Regulation of equity trading in Brazil

Analysis of CVM proposal for block trades and best execution

Prepared for
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Contents

Boxes, figures and tables

Executive summary

Context

The Comissão de Valores Mobiliários (CVM) has launched a public consultation on amendments to the regulatory regime for equity trading in Brazil. These amendments are designed to facilitate the introduction of competition at the trading level in the Brazilian equity market.

The objective of this report, commissioned by B3 (Brasil Bolsa Balcão S.A), is to inform the debate on the design of equity trading markets in Brazil on two important aspects covered in CVM's proposal relating to block trades and best execution, particularly for retail investors.

Throughout this report, we draw on insights from the introduction of competition in equity trading in other financial markets. We also take into account the specific characteristics of the Brazilian market, such as its relative size and the concentration of liquidity in a small number of companies.

Block trading

A block trade is an order for the sale or purchase of a relatively large number of shares on a given stock. Block trading allows institutional investors (often funds or portfolio managers) to buy or sell large volumes executed as a single trade, which may generate cost savings and operational efficiencies for them.

There are several challenges when attempting to execute a block trade. For example, it can be hard to find a counterparty. The trader also risks exposing themselves to other traders who may front run their order to gain at their expense. As a result, block traders typically want to hide their trading intentions by trading in the 'dark' (i.e. without pre-trade transparency) to minimise price impact.

Different approaches have been developed over time and across markets to facilitate block trading. These include: hidden orders on limit order books; over the counter (OTC) trading with broker-dealer firms; dark pools; and auctions.

There has also been a lot of innovation in recent years among trading venues to facilitate block trading, particularly in Europe. This includes:

- new venues focused on facilitating block trades, including Turquoise Plato Block Discovery, Cboe LIS and Euronext Block;
- new order types such as midpoint pegged orders and dark-lit sweep orders, to encourage trading of block on exchanges; and
- innovation in auction design.

Block trading raises several issues from a market design perspective. The demands of block traders to hide their trading intentions creates a tension for policy makers between price formation and liquidity provision. Furthermore, since the same stock can be traded both in small and large sizes, changes to the regulation on block trading will impact the overall functioning of the market and not just block trading activity.

CVM is proposing to change the existing requirement for equity trading in Brazil to be conducted on an exchange by allowing large blocks to be traded in OTC markets. The reforms are intended to improve the functioning of equity

trading. A well-functioning market is one that delivers high quality liquidity and price formation.

We have assessed the relative impact of the different ways to facilitate block trading (including CVM's proposal) on price formation and liquidity, as well as on the cost of trading and competition.

Our analysis finds that:

- executing block trades 'in the dark' is beneficial from a market design perspective, although some limits may need to be imposed. On-venue trading mechanisms with mid-price execution typically provide investors with a cost-efficient solution. OTC trading could be allowed if it did not undermine the viability of dark pool trading and other on-venue solutions for dark trading—i.e. the Brazilian market would need to be sufficiently large to sustain both OTC and dark pool trading.
- in general, dark trading does not contribute to price formation, however a certain amount could be beneficial to the extent that it helps to reduce the pricing errors of uninformed traders on lit markets and it aids the self-selection of informed traders on lit markets and uniformed traders in the dark markets.
- previous studies estimate that an acceptable threshold of dark trading that could take place before market quality and price formation are impaired could be in the region of 10-15% of total trading at the market level, possibly up to 40% if dark trading is limited to large blocks, and ranging from 9–30% depending on the liquidity at the stock level. However, these empirical studies have been conducted based on data in large financial markets and further empirical analysis may need to be undertaken to tailor these thresholds to the Brazilian market.
- To be successful, the pool of block liquidity needs to be sufficiently large to attract order low. To the extent that OTC trading could co-exist with on-venue dark solutions, one option could be to set a very high trade size threshold for OTC block trading and a slightly lower threshold for on-venue block trading. Another option would be to allow only block trading in relatively illiquid stocks to be traded OTC, where there is too little trading for dark pools to be viable.

The calibration of the minimum size for an order to be classified as a block trade will have important implications on market functioning. There is a trade-off between limiting the amount of dark trading, to protect market quality, while ensuring there is sufficient liquidity for traders seeking to trade large orders. The number should be determined based on an empirical assessment of the future demand for block trading and the expected distribution of trade sizes in Brazil.

Clearing of block trades

In Brazil, all equity trades (including large orders) are currently executed on B3's exchange and are therefore cleared with B3's CCP. This means that CVM's proposal to permit block trading in OTC markets poses questions as to the optimal post-trading arrangement for block trades. We understand that CVM is considering to propose to exempt OTC block trades from being required to be cleared by a CCP.

In assessing CVM's proposal for clearing of block trades, it is useful to consider the rationale for CCP clearing, which has been well documented in the literature.

The benefits of CCP clearing to individual investors include: risk mitigation, greater capital efficiency, lower overall costs of trading, post-trade anonymity and reduced administrative requirements.

Our analysis shows that there are investor-level benefits from CCP clearing in the case of OTC agency trading (given the anonymity under which trades are executed) but that these may be less relevant for principal trading. This is because, in the case of a principal trade the market participants, such as fund managers, may have trusted long-established brokerage relationships that allow both sides of the trade to assess or already know the counterparty risk in a transaction. Furthermore, the only parties to the trade are the broker and the investor which means that the investor is not concerned about the counterparty risk of anonymous third-party market participants matching on the other side of the trade.

However, under both types of OTC trading (agency and principal trading), there are still important wider market benefits from CCP clearing that comprise:

- **monitoring and efficiency**—CCPs have the capacity to monitor and assess counterparty risks through normal course of operations across the market. This is because CCPs observe the net exposures of market participants across all trade activity, including instance of defaults as they occur. CCPs can respond to this information by adjusting margin requirements to account for varying counterparty risk. In the absence of a CCP, information counterparty risk is not centralised or generated based on the widest possible information; rather, each market participant may incur costs to assess this individually. Given a higher propensity for asymmetric information on the true counterparty risk of market participants, there are likely to be inefficient outcomes in relation to areas such as assessment of the risk of a trade and the setting of margin requirements;
- **resilience**—in the absence of a CCP, both sides of the trade are exposed to the counterparty risk—i.e. the failure of the one side to honour the terms of an agreed trade. In cases where a substantial volume of shares are transacted, there are systemic risks that could lead to contagion between intermediaries. CCPs are better positioned to absorb losses than individual market participants. During periods of financial distress, CCPs can act as a backstop/insurance for trades and to maintain confidence in transacting securities.

Our conclusion is that since not all market participants may be incentivised to the same degree to CCP-clear an OTC trade, a CCP-clearing obligation could be appropriate if CVM wants the *wider market* to continue to benefit from CCP clearing.

Best execution

Best execution refers to the obligation of an investment services firm (i.e. fund managers and/or brokers) to ensure the best possible result for clients, taking into account price, costs, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of the order.

It is a fundamental component in the regulation of financial services, as it contributes to ensuring investor protection (which is particularly important for

retail investors) and the integrity of the price formation process and it promotes competition among trading venues.

