition of the first price levels will depend on the characteristics of the asset's order book, mainly on the **depth** of the book, which indicates the number of existing bid and ask prices for the asset at a given moment.

Market reaction

At this phase, the market must react to the artificial liquidity created by the investor who supposedly carried out the layering practice.

⚠ In the examples presented in item 3.1, the market reacted to the apparent liquidity created by the supposed layering practice by inserting an order with the price of R\$ 19.29. The market reaction may have been carried out through the same Participant as the investor who allegedly carried out the practice or through another Participant.

Trade execution

Having identified the previously mentioned signs of atypicality, the investor must have traded on the opposite side to the one that inserted the order that generated the artificial liquidity. In this way, the effects of possible irregularity reinforce the hypothesis of atypicality, since the investor managed to carry out the transaction at a better price (buying at a lower price or selling at a higher price) than the asset had before the start of the transaction.

Cancellation of artificial liquidity

The cancellation of artificial orders can occur before or after the execution of the trade. At this phase, some points should be considered:

- **Price level of orders at the time of cancellation**

For the phase of the cycle where the cancellation of artificial orders takes place, if the cancellation occurs **before** the trade is executed, at the time of cancellation, the order(s) must be among the first price levels.

If cancellation occurs after the trade, at the time of execution, the artificial orders must be among the first price levels.

⚠ In example c presented in item 3.1, the trade was executed at a price of R\$ 19.29, and the artificial order, which was subsequently canceled, was placed at the second price level (R\$ 19.30) at the time of execution of the trade.

- **Interval between cycle phases**

It is important considering the time elapsed between the supposed creation of artificial liquidity and its cancellation. For this purpose, it is possible to calculate an average time benchmark between trades of the asset and compare it with the time interval between orders that generated artificial liquidity (time of insertion or last modification) and the cancellation of orders.

- ⚠ For example b presented in item 3.1, assuming that an average time of 3 seconds (00:00:03.00) between trades of the asset was calculated, the investor who supposedly carried out the irregular practice modified the order for the last time at 11:13:41.572 and canceled it at 11:13:43.219. This represented an interval of 1 second and 674 milliseconds (00:00:01.674), which is less than the average time between trades for the asset in question. This fact strengthens the hypothesis of atypicality, since the investor's order remained in the book for a period shorter than the average of market offers, thus increasing the indication that the order was artificially inserted and changed.

- ⚠ The average time benchmark between asset trades is calculated and made available by BSM monthly. See link [benchmarks](#).

Calculation of the potential profit earned

Aiming to measure the potential result that the investor obtained when carrying out the layering practice, we can calculate the difference between the price of the best offer entered in the book before the beginning of the creation of the artificial layer by the investor and the price at which the investor carried out the trade, multiplied by the amount traded by the investor, according to examples 1 and 2:

- **Example 1**

In this example, the best ask available in the book before the investor's action was R\$ 19.59:

Table 31 – Order book before investor action

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.59	2,000	E	11:12:35.874
11:13:31.431	B	100	19.02	19.59	100	E	11:12:38.786
11:13:15.209	D	200	19.01	19.60	100	F	11:13:24.726
11:12:04.756	C	500	18.93	19.64	200	G	10:18:26.293
11:12:41.018	D	100	18.90	19.68	200	D	09:45:01.064

After identifying the other phases of the layering cycle, we consider that the investor has carried out a trade at the price of R\$ 19.26 involving 2,000 shares, as presented below:

Table 32 – Order book at the time the investor carried out the trade

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:13:49.624	C	2,000	19.26	19.26	2,000	A	11:13:48.218
11:12:38.431	B	100	19.02	19.27	100	C	11:13:48.213
11:13:31.431	B	100	19.02	19.29	100	C	11:13:47.796
11:13:15.209	D	200	19.01	19.31	100	C	11:13:46.820
11:12:04.756	C	500	18.93	19.33	100	C	11:13:46.621

In that case⁸, the potential profit earned by the investor is calculated as follows:

- R\$ 19.59 (best price at which the investor could buy the asset before the alleged layering practice) – R\$ 19.26 (price at which the investor bought the asset after the supposed layering practice) = R\$ 0.33
- R\$ 0.33 X 2,000 (amount purchased by the investor with the alleged practice of layering) = **R\$ 660.00**

In this example, there was enough depth for the investor to purchase 2,000 shares at the price of R\$ 19.59 each. If there was no quantity available in the book at the first price level, we would have to consider the other price levels until reaching the quantity traded by the investor, which will be demonstrated in Example 2.

• Example 2

In this example, the best ask available in the book before the investor's action was R\$ 19.59:

Table 33 – Order book before investor action

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:12:38.431	B	100	19.02	19.59	400	E	11:12:35.874
11:13:31.431	B	100	19.02	19.59	100	E	11:12:38.786
11:13:15.209	D	200	19.01	19.60	100	F	11:13:24.726
11:12:04.756	C	500	18.93	19.64	200	G	10:18:26.293
11:12:41.018	D	100	18.90	19.68	200	D	09:45:01.064

⁸ In this example, a share with a quotation factor equal to one (1) was considered as a product. For other products, the particularities and specific characteristics must be evaluated in the calculation.

After identifying the other phases of the layering cycle, we consider that the investor has carried out a trade at the price of R\$ 19.26 involving 800 shares, as presented below:

Table 34 – Order book at the time the investor carried out the trade

Bid				Ask			
Hour	Part	Qty	Price (\$)	Price (\$)	Qty	Part	Hour
11:13:49.624	C	800	19.26	19.26	800	A	11:13:48.218
11:12:38.431	B	100	19.02	19.27	100	C	11:13:48.213
11:13:31.431	B	100	19.02	19.29	100	C	11:13:47.796
11:13:15.209	D	200	19.01	19.31	100	C	11:13:46.820
11:12:04.756	C	500	18.93	19.33	100	C	11:13:46.621

In the example, the potential result earned by the investor is calculated as follows:

- Quantity available at the best price level before alleged layering (500) multiplied by the result of subtracting the best price at which the investor could buy before the practice (R\$ 19.59) and the price at which the investor effectively bought the share (R\$ 19.26), that is, $500 \times (\text{R\$ } 19.59 - \text{R\$ } 19.26) = \text{R\$ } 165.00$
- Quantity available at the second best price level before the layering practice (100) multiplied by the result of subtracting the best price at which the investor could buy before the practice (R\$ 19.60) and the price at which the investor effectively bought the share (R\$ 19.26), that is, $100 \times (\text{R\$ } 19.60 - \text{R\$ } 19.26) = \text{R\$ } 34.00$
- Quantity available at the third best price level before the layering practice (200) multiplied by the result of subtracting the best price at which the investor could buy before the practice (R\$ 19.64) and the price at which the investor effectively bought the share (R\$ 19.26), that is, $200 \times (\text{R\$ } 19.64 - \text{R\$ } 19.26) = \text{R\$ } 76.00$
- The total result is the sum of what the investor would be able to execute at each price level until reaching the size of the order executed with the supposed layering practice, that is, $\text{R\$ } 165.00 + \text{R\$ } 34.00 + \text{R\$ } 76.00 = \text{R\$ } 275.00$

 The asset's order book plays a key role in the layering analysis since it provides information related to the dynamics of orders that are essential to identify atypical situations.



ALERTS

4. Spoofing

4.1 Main concepts related to the alert

Spoofing is a form of price manipulation that, like layering, creates artificial liquidity in the asset's book, but using an order that is disproportionate to those in the book, with the purpose of influencing investors to overcome the artificial order and generate business on the opposite side of the book.

⚠ CVM Resolution 62 defines as **artificial conditions of demand, supply or price of securities** “those created as a result of negotiations by which its participants or intermediaries, by intentional action or omission, directly or indirectly cause changes in the flow of purchase or sale orders of securities.”

Example of Spoofing dynamics

The following table shows the order book just before the action of the investor who allegedly acted irregularly:

Table 35 – Order book before the action of the investor who allegedly carried out the practice of spoofing⁹

Bid				Ask			
Hour	Part	Qty.	Price (\$)	Price (\$)	Qty.	Part	Hour
12:17:22.966	B	6,000	10.20	10.35	300	A	11:55:27.836
12:14:13.963	A	400	10.19	10.35	4,000	B	12:16:20.841
12:17:22.967	A	200	10.18	10.36	200	A	12:15:31.607
12:15:21.564	F	1,000	10.17	10.36	3,000	C	12:16:20.762
12:16:12.498	B	200	10.16	10.36	100	E	12:16:28.221

At the time presented, the asset spread was R\$ 0.15, resulting from the difference between the best ask price (in the amount of R\$ 10.35) and the best bid price (in the amount of R\$ 10.20).

The investor highlighted in gray entered an offer to sell 5,000 shares at the price of R\$ 10.34, as presented below:

⁹ Orders are ranked according to the best price priority principle. In the case of purchase, the higher the price, the higher the priority, and in the case of sale, the lower the price, the higher the priority. Orders with equal prices are sorted according to the registration or modification time, that is, previously inserted or modified orders have priority.

Table 36 – Order book at the time the investor entered the order he/she wished to trade

Bid				Ask			
Hour	Part	Qty.	Price (\$)	Price (\$)	Qty.	Part	Hour
12:17:22.966	B	6,000	10.20	10.34	5,000	D	12:17:22.989
12:14:13.963	A	400	10.19	10.35	300	A	11:55:27.836
12:17:22.967	A	200	10.18	10.35	4,000	B	12:16:20.841
12:15:21.564	F	1,000	10.17	10.36	200	A	12:15:31.607
12:16:12.498	B	200	10.16	10.36	3,000	C	12:16:20.762

Next, the investor entered a buy order for 100,000 shares (highlighted in gray) at a price of R\$10.18, generating artificial liquidity in the order book, as presented below:

Table 37 – Order book at the time the investor entered the order that generated the artificial liquidity

Bid				Ask			
Hour	Part	Qty.	Price (\$)	Price (\$)	Qty.	Part	Hour
12:17:22.966	B	6,000	10.20	10.34	5,000	D	12:17:22.989
12:14:13.963	A	400	10.19	10.35	300	A	11:55:27.836
12:17:23.002	D	100,000	10.18	10.35	4,000	B	12:16:20.841
12:17:22.967	A	200	10.18	10.36	200	A	12:15:31.607
12:15:21.564	F	1,000	10.17	10.36	3,000	C	12:16:20.762

After the creation of artificial liquidity, the market reacted to the pressure created by the investor by inserting the bid order for 5,000 shares at the price of R\$ 10.34 (highlighted in blue) and attacking the initial ask offer by the investor, carrying out the trade, according to the following table.

Table 38 – Order book at the time the investor carried out the trade

Bid				Ask			
Hour	Part	Qty.	Price (\$)	Price (\$)	Qty.	Part	Hour
12:17:23.967	A	5,000	10.34	10.34	5,000	D	12:17:22.989
12:17:22.966	B	6,000	10.20	10.35	300	A	11:55:27.836
12:14:13.963	A	400	10.19	10.35	4,000	B	12:16:20.841
12:17:23.002	D	100,000	10.18	10.36	200	A	12:15:31.607
12:17:22.967	A	200	10.18	10.36	3,000	C	12:16:20.762
12:17:13.703	C	1,000	10.17	10.36	100	E	12:16:28.221

⚠ In this example, the offer of the investor who carried out the alleged spoofing practice was attacked, that is, the investor had inserted an ask order in the order book and another investor (market) entered a bid offer, generating a trade at a price of R\$ 10.34. One of the possible variations would be for the investor to have inserted the order after the market reaction (aggressor), as shown in the layering example.

Subsequently, the investor cancels the significant order that generated the artificial liquidity in the book. The cancellation of orders does not necessarily have to occur after the investor's business has been carried out, but may occur before.

4.2 Suggestions for building the alert

We will detail some suggestions on how to identify signs of irregularity. For this purpose, four steps will be segregated which, when identified, form a **spoofing cycle**.

- An investor **creates artificial liquidity** in the order book, on the opposite side to the one he/she wants to trade, using the insertion or modification of expressive orders, which we will call here an “artificial order”.
- **Market reaction** (other investors) to artificial liquidity created by the investor.
- Investor **carries out the trade**.
- Investor **cancels the order** that generated the artificial liquidity or **changes the order** for worse prices.

- ⚠ The four steps of the **spoofing cycle** do not necessarily need to be implemented in the same order as presented above. An alert can be generated if one or more cycles are identified, depending on the risk approach and criteria used in the alert.

Creation of artificial liquidity

The creation of artificial liquidity can occur by inserting a significant order when the investor inserts or modifies one or more buy or sell orders (on the opposite side to the one that really wants to execute the trade).

The suggestion to identify the orders that are significant is to use a benchmark of the average number of orders for the asset, which consists of calculating the average number of bid and ask orders per asset and compare it to the size of the artificial offer.

To ensure greater probability that the expressive order generates pressure in the book, the suggestion is to consider only the orders that are inserted in the first price levels and that represent a relevant percentage of the orders in the book.

- ⚠ In the example presented in item 4.1, assuming that the average number of bids for the aforementioned asset was 7,500, the investor who supposedly carried out the practice entered an order for 100,000 shares on the buy side, with this order being almost 14 times greater than the benchmark, which can impact the dynamics of the orders.

Market reaction

At this phase, the market must react to the artificial liquidity created by the investor who supposedly carried out the spoofing practice.

- ⚠ The average number of order benchmark is calculated and made available monthly by BSM. See link [benchmarks](#).

Trade execution

Having identified the previously mentioned signs of atypicality, the investor must have traded on the opposite side to the one that inserted the order that generated the artificial liquidity. Thus, the effects of the possible irregularity materialize, since the investor managed to carry out the transaction with a better price than the asset presented before the beginning of the action.

Cancellation of artificial liquidity

The cancellation of the artificial order can occur before or after the execution of the trade. At this phase, some points should be considered:

- **Price level of orders at the time of cancellation**

For the phase of the cycle where the cancellation of the artificial orders takes place, if the cancellation occurs **before** the trade is executed, the orders must be among the first price levels at the time of the cancellation.

If cancellation occurs **after** the trade, the artificial order must be among the first price levels at the time of the trade execution.

⚠ The definition of the first price levels will depend on the characteristics of the asset's order book, mainly on the **depth** of the book, which indicates the number of existing bid and ask prices for the asset at a given moment.

⚠ In example c presented in item 4.1, the trade was executed at a price of R\$ 10.34, and the artificial order, which was subsequently canceled, was placed at the second price level (R\$ 10.18) at the time of execution of the trade.

- **Interval between cycle phases**

It is important considering the time elapsed between the creation of artificial liquidity and its cancellation. For this purpose, it is possible to calculate an average time benchmark between trades of the asset and compare it with the time interval between orders that generated artificial liquidity (time of insertion or last modification) and the cancellation of orders.

⚠ Considering a average time between asset trades of 2 seconds (00:00:02.000), in the example presented in item 4.1, the investor who supposedly carried out the irregular practice entered the order at 12:17:23.002 and canceled it at 12:17:23,987, which represented an interval of 985 milliseconds (00:00:00.985), which is less than the average time between trades for the asset in question. This short interval strengthens the hypothesis of atypicality, since the investor's order remains in the book for a period shorter than the average of market orders, which indicates that the order was inserted artificially, and not with the intention of being traded.

- ⚠ The average time benchmark between trades is calculated and made available by BSM monthly. See link [benchmarks](#)

Calculation of the potential profit earned

To measure the potential result that the investor obtained with the supposed spoofing practice, we can calculate the price difference between the best offer in the book before the beginning of the creation of the artificial layer by the investor and the price at which the investor carried out the trade, multiplied by quantity traded by the investor, as presented in item 4.1:

- Before the investor's action, the best bid available in the book was R\$10.20.
- After the supposed creation of artificial liquidity, the investor carried out a trade at a price of R\$ 10.34 (that is, the investor managed to sell at a better price than that available in the order book before the practice was carried out).

In this example¹⁰, the potential result earned by the investor was calculated as follows:

- R\$ 10.34 (price at which the investor sold with the alleged spoofing practice)
- R\$ 10.20 (best price at which the client could sell before the alleged spoofing practice)
- 5,000 (amount that the client sold with the alleged spoofing practice), that is,
 $\text{R\$ } 0.14 \times 5,000 = \text{R\$ } 700.00$

- ⚠ In this example, there was depth (sufficient offers) for the investor to sell 5,000 contracts at a price of R\$ 10.20 each. However, if the quantity was not available in the book at the first price level, we would have to consider the other price levels until reaching the quantity traded by the investor.

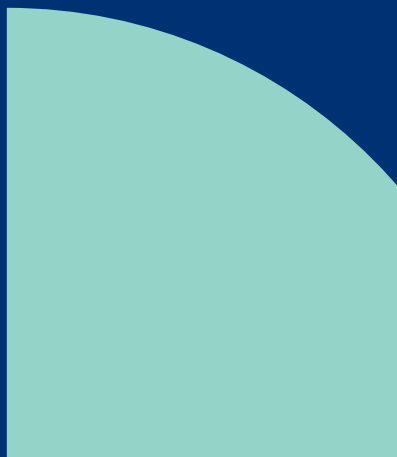
- ⚠ The asset's order book plays a key role in the spoofing analysis since it provides information related to the dynamics of orders that are essential to identify atypical situations

¹⁰ In this example, a share with a quotation factor equal to one (1) was considered as a product. For other products, the particularities and specific characteristics must be evaluated in the calculation



ALERTS

5. Front Running



5.1 Main concepts related to the alert

Front running transactions are those that offer an undue advantage to an investor who, supposedly having prior knowledge that a certain transaction will be carried out, anticipates it, thus gaining a financial benefit.

⚠ CVM Resolution 62 defines **unfair practice** as “the one that results, directly or indirectly, effectively or potentially, in a treatment for any of the parties, in securities trading, that places it in an undue position of imbalance or inequality in the face of the other participants in the transaction.”