CVM is proposing to change the current best execution rules by introducing specific requirements for retail investors, based on the total cost of the trade (also referred to as 'total consideration').

We identify two main areas of CVM's proposal that could lead to unintended consequences: the strict 'total consideration' approach for retail orders, and the uncertainty regarding what is included and/or excluded under execution costs.

Our analysis finds that:

- a best execution regime solely based on price and costs may be too restrictive for more sophisticated investors, who may value speed and other factors more in some instances;
- other factors such as speed and certainty of execution may be more relevant than net price under a scenario of financial distress;
- if total consideration includes broker fees, brokers would then be able to lower their fees for a given venue to direct order flow there and thereby distort competition between venues;
- if there are multiple trading venues, each connected to their own CCP, a trader can potentially benefit from netting if they concentrate all trading activity on one venue.

Based on our analysis of CVM's proposal, we conclude that, while price and cost are likely to be the most relevant factors for orders from retail investors, it is important that best execution rules maintain a well-rounded view, taking into account other factors as well, where relevant.

1 Introduction

Comissão de Valores Mobiliários (CVM) has launched a public consultation with amendments to the regulatory regime to facilitate the introduction of competition at the trading level in the Brazilian financial market.[1]

B3—Brasil Bolsa Balcão S.A has commissioned Oxera to undertake independent economic analysis on two important topics covered in CVM's proposal:

- block trades;
- best execution policies, particularly for retail investors.

The objective of this report is to inform the debate on the design of equity trading markets in Brazil—in particular, to assess the impact on market outcomes such as costs of trading and price formation from changing the rules relating to block trades and best execution.

The report is structured as follows.

- section 2 provides a short overview of the equity market in Brazil and the key characteristics of the market.
- section 3 assesses the options for facilitating block trading in equity markets and the expected impact on market functioning.
- section 4 assesses CVM's proposal for block trades.
- section 5 assesses the impact on market functioning of CVM's proposal to exempt OTC trades from central clearing.
- section 6 evaluates the impact on market functioning of CVM's proposed best execution policy for retail investors.

[1] CVM (2020), 'PUBLIC HEARING NOTICE SDM No. 9/19'.

2 Key characteristics of the Brazilian equity market

2.1 Introduction

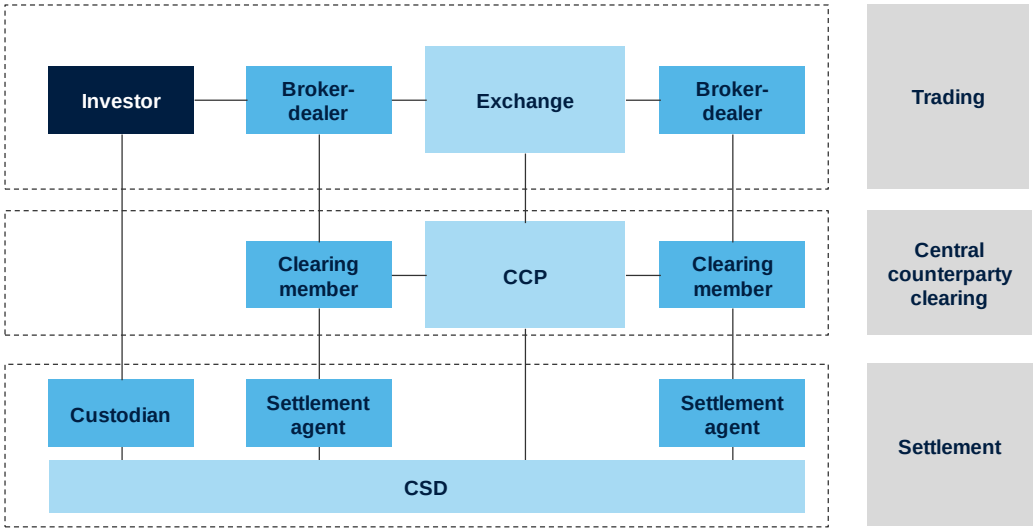
To assess the impact of changing the regulatory regime for trading and post-trading services, it is necessary to consider the current characteristics and structure of the market.

2.2 Market structure

The value chain for equity trading consists of three core elements: trading, clearing and settlement. At each level of the value chain there are a range of participants.

Figure 2.1 shows a stylised example of the value chain for equity trading. The remainder of this section provides a brief overview of each level.

Figure 2.1 Value chain for trading in equities



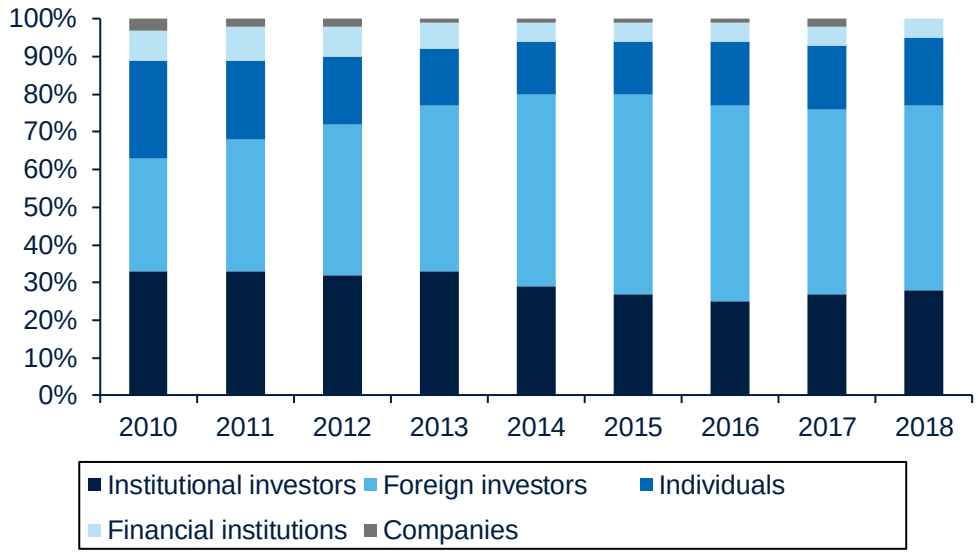
Note: CCP refers to central clearing counterparty; CSD refers to central securities depository.

Source: Oxera.

2.2.1 Investors

A mix of types of investor participate in the Brazilian equity market. Figure 2.2 shows the breakdown of average daily traded value by different investor types. In 2018, the largest identified group of investors was foreign investors; the share of foreign investors grew from 30% of the value of equity trading in 2010 to 49% in 2018. The next largest group was institutional investors, who accounted for between 20% and 30% of annual trading activity over the period 2010–18. The share of activity driven by individual investors fell from 26% in 2010 to 18% in 2018. The remaining trading activity was attributable to financial institutions, with a very small proportion linked to non-financial companies.

Figure 2.2 Average daily value traded by type of investor (percentage of total)



Note: Data includes cash equities and derivatives on single-stocks.