Example:

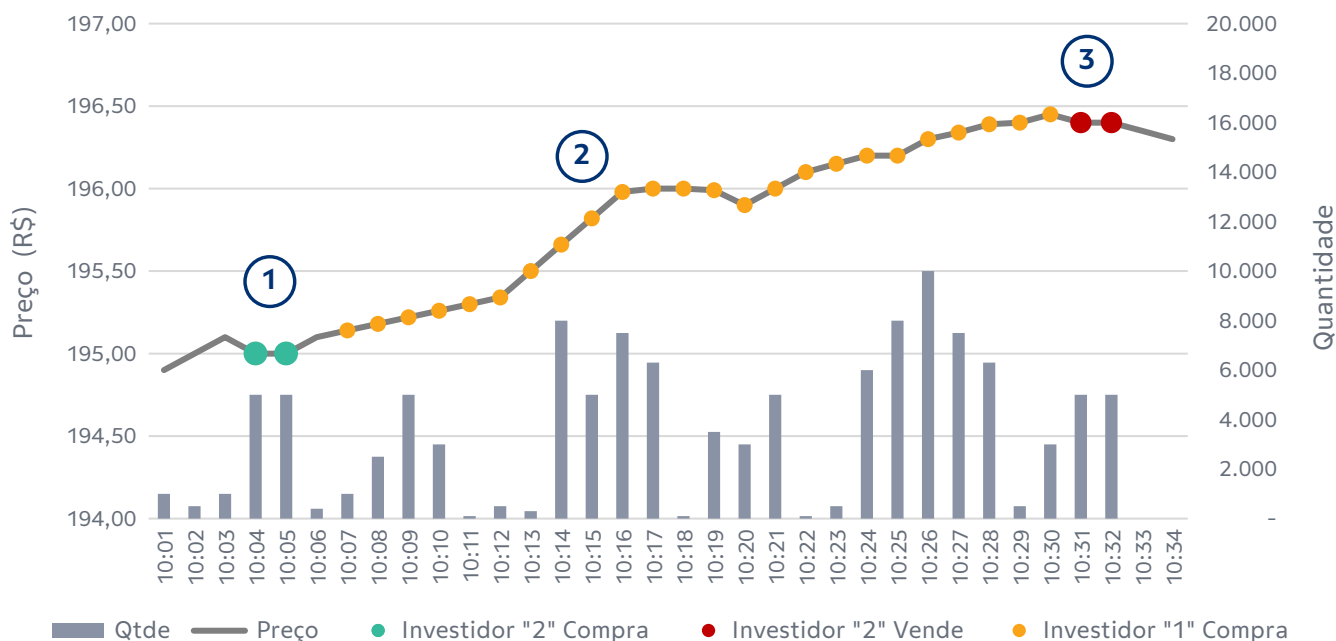
Investor 1 wants to carry out a buy transaction for a certain asset. Knowing this information and transaction, as it involves a significant lot, could impact the asset price, Investor 2 takes a position before it is executed. During or after Investor 1's transaction, Investor 2 reverses its position, earning a financial benefit.

The hypothetical steps of the transaction and the chart illustrating the dynamics of the irregularity are presented below.

1. Investor 2 positions himself/herself by carrying out buy transactions (highlighted in green), anticipating the transactions of Investor 1.
2. Investor 1 carries out the buy transaction with a significant amount, and the asset appreciates (highlighted in yellow).
3. During Investor 1's transactions, Investor 2 carries out sell transactions against Investor 1, earning a profit (highlighted in red).

⚠ In the example above, Investor 2 carries out sell transactions against Investor 1, earning a profit, which increases the indications of coordination between investors. In another scenario, Investor 2's sell transactions could have been carried out against other investors (market), which should also be considered when identifying atypicality.

Chart 2 – Example of Front Running dynamics



In the example presented in the chart, Investor 2 bought 10,000 shares at the price of R\$ 195.00 and sold 10,000 shares at the price of R\$ 196.40, earning a profit of R\$ 14,000.00. Investor 1 purchased 100,000 shares at an average price of R\$ 195.96 each (started transactions at a price of R\$ 195.14 and ended at a price of R\$ 196.40).

⚠ It is also possible to identify situations in which the investor can anticipate a sell transaction, considering that the asset will depreciate. Aiming to obtain the benefit, the investor performs sell transactions before the devaluation and reverses his/her position by carrying out buy transactions.

5.2 Suggestions for building the alert

To identify indications of irregularity, some factors are important and can be considered in the construction of the alert, such as:

- Identify whether there were periods, within each of the trading sessions, in which the asset appreciated or depreciated.
- Identify investors who traded with price fluctuations and may have been responsible for the asset appreciation or depreciation.
- Identify investors who benefited from the asset appreciation or depreciation, positioning themselves earlier and reversing their positions later.

- **Suggestions for identifying asset appreciation or depreciation periods**

To identify such periods, the suggestion is to divide the trading session into intervals and calculate the price weighted moving average.¹¹ If the price weighted moving average increases over time, there is an indication of asset appreciation. If the price weighted moving average decreases over time, there is an indication of the asset's depreciation.

⚠ One suggestion is to divide the trading session considering intervals, depending on the behavior of asset prices and liquidity. The more liquid the asset, the smaller the interval used and the less liquid the asset, the larger the interval to be used.

In the following example, the price weighted moving average (which we will call “Average price”) was calculated, considering a 60-minute interval and dividing the sum of the traded volume by the sum of the traded quantity.

$$\text{Average price} = \sum \text{Volume in defined interval} / \sum \text{Quantity in defined interval}$$

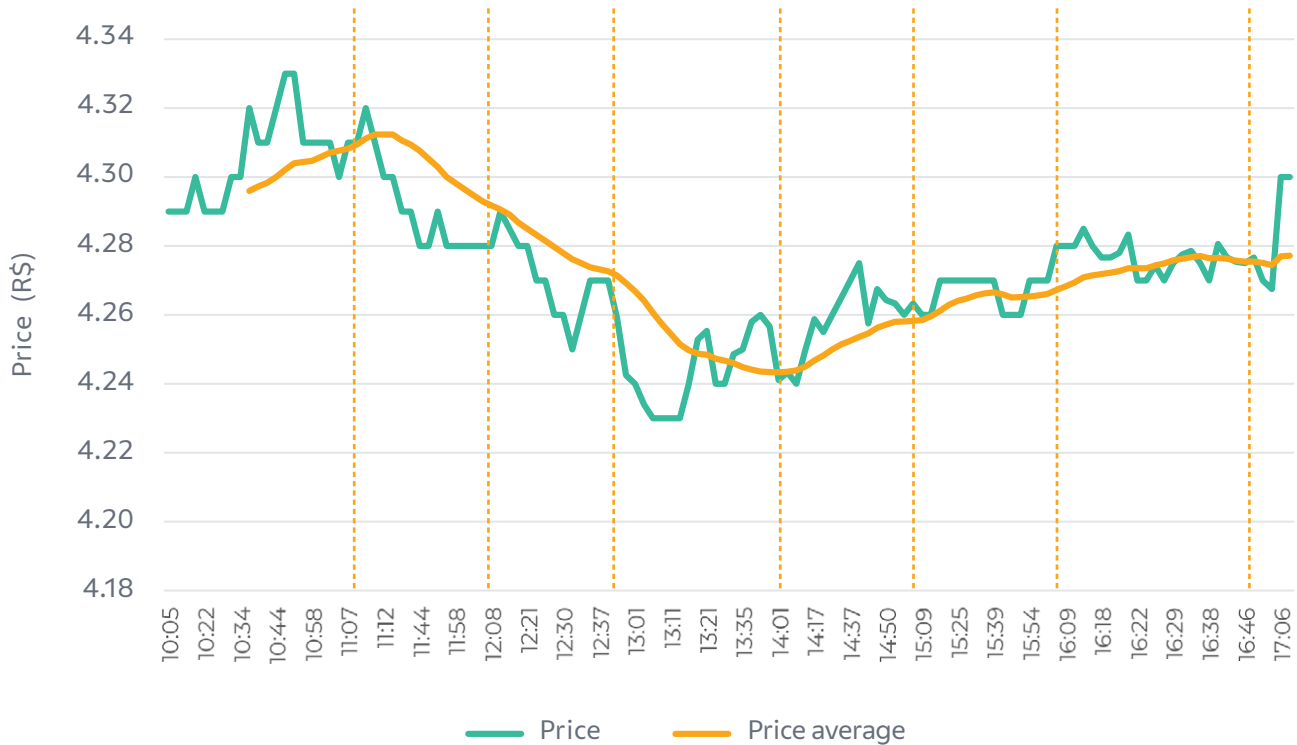
Table 39 – Example of calculating the price weighted moving average

Hour	Qty.	Volume (\$)	Price (\$)	Average price (\$)
10:05	800	3,448.00	4.31	4.30
10:07	200	864.00	4.32	
10:07	200	864.00	4.32	
10:09	200	862.00	4.31	
10:09	100	432.00	4.32	
10:17	400	1,724.00	4.31	
10:22	500	2,160.00	4.32	
10:25	2,000	8,660.00	4.33	
10:30	700	3,031.00	4.33	
10:33	400	1,732.00	4.33	
10:34	200	864.00	4.32	
10:40	300	1,296.00	4.32	
10:41	300	1,287.00	4.29	
10:43	200	858.00	4.29	
10:44	900	3,861.00	4.29	
10:45	100	429.00	4.29	
10:49	100	429.00	4.29	
10:49	11,500	49,335.00	4.29	

¹¹ Examples of average variations that can be considered include: simple moving average, weighted moving average, exponential moving average, double exponential moving average, triple average index, Hull moving average.

The chart below shows the price weighted moving average marking throughout the day, considering 60-minute intervals:

Chart 3 – Marking of the price moving average considering 60-minute intervals



Based on the chart, it is possible to infer that:

- Between 10:00 am and 11:00 am, the asset showed an increase in the price moving average, indicating an appreciation.
- Between 11:00 am and 02:00 pm, the asset showed a decrease in the moving average, indicating depreciation.
- Between 2:00 pm and 4:00 pm, the asset resumed appreciation.
- Between 4:00 and 5:00, the asset remained stable, that is, this period will not be selected for analysis.
- As of 5:00 pm, the asset showed an increase in the price moving average, indicating appreciation.

The periods of appreciation and depreciation mentioned will be referred herein as “ramps”, which represent the analysis interval in which the asset presented directional fluctuation, positive or negative, delimiting the minimum and maximum prices reached in this interval.

To identify which assets showed more significant oscillations, we suggest calculating the following indicator:

- “Ramp” price variation (minimum and maximum price of the asset in the interval)

$$\text{Ramp price change} = \left(\frac{\text{Maximum price}}{\text{Minimum price}} - 1 \right)$$

To exemplify the calculation, we will use the previous example. See below:

Table 40 – Example of ramp price variation calculation

Interval	Period	Minimum price (\$)	Maximum price (\$)	Ramp price change
1	10:00 am to 11:00 am	4.29	4.33	0.93%
2	11:00 am to 12:00 pm	4.28	4.32	0.93%
3	12:00 pm to 01:00 pm	4.24	4.31	1.65%
4	01:00 pm to 02:00 pm	4.21	4.26	1.19%
5	02:00 pm to 03:00 pm	4.24	4.27	0.71%
6	03:00 pm to 04:00 pm	4.26	4.27	0.23%
7	04:00 pm to 05:00 pm	4.27	4.29	0.47%

- Suggestions for identifying investors responsible for oscillations**

To identify whether there was any investor responsible for the asset appreciation or depreciation in a given interval, the indicators below can be calculated.

Indicator of trades performed with directional price fluctuation

The greater the proportion between trades with fluctuation by the investor in relation to trades with fluctuation by other investors who operated in the period (market), the greater the probability that transactions were carried out with the purpose of manipulating prices.

- Buy trades for positive fluctuation:

$$\frac{\text{\# of buy trades with positive investor fluctuation}}{\text{\# of buy trades with positive market fluctuation}}$$

- Sell trade for negative fluctuation:

$$\frac{\text{\# of sell trades with negative investor fluctuation}}{\text{\# of sales trades with negative market fluctuation}}$$

Assuming that, in a certain interval, 380 trades with positive fluctuation were carried out, Investors 1, 2 and 3 presented the following numbers:

Table 41 – Example of trades carried out with positive fluctuation

Trades with fluctuation	Investor 1	Investor 2	Investor 3	Other investors	Total
Total buy trades with positive fluctuation	182	67	34	97	380

Using the formula indicated in this topic, we brought the indicator in percentage of buy trades with positive fluctuation carried out by investors in relation to the market:

Table 42 – Example of calculating the percentage of positive fluctuation

Trades with fluctuation	Investor 1	Investor 2	Investor 3	Other investors
Percentage of buy trades with positive fluctuation against the market	48%	18%	9%	25%

The indicators show that Investor 1 accounted for 48% of the buy trades carried out with positive fluctuation.

Aggressor business indicator

The greater the proportion between the investor's aggressor trades in relation to the aggressor trades of the other investors that operated in the period (market), the greater the probability that transactions were carried out with the purpose of manipulating prices.

- Buy aggressor businesses:

$$\frac{\text{\# of investor buy trades where the buy order was the aggressor}}{\text{\# of market buy trades where the buy order was the aggressor}}$$

- Sell aggressor businesses:

$$\frac{\text{\# of investor sell trades where the sell order was the aggressor}}{\text{\# of sales trades in the market where the sell order was the aggressor}}$$

To exemplify the indicator, we present below the trades carried out in a time interval. The last column shows the person responsible for the aggressor order, that is, the one that generated the trade.

Table 43 – Example of aggressor business indicator

Time of trade	Price (\$)	Qty.	Buyer participant	Buyer investor	Seller participant	Seller investor	Aggressor
10:22:39.494	1.14	100	B		A	Investor 3	Seller
10:22:41.494	1.14	100	D		B		Buyer
10:22:57.494	1.14	100	B		A	Investor 1	Buyer
10:26:39.494	1.15	100	B		A	Investor 4	Buyer
10:28:32.494	1.19	1,600	A	Investor 1	B		Buyer
10:36:48.958	1.21	800	A	Investor 1	C		Buyer
10:48:01.381	1.19	500	A	Investor 1	A	Investor 4	Buyer
10:51:05.976	1.20	900	A	Investor 2	C		Seller
10:54:09.726	1.24	1,200	A	Investor 1	B		Buyer
10:58:17.955	1.28	700	A	Investor 1	C		Buyer
10:59:23.762	1.28	100	A	Investor 1	C		Buyer

In this case, of the 11 trades executed, 9 had the “Buyer” offer as the aggressor. We verified that Investor 1, which carried out the transactions intermediated by Participant A, was responsible for 6 of the orders that had the “Buyer” as the aggressor, representing 67% of the aggressor trades.

Price variation indicator for trades carried out by the investor (minimum and maximum price) in relation to the price variation of the ramp

$$\frac{(\text{maximum investor price}/\text{minimum investor price})-1}{(\text{maximum ramp price}/\text{minimum ramp price})-1}$$

To exemplify the indicator, we present below the comparison between the trades carried out by one of the investors with the market.

Table 44 – Example of comparing an investor's business with the market

Interval	Period	Minimum price (\$)	Maximum price (\$)	Ramp price change	Investor 1 minimum price (\$)	Investor 1 maximum price (\$)	Investor 1 price variation	Variation indicator
1	10:00 am to 11:00 am	4.29	4.34	1.17%	4.31	4.32	0.23%	19.91%
2	11:00 am to 12:00 pm	4.23	4.32	2.13%	4.28	4.32	0.93%	43.93%
3	12:00 pm to 01:00 pm	4.23	4.34	2.60%	4.23	4.33	2.36%	90.91%
4	01:00 pm to 02:00 pm	4.24	4.28	0.94%	4.26	4.27	0.23%	24.88%
5	02:00 pm to 03:00 pm	4.25	4.27	0.47%	4.25	4.25	0.00%	0.00%
6	03:00 pm to 04:00 pm	4.27	4.27	0.00%	4.27	4.27	0.00%	0.00%
7	04:00 pm to 05:00 pm	4.27	4.28	0.23%	4.27	4.27	0.00%	0.00%

The indicator shows how much the fluctuations made by the investor accounted for the market fluctuation in each of the periods, with emphasis on interval 3, which represented 90.91%.

Investor buy and sell trade indicators

- Buy trades:

$$\frac{\text{\# of investor buy trades}}{\text{\# of investor buy and sell trades}}$$

- Sell trades:

$$\frac{\text{\# of investor sell trades}}{\text{\# of investor buy and sell trades}}$$

This indicator aims to complement the previous one, evaluating whether the investor trades in the asset purchase and sale. An example table to illustrate the situation is presented below:

Table 45 – Example of investor trades indicator

Investor	Number of but trades	Number of sell trades	Buy trade indicator	Sell trade indicator
Investor 1	2	10	0.17	0.83
Investor 2	200	220	0.48	0.52
Investor 3	20	10	0.67	0.33
Investor 4	1,500	1,600	0.48	0.52
Investor 5	30	5	0.86	0.14
Investor 6	2,000	2,000	0.50	0.50
Investor 7	5	5	0.50	0.50

The closer to 1, the greater the indication that the investor is trading only on one side (buying or selling).

- **Suggestions for identifying benefiting investors**

To identify whether there was any investor who benefited from the asset appreciation or depreciation, indicators such as the following can be calculated:

Reversal percentage

This is the comparison between the amount opened before and during the ramp and the amount reversed during and after the ramp.

- When the asset appreciates:

$$\frac{\text{Qty sold during or after the ramp}}{\text{Qty bought before or during the ramp}}$$

- When the asset presents devaluation:

$$\frac{\text{Qty bought during or after the ramp}}{\text{Qty bought before or during the ramp}}$$

⚠ **Opening a position** occurs when an investor decides to start a new position by buying an asset that he/she did not previously own.

Position reversal happens when an investor decides to close an existing position in an asset, either selling his/her position or buying a position he/she had sold to close it, which can occur in full or in part, as detailed in this Guide.

Calculation example: consider Investor A who opened a position with asset XYZ, buying 100,000 units before the asset showed a supposed appreciation (amount bought before the ramp). After the asset's appreciation, this investor reversed his/her position by 100,000 units, that is, presented a reversal percentage of 100%. A high percentage of reversals may indicate a higher level of investor intentionality, that is, the investor was able to identify the right moment to open and reverse his/her positions and make a profit.

Financial result obtained by the investor¹²

FR = MQ x (AP – BP), where:

- **MQ = Matched Quantity:** is the investor's smallest quantity between buy and sell transactions: $\min(\sum \text{buy qty}, \sum \text{sell qty})$
- **AP = Ask Price:** average price weighted by the investor's sales quantity: $(\sum (P \times \text{qty}) / \sum \text{qty})$
- **BP = Bid Price:** average price weighted by investor buy quantity: $(\sum (P \times \text{qty}) / \sum \text{qty})$

An example demonstrating the ¹³calculation is presented below:

¹² The examples consider the calculation of the average price, obtained by dividing the total volume operated by the total quantity operated. There are other ways that can be used to calculate the financial result, for example, the FIFO (First in, First out) method.

¹³ In this example, a share with a quotation factor equal to one (1) was considered as a product. For other products, the particularities and specific characteristics must be evaluated in the calculation.

Table 46 – Example of investor financial result

Asset	Quantity	Price (\$)	Volume (\$)	Type of transaction
XYZ	40,000	6.30	252,000.00	Sell
XYZ	50,000	6.41	320,400.00	Sell
Total sales transactions by the investor	90,000	6.36	572,400.00	
XYZ	45,000	5.10	229,500.00	Buy
XYZ	45,000	5.05	227,250.00	Buy
Total buy transactions by the investor	90,000	5.075	456,750.00	

Considering the formulas:

- $AP = (\sum(P \times qty) / \sum qty)$, we have
 $AP = ((6.30 \times 40,000 + 6.41 \times 50,000) / (40,000 + 50,000))$, that is,
 $AP = 6.36$
- $BP = (\sum(P \times qty) / \sum qty)$, we have
 $BP = ((5.10 \times 45,000 + 5.05 \times 45,000) / (45,000 + 45,000))$, that is,
 $BP = 5.075$
- $FR = MQ \times (AP - BP)$, we have $FR = 90,000 \times (\$ 6.36 - \$ 5.075)$, that is, $FR = \$ 115,650.00$

Comparison of the investor's average price with the best opening price (Opening comp.) and position reversal (Reversal comp.)

- When the asset appreciates:

$$\text{Opening comp.} = \frac{\text{Qty purchased} / \text{volume purchased from investor}}{\text{Minimum ramp price}}$$

$$\text{Reversal comp.} = \frac{\text{Investor qty sold} / \text{volume sold}}{\text{Max ramp price}}$$

- When the asset presents devaluation:

$$\text{Opening comp.} = \frac{\text{Investor qty sold / volume sold}}{\text{Max ramp price}}$$

$$\text{Reversal comp.} = \frac{\text{Qty purchased / volume purchased from investor}}{\text{Minimum ramp price}}$$

Thus, it is possible to analyze whether the investor opened and reversed his/her position at the points on the ramp where it would be possible to obtain the greatest benefit from its fluctuation, that is, whether he/she purchased an asset at the minimum price of the ramp and sold it at its maximum price.

Comparison of the investor's position opening and reversal time with the ramp time

$$\text{Opening} = |\text{Opening time of position} - \text{Ramp start time}|$$

$$\text{Reversal} = |\text{Reversal time of position} - \text{Ramp end time}|$$

Comparison of the investor's position opening and reversal times with the start and end times of the ramp can indicate whether the investor took advantage of buying or selling opportunities at favorable times, strengthening the atypicality hypothesis. The further away from the ramp the investor acts, the smaller the indications of coordination and intentionality regarding the irregularity.

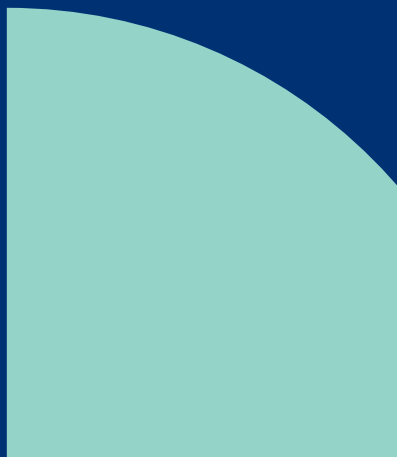
Selection of ramps and investors that need to be analyzed

For a more assertive selection of investors, the suggestion is to rank them by indicator or define a score to capture those that stood out the most. The most relevant cases can be selected for analysis. However, it is worth recalling that the indicators should not be analyzed separately.



ALERTS

6. Day Trade Ranking



6.1 Main concepts related to the ranking

Day trade transactions (in which positions are opened and closed on the same day) are usually carried out by investors who are more likely to take risks. These are attractive transactions due to the possibility of short-term gains. Their monitoring transaction is necessary, since, in this strategy, irregular performance in the capital market can also be identified.

In this Guide, we will present a ranking of investors who carried out day trading as one of the ways to monitor data related to transactions of this type.

6.2 Suggestions for building the ranking

The suggestion is that different variables and indicators are considered in the ranking, in addition to the result obtained with day trade transactions, for the identification of atypical situations.

We suggest below non-exhaustive examples of indicators from which investors can be evaluated, based on transactional characteristics. In the examples, a monthly analysis period was considered:

Example 1

Day trader indicator: an investor can be considered a day trader when the number of days on which he/she performed a day trade divided by the number of days on which the investor traded is greater than or equal to a predefined percentage, for example, 70%.

Example 2

“High day trade frequency” indicator: investor can be included in this profile when the number of days they carry out day trade transactions is greater than or equal to a predefined number, for example, 15 days.

Moreover, it is suggested to use the transactional variables of investors that could be considered in the ranking construction. It is worth highlighting that the information on transactions and registration data of the analyzed investors is known.

Registration variables related to the investor (non-exhaustive examples)

- Segmentation: identify whether the investor is a resident or non-resident individual, financial or non-financial legal entity, institutional investor, etc.
- Economic activity.
- registration information of [accounts](#) used in day trade transactions, such as opening date and account number.
- Identify whether the investor is a High Frequency Trader (HFT).
- Identify whether the investor is a market maker.
- Find out if the investor is a [politically exposed person \(PEP\)](#).
- Registration address.
- Registration email.
- Find out if the investor is a person related to the Issuing Company of the asset with which he/she carried out the transaction or to the Participant who intermediated his/her transactions.

Variables related to investors' transactions in the period defined for analysis (non-exhaustive examples)

- Market segment in which the investor operated: for example, spot market or derivatives.
- Number of assets traded.
- Number of assets with which the investor carried out day trade transactions.
- Number of days operated.
- Number of days on which the investor carried out day trade transactions.
- Total volume traded by the investor.
- Investor operated day trade volume.
- Result of day trades.
- Return proportional to the total operated by the investor.
- Number of days in which the investor presented a positive result in the day trades (Success ratio in day trades).
- Number of days in which the investor had a negative result in the day trades (Loss ratio in day trades).
- Main investor that acted in the counterparty of the transactions (or main Participant that acted in the counterparty of the transactions, when there is no data on other investors).

⚠ Analyzing the investor's registration information can help detect atypical situations and prevent possible illegal activities in the capital market. For example, the situation where an investor with a conservative investment profile and a modest income starts to carry out risky and high value day trades would be an indication of suspicious activity.

Calculation of the result obtained in day trades

The calculation of the result can be performed by different methods. The FIFO (first in, first out) method is presented below¹⁴, which is because the assets acquired first are the first to be sold.

In this method, the financial result in a day trade (FR_{dt}) is the sum of the volume operated in a day trade (Vol_{dt}), considering that the purchase and sale amounts are the same:

$FR_{dt} = \sum Vol_{dt} = \sum Sell_{Vol} (-) \sum Buy_{Vol}$, where:

- **Sell Vol:** quantity sold by the investor multiplied by the ask price
- **Buy Vol:** quantity purchased by the investor multiplied by the bid price

¹⁴ In this example, a share with a quotation factor equal to one (1) was considered as a product. For other products, the particularities and specific characteristics must be evaluated in the calculation

Table 47 – Example of calculating the financial result using the FIFO method

Asset	Hour	Buy quantity	Bid price (\$)	Buying volume (\$)	Sell quantity	Ask price (\$)	Selling volume (\$)	# Day Trades	Day Trade volume (\$)	Day Trade result (\$)
XYZ	10:20:05.123	70,000	25.05	1,753,500.00				70,000	- 1,753,500.00	10,500.00
XYZ	10:20:06.888				70,000	25.20	1,764,000.00		1,764,000.00	
XYZ	10:25:12.728	90,000	26.08	2,347,200.00				90,000	- 2,347,200.00	200.00
XYZ	10:20:06.888				20,000	26.12	522,400.00		522,400.00	
XYZ	12:20:03.111				40,000	26.05	1,042,000.00		1,042,000.00	
XYZ	14:20:06.818				30,000	26.10	783,000.00		783,000.00	
XYZ	14:20:08.221	30,000	25.90	777,000.00						Not considered
Financial result								160,000		10,700.00

Another way to calculate the result would be by the average price of transactions:

$FRdt = MQ \times (AP - BP)$, where:

- **FRdt = Day trade financial result**
- **MQ = Matched quantity:** is the smallest quantity of the investor between sell transactions carried out in the pre-disclosure period and sales transactions carried out in the post-disclosure period: $\min(\sum \text{buy qty}, \sum \text{sell qty})$
- **AP = Ask Price:** average price weighted by the sales quantity in the investor's post-disclosure period: $(\sum (P \times \text{qty}) / \sum \text{qty})$
- **BP = Bid Price:** average price weighted by the buy quantity in the investor's post-disclosure period: $(\sum (P \times \text{qty}) / \sum \text{qty})$

Table 48 – Example of calculating the financial result using the average price method

Asset	Hour	Buy qty.	Bid price (\$)	Buying volume (\$)	Sell qty.	Ask price (\$)	Selling volume (\$)
XYZ	10:20:05.123	70,000	25.05	1,753,500.00			
XYZ	10:20:06.888				70,000	25.20	1,764,000.00
XYZ	10:25:12.728	90,000	26.08	2,347,200.00			
XYZ	10:20:06.888				20,000	26.12	522,400.00
XYZ	12:20:03.111				40,000	26.05	1,042,000.00
XYZ	14:20:06.818				30,000	26.10	783,000.00
XYZ	14:20:08.221	30,000	25.90	777,000.00			
Total		190,000	25.67	4,877,700.00	160,000	25.69	4,111,400.00

Table 49 – Example of calculated financial result

Buy qty.	Bid price (\$)	Ask price (\$)	Day trade result (\$)
160,000	25.69	25.67	3,863.16
Financial Result			3,863.16



ALERTS

7. Operations with the Same Counterparty (OMC)



7.1 Main concepts related to the alert

Operations with the Same Counterparty or OMC are those in which the same investor acts as buyer and seller in a given transaction, through the same Participant or through different Participants.

⚠ Operations with the Same Counterparty are also known as wash trades. The main difference between them is that operations known as wash trades could be carried out by different counterparties, even if they represent the same interest or ultimate beneficiary.

Table 50 – Example of Operation with the Same Counterparty

Example	Assets	Buyer	Purchase Participant	Seller	Sale Participant	Price (R\$)	Quantity	Volume (R\$)
1	XYZ	Investor 1	A	Investor 1	A	100	600	60,000.00
2	XYZ	Investor 2	A	Investor 2	B	120	800	96,000.00

As presented in the previous Table, in the first example “Investor 1” carried out a transaction involving the purchase and sale of asset “XYZ”. In this case, the purchase and sale, were carried out through “Participant A”. In the second example, “Investor 2” acted in the purchase and sale of asset “XYZ”, with the intermediation of “Participant A” in the purchase and “Participant B in the sale.”

Why Operations with the same Counterparty (OMC) occur?

OMCs occur since investors are allowed to place buy and sell orders for the same security. Opposite orders (purchase and sale) may eventually find themselves on the B3 trading platform depending on the values and chronological order of insertion and originate trades on behalf of the same investor.

Are Operations with the same Counterparty always irregular?

The occurrence of OMC through one or more Participants may or may not be characterized as an irregularity. OMCs are not irregular if they are considered by the Participant that classified the transactions as occasional, random or unintentional, after analyzing them.

- ⚠ When OMCs are considered irregular, i.e., with characteristics of systematicity, recurrence or intentionality, whether in the trading or post-trading environment, may cause negative impacts on the organized markets managed by B3, such as:
- Creation of artificial supply, demand or price conditions;
 - Price manipulation;
 - Distortion in the liquidity indicators of traded securities;
 - Distortion in the formation of indices (i.e., the tradability index);
 - Distortion in the formation of the adjustment price of traded securities, including the MtM (Market-to-Market) process and the definition of the settlement price of a security with future maturity;
 - Sending stop orders or scheduled systemic full sales;
 - Distortion in the formation of minimum, average and maximum prices, and in the average quantity traded.

Who should monitor Operations with the same Counterparty?

The participants in organized markets managed by B3 undertake to monitor and analyze OMCs carried out by their clients in all trading environments, including in transactions performed in regular trading sessions, auction, or in direct transactions, as well as in onlending transactions, in the B3 post-trading environment, aiming to prevent and curb irregular practices.

BSM makes available the [Standard on Supervision over Operations with the Same Counterparty \(OMC\)](#) on its website with the purpose of providing guidance on the monitoring to be carried out by Participants, based on the current guidelines of CVM and B3.

If the Participant concludes that the OMCs analyzed present signs of irregularity or impacts on the markets managed by B3, BSM and CVM must be informed about the analysis performed, the characteristics and conclusions.

- ⚠ Communication about the monitoring of operations and offers is a duty of the operations intermediary to ensure the integrity and proper operation of the market, and to continuously monitor operations and orders.

[Circular Letter 1/2024/CVM/SMI](#) emphasizes the need to follow specific procedures when communicating from this monitoring. BSM prepared a Guide of best communication practices, in accordance with CVM Resolution 35, which can be consulted at this [link](#).

How to avoid Operations with the same Counterparty?

Participants play a key role in maintaining a fair and efficient trading environment by providing appropriate guidance and fostering their clients' awareness of market rules. Thus, it is important to guide the investor on possible impacts arising from the implementation of the OMC and on the existence of mechanisms for detecting the practice by regulatory bodies.

Use of Self Trade Prevention (STP)

STP is a feature provided by B3¹⁵ which seeks to prevent operations with the same counterparty. It is optional and can be used by Participants and Clients who use the Entrypoint order entry interface¹⁶, i.e., for trading desk connections to have access, they must use trading screens that support this functionality.

The identification that it is the same counterparty is performed by filling in of a unique investor identifier ("Counterparty's identifier", Investor ID" or "ID"), in accordance with the B3 Trading Operational Procedures Manual ("B3 Trading MPO")^{17,18}

It is worth highlighting the following about STP:

- The functionality is optional; that is, it will not have an effect on orders that do not contain the filled tags;
- The investor holding one or more accounts and/or linked to one or more trading participants that deems it necessary to use more than one ID to execute different management frameworks or strategies may do so by adding different prefixes, as provided for in MPO;
- Such procedure **does not imply latency** for the trading participant or for trading participants in the trading system;
- No validation will be performed by the functionality during auction periods.

7.2 Suggestions for building the alert

The following will present important characteristics to be considered in monitoring¹⁹ OMC, with practical suggestions for developing the alert:

a. Map the representation of OMC in trades, quantity/volume of clients:

Suggestion: consider a specific period, for example: monthly monitoring of the number of OMCs;

¹⁵ At its sole discretion, B3 may disable the functionality for a specific group or groups of instruments, communicating such change to the market in advance.

¹⁶ Entrypoint refers to the Order Submission interface. Further details are available at: https://www.b3.com.br/pt_br/solucoes/plataformas/puma-trading-system/para-desenvolvedores-e-vendors/entrypoint-entrada-de-ofertas/

¹⁷ B3 Trading MPO. Title II. Chapter IV. Items 5.1. to 5.3.

¹⁸ As indicated in the BSM's [Supervision Standard on Operations with the same Counterparty](#).