Source: B3, 'Investor Relations: institutional presentation - 3Q19', https://ir.b3.com.br/enu/4380/B3%20-%20Apresentao%20Jan-20%20EN.pdf

The amount of high-frequency trading and algorithmic trading in Brazilian equities has been fairly stable in recent years and is generally not as prevalent as in other financial centres.[2]

2.2.2 Broker-dealers

In order to buy or sell a Brazilian-listed stock, investors send a trade instruction to a broker. The broker will then implement the client's trade instruction by sending an order to the exchange. Depending on the order size, the broker may split the client order into several smaller orders on the exchange. Once an order results in an executed trade, the broker will inform the client's custodian of the trade. Brokers may also undertake other activities such as research on listed companies.

There are around 70 brokers active in the Brazilian equities market. The largest brokers in terms of gross value traded are XP Inc and UBS.[3] In some cases brokers may act as a market maker in a given stock, trading on their own account via the lit order book to promote liquidity.[4] Table 2.1 lists the market makers currently accredited by B3.

[2] See, for example, Ramos and Perlin (2019), which analyses the impact of algorithmic trading in the Brazilian market using 'messages per dollar traded volume' as a proxy for high-frequency trading activity. The paper reports a median value of R$530 per message sent. See Ramos, H.R. and Perlin, M.S. (2019), 'Liquidity and Algorithmic Trading in Brazil', *SSRN Electronic Journal*, July.
[3] Lucchesi, C., Andrade, V. and Marques, F. (2029), 'IPO for Brazil's Biggest Broker to Target $1.5 Billion', Bloomberg, 26 November, https://www.bloomberg.com/news/articles/2019-11-26/ipo-for-brazil-s-biggest-broker-is-said-to-target-1-5-billion
[4] B3 website, 'About the market maker', http://www.b3.com.br/en_us/products-and-services/trading/market-maker/join-in/about-the-market-maker.htm

Table 2.1 Accredited market makers

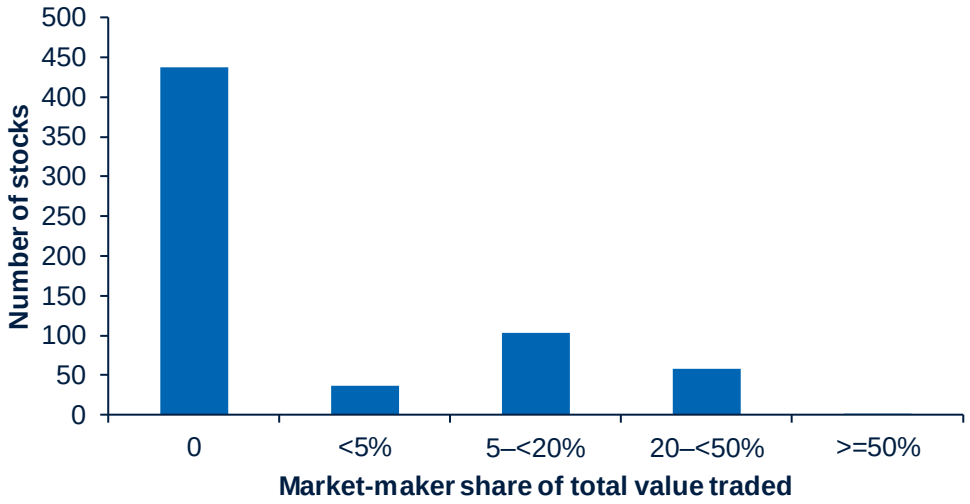
Banco Fator	Banco Santander
Bradesco	Brasil Plural
BTG Pactual	Caieiras Fundo
Credit Suisse	Credit Suisse (Brasil)
Headlands	Itaú
XP Investimentos	

Note: Accreditation is provided on a stock-level basis.

Source: B3 website, 'Market maker', http://www.b3.com.br/en_us/products-and-services/trading/market-maker/equities/

Market-making activity is limited in Brazil. Figure 2.3 shows that most stocks traded across 2018 and 2019 did not have an active market maker.

Figure 2.3 Histogram of market-making activity as a proportion of total trading activity, January 2018–December 2019



Note: Data covers all market makers (accredited and non-accredited).

Source: Oxera analysis of B3 data.

2.2.3 Exchanges

The main provider of trading and post-trading services for Brazilian equities is Brasil Bolsa Bolcão (B3). Other market participants have announced an intention to offer trading in Brazilian equities.

Off-exchange (OTC) trading of listed securities is currently prohibited in Brazil.

Some Brazilian companies can also be traded in the USA using American depositary receipts (ADRs).

2.2.4 Clearing and settlement

B3 owns the central clearing counterparty (CCP) and the central securities depository (CSD) in Brazil. The CCP has 69 clearing members.[5]

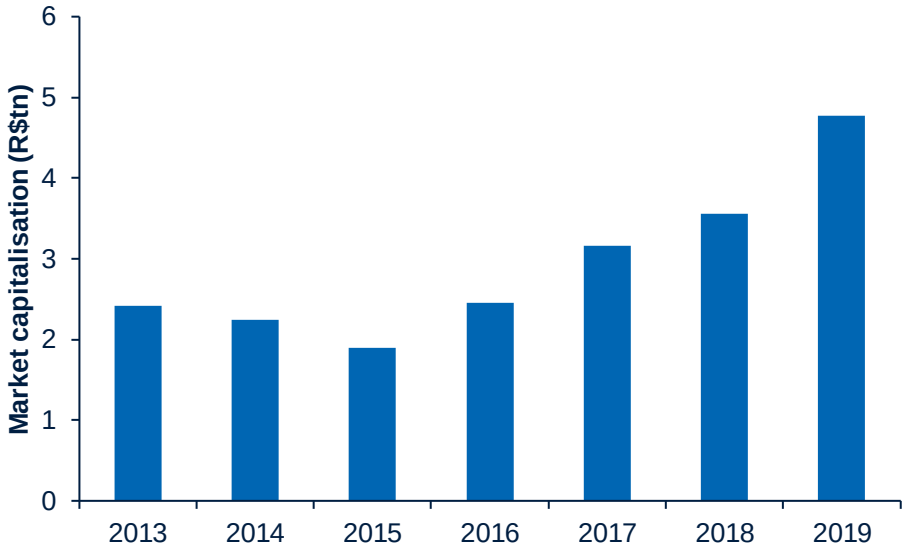
[5] B3, 'Investor Relations: institutional presentation - 3Q19', https://ir.b3.com.br/enu/4380/B3%20-%20Apresentao%20Jan-20%20EN.pdf

2.3 Scale of the market

2.3.1 Size of the Brazilian equity market

Brazil's equity market has grown considerably in value since the 2014 economic crisis, with total equity market capitalisation increasing by around three times since 2015 (in nominal terms). This is shown in the figure below.

Figure 2.4 Market capitalisation, 2013–19



Note: Market capitalisation is defined as the share price multiplied by the number of shares outstanding. Data covers all companies listed on B3 and is taken for the last trading day in December.

Source: B3.