7. Operations with the Same Counterparty (OMC)

- **By type of person or investor**

Suggestion: segregate the type of person who performed the OMC, for example: Individual and Legal Entity; Market Makers and/or HFT;

- **Considering the segment or market in which the operations were performed**

Suggestion: segregate the transactions that occurred by segment (spot or derivatives) or in a more granular form by market (futures, spot, options, fractional etc.);

Chart 4 – Example of dashboard for monitoring the Operation with the same Counterparty¹⁹

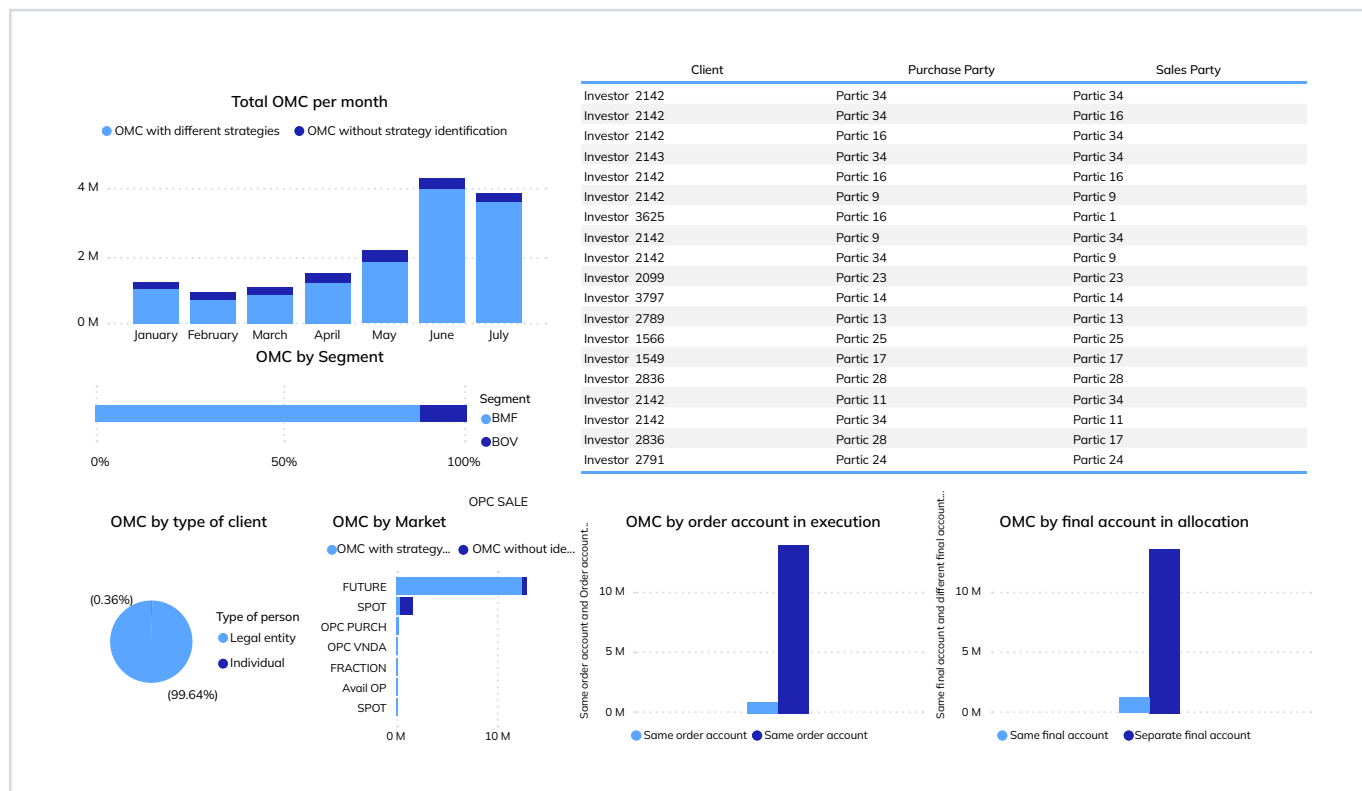


Table 51 – OMC Representation by Investor

Investor	Analysis Month	Total businesses	Total OMC	Total volume (R\$)	OMC Volume (R\$)	Trading sessions negotiated	Auctions with occurrence of OMC	Auctions with performance of OMC (%)	Total OMC x Total Trades (%)	Total OMC x Traded Volume (%)
Investor 1	Mar '24	1,000	3	2,000,000.00	18,000.00	45	1	2%	0%	1%
Investor 1	May '24	8,458	802	5,643,232.00	370,578.00	278	131	47%	9%	7%
Investor 1	July '24	17,444	5,879	12,456,712.00	2,271,387.00	277	156	56%	34%	18%

¹⁹ The values presented are hypothetical and illustrative.

7. Operations with the Same Counterparty (OMC)

In the hypothetical example presented, through mapping Investor 1 transactions, it is possible to identify that in addition to the increase in the volume operated, there was an increase in the representation of OMC transactions. Such operations must be analyzed to identify and mitigate potential irregularities.

b. OMC in regular auction that present:

- **Signs of intention to generate price fluctuations in the security**
Suggestion: identify bids at prices higher than asks or ask at prices lower than the bid, with these offers always being aggressors;
- **Signs of intention to increase or decrease the price of the security**
Suggestion: check whether there is a potential conflict with existing positions in the client account that justify the motivation for the price increase;
- **Signs of intention to attract the market**
Suggestion: identify whether there is always an aggressor order with a smaller lot than the resting order and which has systematic or frequency in its execution (until the potential intention of attracting the market is reached) and having its order attacked by the market.

In hypothetical example A, Investor 1, with the apparent intention of increasing the value of the asset and selling it at a higher price, carries out an OMC with a positive oscillation in the asset price:

Table 52 – Example A – Operation with the Same Counterparty with positive price fluctuation

Time	Trade #	Price (R\$)	Fluctuation	Quantity	Volume (R\$)	Type of operation	Investor Responsible for OMC s	Investor (Participant) Counterparty
12:05:33,212	2760	150.02	0.00%	500	75,010.00	C	Investor 1	A
12:05:39,000	2770	150.50	0.32%	100	15,050.00	V	Investor 1	Investor 1
12:15:07,212	2780	150.80	0.20%	100	15,080.00	V	Investor 1	Investor 1
12:18:20,950	2790	151.50	0.46%	500	75,750.00	V	Investor 1	B

In hypothetical example B, Investor 1, with the apparent intention of devaluing the price of the asset and buying it at a lower price, carries out an OMC with a negative oscillation on the price of the asset:

Table 53 – Example B – Operation with the Same Counterparty with negative price fluctuation

Time	Trade #	Price (R\$)	Fluctuation	Quantity	Volume (R\$)	Type of operation	Investor Responsible for OMC s	Investor (Participant) Counterparty
13:17:27,280	3430	152.00	0.00%	500.00	76,000.00	V	Investor 1	A
13:55:52,110	3440	151.37	-0.41%	100.00	15,137.00	V	Investor 1	Investor 1
14:18:28,010	3450	151.18	-0.13%	100.00	15,118.00	V	Investor 1	Investor 1
15:33:28,100	3460	151.00	-0.12%	100.00	15,100.00	V	Investor 1	Investor 1
15:33:28000	3470	150.90	-0.07%	500.00	75,450.00	C	Investor 1	B

7. Operations with the Same Counterparty (OMC)

In hypothetical example C, Investor 1 inserts an ask at 11:03:04 and 580ms for 5,000 shares of the FXYZ4 asset at a price of R\$ 5.74, with no market reaction to this offer. After an interval of more than 2 hours, at 01:32:57.222 pm, apparently intentionally, the investor carries out several OMCs until he manages to attract investors (participants) B and C to carry out trades.

Table 54 – Example C – Operation with the Same Counterparty with order to attract the market

Bid				Business				Ask				Balance of order
Hour	Investor or Participant	Price	Quantity	Number	Price	Investor or Participant – Bid	Investor or Participant – Ask	Hour	Investor or Participant	Price	Quantity	
-	-	-	-	-	-	-	-	11:03:04,580	Investor 1	5.74	5,000	5,000
13:32:57,222	Investor 1	5.74	100	4490	5.74	Investor 1	Investor 1	-	-	-	-	4,900
13:32:58,232	Investor 1	5.74	100	4500	5.74	Investor 1	Investor 1	-	-	-	-	4,800
13:32:59,122	Investor 1	5.74	100	4510	5.74	Investor 1	Investor 1	-	-	-	-	4,700
13:33:01,445	Investor 1	5.74	100	4520	5.74	Investor 1	Investor 1	-	-	-	-	4,600
13:33:11,000	B	5.74	2,000	4530	5.74	B	Investor 1	-	-	-	-	2,600
13:33:11,922	C	5.74	2,600	4540	5.74	C	Investor 1	-	-	-	-	0

c. OMC in auction with:

- Signs of intention to nullify the effect of the order: In this context, the irregularity can be related to the fact that other orders that were participating in the formation of the theoretical price are no longer met due to the order that generated the OMC;

In the example below, at 09:51:05:000 am, Investor 1 inserted an ask price in the book for 99 shares of the hypothetical asset WXYZ3, at an auction time, with priority in execution being given to the ask prices highlighted in gray.

Table 55 – Example: Order book for the pre-OMC auction

Purchase Participant	Hour	Buy quantity	Ask price (R\$)	Bid price (R\$)	Sell quantity	Hour	Sale Participant
B	09:51:05,000	99	MKT	43.50	10	09:56:10,000	F
A	09:55:09,000	99	MKT	45.00	20	09:45:45,000	G
C	09:55:12,000	1	MKT	48.00	42	09:53:59,000	H
D	09:55:15,000	99	MKT	48.87	56	09:45:27,000	I
E	09:55:22,000	1	MKT	48.00	10	10:02:36,000	J

7. Operations with the Same Counterparty (OMC)

At this point, the investor inserts an ask price at market value, which causes an apparently intentional OMC, displacing sellers initially served by his offer, which would be an irregular transaction by creating artificial market conditions.

Table 56 – Example: Order book at auction at the time of the OMC

Purchase Participant	Hour	Buy quantity	Ask price (R\$)	Bid price (R\$)	Sell quantity	Hour	Sale Participant
B	09:51:05,000	99	MKT	MKT	99	10:04:10,000	B
A	09:55:09,000	99	MKT	43.50	10	09:56:10,000	F
C	09:55:12,000	1	MKT	45.00	20	09:45:45,000	G
D	09:55:15,000	99	MKT	48.00	42	09:53:59,000	H
E	09:55:22,000	1	MKT	48.87	56	09:45:27,000	I
				48.00	10	10:02:36,000	J

Furthermore, it is necessary to monitor OMCs that involve:

d. Direct OMC transactions

- Identify direct operations that had their buying and selling clients specified at the time of registering the direct order and were the final account of a same client in the trading environment;
- Identify direct operations that had their clients allocated after the moment of registration of the cross order using an interim account in the trading environment;

e. Identify possible OMC standards

- Map the executing account, the allocated final account, the executing session, the executing operator, executing advisor, and execution ID equal to the final ID, aiming to identify operation patterns;
- Map OMC that involve error account and own portfolio;
- Check any time difference between the execution of operations and the allocation that results in OMC.



ALERTS

8. Operations with the Same Group (OMG)



8.1 Main concepts related to the alert

Operations with the Same Group or OMG refer to financial transactions that occur between entities that are part of the same control or management structure, or are interconnected by contractual, influence, common management or coordination relationships.

Some of the possible relationships between entities in the same group are exemplified below:

- 1. Controlling interest:** It occurs when a company (parent company) holds a sufficient portion of voting shares in another (subsidiary) to influence its strategic and operational decisions.
- 2. Ownership interest:** One company owns shares in another, which may be a minority or majority interest, but without necessarily having control over the decisions of the latter.
- 3. Common Management:** Companies share some or all the members of their governing bodies, such as the board of directors or the executive board.
- 4. Consolidation of balance sheets:** Accounting process in which the financial statements of all companies in the economic group are combined to reflect the financial position and performance of the whole group.
- 5. Contractual relations:** Formal agreements established between entities, in which terms and conditions are defined for carrying out transactions or operations with products and services between them. A possible example would be the relationship between investment advisors and brokerage firms.
- 6. Family relationship:** Family connection between investors, which may be members of the same family, such as parents, children, siblings, spouses or other close relatives, who may influence investment decisions and financial strategy and evidence coordination in operations, especially if there is a repeated pattern of transactions.
- 7. Investment Funds or Investment Clubs and their shareholders:** Shareholders of Funds or Clubs can be considered as part of a common group, since there are aligned financial interests that directly impact their equity interests.
- 8. Related individuals and legal entities:** If an individual has control or significant influence over a legal entity (for example, a partner or officer), transactions between them may be considered to be within the same group. Control can be direct, through ownership of shares, or indirect, through family or business relationships.
- 9. Group of clients with differentiated monitoring:** Transactions between groups of investors with differentiated monitoring can be classified as transactions of the same group when they present common characteristics that allow their categorization into a specific set.

Operations in the same economic group are common and legitimate, but they must be carried out transparently and in compliance with rules and laws. Regulatory bodies often monitor said operations to ensure that they are not used for irregular practices such as:

- Transfer of assets at non-commercial prices (at prices well below or well above market value), which may be an indication of fraud, manipulation of financial results or undue benefit of one company to the detriment of others.

- Undue use of privileged information: If a group company uses privileged information to obtain an undue advantage in transactions with other group entities, this may be considered an irregular practice. Undue use of privileged information violates the capital market rules and may lead to legal and reputational penalties (see Alert 2. Insider, of this Guide).

⚠ When monitoring Operations with the Same Group, it is fundamental that Participants have a clear definition of what they consider to be a group and determine the relationships that exist within these groups, so that there is adequate supervision of activities and monitoring in accordance with applicable regulations.

8.2 Suggestions for building the alert

The following will present important characteristics to be considered when monitoring OMG, with practical suggestions for developing the alert:

a. Identify and establish lists of economic groups that allow:

- Listing of entities from the same group to capture situations that may represent signs of irregularity;
- Monitoring recurring transactions between entities in the same group to identify irregular transfers of funds;

⚠ Example of group structure considering asset management as a criterion:

Group's structures:

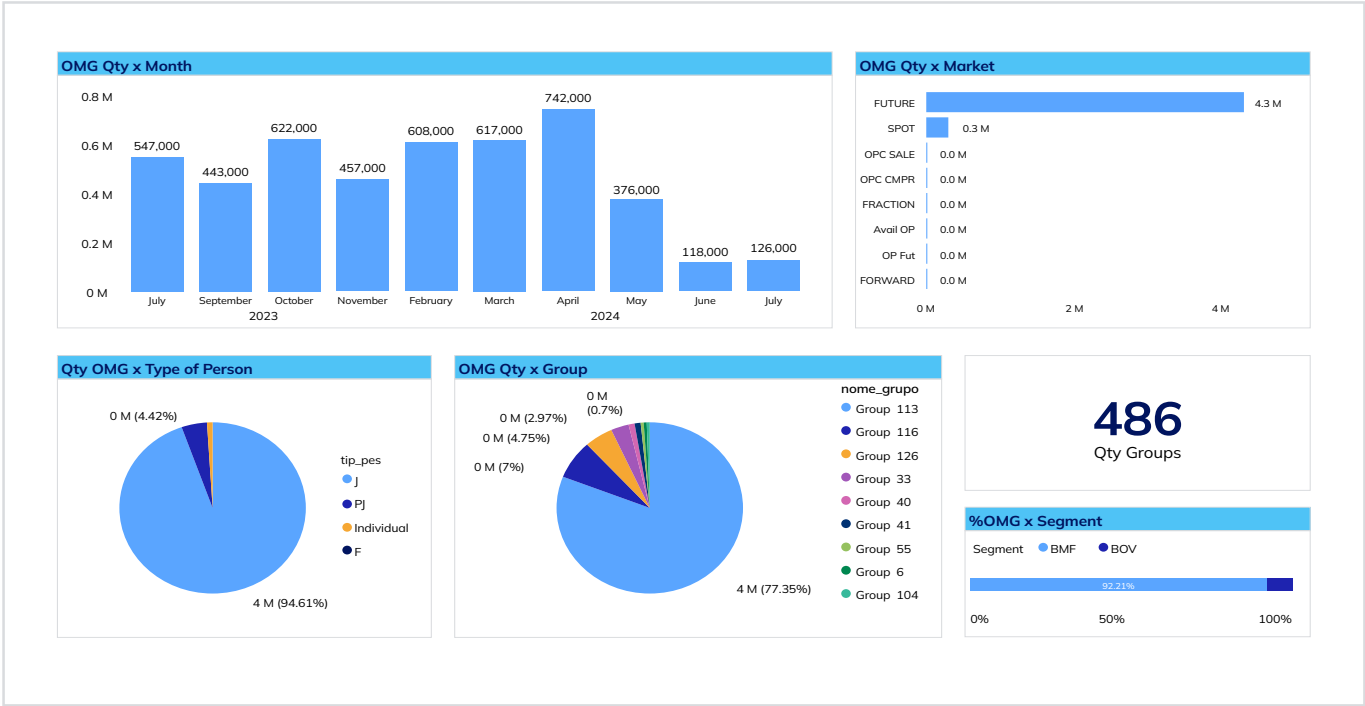
BCD Manager has a division dedicated to managing investment funds, which includes equity, fixed income, multimarket and private equity funds. The following may be considered as parts of the Group's structure, among others:

- Investment Funds managed by BCD
- Institutional investors: E.g.: Pension funds and insurance companies that allocate capital in different funds managed by BCD.
- Qualified Investors: Individuals or legal entities that have a minimum equity and can access more sophisticated investment products from the manager;
- Family Offices: Structures that manage the assets of high-income families, investing in BTG Pactual funds.
- Partners of BCD Manager and their families..

b. Mapping the representation of OMG:

- In business**
Suggestion: consider a specific period, for example: monthly monitoring of the number of OMGs;
- By type of person or investor**
Suggestion: segregate the type of person who performed the OMC, for example: Individual and Legal Entity; Market Makers and/or HFT;
- By segment or market in which the operations were performed**
Suggestion: segregate the transactions that occurred by segment (spot or derivatives) or in a more granular form by market (futures, spot, options, fractional etc.).

Chart 5 – Example of a Operation with the Same Group monitoring dashboard²⁰



The following hypothetical groups stood out due to the concentration of OMG in a given period. Concentration considers the proportion of the quantity traded in OMG in relation to what was traded outside the group. In this scenario, the highlights will be those whose concentration is greater than or equal to 10%, which may vary depending on each analysis and criteria considered:

20 The values presented are hypothetical and illustrative.

Table 57 – Representation of OMG by Economic Group for the asset ABCD4

Analyzed period	Economic group	# of Group Investors (who carried out OMG)	Segment	% Qty OMG x Total Trades
2024_06	1	7	Spot	12%
2024_06	2	11	Spot	7%
2024_06	3	5	Derivatives	5%
2024_06	4	4	Spot	4%
2024_06	5	4	Spot	1%

For Economic Group 1, whose OMG concentration was 12%, 7 investors with family ties were identified, with OMG concentration in the Spot market. The table below presents information on the group's operations in the period analyzed, with Investors 3 and 4 accounting for 88% of total transactions, and characteristics of recurrence of gains having been identified for Investor 3 and losses for Investor 4 during the analysis. Such factors must be analyzed thoroughly as they present characteristics of potential irregularity in operations.