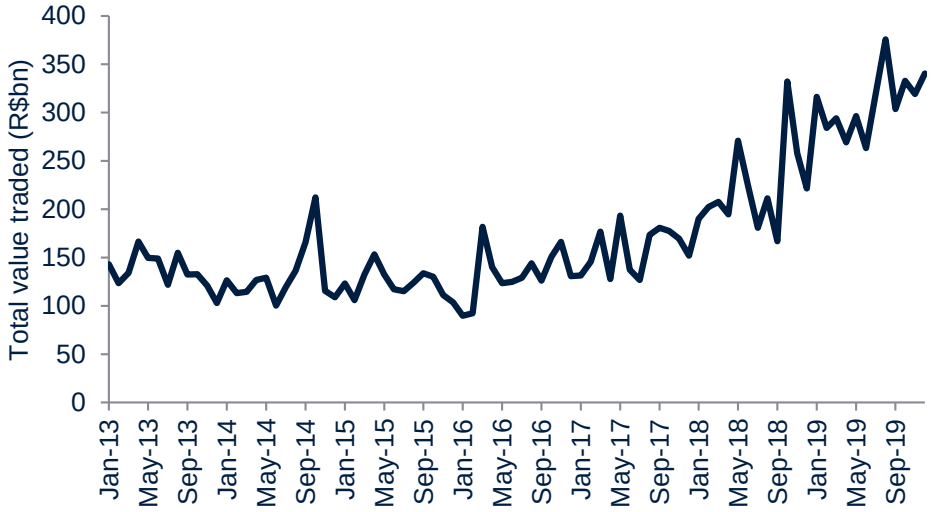
The overall capitalisation measure in 2019 lists Brazil (€1.1tn) at a smaller size to Germany (€1.8tn) but ahead of some of the other major European economies such as Spain (€0.7tn) and Italy (€0.6tn). Other European financial centres in France (€2.6tn) and the UK (€4.5tn) remain significantly larger.[6]

As at 2018, Brazil's market capitalisation as a percentage of GDP (49%) was broadly comparable with Italy and Germany (32% and 44% respectively), but considerably lower than the UK and USA (117% and 148% respectively).

The value of trading in the Brazilian equity market has also increased substantially, particularly over the last three years (see Figure 2.5).

[6] B3 and LSE data converted to euros using the 2019 average ECB rate. Data for Germany, Spain, Italy, France and the UK is taken from stock exchange factbooks. Data for Spain is taken from WFE.

Figure 2.5 Monthly value of share trading, January 2013–December 2019

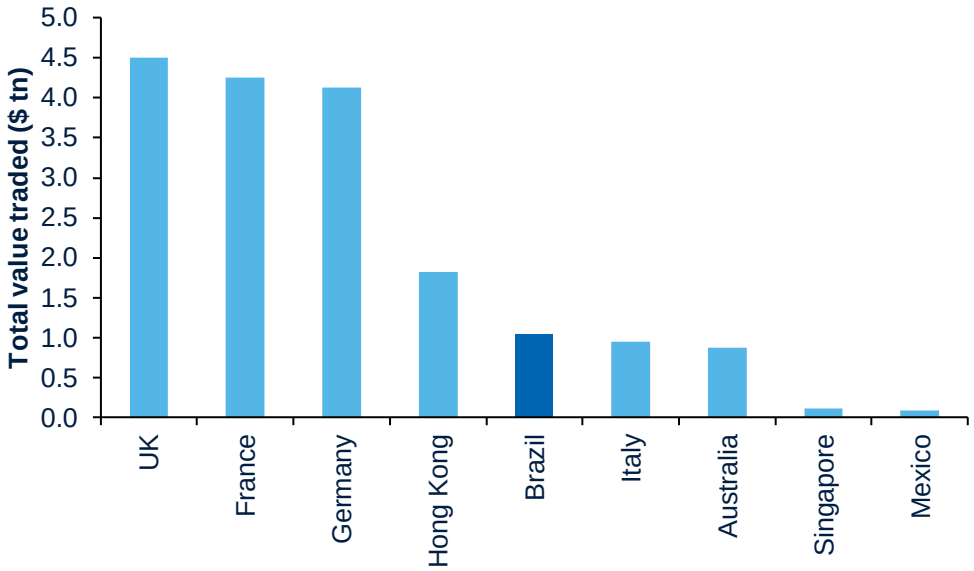


Note: The value of share trading is the total number of shares traded multiplied by their respective prices.

Source: B3.

Figure 2.6 shows how the value of equity trading activity in Brazil compares to other financial centres. The total value of electronic order book (EOB) share trading on B3 was comparable to trading in Australian and Italian equities. However, trading activity on B3 in 2019 remained below some of the larger global stock exchanges such as Hong Kong and was significantly lower than the value of trading in UK, French and German equities.[7]

Figure 2.6 Annual value of domestic company share trading, 2019



Note: The value of share trading is the total number of shares traded multiplied by their respective prices. Data for the UK, France, Italy and Germany taken from Thomson Reuters

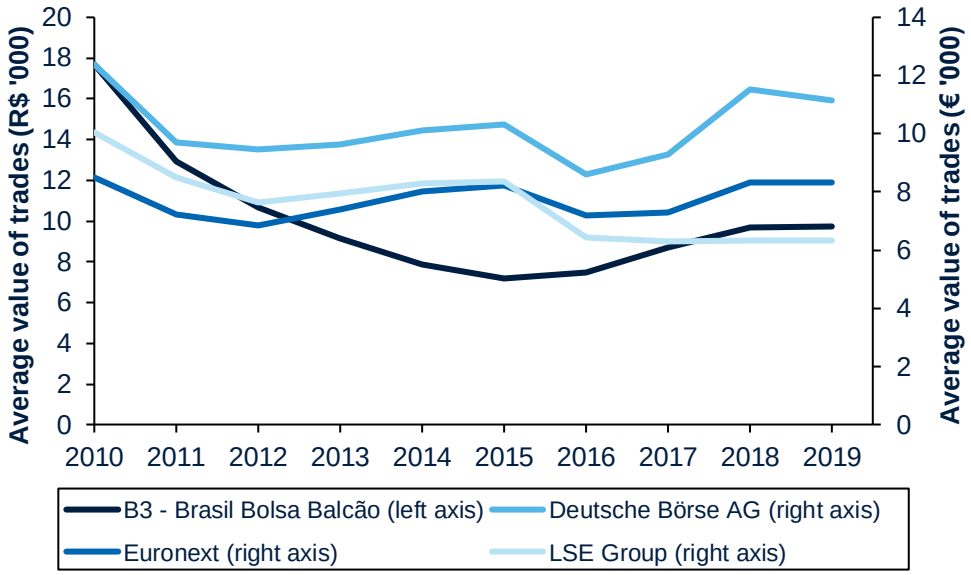
[7] Based on 2019 data. As equity trading in the UK, France, Germany and Australia is fragmentated between multiple trading venues, the data for these countries covers trading across multiple venues, not just the primary exchange.

Market Share Reporter and includes all trading of companies domiciled in the respective country. Data is annualised based on monthly data from January to July 2019. Data for Australia is taken from Fidessa Fragulator and covers trading in Australian equities on ASX and Chi-X in 2019. Data for Hong Kong, Brazil, Singapore and Mexico is taken from respective stock exchanges using WFE data. WFE data includes EOB transactions in domestic companies only. Data for the UK, France, Italy and Germany has been converted from euros to US dollars using the average ECB spot rates for 2019. Data for Australia has been converted from Australian dollars using the average RBA spot rates for 2019.

Source: WFE, Thomson Reuters Market Share Reporter, Fidessa Fragulator.

The average value of EOB trades on B3 has fallen considerably since 2010 (see Figure 2.7). In 2019, the average trade value on B3 was around 30–35% of the average trade value executed on the major European exchange operators.

Figure 2.7 Average value of trades via the electronic order book



Note: Average value of trades is calculated as value of share trading divided by the number of trades executed. Data includes EOB trades only.

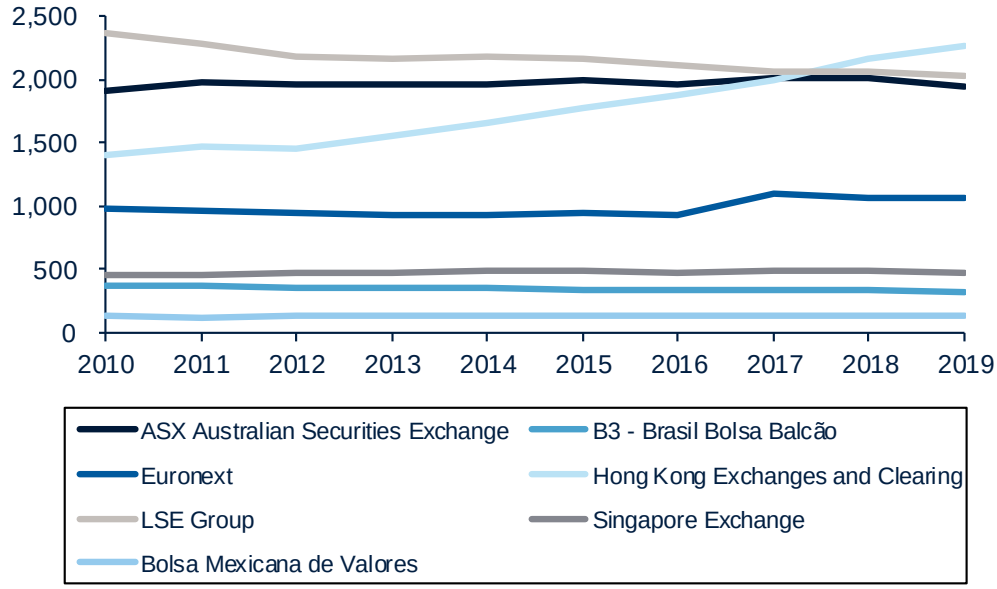
Source: WFE.

WFE data shows that the number of equity trades in Brazil has increased over the same period, while overall value traded remained broadly constant between 2010 and 2016. This is consistent with feedback from market participants indicating that a larger share of parent orders are being split up into smaller individual trades, supported by the increased electronification of trading.

2.3.2 Listed companies

Despite the growing trading volumes, the number of listed companies in Brazil is relatively low, at approximately 15% of the number on ASX and LSEG. Figure 2.8 also shows that the number of domestically listed companies in Brazil has decreased steadily since 2010.

Figure 2.8 Number of domestically listed companies, 2010–19



Note: WFE defines a listed domestic company as one that is either i) incorporated in the same country as the exchange location; or ii) incorporated elsewhere but listed only on the exchange in question. LSE Group includes the London Stock Exchange and Borsa Italiana.

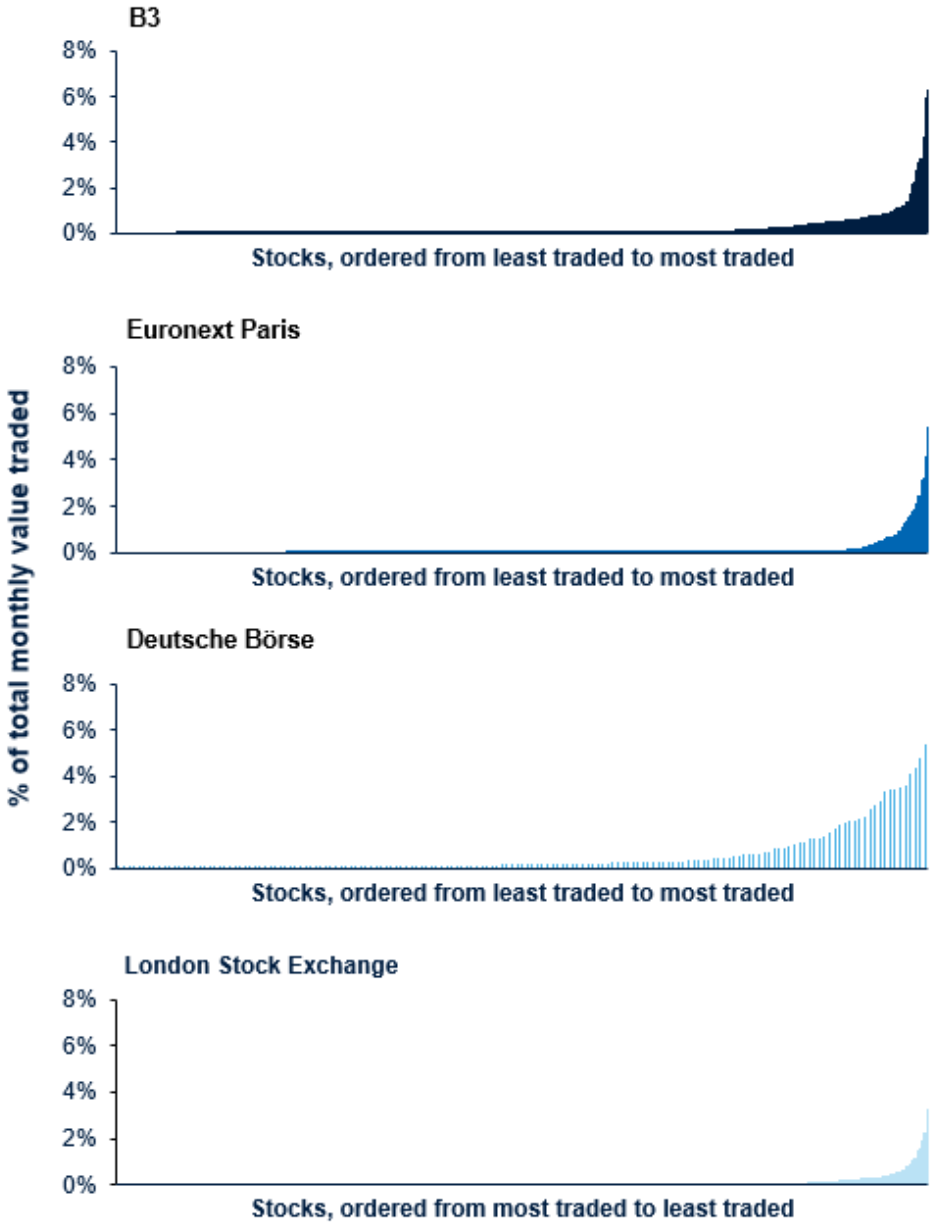
Source: WFE.