Table 58 – Representation of OMG by Economic Group for the asset ABCD4

Analyzed period	Economic group	Analyzed investor	Segment	Days traded	% Operation volume in the period
2024_06	1	Investor 1	Spot	1	1%
2024_06	1	Investor 2	Spot	2	4%
2024_06	1	Investor 3	Spot	12	44%
2024_06	1	Investor 4	Spot	12	44%
2024_06	1	Investor 5	Spot	3	3%
2024_06	1	Investor 6	Spot	3	3%
2024_06	1	Investor 7	Spot	3	1%

Furthermore, it is necessary to monitor OMCs that involve:

c. OMG operations in regular trading and auction that present:

- Signs of intention to generate price fluctuations in the security;
- Signs of intention to increase or decrease the price of the security;
- Signs of intention to attract the market;
- Signs of intention to nullify the effect of the order;

⚠ The examples presented in chapter 7.2 of this guide are applicable to Operations with the Same Counterparty and Operations with the Same Group and can assist in the construction of alerts.

d. Direct OMC transactions:

- Identify direct operations that had their buying and selling clients specified at the time of registering the direct order and were the final account of a same group in the trading environment;

e. Identify possible OMC standards

- Map the executing account, the allocated final account, the executing session, the executing operator, executing advisor, and execution ID equal to the final ID, aiming to identify operation patterns;
- Map OMG that involve error account and own portfolio;
- Check any time difference between the execution of operations and the allocation that results in OMG.



ALERTAS

9. Preferential



9.1 Main Concepts Related to the Alert

In organized markets, such as those managed by B3, the concept of Preferential treatment is associated with unequal, discriminatory, or non-equitable treatment among participants. Although it is not a typical technical term used in capital markets regulation, the underlying concept — where a participant who should have received a certain treatment is bypassed or left out — is directly related to non-equitable practices.

Broadly speaking, Preferential treatment occurs when a participant with a right or legitimate expectation of equitable treatment is disadvantaged in favor of another participant without an objective, technical, or regulatory basis. In organized markets, equity is reflected, among other aspects, through

- Non-discriminatory access to trading and post-trading infrastructure;
- Clear priority rules (such as price-time priority); and
- Equal treatment among participants under equivalent conditions.

The violation of these principles may result in situations in which a participant is materially disadvantaged, even though regulation may use terms such as undue discrimination, non-equitable practices, or Preferential treatment.

This phenomenon may arise in different contexts, including:

- Failure to observe order priority rules (price-time priority), where better-positioned orders are not executed in favor of other orders;
- Unequal access to infrastructure or relevant operational information, which may constitute a violation of the fair access principle and may be characterized as a non-equitable practice;
- Non-equitable allocation of offerings in issuances or bookbuilding processes; and
- Differentiated treatment among clients by intermediaries without a technical justification.

From the perspective of market infrastructure and self-regulation, unfair preferential treatment is associated with fundamental principles such as:

- Neutrality, which requires that participants under equivalent conditions are not favored;
- Transparency, through clear and stable rules governing access, priority, and allocation; and
- Information symmetry, ensuring timely and equitable access to relevant information.

Whenever there is an asymmetry of treatment without a legitimate justification, it may be characterized, in a broad sense, as a form of Preferential treatment, with negative impacts on market integrity and confidence.

Within the context of self-regulatory activities, addressing this type of practice involves:

- Monitoring compliance with order priority rules;
- Verifying equitable access conditions to market infrastructure;
- Supervising allocation and distribution processes; and
- Analyzing indicators of unequal treatment among participants or clients.

In this sense, Preferential treatment may be understood as a conceptual expression of non-equitable practices, in which a participant who should have been treated under equitable conditions is improperly disadvantaged, compromising market efficiency, equity, and confidence.

Transactions executed through temporary accounts, or allocations performed by the same Participant trading desk operator in a manner that assigns better prices or returns to certain accounts at the expense of others competing under the same execution conditions, may constitute a Preferential treatment scenario. Such practice may occur when execution takes place in a block through a temporary account and the distribution to final clients is performed later or based on unjustified discretionary criteria, resulting in unequal treatment among clients.

CVM Resolution No. 62 defines artificial conditions of demand, supply, or price of securities as those created through transactions in which Participants or intermediaries, through intentional action or omission, directly or indirectly cause changes in the flow of purchase or sale orders of securities

For monitoring purposes, an integrated analysis of trading and post-trading information becomes relevant so that, for each executed trade, it is possible to identify:

- The trade execution time; and
- The client specification and final allocation time.

The time difference between execution and allocation may provide relevant elements for the assessment of potential Preferential treatment practices.

9.2 Suggestions for Building the Alert

To identify potential Preferential treatment situations, the monitoring of transactions distributed outside the average price may be considered, jointly evaluating the following aspects.

9.2.1. Identification by Temporary Account Type

It is important to identify the different types of temporary accounts used by the Participant, such as *master*, *capture*, *admincon*, among others, considering that each type may be subject to different allocation timing criteria.

For example, when a transaction is executed without a specified client at the time of execution, the Participant has a time window established by B3 to specify the client. During this period, in a potential Preferential treatment scenario, clients receiving the best-priced executions may be selected while others are disadvantaged.

For additional details regarding account types and post-trading criteria, refer to the B3 Clearing Operational Procedures Manual

ADDITIONAL MONITORING SUGGESTION

Another important aspect to be considered when monitoring the use of master accounts is to verify whether the account records demonstrate the relationship between the master account and its respective linked accounts. In addition, it is possible to verify whether, after the execution of a transaction through the master account, the trade allocations were directed to accounts associated with the master account (linked accounts).

9.2.2. Identification of the Trader, Investment Advisor, or Order Originator

Another element that may provide greater precision in the characterization of a Preferential treatment scenario is the identification of allocations resulting from transactions executed through the same investor point of contact, such as:

- Clients served by the same trader;
- Clients served by the same investment advisor; and
- Clients with the same order originator.

The distinctions described in Sections 9.2.1 and 9.2.2 may assist in:

- Segmenting the analyzed scenarios;
- Developing specific metrics; and
- Defining benchmarks compatible with each operational structure

9.3 Example of Preferential treatment

Consider a hypothetical scenario in which a temporary account enters a market order that is executed at different price levels.

During the allocation stage, it is observed that a specific client systematically receives the best prices obtained in the execution, while the remaining clients receive less favorable prices, despite having competed under the same market conditions and at the same execution time.

This type of distribution may indicate selective favoring, particularly when there is no operational or regulatory justification for the observed differentiation.

Table 1 below presents a non-exhaustive example of hypothetical trades executed through temporary account No. 1,000, which submitted a market order executed at different prices.

Table 59 – Hypothetical Trades Executed Through a Temporary Account and Their Respective Allocations to Final Clients

Trading Session	Trade Time	Allocation Time	Order Number	Asset	Qty.	Allocated Qty.	Trade Price	Traded Volume	Side	Final Account
08/01/2025	10:26:22	19:00:45	987654321	XY23	100.000	60.000	R\$ 10,10	R\$ 606.000,00	Compra	A
08/01/2025	10:26:22	19:00:45	987654321	XY23	100.000	10.000	R\$ 10,50	R\$ 105.000,00	Compra	B
08/01/2025	10:26:22	19:00:45	987654321	XY23	100.000	10.000	R\$ 10,60	R\$ 106.000,00	Compra	C
08/01/2025	10:26:22	19:00:45	987654321	XY23	100.000	10.000	R\$ 10,20	R\$ 102.000,00	Compra	D
08/01/2025	10:26:22	19:00:45	987654321	XY23	100.000	10.000	R\$ 10,50	R\$ 105.000,00	Compra	E

The purchase transactions executed through temporary account No. 1,000 were allocated at more favorable prices to Client “A”, who benefited at the expense of the other clients.

9.3.1. Allocation Specification Methodology

Verify whether allocations are performed:

- Individually, on a trade-by-trade basis; or
- Through average price block allocation, an optional Clearing functionality.

This distinction is relevant to understanding the mechanisms used in the final allocation of prices and the risks associated with each structure.

For additional details regarding average price allocation, refer to the B3 Clearing Operational Procedures Manual

9.4 Analysis of Block Allocations, Individual Allocations, and Potential Distortions

In cases involving average price block allocation, it may be considered that:

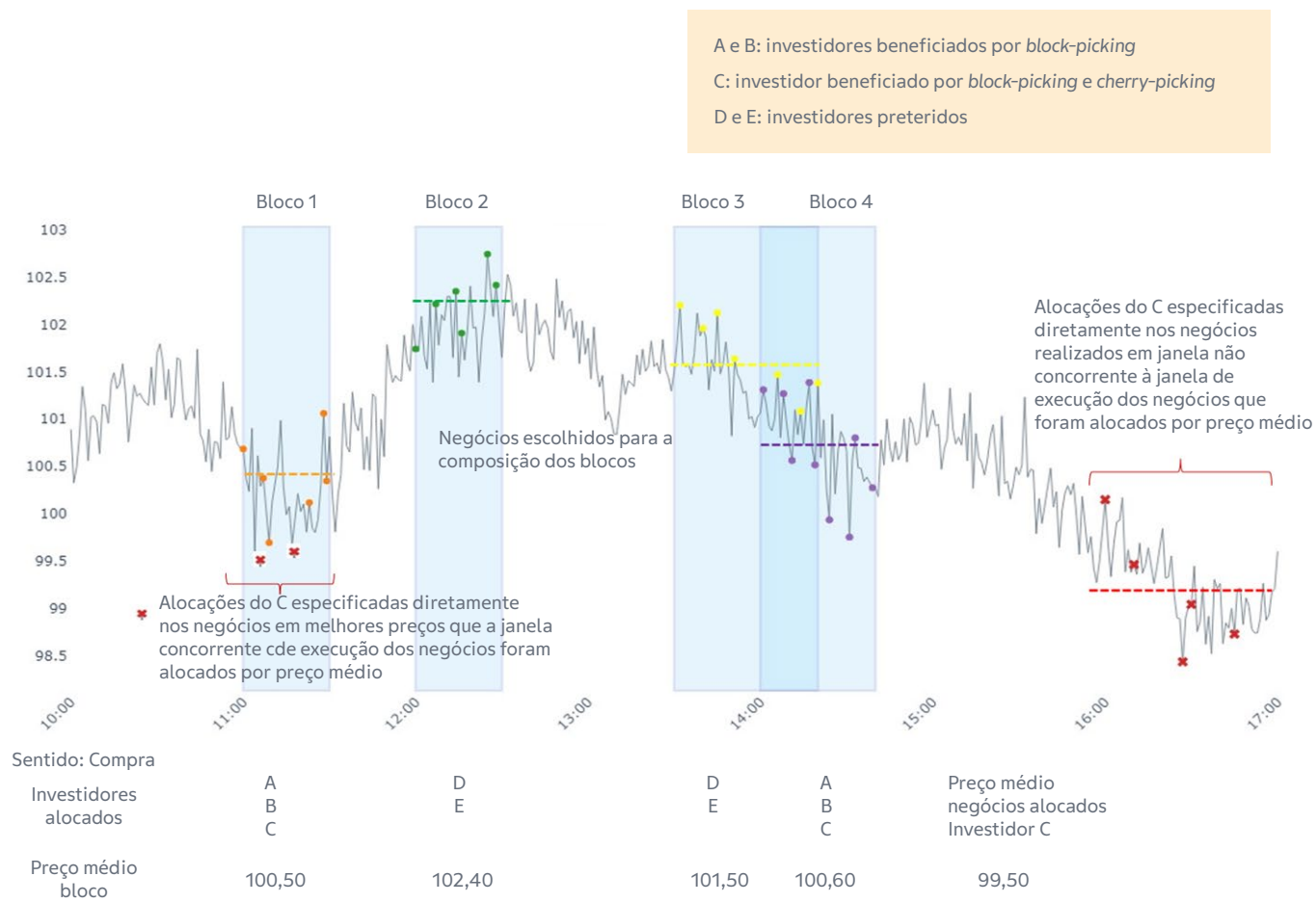
- The structure allows the creation of multiple allocation blocks; and
- Block allocations and direct trade-by-trade allocations may coexist for the same instrument.

In this context, the analysis may seek to identify:

- Individual allocations directed to more favorable prices, while less advantageous prices remain in the average-price block, a configuration commonly associated with selective allocation through the choice of the best trades (*cherry-picking*);
- Distinct blocks with significantly different average prices for the same asset and side (buy or sell), when specific investors are recurrently allocated to the most favorable blocks, a configuration associated with Preferential treatment between blocks (*block picking*);
- Situations involving Preferential treatment between block allocations and non-block allocations, where different allocation mechanisms result in economically unequal conditions among clients who competed for the same executions.

9.4.1. Example of Preferential treatment Using Block Allocations (*Block Picking*) and Individual Trade Allocations (*Cherry-Picking*)

Chart 6 – Figure 1 – Cherry-Picking and Block Picking Using the Average Price Allocation Functionality



It is worth noting that, in addition to these allocation scenarios, the construction of the alert may consider as allocation groups or blocks situations involving transactions executed through the same master account, the same trader, among others previously mentioned. For example, it may be assessed whether there is *block picking* involving investors associated with the same trader.

9.5 Metrics and Benchmarks (Non-Exhaustive Suggestions)

To support analyses of potential Preferential treatment practices, including situations associated with trade-by-trade allocations (*cherry-picking*) or block allocations (*block picking*), the following metrics and criteria may be considered, among others.

9.5.1. Price Reference Metrics

- Calculation of benchmark prices, such as:
 - Average asset price within trading windows;
 - Volume-weighted average price (VWAP);
 - Other price references available for the asset or instrument; and
- Calculation of the average price effectively obtained by client, portfolio, or block.

9.5.2. Metrics Related to Cherry-Picking (Trade-by-Trade Allocation)

- Difference between the prices of trade-by-trade allocations and the average price of the corresponding block:
 - If there is a single trade: direct difference;
 - If there are multiple trades: minimum, maximum, and central tendency measures (for example, median);
- Metrics to identify clients that recurrently concentrate the best execution prices;
- Comparison between:
 - Financial value of trade-by-trade allocations; and
 - Financial value of block allocations;
- Assessment of the investor's net result (*netting*), considering the combination of individual trades and blocks; and
- Relative metrics that relate the benefit obtained through individual trades to the investor's total exposure within the block.

9.5.3. Metrics Related to Block Picking (Preferential treatment Between Blocks)

- Comparison between average prices of different blocks involving the same asset and side (buy or sell);
- Absolute or relative difference metrics between average block prices;
- Number of overlapping blocks by asset, portfolio, or period;
- Dispersion of average prices among blocks within the same portfolio; and
- Identification of investors that recurrently receive blocks with more favorable prices compared to others.

9.5.4. Prioritization and Impact Metrics

- Statistics for identifying outlier clients within the group that competed for the same executions;
- Metrics related to recurrence and systematicity of the observed pattern;
- Materiality metrics considering:
 - Traded volumes;
 - Absolute and relative financial impact;
- Identification of potentially disadvantaged investors; and
- Estimation of potential losses borne by investors that received less favorable conditions.

9.6 Risk-Based Analysis

The analysis of potential Preferential treatment practices should consider the set of available evidence, assessing, among other aspects:

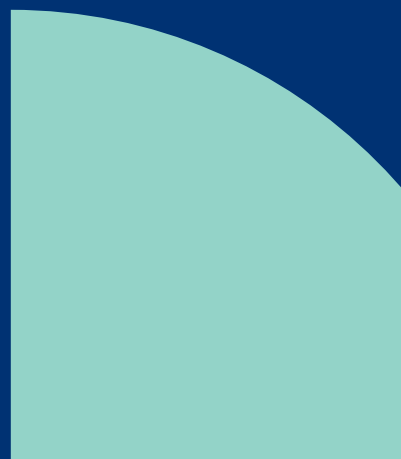
- The recurrence and systematicity of the behavior;
- The existence of a legitimate economic or operational rationale;
- The financial materiality involved;
- The number of potentially affected investors;
- The existence of relationships between Participant representatives and final clients; and
- Adherence to the principles of the Risk-Based Approach (RBA).

The observation of an isolated event is not, by itself, conclusive. Indicators should be assessed in an integrated, contextualized, and risk-proportionate manner.



ALERTAS

10. Monitoring of over-the-counter and organized market operations



10.1 Main concepts related to the alert

Operations in the **over-the-counter market**, also known as OTC, are those in which Participants trade instruments such as fixed income securities, financial assets, derivatives and structured operations, through bilateral agreements, under the conditions defined by the parties involved.

- ⚠ Over-the-counter trading may involve financial distributors, such as brokers and banks, who act as facilitators and provide liquidity to the market. In some cases, there is no intermediary involved in the transactions.

In this context, this Guide will describe suggestions and criteria that help detecting possible irregularities, focusing on operations carried out in the secondary market.

10.2 Suggestions for building the alert

The criteria and assumptions below that can be considered when constructing the alert will be suggested:

- ⚠ The presence of one or more of the indicators suggested herein does not necessarily confirm the existence of an irregularity, but it certainly justifies an in-depth analysis. Reporting detections of atypical situations to Regulators and financial market supervisory authorities (CVM) is extremely important to determine whether there have been violations of applicable rules and laws. BSM prepared a Guide of best communication practices, in accordance with CVM Resolution 35, which can be consulted at this [link](#).

a. Trading at unusual prices

Trading at unusual prices refers to transactions carried out at values that are outside the usual or expected price range for a given financial asset or security. These prices may be higher or lower than market prices for similar assets or under comparable conditions.

⚠ A price is considered unusual or atypical when it deviates from the expected standards for a given security, considering current market conditions. To determine whether a price is unusual, the following may be considered:

- Established metrics: Based on statistical measures such as mean, median and standard deviation, it is possible to establish limits to identify unusual prices. For example, prices that are more than three standard deviations above or below the median can be considered outliers.
- Comparison with reference indices or market benchmarks to assess the relative performance of the security.
- Comparison of prices with similar assets or with the same industry to determine if there are significant differences.
- Examination of trading volume associated with price changes to determine whether the volume is consistent with the observed price changes.
- Consideration of macroeconomic conditions, market news, corporate events (such as the release of financial results or changes in management), and other factors that may influence security prices.