2.3.3 Concentration of trading volumes

Figure 2.9 shows the total value of trading of stocks listed on B3 (Panel A) in January 2020, and equivalent data for stocks listed on Euronext Paris (Panel B), Deutsche Börse (Panel C) and London Stock Exchange (Panel D) for comparison with both larger and equivalent sizes of equity markets.

The data shows that trading activity in Brazil is concentrated in a small number of stocks—the top 20 stocks in terms of trading activity accounted for 50% of the total trading value in January 2020. The top 20 stocks traded on Euronext Paris and Deutsche Börse accounted for similar shares of total trading value (56% and 60% respectively) in the same period. The top 20 stocks on London Stock Exchange accounted for 36% of total trading value.

Figure 2.9 Distribution of total value traded, January 2020



Note: Euronext Paris data includes all stocks with a Market of Reference as Euronext Paris. Deutsche Börse data includes all stocks listed in the DAX, MDAX and SDAX. London Stock Exchange data includes all stocks listed on the Main Market.

Source: B3, Euronext Cash Market data, Deutsche Börse cash market data, London Stock Exchange Trading Summary Factsheet.

2.4 Implications for the analysis in this report

The scale of the Brazilian equity market is an important consideration when analysing the potential impact of regulatory changes. Trade execution is subject to economies of scale and network effects, which means that there are likely to be minimum scale thresholds for certain venues and trading mechanisms to be able to function properly. For example, if new trading venues or trading mechanisms were not sufficiently large-scale, it could result in inefficient duplication of costs and/or fragmentation of liquidity.

The characteristics analysed above place the Brazilian equity market in approximately the same position as that of Australia, in terms of market size and number of trading venues and trading activity, and in a similar position to other economies (such as Germany and Italy) with respect to indicators such as market capitalisation as a proportion of GDP.

In terms of size of the main exchange, Brazil is similar to a number of individual European exchanges where competition has been introduced and fragmentation has taken place (e.g. Euronext Paris), and exchanges in smaller economies (e.g. ASX). The market structure in Brazil is likely to evolve once a new trading venue enters the equity market.

In terms of the overall equity market, trading activity is much lower in Brazil than in the USA, the UK, France and Germany. Market activity is concentrated on the largest companies.

The remainder of this report draws insights from other financial markets to inform the policy design of the Brazilian equity markets. While this is informative, it is important to take into account the different characteristics of the Brazilian market, and make the necessary adjustments, where required, before formulating and implementing policy proposals.

3 Block trading

3.1 Introduction

CVM is proposing to change the existing requirement for equity trading in Brazil to be conducted on an exchange by allowing large blocks of trades to be executed in OTC markets.

In order to assess the potential impact of this change in market design, this section provides a description of the current regulatory framework and market practices for block trading in Brazil, as well as in other financial centres. The following section then evaluates different policy options for block trading from a market design perspective.

The remainder of this section is structured as follows:

- section 3.2 provides a brief conceptual overview of block trading;
- section 3.3 outlines the current regulatory framework for block trading in Brazil;
- section 3.4 discusses potential trading mechanisms that can be used for block trading;
- section 3.5 describes how block trading occurs in Brazil and other financial centres.

3.2 What is block trading?

There is no precise and universal definition. In general, a block trade is an order for the sale or purchase of a relatively large number of shares of a given stock.

In Brazil, the regulation defines a block trade as a substantial block of shares or a quantity of shares or rights substantially higher than the average number traded during the last 30 days of trading, even if the size of the block does not represent the transfer of a company's control.[8]

In Europe, the term typically refers to orders that are large in scale (LIS) compared with the normal market size, as defined by EU regulation. The minimum size for an order to qualify as LIS is determined at the instrument level, with more liquid instruments having a higher threshold, depending on the average daily turnover of shares admitted to trading on a regulated market for that instrument. The minimum size thresholds range from €15k for instruments with an average daily turnover of less than €50k, to €400k for instruments with an average daily turnover of between €25m and €50m. For less liquid instruments, an order must be at least 10% of the average daily turnover for that instrument to qualify as LIS.[9]

Block trading allows a fund to buy or sell a large block of shares and portfolio managers to buy or sell a large quantity of securities executed as a single trade (which may generate cost savings and operational efficiencies) and then allocate them to multiple clients.

[8] Regulations of interest to foreign investors, CVM Instruction 168, http://www.cvm.gov.br/export/sites/cvm/subportal_ingles/menu/investors/anexos/CVM-Instruction-168.pdf
[9] See Article 5 of the EU Markets in Financial Instruments Regulation (MiFIR), EU Regulation (2017/587), Annex II.

There may be challenges when attempting to execute a block trade:[10]

- first, the trader needs to find a counterparty with which to trade the block (the latent demand problem);
- second, the trader risks exposing orders to other possible traders on the same side of the block order who may front-run[11] the block, and/or traders on the other side of the block who may delay order(s) to gain at the expense of the block trade (the order exposure problem);
- third, liquidity providers will not want to be the first ones to provide liquidity to the block if there is a risk that the price will move against them, i.e. if more orders in the same direction will follow (the price discrimination problem);
- finally, liquidity suppliers may be reluctant to trade with the block trader if they consider that the block trader is better informed (the asymmetric information problem).

Large trades often have a significant impact on prices, which is why traders need to be careful in how they reveal their orders to minimise transaction costs and, in particular, price impact costs (see Box 3.1).

[10] See, chapter 15 in Harris, L. (2003), *Trading and Exchanges: Market Microstructure for Practitioners*, Oxford University Press.
[11] Front-running is a trading strategy of anticipating market orders (or marketable limit orders with price impact) from an investor, buying up liquidity using market orders and posting it at a less favourable price using limit orders. For more detail see, for example, Hens, T., Lensberg, T. and Schenk-Hoppé, K. (2017), 'Front-Running and Market Quality: An Evolutionary Perspective on High Frequency Trading', Swiss Finance Institute Research Paper No. 17-10.