Reference values

Some sources of information can be used to establish a usual or reference value for the price traded in transactions:

- B3 makes the “Daily Market Bulletin”²¹ available on its website, providing information such as the reference price of fixed income assets and the transactions carried out on the trading and registration platforms;
- B3 Calc²² pricing tool for fixed income assets in the Brazilian market.
- The trading system itself, which records the prices and volumes of transactions carried out between buyers and sellers;
- ANBIMA makes “ANBIMA Data”²³ available on its website, containing an extensive database with market information, calculators and specific product comparators;
- Offline features per record: Recorded transactions create a transaction history that reflects market conditions at specific points in time. This history can be used to determine reference values in other trades, leading to greater consistency in the prices charged.

²¹ Available at: [Daily Market Bulletin | B3](#)

²² Available at: [B3 Calc](#).

²³ Available at: [ANBIMA DATA](#)

⚠ Indicative prices are a reference value for assets. Businesses with different values can be observed depending on the supply and demand dynamics, transaction costs and volume of transactions.

Table 60 – Examples of operations at unusual prices

Financial Instrument Code	Participant	Counterparty	Type of person	Traded price (R\$)
ABDC11	Bank DEF	Client B	Individual	10.25
ABDC11	CDE DTVM	Client C	Individual	10.50
ABDC11	Bank DEF	Client A	Individual	11.15
ABDC11	Bank GHI	-	Bank	12.50
ABDC11	Fund AB	-	Fund	15.15
ABDC11	Bank GHI	Client D	Legal entity	17.20
ABDC11	Bank XYZ	-	Bank	55.15

In the example presented above, a closed-end fund share traded on a given day presented a transaction with an unusual price, identified from a metric based on the median plus or minus two standard deviations, pursuant to the calculation presented below:

Calculated metric (in R\$)

Median: 12.00

Standard deviation (sd): 15.01

2sd: 30.02

Prices considered unusual:

Prices above: $12.00 + 30.02 = 42.52$

Considering this metric, the price traded in the highlighted transaction (R\$ 55.15) would be considered unusual as it is above the price calculated in the established metric (R\$ 42.52), requiring actions such as additional analyses, verification of compliance, internal communication or communication to regulators and corrective measures, when applicable.

b. Classification of gains and losses of Participants and Counterparties of Organized Over-the-Counter Markets

One possible way to assist in monitoring over-the-counter transactions is by identifying transactions by participants and counterparties based on pre-determined criteria.

Next, steps and assumptions will be suggested for classifying investors who stood out positively or negatively in the secondary trading of securities and financial assets deposited.

Steps and assumptions adopted to identify transactions:

- 1. There must have been at least one purchase transaction and one sale transaction of the same instrument by the same investors during the analysis period, i.e. there must have been a starting transaction and a resulting transaction. In the example below, “Investor 1” and “Bank XYZ” trade the hypothetical instrument ABCD12 between themselves:

Table 61 – Example of full transaction with the same instrument

Date	Analyzed Investor (Buyer)	Counterparty Investor (Seller)	Financial Instrument Code	Quantity	Unit Price (R\$)	Financial Volume (R\$)
01/10/2024	Investor 1	Bank XYZ	ABCD12	100	2,095.00	209,500.00
01/15/2024	Bank XYZ	Investor 1	ABCD12	100	1,045.00	104,500.00

- 2. Consider the matched quantity; that is, the smallest quantity between the investor’s buy and sell operations in the analysis period.

Table 62 – Example of calculation of the matched quantity

Date	Analyzed Investor (Buyer)	Counterparty Investor (Seller)	Financial Instrument Code	Quantity	Unit Price (R\$)	Financial volume (\$)
01/10/2024	Investor 1	Bank XYZ	ABCD12	100	2,095.00	209,500.00
01/10/2024	Investor 1	Bank VWX	EFGH11	200	1,120.00	224,000.00
01/12/2024	Investor 1	Bank XYZ	CACB11	100	1,100.00	110,000.00
01/12/2024	Investor 1	Bank XYZ	CACB11	50	1,095.00	54,750.00
01/13/2024	Bank XYZ	Investor 1	CACB11	80	1,215.00	97,200.00
01/15/2024	Bank XYZ	Investor 1	ABCD12	100	1,045.00	104,500.00
01/24/2024	Bank VWX	Investor 1	EFGH11	50	1,130.00	56,500.00

10. Monitoring of over-the-counter and organized market operations

In the example above, for transactions with the asset **ABCD12**, the quantity traded in the purchase and sale is the same and, therefore, the matched quantity is 100. In transactions with **EFGH11**, the matching quantity in the period is 50 and, for the asset **CACB11**, the matching quantity is 80, as it considers the minimum between the sum of the quantity of assets in the purchase and sale operations.

3. Define a period, which may vary depending on the characteristics and purposes of the analyses. The suggestion is to consider the payment dates of all possible corporate events within the defined range.

⚠ It is important considering the existence of corporate events in the period analyzed when calculating the Financial Result of operations, such as:

- Scheduled or extraordinary amortization
- Amendment
- Amendment to include interest
- Amendment to redemption conditions
- Interest payment
- Remaining payment
- Payment of yield
- Payment of profit sharing
- Periodic amortization payment
- Payment of retention premium
- Barter
- Payment of interest on extraordinary amortization

The total financial result obtained by the investor is obtained by:

Financial result = Financial Result of Operations + Corporate Events, which will be exemplified below..

4. Calculate the financial result obtained from operations to identify atypical gains or losses.

The ways of calculating the financial result, segregated by type of instrument, is presented below:

– For Securities and Financial Assets

One way to calculate the financial result of operations is to use the average price weighted by the quantity traded of each operation of the respective financial instrument and the combined quantity of transactions:

$RF = QC \times (PV - PC)$, where:

RF = Financial Result

QC = Matched Quantity: is the smallest amount between investor's buy and sell transactions carried out in the period: $\min(\sum \text{qty purchase}, \sum \text{qty sale})$

PV = Average unit sales price: average price weighted by quantity sold in the period: $(\sum (P \times \text{qty}) / \sum \text{qty})$

PC = Average unit purchase price: average price weighted by the buy quantity in the period: $(\sum (P \times \text{qty}) / \sum \text{qty})$

Table 63 – Example of calculation of Financial Result for Securities and Financial Assets

Date	Analyzed Investor (Buyer)	Counterparty Investor (Seller)	Financial Instrument Code	Quantity	Unit Price (R\$)	Financial Volume (R\$)
01/10/2024	Investor 1	Bank XYZ	ABCD12	100	2,095.00	209,500.00
01/10/2024	Investor 1	Bank VWX	EFGH11	200	1,120.00	224,000.00
01/12/2024	Investor 1	Bank XYZ	CACB11	100	1,100.00	110,000.00
01/12/2024	Investor 1	Bank XYZ	CACB11	50	1,095.00	54,750.00
01/13/2024	Bank XYZ	Investor 1	CACB11	80	1,215.00	97,200.00
01/15/2024	Bank XYZ	Investor 1	ABCD12	100	1,045.00	104,500.00
01/24/2024	Bank VWX	Investor 1	EFGH11	50	1,130.00	56,500.00

In the example in the table above, for asset **ABCD12**, the financial result obtained by the Analyzed Investor can be calculated as follows:

$$RF = 100 \times (1,045.00 - 2,095.00)$$

$$RF = 100 \times (-1,050.00)$$

$$RF = -105,000.00$$

For the asset CACB11, the financial result obtained by the Analyzed Investor can be calculated as follows:

$$RF = 80 \times (1,215.00 - 1,098.33^*)$$

$$RF = 100 \times (-1,050.00)$$

$$RF = 9,333.33$$

*The average unit purchase price was calculated as follows:

$$PC = (110,000.00 + 54,750.00) / 150$$

$$PC = 1,098.33$$

– For Securities and Financial Assets Deposited with Corporate Event

Considering the hypothetical example above, on 10/01/2024 “Investor 1” acquired 200 quantities of EFGH11. On 01/20/2024, there was **payment of interest** by the Issuing Company of EFGH11 in the amount of R\$ 25.00 per quantity.

As the investor owned 200 quantities of the asset until the date of the Corporate Event (interest payment), he received the financial volume of R\$ 5,000.00, according to the table below:

Table 64 – Example of Financial Result calculation considering the Corporate Event

Financial Instrument Code	Event Payment Date	Quantity in D-1	Type of Corporate Event	Corporate Event Unit Price	Financial Volume (R\$)
EFGH11	01/20/2024	200	Interest payment	25.00	5,000.00

To calculate the financial result of the corporate event, the amount in the investor’s custody on D-1 of the Event date is considered.

On 01/24/2024, “Investor 1” sold 50 quantities of the asset. Thus, the financial result obtained in the period can be calculated as follows:

RF = Result of Operations + Interest Payment for the period
 $RF = 50 \times (1,130.00 - 1,120.00) + 5,000.00$
 $RF = 50 \times (10.00) + 5,000.00$
 $RF = 500.00 + 5,000.00 = 5,500.00.$

– For Derivatives

Due to their specific characteristics, the following assumptions can be adopted to calculate the financial result of **derivative** instruments:

- a. At least one transaction with a financial result must have occurred (regardless of the quantity) during the analysis period;
 - b. Analyze the difference between opening and closing the contract;
 - c. Consider the parties involved in the contract, when known;
 - d. Consider the type of asset underlying the derivative contract;
- I. **For option contracts:** Consider the difference between the sum of the positive and negative financial results generated in operations, pursuant to the example below:

$RF = \sum(PU \times qty \text{ positive transaction}) - \sum(PU \times qty \text{ negative operation}),$ where:

RF = Financial Result
PU = Unit Price

⚠ It is important considering concepts related to both sides of the operation:

- **Positive operation:** creditor, buyer and seller of the option
- **Negative operation:** debtor, holder and buyer of the option

Table 65 – Example of calculating the financial result for Derivatives (Options)

Operation Date	Type of Operation	Financial Instrument Code	Holder	Buyer	Registration Price (R\$)	Quantity	Financial Volume (R\$)
01/10/2024	Premium Payment	OPCB11111	Investor 1	Bank XYZ	5.00	1,000	5,000.00
01/10/2024	Premium Payment	OPCX22222	Bank XYZ	Investor 1	8.00	1,000	8,000.00

In the example above, “Investor 1” purchased a call option and sold a put option. In these transactions, he paid R\$ 5,000.00 in premium for the call and received R\$ 8,000.00 in premium for the put, obtaining a financial result of R\$ 3,000.00.

⚠ For operations with flexible options in the over-the-counter market, it is also important to check the pricing of the contracts, both at the time of registration and in the event of an advance.

Consider the example below in which the underlying asset of the contracts is a hypothetical share traded on the stock exchange, whose reference price on the registration date was R\$ 10.00, the strike price was R\$ 13.00 and implied volatility was 10%, with maturity in 5 days:

Table 66 – Example of Flexible Call Option operation

Operation Date	Type of Operation	Type of Instrument	Financial Instrument Code	Holder	Buyer	Maturity date	Registration Premium (R\$)	Strike Price	Quantity	Financial Volume (R\$)
01/10/2024	Premium Payment	Flexible Call Option	OPCB111222	Investor 1	Bank XYZ	01/15/2024	6.00	13.00	10,000	60,000.00

In the situation presented above, the premium paid by “Investor 1” of R\$ 6.00 is above the reference value (R\$ 0.00) calculated based on the Black & Scholes model²⁴, considering an out-of-the-money option. Such a difference between the price charged and the reference price may indicate a possible atypical situation related to the pricing of the contract, which, consequently, resulted in a higher cost to the investor in the operation. Furthermore, it is suggested to establish a haircut in relation to the value of the underlying asset²⁵.

The same verification is necessary for anticipation of derivative contracts. The following example presents the characteristics of the contract and conditions in advance. Suppose the reference price of the asset underlying the contract at the time of registration was R\$ 15.00 and at the time of advance it was R\$ 17.50 and the implied volatility at both times was 20%.

Table 67 – Example of Flexible Purchase Option operation with advance

Operation Date	Type of Operation	Type of Instrument	Financial Instrument Code	Holder	Buyer	Maturity date	Unit Price (R\$)	Strike price (R\$)	Quantity	Financial Volume (R\$)
01/16/2024	Premium Payment	Flexible Call Option	OPCB111333	Investor 1	Bank XYZ	03/25/2024	2.00	13.00	10,000	20,000.00
02/27/2024	Advance	Flexible Call Option	OPCB111333	Bank XYZ	Investor 1	03/25/2024	1.00	13.00	10,000	10,000.00

In the full anticipation of flexible option contracts, the positions are reversed with the purpose of closing the contract, so that the option holder – who paid the premium upon registration – receives the financial volume in advance, which can be calculated based on the multiplication of the unit price of the advance by the quantity of the contract.

In the hypothetical situation presented above, “Investor 1” paid, upon registration of the option, the unit premium of R\$ 2.00, totaling a financial volume of R\$ 20,000.00. In the early termination of the contract, the unit price was R\$ 1.00, so that “Investor 1” received R\$ 10,000.00, resulting in a total negative result of R\$ 10,000.00. However, when checking the unit price used in the advance based on the Black & Scholes methodology, the appropriate price would be around R\$ 4.00, considering the reference price of R\$ 17.50 and implicit volatility of 20% on the advance date. In this case, it was possible to detect evidence of atypicality in the unit price used in the advance, justifying a more thorough analysis.

⚠ It is worth highlighting the importance of checking the conditions agreed in derivatives contracts to ensure the proper operation of the market. The analysis of atypical situations may cover several points, such as pricing, contract validity, operational standard and investor registration information, possible links with companies issuing the underlying asset, volatility of the underlying asset, among others.

24 The Black-Scholes Model, also known as the options pricing model, aims to find fair prices for these options, so that they are favorable to a forecast of future value. In this hypothetical case, in a free simulation, the value calculated for the prize would be R\$ 0.00.

25 In the scenario of this example, a haircut of up to 20% in relation to the value of the underlying asset was considered.

II. **For Term Contracts**²⁶, the suggestion is considered in the calculation of the Financial Result (RF):

- for the **buyer**: the difference between the spot price of the asset underlying the contract (Spot Parity) and the value agreed upon in the registration (Term Parity), multiplied by the base value of the contract (Base Value).
- for the **seller**: the difference between the value agreed upon in the registration (Term Parity) and the spot price of the asset underlying the contract (Spot Parity), multiplied by the base value of the contract (Base Value), where:

$$\text{Buyer RF} = \text{Base Value} \times (\text{Spot Parity} - \text{Term Parity})$$

$$\text{Seller RF} = \text{Base Value} \times (\text{Term Parity} - \text{Spot Parity})$$

⚠ The **spot** price of the asset underlying the contract is the current market price of the underlying asset that is being traded at the time the contract is executed. This price is determined by supply and demand in the market and reflects the current value of the asset without considering any future adjustments or costs.

The agreed upon registration value is the monetary amount that the contracting parties agree to pay or receive for the asset underlying the forward contract. This value is agreed upon at the time of registration of the contract and is based on the spot price of the asset, but may include other adjustments or costs, such as interest rates and dividends.

The base value of the contract is the total financial value of the forward contract, which is calculated by multiplying the spot price of the underlying asset of the contract by the number of units of the underlying asset included in the contract. This value represents the total by which the parties are committed to and is used to determine the amount of future payments or receipts related to the forward contract.

In the hypothetical example below, the investor believes in the devaluation of the real (R\$) against the dollar (USD) and opened a position (purchase) of US\$ 1M with maturity in 90 days. Therefore, the buyer's Financial Result can be calculated as follows:

$$\text{Buyer RF} = \text{Base Value} \times (\text{Spot Parity} - \text{Term Parity})$$

Dollar price at registration (Term Parity): R\$ 6.00

Price after 90 days (Spot Parity): R\$ 6.05

Contract base value: R\$ 1,000,000.00

RF Buyer = $1,000,000.00 \times (6.05 - 6.00) = \text{R\$}50,000.00$

²⁶ The method of calculating financial results presented for both Term and Swap contracts refers to contract types with a final payment flow, that is, at the closing of positions.

Checking the conditions agreed upon when registering a fixed-term contract is essential to identify any atypical situations.

In another hypothetical example, the agreed price for 1,000 quantities of US Dollar was R\$ 4.50 and the spot price on the registration date was R\$ 6.00, with maturity in 5 days. At this point, it is important observing the price trend of the underlying asset for the effectiveness of the contract. The parties can check the dollar rate projection on the B3²⁷ reference rates page 28 or with a vendor. Assuming that the expected price of the US dollar for a 5-day maturity is R\$ 6.05, the contract would show signs of inconsistency in the recording of a forward contract of 1 in pricing, considering a verification metric calculated from the average of the projected price for the maturity plus or minus 2 standard deviations of the underlying asset. The agreed price value in this case should be greater than R\$ 4.78 to be considered within the 95% confidence interval. Considering a spot price of R\$ 6.02 at maturity and the calculation methodology presented above, the result obtained by those involved would be:

Term Parity: R\$ 4.50

Spot Parity: R\$ 6.02

Base Value: USD1.000,00

RF Buyer:

RF Buyer = $1,000 \times (4.50 - 6.02)$

RF Buyer = $1,000 \times (-1.52)$;

RF Buyer = - R\$ 1,520.00

RF Seller:

RF Seller = $1,000 \times (6.02 - 4.50)$

RF Seller = R\$ 1,520.00

Another suggestion for checking the price could be to divide the spot value on the day of the transaction by the value reported in the registration or advance, subtracting 1 from the result. The value will indicate the percentage change between prices. A range of, for example, plus or minus 20% can be established. In the situation presented above, the price at the registration should be between R\$ 4.80 and R\$ 7.20:

Percent change:

Spot on the day of the transaction / forward price

= $(6.00/4.50) - 1 = 0.33$

 The calculation of the financial result in advance is calculated in the same way, but using the spot price on the date of advance, instead of the quote on the agreed verification date.

27 Available at: [BM&FBOVESPA Reference Rates](#)

III. For Swap contracts, the adjustment represents the financial compensation that occurs periodically, following the definitions agreed between the parties involved in the contract. The calculation of the adjustment for a hypothetical Swap contract will be demonstrated below, as follows:

$$\text{Swap Adjustment} = (\text{Future Value Asset Position}) - (\text{Future Value Liability Position})$$

⚠ In short, **swaps** are transactions that exchange future cash flow, based on a comparison of profitability between indexes. Normally defined as an exchange of risks, they can have the following as underlying assets:

- Floating interest rate;
- Fixed interest rate;
- Foreign interest rate;
- Foreign currency;
- Shares;
- Stock Index; e
- Credit.

In a hypothetical example, a Swap transaction occurs between the DI rate (interbank interest rate) and the US Dollar for a period of one year. In this scenario, there is a debt in the amount of USD 10,000,000.00 that will be used as the basis for this transaction.

Example of data:

American currency appreciation: 5%;

American interest rate: 2%;

DI rate of the period: 6%.

Future Value of Asset Position (Dol) = $10,000,000.00 \times (1+0.05) \times (1+0.02) = 10,710,000.00$

Future Value of Liability Position (DI) = $10,000,000.00 \times (1+0.06) = 10,600,000.00$

Swap Adjustment = $10,710,000.00 - 10,600,000.00 = 110,000.00$

As with other derivative contracts, price validations, rate conditions, volatility, economic fundamentals, operational standard, investor's economic activity and possible links between the parties and/or companies issuing the underlying assets are necessary for Swap contracts.

The hypothetical example below presents a potentially atypical situation, which would justify a more in-depth analysis. This is a Swap operation between the DI rate and the pre-rate for a period of one year.

10. Monitoring of over-the-counter and organized market operations

Example of data:

Fixed rate of the period: 50%;
100% rate of DI for the period: 12%.

Contract base value: R\$ 1,000,000.00
Future Value Asset Position (Pre) = 1,000,000.00 × (1+0.5) = 1,500,000.00
Future Value Liability Position (DI) = 1,000,000.00 × (1+0.12) = 1,120,000.00
Swap Adjustment = 1,500,000.00 – 1,120,000.00 = 380,000.00

In this case, the active investor at the fixed end of the contract obtained a financial result of R\$ 380,000.00 and the counterparty of the operation, a loss of the same amount. The atypical situation would be the value of the fixed rate used in the contract, since it is higher than the trend of the DI rate in the period after analyzing the interest rate curve. Brazil at the time of Registration. The exchange of the profitability of these indexes in the values established in the contract registration would not be guaranteeing the best conditions for the passive investor at the fixed end. For the advance, we suggest to check, in addition to the points mentioned above, the spread practiced in the trade.

! You can consult the projection of some indexes as a reference on the B3 reference rates page, available at [Reference Rates](#).

5. Consider segmentation variables:

The factors considered in clustering may involve different investor attributes, such as age, income, level of risk tolerated, investment objectives, among others. Suggestions for clusters that can be used in this type of alert are presented below:

Table 68 – Cluster suggestions for Alert analysis

Segmentation	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Operated Product	Fixed income	Fixed income	Fixed income and derivatives	Fixed income and derivatives
Type of account	Institutional clients (account.10 or.20)	Own accounts (accounts other than.10 and.20)	Own accounts – Economicnature: Banks, Funds, Brokerage Firms, Securitization Companies, among others)	All accounts

c. Transfer of resources between funds of the same manager

Transfers of resources may have unusual and potentially irregular characteristics such as coordinated and previously agreed between the parties, in which one is the winner and the other is the loser, in a systematic, recurring and apparently intentional manner.

This topic will present suggestions for creating an alert related to the transfer of resources between funds of the same manager or front family²⁸.

The following table shows an example of purchase and sale transactions carried out between two funds during a period, which resulted in a benefit of R\$ 160,000.00 to Fund A and a loss of the same amount to Fund B.

Table 69 – Example of atypical transfer of funds between two Funds

Financial Instrument Code	Buyer	Seller	Price (R\$)	Quantity	Financial volume (R\$)
ABCD12	Fund A	Fund B	1,000.00	800	800,000.00
ABCD12	Fund B	Fund A	1,200.00	800	960,000.00

Analysis objects that can be considered when constructing the alert are suggested below:

- ⚠ The development suggestions in this alert are primarily aimed at fund administrators, fund managers, and custodians;

Participants:

- **Institutional investors:** investment funds, insurance companies, securitization companies, credit companies, brokerage firms etc.
- **Managers**
- **Front Families** ^{30 29}

Instruments

- **Securities** (DEB, CFF, CRI, CRA, NC)
- **Deposited financial assets** (LF, LFS, LFV, LFSC, LFSN, LIG, COE, CDCA)

Operations

- **Suggestions of transactions for analysis: Purchase and sale in the secondary market** ^{30 31}:
Example: Cash purchase and sale
Forward purchase and sale

²⁸ The term family refers to the entry into the over-the-counter system, in which the participant loads the accounts that will be operated and the users who will access the system. The Participant may have their own family. Therefore, they will make their entries in the system, or the Participant's account may be linked to the family of another Participant (Typist), in accordance with the rules established in the B3 Rules and Regulations Manual. For the front-office family, there is no need to link a holder account, the Participant, depending on its structure, may have more than one Front-Office family regardless of the number of accounts.

²⁹ Participant who operates in the Allocation System to carry out the allocation of Selic Bonds, Deposited Assets and Registered Securities.

³⁰ According to B3 Operations Manual – Operations Manual

Define the analysis period

Once the objects of analysis have been defined, we suggest defining a period, which may vary according to the characteristics and purposes of the analyses, for example: operations carried out between the 9th day of the reference month and the 10th day of the subsequent month (e.g.: June/09 to July/10). In this case, the definition of the period considers the end of each month due to the monthly reporting processes of investment funds.

Summarize trades and define the basis of monitored transactions

To compose the basis of monitored transactions, the suggestion is to initially identify who the ultimate beneficiaries of the trades are, considering their respective managers and/or front family;

Table 70 – Example of identification of beneficiaries

Operation Date	Buyer	Seller	Financial Instrument Code	Quantity	Unit Price (R\$)	Financial Volume (R\$)
01/15/2024	Intermediary X	Fund A	ABCD12	500	1,020.00	510,000.00
01/15/2024	Fund B	Intermediary X	ABCD12	500	1,020.00	510,000.00
01/29/2024	Intermediary X	Fund B	ABCD12	500	1,050.00	525,000.00
01/29/2024	Fund A	Intermediary X	ABCD12	500	1,050.00	525,000.00

⚠ In the suggestions presented herein, only trades with final buyer and seller who have the same manager and/or front family will be kept in the alert database.

After identification, the sum of the transactions between each pair of documents per financial instrument can be considered.

Table 71 – Example of summarization of transactions among identified beneficiaries

Financial Instrument Code	Operation Date	Buyer	Seller	Quantity	Unit Price (R\$)	Financial Volume (R\$)
ABCD12	01/15/2024	Intermediary X	Fund A	500	1,020.00	510,000.00
ABCD12	01/15/2024	Fund B	Intermediary X	500	1,020.00	510,000.00
ABCD12	01/29/2024	Intermediary X	Fund B	500	1,050.00	525,000.00
ABCD12	01/29/2024	Fund A	Intermediary X	500	1,050.00	525,000.00
CRA12345	01/12/2024	Intermediary X	Fund B	800	1,100.00	880,000.00
CRA12345	01/12/2024	Fund A	Intermediary X	800	1,100.00	880,000.00
CRA12345	01/30/2024	Intermediary X	Fund A	800	1,050.00	840,000.00
CRA12345	01/30/2024	Fund B	Intermediary X	800	1,050.00	840,000.00

A new filter is applied, keeping only pairs of documents that had “outbound” and “inbound” operations with some financial instrument.

Table 72 – Example of identifying resource transfer operations

Financial Instrument Code	Operation Date	Buyer	Seller	Quantity	Unit Price (R\$)	Financial Volume (R\$)
ABCD12	01/15/2024	Intermediary X	Fund A	500	1,020.00	510,000.00
ABCD12	01/15/2024	Fund B	Intermediary X	500	1,020.00	510,000.00
ABCD12	01/29/2024	Intermediary X	Fund B	500	1,050.00	525,000.00
ABCD12	01/29/2024	Fund A	Intermediary X	500	1,050.00	525,000.00
CRA12345	01/12/2024	Intermediary X	Fund B	800	1,100.00	880,000.00
CRA12345	01/12/2024	Fund A	Intermediary X	800	1,100.00	880,000.00
CRA12345	01/30/2024	Intermediary X	Fund A	800	1,050.00	840,000.00
CRA12345	01/30/2024	Fund B	Intermediary X	800	1,050.00	840,000.00
EFGH11	01/17/2024	Intermediary X	Fund A	300	1,130.00	339,000.00
EFGH11	01/17/2024	Fund B	Intermediary X	300	1,130.00	339,000.00

The highlighted operations would not be selected in the verification because they only have one direction, without the “inbound”.

Selection of operations for analysis

Based on the pairs of documents with the same manager and/or front family that traded with each other during the period, the pairs that presented atypical or unusual financial results can be selected, namely:

Calculation of Financial Result

One way to calculate the financial result to identify atypical situations is by finding the difference between the absolute volume of purchases and sales:

Absolute Result = |Sales Volume – Purchase Volume|
(volume calculated based on the matched quantity)

Table 73 – Example of Absolute Result Calculation

Financial Instrument Code	Operation Date	Buyer	Seller	Quantity	Unit Price (R\$)	Financial Volume (R\$)
ABCD12	01/15/2024	Fund B	Fund A	500	1,020.00	510,000.00
ABCD12	01/29/2024	Fund A	Fund B	500	1,050.00	525,000.00
CRA12345	01/12/2024	Fund A	Fund B	800	1,100.00	80,000.00
CRA12345	01/30/2024	Fund B	Fund A	800	1,050.00	40,000.00

In the examples in the table above, the absolute result of the funds, as the final ends of the operations, was R\$ 55,000.00, with the result from the operations of the ABCD12 instrument being R\$ 15,000.00 and the result from the operations of the CRA12345 instrument was R\$ 40,000.00, calculated by subtracting the sales and purchase volumes. In this case, Fund B benefited and Fund A suffered a loss.

Identification of atypical situations:

The identification of atypical situations can be based on different factors, such as the use of metrics considering the median and median absolute deviations.

Absolute Result > Median + 2 * Median Absolute Deviations (MAD)

Comparison by average and mean absolute deviations is often used to assess whether a set of data is within a range of values considered acceptable or whether there are values that deviate significantly, that is, whether there is atypicality in the data set. It is worth highlighting that external factors inherent to each operation must also be considered when analyzing the identified atypical situations.

⚠ The B3 Organized Over-the-Counter Regulation establishes the rules and procedures for trading derivatives and other financial instruments in the over-the-counter market. This Regulation contains guidelines on risk management, the settlement of contracts and what happens in cases of default and special situations

11. Monitoring of Movements in the Central Securities Depository (Non-Cash Transactions)



11.1 Main Concepts Related to the Alert

The purpose of this monitoring is to identify potentially atypical situations, inconsistencies, or transactions lacking a clear economic rationale, contributing to the integrity of the capital markets, the proper oversight of custody and registrar activities, and compliance with applicable regulatory requirements. The monitoring covers movements carried out in both the OTC and Listed Markets, involving Registrars and Custodians, in the following relationships:

- Between Custodians; or
- Between a Custodian and a Registrar, in cases involving the deposit or withdrawal of securities.

The broader coverage of securities and financial assets enhances the monitoring of non-cash transfers.

11.2 Recommendations for Alert Design

The following section presents key characteristics that should be considered when structuring this monitoring process, together with practical recommendations for building the alert.

The monitoring framework is based on the following principles:

- Focus on effectively completed transactions;
- Application of materiality criteria, considering the economic relevance of the transaction;
- Enhanced scrutiny of Politically Exposed Persons (PEPs);
- Analysis of recurrence and behavioral patterns; and
- Contextual assessment, taking into account the type of asset and the declared purpose of the movement.

11.2.1. Main Situations Subject to Monitoring

Asset Transfers for Wealth-Related Purposes

Monitoring of transactions associated with donations, inheritances, and asset division arrangements is recommended. The analysis may consider, among other aspects:

- Compatibility between the parties involved;
- Consistency between the declared purpose and the transaction carried out; and
- Economic relevance of the transaction.

Transfers with a Business or Commercial Nature

This category includes transactions such as:

- Loans between parties;
- Private transfers; and
- Lending-type transactions.

11. Monitoring of Movements in the Central Securities Depository (Non-Cash Transactions)

These situations deserve particular attention when they:

- Involve investment funds;
- Occur between parties with corporate or economic links;
- Present substantial values or recurring patterns; and
- Display observed pricing patterns.

Corporate Reorganizations and Succession Events

Monitoring of movements resulting from corporate reorganizations and succession events is recommended to assess whether the transaction is consistent with the relationship between the parties involved, particularly where no clear corporate relationship exists.

Physical Settlement of Derivatives

The monitoring should assess whether:

- The asset movement is consistent with previously established contracts; and
- The parties, timelines, and assets involved are coherent and consistent.

A lack of appropriate correspondence may indicate the need for further investigation.

Deposits and Withdrawals Between Custodian and Registrar

Two primary patterns may be evaluated:

a) Back-and-Forth Movements

- Successive inflows and outflows of the same asset;
- Consistency analysis between parties and quantities involved; and
- Identification of potential misuse or deviations from the intended purpose.

b) Unidirectional Movements

- Deposit-only or withdrawal-only transactions; and
- Assessment of market context, pricing, and economic relevance.

Assets Priced Outside Market Parameters

As part of an expanded monitoring scope, consideration may also be given to situations in which:

- The value assigned to the asset significantly diverges from market references; and
- The transaction occurs in a sensitive context or between related parties.

In such cases, additional analysis of materiality and economic context should be performed.

11.2.2. Relevant Information to Support the Alert Outcome

When a relevant indication is identified, the alert generates structured information to support the analysis, including:

11. Monitoring of Movements in the Central Securities Depository (Non-Cash Transactions)

- Description of the movement;
- Parties involved;
- Asset concerned;
- Declared purpose; and
- Relevance and recurrence indicators.

The resulting information supports monitoring activities and may lead to:

- Requests for clarification;
- Recommendations; or
- Other appropriate actions, depending on the circumstances.

11.3 Practical Alert Examples

Table 74 – Example of a “Round-Trip” Scenario (Deposit and Withdrawal Between Registrar and Custodian)

Date	Party	Party Name	Counterparty	Counterparty Name	FI Code	Transaction Type	Quantity
25/05/2026	Registrar	BETA	Holder	FUND A	DEBENTURE A	WITHDRAWAL	7,000
25/05/2026	Registrar	BETA	Holder	FUND B	DEBENTURE A	WITHDRAWAL	18,000
29/05/2026	Holder	FUND C	Registrar	BETA	DEBENTURE A	DEPOSIT	25,000
13/06/2026	Registrar	BETA	Holder	FUND C	DEBENTURE A	WITHDRAWAL	25,000
15/06/2026	Holder	FUND D	Registrar	BETA	DEBENTURE A	DEPOSIT	25,000

The same asset is moved without any associated cash settlement, leaving and subsequently returning to the registrar’s books within a short period of time, involving different holders but equivalent quantities.

Key Characteristics

- Total quantity: 25,000 units;
- Participants involved:
 - One Registrar; and
 - Four distinct investment funds.

Sequence of Movements

1. First Withdrawal

- The asset is withdrawn from Fund A in favor of the registrar, representing 7,000 units.

2. Second Withdrawal (Same Day)

- The same asset is withdrawn again, this time from Fund B in favor of the registrar, representing 18,000 units.

3. Subsequent Deposit

- A few days later, the entire position of 25,000 units is transferred from the registrar and deposited in the name of Fund C.

4. New Withdrawal and New Deposit

- Shortly thereafter, the asset leaves Fund C's custody and returns to the registrar. Finally, the 25,000 units are transferred from the registrar and deposited in the name of Fund D.

Why Does This Scenario Trigger an Alert?

This pattern is characterized as a **round-trip movement** because:

- The same asset repeatedly enters and exits the registration/custody environment;
- The quantities involved are equivalent, while the ultimate holders change;
- No cash settlement is associated with the movements; and
- The behavior may suggest an indirect transfer of ownership or a movement inconsistent with its stated operational purpose.

Result(Outcome):

The alert is generated for further assessment in order to verify:

- The economic rationale for the successive transfers;
- The relationship between the funds involved; and
- Whether the movement is consistent with the permitted circumstances for this type of operation.

Table 75 – Example of an Asset Outside Market Parameters (Non-Cash Movement with a Discrepant Value)

Date	Party	Party Name	Counterparty	Counterparty Name	FI Code	Transaction Type	Quantity	Unit Price
25/05/2026	Holder	Investor A	Registrar	BETA	DEB B	DEPOSIT	7,000	1.00

An asset is moved without any associated cash settlement; however, the value assigned to the transaction is significantly different from prevailing market references for the same asset on the transaction date.

Key Characteristics

- Quantity transferred: 7,000 units;
- Assigned value: BRL 1.00 per unit;
- Market reference on the same date: approximately BRL 32.00 per unit;
 - The movement occurs between a beneficial holder and a registrar;
- No cash settlement is associated with the transfer; and
- The reported value is merely symbolic and does not reflect the asset's economic value.

Why Does This Scenario Trigger an Alert?

The off-market value alert is triggered because:

- The value used in the transaction does not reflect the market price;
- The discrepancy is material and significant; and
- Even in the absence of cash settlement, the reported price may:
 - Affect internal controls;
 - Conceal an indirect economic transfer; or
 - Indicate potential regulatory risk.

Outcome

The case is highlighted for specific review, considering:

- Whether the reported value has a valid operational justification;
- Whether the movement is associated with a corporate event, operational error, or inappropriate practice; and
- Whether similar occurrences involving the same asset or participants have been identified previously.