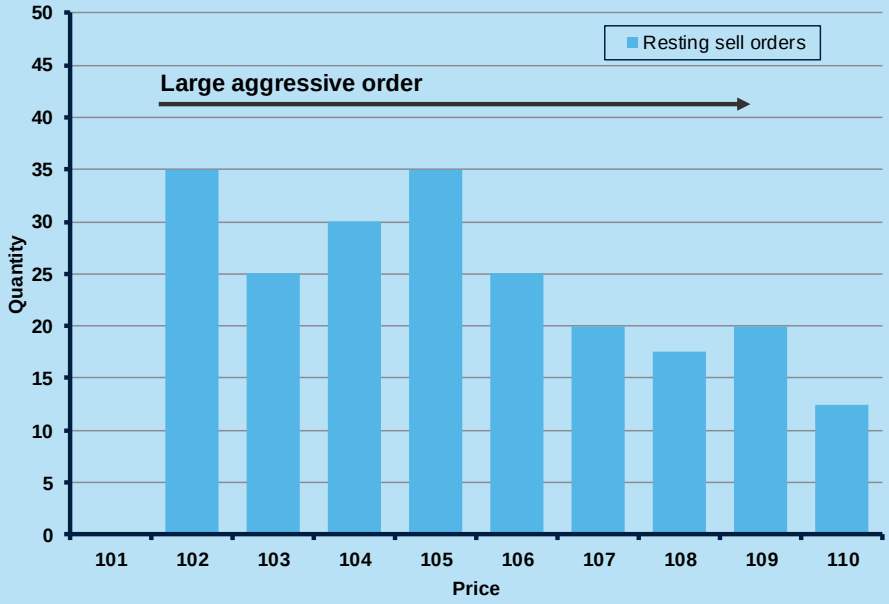
Box 3.1 Block trading and price impact

Price impact refers to the positive correlation between the direction of a trader's order and subsequent price change, such as a buy trade tending to push up the price of a stock.

Temporary price impacts are associated with short-term imbalances in demand and supply, that reverse shortly after the trade is completed. For a large trade posted to a lit order book, temporary price impacts can happen because:

- a large buy (sell) order placed at once will lift (hit) most of the currently resting sell (buy) orders, causing a liquidity imbalance and leading to a less favourable final execution price (see the figure below);
- a succession of smaller orders can allow other market participants to observe the activity of the block trader and alter their actions accordingly. This may involve front-running from high-frequency traders (HFTs) or other participants identifying patterns caused by regular orders on the same side of the order book over a period of time.

Price impact caused by liquidity imbalance



Note: In this scenario, a large buy order (e.g. quantity of 220) will lift the current best offer (102) but will continue to lift offers further away from the best offer until it is filled (at offer price 110), leading to a final average execution price that is much higher than the mid-price.

Source: Oxera.

Permanent price impact represents the effect of new information that is incorporated in the price of the stock as a result of a trade. The resulting price change effectively gives rise to a new equilibrium price. If other traders believe that a block trade is likely to be information-motivated then they are likely to update their beliefs regarding the value of the stock as a result of the trade.

As block trades may generally have predictable price effects, information as to the very existence of a trade can be valuable. The success of the block trader, therefore, depends on how little information the trader allows to leak to the market. In other words, the trading process itself can generate information effects on stock prices.

Traders need to balance the risks and costs that stem from trading a large order in the market either rapidly or slowly. Trading rapidly reduces the execution price risk, but will result in paying a liquidity premium that is increasing with the size of the trade(s). Trading slowly reduces liquidity costs (because the sizes of the trades are smaller), but the average execution price

of the order is more volatile and more exposed to the adverse price impact of the trades.

3.3 Current regulatory framework in Brazil and CVM proposal

Under the current regulatory framework in Brazil, exchanges are required to adopt special procedures for the trading of large blocks.[12] These procedures vary by size of the trade (see Table 3.1 for a summary) and typically involve the exchange running an auction to facilitate the trade.

It is also possible for large block orders to be split into smaller 'child' orders that are then submitted to the continuous central limit order book (CLOB) trading session. Another option is to submit iceberg orders, where only part of the size of the order is visible in the order book, which is also allowed by B3.[13]

Table 3.1 CVM special procedures for block trades

Size of trade relative to ADV	**Size of trade relative to free-float**				
	% of ordinary shares		% of preferred shares		Procedure
< 5	and	< 0.5%	or	< 1%	Register transaction immediately
5–10	or	0.5–0.99%			Immediate auction
< 10			and	1–2.99%	Auction, with notification 15 minutes prior
> 10	or	1–2.99%	or	3–4.99%	Auction, with notification 1 hour prior
Any		3–6%	or	5–20%	Auction, with notification 24 hours prior
Any		> 6%	or	> 20%	Auction, with notification 48 hours prior

Note: Size of trade relative to ADV refers to the total number of shares being traded relative to the average number of shares traded in the previous 30 trading sessions. Size of trade relative to free-float refers to the percentage of total shares within that class. Choice of procedure is determined by a combination of ADV and free-float thresholds. For example, a trade that is either larger than 10 times ADV or includes 1–2.99% of all ordinary shares or 3–4.99% of all preferred shares would trigger an auction, with notification 1 hour prior.

Source: CVM Instruction 168, http://www.cvm.gov.br/export/sites/cvm/subportal_ingles/menu/investors/anexos/CVM-Instruction-168.pdf

Following some concerns from market participants about block trading in Brazil, CVM is proposing changes to the regulatory regime with the aim of helping to facilitate the trading of large blocks, without compromising the functioning of the equity market as a whole.

The current CVM proposal is to exempt large blocks (with the exact thresholds still to be defined) from the requirement to be traded on-exchange.[14]

[12] As explained above, under CVM Instruction 168, large blocks are defined as 'either a substantial block of shares or a quantity of shares or rights substantially higher than the average that was traded during the last 30 trading days, even if not representing the transfer of the company's control'.
[13] B3 (2019), 'B3's Trading Procedures Manual', December, http://www.b3.com.br/en_us/regulation/regulatory-framework/operational/
[14] More specifically, the draft proposal would allow block trades of securities in the Brazilian market 'by means of exchange or OTC markets' special procedures or exclusively on the organized OTC market through the registration of previously executed trades.'

3.4 Trading mechanisms for large block trades: what are the options for investors?

While the continuous CLOB model works well for most trades, in the case of large volume trades, or block trades, this process can sometimes falter if other traders think the large trade is information-motivated. As trade size may act as a signal of information-based trading, block traders have sought quantity-concealing alternatives to the continuous order book process.

As discussed above, trading large blocks in lit markets can be challenging, especially as trade sizes have become much smaller (in Brazil, and more generally in other financial centres), and the order book near the best quotes tends to be thin. On a typical trading day it is likely to be the case that only a few investors will be willing to buy at the best price, while others would require a lower price if they are to trade, and this is irrespective of the order size. Algorithms can slice and dice large orders and distribute them across the different trading platforms to minimise implicit trading costs and adverse price movements or can spread the trading of the smaller order over a trading window. These algorithms, however, can be exploited by HFTs (after being detected by pattern recognition algorithms) front-running or back-running them.[15]

Over time, financial markets around the world have evolved to provide better solutions for institutional investors seeking to trade large blocks. Markets are still evolving under pressure from investors and fund management firms, increasing competition among different infrastructure providers.

Trading mechanisms that have developed in different financial centres that can be used to trade large blocks include, but are not limited to, trading the large block:

- on a CLOB as a 'hidden order';
- over the counter with a broker-dealer firm instead of an exchange;
- in a dark pool, with no pre-trade transparency rules and at a reference price linked to a primary CLOB;
- in an auction—an opening, closing, or ad hoc auction; some exchanges also offer midday auctions.