These two examples illustrate how the alert operates in practice:

- The **round-trip movement** scenario focuses on behavioral patterns and recurrence; and
- The **off-market value** scenario focuses on economic consistency and adherence to market parameters.

In both cases, the objective is not to presume the existence of an irregularity, but rather to identify situations that warrant qualified review, thereby reinforcing transparency and integrity within the custody and registrar environment.



Practical Recommendations



PRACTICAL RECOMMENDATIONS

1.

Use of Artificial Intelligence in Supervision and Monitoring Processes



1.1 Purpose of the Chapter

This chapter aims to present recommendations regarding the use of Artificial Intelligence (AI) in supervision, monitoring, compliance, and alert-building processes, in line with the principles, concepts, and approaches already established in this Guide.

The content presented herein complements the previous sections and does not replace the specific alert chapters. It should be interpreted in accordance with the Risk-Based Approach (RBA), as well as the assessment of recurrence, systematicity, and materiality, as described in the General Aspects section.

1.2 Contextualizing the Use of AI in Monitoring

In market monitoring processes, alerts are structured based on quantitative assumptions, materialized through metrics, parameters, and indicators designed to identify potentially atypical transactions and offerings.

Once a potential anomaly has been identified, there should be a clear and traceable rationale demonstrating the factors that motivated the analysis, whether based on a single metric or a combination of multiple indicators.

The adoption of Machine Learning or Artificial Intelligence models expands the analytical capabilities of these processes; however, it also introduces additional complexity to the relationship between assumptions and outcomes, requiring enhanced attention to explainability, governance, and controls.

Traditional Rule-Based Models

In this context, traditional rule-based models represent a more direct and transparent approach to alert generation. These models are structured around predefined logical conditions, where limits, thresholds, and combinations of indicators are explicitly established by business specialists. For example, a rule may determine that a transaction should be flagged when it exceeds a certain financial volume, deviates from a participant's historical behavior, or involves specific securities under atypical market conditions.

Previous sections of this Guide present applications of rule-based models. In the case of the Insider Trading alert, for example, some conditions include: if an investor purchases securities prior to the disclosure of a material event, sells after the security appreciates, and obtains significant profits or reduces a potential loss, then a potential Insider Trading case should be flagged.

Unlike Machine Learning models, in which rules are inferred from data, rule-based models provide immediate traceability of decisions, since the criterion that triggered the alert are known and interpretable from the outset. This characteristic enhances auditability, regulatory transparency, and operational control, making it particularly relevant in supervisory environments that require clear justification for analytical conclusions.

On the other hand, such models tend to offer lower flexibility and adaptability and are therefore better suited to scenarios where behavioral patterns are well understood and relatively stable. In practice, supervisory environments commonly combine approaches, using rule-based models as an initial detection layer and more advanced models for deeper analysis, thereby balancing interpretability and predictive capability, as discussed in the following sections.

1.3 Principles for the Adoption of Artificial Intelligence

The following principles are recommended:

- Maintenance of objective, parameterized, and documented criteria;
- Preservation of the ability to explain analyses and results;
- Existence of human oversight and validation in decision-making processes;
- Adherence to the institution's Risk-Based Approach (RBA).

Artificial Intelligence should be understood as a complementary tool intended to enhance the efficiency and effectiveness of the monitoring processes described in this Guide.

1.4 Hybrid Approach to Alert Construction

Within the context of *market surveillance*, studies suggest the adoption of hybrid approaches combining rule-based models with AI models, rather than fully replacing traditional anomaly-detection mechanisms.

In general, this approach may be structured according to the alternatives described below.

1.4.1. AI as Analytical Support

Under this approach, alert identification remains grounded in rules, metrics, and parameterized filters, while AI is used to support subsequent analytical stages.

Examples include:

- Automated reading, classification, and summarization of documents;
- Transcription and analysis of recordings and communications; and
- Consolidation of unstructured information from multiple sources.

Under this approach, AI does not influence the alert-triggering criteria; instead, it supports the analyst's qualitative assessment and provides productivity gains.

1.4.2. AI as a Supporting Metric

Under this alternative, AI is applied to the construction of complementary metrics without acting as the primary alert-generation criterion.

Examples include:

- Creation of auxiliary scores for alert prioritization;
- Multivariate models for identifying investor behavioral patterns;
- Support for the development, review, and segmentation of benchmarks;
- Investor clustering techniques used as supplementary metrics to compare an individual's behavior against that of a peer group and identify meaningful deviations within homogeneous profiles.

In this context, clusters function as a secondary assessment layer, supporting the identification of outliers without replacing the deterministic logic underlying alerts.

The core stage of anomaly identification remains rule-based, consistent with the practices described in the specific chapters of this Guide.

1.4.3. AI in the Alert Refinement Stage

Under this approach, initial alert identification is conducted using traditional models, while AI is applied during the refinement stage based on historical analyses and prior decisions.

Key steps include:

- Alert identification through rules and parameterized filters;
- Training AI models using historical conclusions and decisions;
- Applying the model to support prioritization and deeper investigation of cases.

Even where AI plays a significant role at this stage, it is recommended that the rule-based framework remain the central element of the monitoring process.

1.5 Combined Use of Analytical Models

In market monitoring – particularly in *market surveillance* activities – analytical models are employed to identify behavioral patterns that may indicate atypical or potentially irregular activities. Traditionally, these processes rely on metrics and parameters that form the assumptions supporting alert generation and subsequent analysis.

With the introduction of Machine Learning and Artificial Intelligence techniques, analytical models become more sophisticated, enabling the identification of complex relationships among variables that are often difficult to explain. Two broad categories stand out in this context:

- Supervised models, trained using historical cases that have been analyzed and classified;
- Unsupervised models, focused on identifying new patterns and operational behaviors.

The selection and combination of such models should align with the institution's risk appetite, process maturity, and technical capabilities.

1.5.1. Supervised Models

Supervised models are based on historical datasets in which each observation is associated with a known outcome, such as a case being classified as “relevant” or “dismissed.” When such historical data is available, these models become particularly useful because they learn which characteristics are associated with actionable cases and which relate to irrelevant situations. They can then apply this learning to new observations, functioning as a triage or alert-prioritization mechanism that improves operational efficiency and reduces false positives.

In practice, this type of model is often incorporated into supervisory workflows where rules initially generate a large volume of alerts. The supervised model subsequently analyzes these alerts and assigns greater priority to those with a higher likelihood of relevance, enabling teams to focus their efforts on the most critical cases.

For supervised models to operate effectively, certain requirements are essential, including the availability of a consistent labeled historical dataset, the structured storage of such information, and full traceability throughout the analytical process. Organizations should be able to clearly identify whether an alert was analyzed, which decision was taken, whether it was referred for investigation or enforcement, and which factors influenced the decision. Without this level of control, the process loses its feedback capability, making it impossible to properly train the models.

Another significant challenge relates to data observability. Not all events have a clear or complete outcome, which is common in analogous contexts such as credit risk. Many cases do not progress to formal investigations, others never receive definitive confirmation of misconduct, and, in many situations, there is a considerable lag between the occurrence of an event and its final resolution. As a result, issues such as imbalanced datasets, label noise, and selection bias arise.

To mitigate these limitations, complementary approaches are often required, including resampling techniques (such as oversampling and undersampling), the use of auxiliary models to estimate probabilities for underrepresented classes, the creation of proxy variables, and the combination of heuristic rules. Consequently, supervised models frequently rely on additional modeling layers to compensate for limited observability and data imbalance.

1.5.2. Unsupervised Models

Unsupervised models follow a different logic because they do not depend on prior labels. Their purpose is to explore data in order to identify hidden structures, behavioral clusters, outliers, and emerging patterns that have not yet been formally recognized. In market supervision, these models are particularly important for identifying emerging misconduct patterns and behaviors not represented in historical datasets and help address the inherent limitations of supervised models.

They may be used to segment investors based on behavior, detect anomalous transactions, identify market manipulation indicators, and explore high-dimensional datasets to uncover new relevant factors that had not previously been considered.

1.5.3. Hybrid Approach

Given the characteristics of both approaches, the most effective framework tends to be a hybrid one that combines their strengths. Typically, the process begins with rule-based detection using clearly defined metrics that ensure greater control and explainability, followed by enrichment through unsupervised techniques that help generate additional metrics, identify hidden patterns and segment populations. Next, supervised models leverage historical data to classify and prioritize alerts, reducing false positives. Finally, a decision may be made either by an analyst or automatically, based on the combination of outputs generated throughout the process.

1.6 Risks and Controls Associated with AI

Potential risks include:

- Biases, inconsistencies, or limitations in the data used;
- Explainability constraints;
- Governance and accountability weaknesses;
- Excessive dependence on third-party providers and technology vendors; and
- Inappropriate use of AI in processes involving ethical, regulatory, or discretionary judgment.

An integrated effort involving technical, monitoring, regulatory, and compliance functions is recommended to mitigate non-compliance risks.

1.7 Examples of AI Use Cases in the Monitoring of Market Transactions and Offerings

- Analysis of historical trading and investor behavior patterns;
- Transcription and analysis of recordings and communications for conduct supervision purposes;
- Generation of communications and inquiries arising from monitoring alerts;
- Reduction of false positives in traditional surveillance workflows;
- Automation and enhancement of document preparation (summaries, technical reports, and compliance documentation);
- Extraction of information from complex and unstructured documents;
- Support for the development, review, and maintenance of systems and code;
- Validation and enhancement of data quality used in monitoring processes.

1.8 Final Considerations

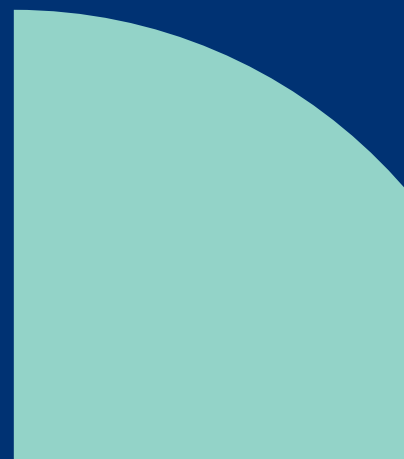
The use of Artificial Intelligence in monitoring processes should be conducted in a manner proportionate to risk, while preserving traceability, explainability, and accountability for the decisions made.

This chapter reinforces that AI does not replace the criteria, metrics, and controls described in this Guide. Rather, it should be applied as an additional tool to support the continuous improvement of monitoring processes.



PRACTICAL RECOMMENDATIONS

2. Use of Participant Registration Information in the Identification of Coordinated Activity



Suggested Verification Procedures for Identifying Coordinated Activity Among Clients of the Same Participant

Under the Risk-Based Approach (RBA), the identification of coordinated activity among clients of the same Participant may strengthen indications of atypical behavior when internally identifiable relationships are observed in combination with compatible operational and behavioral characteristics.

Given that the Participant has access to its own registration, relational, and operational information, it is recommended to perform checks that enable the establishment of objective links between clients. When analyzed together with the operational patterns described below, such links may contribute to the identification of potential coordinated practices.

The examples below are non-exhaustive suggestions and may be assessed and adapted according to the risk profile, size, and operating model of each institution.

2.1 Direct Registration Relationships

It is recommended to assess the existence of matching or correlated registration information among clients exhibiting similar or complementary trading behavior, such as:

- Identical or similar residential or business addresses, including:
 - Same street and number;
 - Shared offices within commercial buildings;
 - Common mailing address (e.g., same ZIP code, neighborhood, etc.);
- Shared or similarly structured email addresses, including:
 - Use of the same corporate domain;
 - Minor variations in email naming conventions;
- Common telephone number or other contact information, where available;
- Shared public IP address;
- Common banking information, such as:
 - The same bank account number;
 - The same financial institution used as the primary settlement channel.

2.2 Family or Personal Relationships

Whenever such information is available in registration records or internal databases, the existence of family or personal relationships between clients may be assessed, including:

- Spouses or domestic partners;
- Ascendants and descendants (parents and children);
- Siblings;
- Other reported or identified family relationships;
- Legal guardians or formal representatives;
- Relationships evidenced through social media networks.

2.3 Operational Relationship – Trader, Investment Advisor, or Service Structure

Where the Participant has information regarding the trading desk operator, investment advisor, or client service structure, the existence of a common operational relationship may be assessed, including:

- Different clients recurrently serviced by the same trader or advisor;
- A stable servicing relationship, even across different accounts;
- Association of the same trader with clients trading the same markets or instruments.

2.4 Corporate, Professional, or Fiduciary Relationships

In addition to registration and operational links, other internally identifiable relationships may be considered, such as:

- Corporate relationships, including:
 - Common shareholders or partners;
 - Cross-ownership interests in legal entities;
 - Companies belonging to the same economic group; and
 - Controllers or directors of companies associated with the traded securities.
- Professional relationships, such as:
 - The same employer; and
 - Common administrators or service providers.
- Fiduciary or mandate relationships, such as:
 - Attorneys-in-fact;
 - Formal representatives; and
 - Managers or decision-makers not formally registered as such.

2.5 Potential Operational and Behavioral Characteristics Indicative of Coordination

(To be assessed in conjunction with the identified relationships)

The relationships described above become more analytically relevant when associated with operational and behavioral characteristics indicating strategic alignment, synchronized decision-making, or complementary trading activity.

On a non-exhaustive basis, the following characteristics may be considered:

- **Temporal synchronization of trades**, including:
 - Order entry within the same time interval or with only a minimal time difference;

2. Use of Participant Registration Information in the Identification of Coordinated Activity

- Recurrent activity within similar time windows;
- **Activity involving the same securities or instruments on a simultaneous or recurring basis;**
- **Complementary trading structures**, such as:
 - One client predominantly acting as buyer while another acts as seller;
 - Position opening by one client and position closing by another;
 - Recurring asymmetric distribution of profits and losses.
- **Similarity of trading parameters**, including:
 - Frequently similar or proportional order quantities;
 - Trading at the same price levels or within close price ranges;
 - Similar patterns of aggressiveness or order types.
- **Coordinated position closing**, such as:
 - Total or partial reversals within the same time interval;
 - Simultaneous exposure adjustments;
- **Recurring and systematic behavior across different trading sessions, securities, or market contexts.**

The presence of these characteristics is not conclusive on a standalone basis; however, when observed together with the identifiable relationships described above, they may strengthen indications of coordinated activity.

2.6 Integrated Assessment and Risk-Based Approach

It is recommended that the examples of relationships and characteristics described herein be assessed in an integrated manner, considering, among other factors:

- Recurrence and systematic nature of the behavior;
- Financial materiality involved;
- Economic rationale of the transactions; and
- Clients' registration profile and trading history.

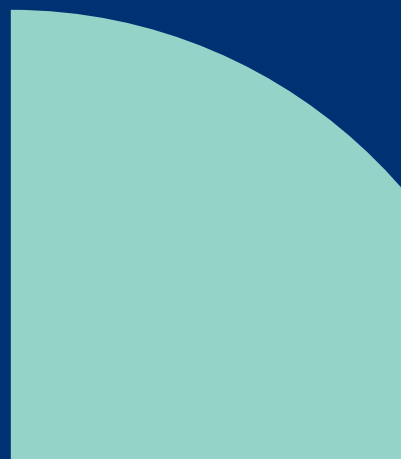
Such an integrated assessment allows the Participant to prioritize the most relevant cases and allocate analytical efforts efficiently, in line with the principles set forth in the BSM Alerts Guide.



PRACTICAL RECOMMENDATIONS

3.

Access to OTC Market Information in the NoMe System



To support the supervision of OTC markets, one option is to use the information available in the B3 NoMe platform tables, available at <https://nome.cetip.net.br/menu/ctp/TelaPrincipalCetip21>. Access requires adherence to the applicable regulations and rules, completion of the registration process, and authorization to access the platform environment. Below are the navigation paths for some of the main tables:

Registration Data

Client (Comitente)

Stores registration information on clients, including identification documents, contact details, and accounts.

> [Client Identification](#) > [Inquiry](#) > [Client](#)

Participant

Contains registration records of participants, including their economic and legal nature, contact information, and account classification.

> [Participant Administration](#) > [Inquiries](#) > [Participant Registration Data](#)

Transactions

Stores information on financial transactions recorded in the system. Each entry represents a specific financial transaction, including details on counterparties, financial instruments used, and the nature of the transaction.

> [Transactions](#) > [Inquiries](#) > [Transactions \(NoMe\)](#)

Positions

Stores information on clients' positions in fixed-income investments.

[> Client Identification](#) > [Inquiry](#) > [Custody Position Details](#)

Alternative view:

[> Custody](#) > [Inquiry](#) > [Custody Position](#)

Contracts

Non-CCP Derivatives Contracts

Flexible Options

[> Flexible Options](#) > [Inquiries](#) > [Contract Characteristics](#)

Forwards

[> Forwards](#) > [Multi-Asset Forwards](#) > [Inquiries](#) > [Contract Inquiry](#)

Swaps

[> Swaps](#) > [Inquiries](#) > [Swap Contract Characteristics](#)

CCP Derivatives Contracts

Options

[> CCP](#) > [Option Contracts](#) > [Inquiries](#) > [Option Contract Characteristics](#)

Forwards

[> CCP](#) > [Forward Contracts](#) > [Inquiries](#) > [Forward Contract Characteristics](#)

Swaps

[> CCP](#) > [Swap Contracts](#) > [Inquiries](#) > [Swap Contract Characteristics](#)

Positions (CCP)

[> CCP](#) > [Inquiries and Reports](#) > [OTC Inquiry](#)

Events

[> Financial Indices](#) > [Inquiries](#) > [CCP Equity Corporate Actions Adjustment History](#)

Other Tables

Strategies

Contains information on trading strategies

[> Derivatives Information > Inquiries > Strategy Inquiry](#)

Financial Instrument

Records information on financial instruments traded on B3.

[> Securities and Financial Instruments > Financial Instrument > Financial Instrument Inquiry](#)

Financial Instrument Curve

Contains records of unit prices for financial instruments traded on B3.

[> Securities and Financial Instruments > Inquiries > Financial Instrument Curve](#)

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