3.4.1 Hidden orders

A hidden order is a limit order submitted to visible order books, but for which traders do not have to fully display the quantity they are willing to transact. These orders hide among the visible liquidity that is offered in the lit market.[16] Visible orders at any particular limit price typically have priority over hidden orders at the same limit price. This is to reflect the contribution of visible orders to price formation, which is to the benefit of the market as a whole. Hidden orders may be either fully or partially undisclosed to the order book.

Iceberg orders represent a category of partially hidden orders because the peak (i.e. the visible part of the iceberg order) is introduced in the order book

[15] A back-runner is a type of trader who learns from historical order-flow information and competes with investors trading on fundamental information in a subsequent period. For more detail see, for example, Yang, L. and Zhu, H. (2019), 'Back-running: seeking and hiding fundamental information in order flows', *The Review of Financial Studies*, **33**:4, pp. 1484–1533.
[16] See, for example, Desgryse, H., Tombeur, G. and Wuyts, H. (2015), 'Two shades of opacity: hidden orders versus dark trading', working paper, https://ssrn.com/abstract=2669447

while the residual remains hidden.[17] The undisclosed part of the hidden order is not included in the calculation of the best bid and offer and mid-price, which derives from visible orders.

Investors may use hidden limit orders to minimise the risk of exposing their orders (for example, the risk of being undercut, adversely selected, picked off by faster traders). This risk increases with the size of the order, and is therefore particularly acute for large blocks.

Hidden orders are now much less widely used. In Europe, the use of hidden orders appears to have significantly fallen over the last decade.[18] Feedback from traders suggests that hidden orders can be useful if they are limited in size and number but the problem is the time it often takes to complete an order. Hidden orders could also be detected by HFTs who use algorithms to fish for hidden limit orders in the book. In Europe, the more sophisticated buy- and sell-side players tend not to favour hidden orders due to historical performance in terms of price reversion statistics.

3.4.2 Over the counter (OTC)

Prior to electronification of equity markets, the traditional approach to trading large blocks was to use a broker-dealer firm (in the so-called 'upstairs market'[19]) instead of trading at an exchange.

In the upstairs market, participants would rely on block dealers and/or block brokers to fill their orders. Block dealers would fill large client orders by trading on their own account and subsequently trying to unwind the position, either by identifying other large traders or by breaking up the block into smaller trades that they would then be able to post in the CLOB. Block brokers act on an agency basis, helping to match their clients' block orders with other large liquidity suppliers. Liquidity suppliers rely on block brokers who arrange trades to determine whether the party initiating the trade is informed and honest about the trade size.

Block brokers rely heavily on reputation. Block brokers who front-run block orders risk acquiring a reputation for being untrustworthy and would therefore lose the opportunity to participate in future blocks.[20]

Upstairs markets allowed traders (reluctant to submit large limit orders and thus offer free options to the market) to participate selectively in trades screened by brokers who have strong reputational reasons to avoid trades that may originate from traders with private information. Thus, it could be argued that the upstairs market permitted transactions that would otherwise not have occurred in lit markets—this was before the introduction of other 'hidden'

[17] An iceberg order is specified by its mandatory limit, its overall volume and a peak volume. The peak is the visible part of the iceberg order and is introduced in the order book with the original time stamp of the iceberg according to price/time priority. As soon as the disclosed volume of an iceberg has received a compete fill and a hidden volume is still available, a new peak is entered into the book with a new time stamp. The new peak behaves in an identical manner to a conventional limit order. See Esser, A. and Mobch, B. (2007), 'The navigation of an iceberg: the optimal use of hidden orders', *Finance Research Letters*, **4**:2, pp. 8–81.
[18] See, for example, Comerton-Forde, C. (2018), 'Shedding light on dark trading in Europe', https://cepr.org/sites/default/files/Comerton-Forde%2C%20Carole%20paper.pdf
[19] The upstairs market acquired its name because its traders arranged block trades at trading desks in the offices at which they worked. When traders used to have offices that were in the NYSE building or across the street, these offices were generally above the street level on which the trading floor was located. See, for example, Madhavan, A. and Cheng, M. (1997), 'In Search of Liquidity: Block Trades in the Upstairs and Downstairs Markets', *The Review of Financial Studies*, **10**:1, pp. 175–203, www.jstor.org/stable/2962260
[20] For a more detailed discussion on this point, see chapter 15 in Harris, L. (2003), *Trading and Exchanges: Market Microstructure for Practitioners*, Oxford University Press.

trading mechanisms, such as dark pools or conditional orders (discussed in more detail below).

Research in the market microstructure literature suggests that the upstairs market worked as a signalling device: traders who were placing their orders there, and showing their trading intentions, were assumed to be trading for reasons other than private information.[21]

Another option was to match the blocks after hours—i.e. once the exchange trading session was over, at a price that could not deviate (much) from the closing price of the day. On many occasions, these trades were pre-arranged between buyers and sellers (also called 'applications').

3.4.3 Dark pools

Dark pools are equity trading venues that operate without pre-trade transparency. Dark pools do not publicly display orders prior to execution, and there is typically also less detailed information about the order after an order has been executed (compared with on-exchange orders on the lit order book).

In many financial markets, including in Europe and the USA, dark pools were created to offer certain market participants, particularly institutional investors, the ability to minimise transaction costs when executing large trades by completing their trades without prematurely revealing the full extent of their trading intentions to the wider market.[22]

Some dark pools focus on bringing together buyers and sellers with large orders in the same stock, anonymously, and to facilitate trading between them (specialised size discovery mechanisms). Other dark pools also allow the trading of smaller-sized orders. Market practice varies across financial markets.

Trading in dark pools is not the same as hiding in lit markets. Hidden limit orders (described above) can be detected since HFTs can use their algorithms to fish for hidden limit orders in the book.

Trading in dark pools is not necessarily free of costs or risks. Dark pools offer opacity, but execution is not guaranteed. Many dark pools are also populated by HFTs nowadays. One possible solution would be to exclude HFTs from the dark pool, even all sell-side traders, so that only buy-side institutions could send their orders to the pool to match with those of other institutional investors.

The risks borne by the buy side when executing a block trade are the risk of non-execution and of being adversely selected. Adverse selection risk can be reduced by making the platform non-anonymous, and by requiring participants to place orders that are not liquidity-motivated.

A popular innovation is the conditional order. Conditional orders allow portfolio managers to search for hidden block liquidity without fully committing to trade, as they allow the trader to represent larger orders in multiple venues without the risk of being simultaneously executed in multiple trading venues. [23] Conditional orders are non-binding, which means that when an order matches

[21] See, for example, Burdett, K. and O'Hara, M. (1987), 'Building Blocks: An Introduction to Block Trading', *Journal of Banking and Finance*, **11**, pp. 193–212; and Seppi, D. (1990), 'Equilibrium Block Trading and Asymmetric Information', *Journal of Finance*, **45**, pp. 73–94.
[22] See, for example, SEC (2015), 'Shedding Light on Dark Pools'.
[23] Conditional orders are becoming a popular method for buy-side traders to access a consolidated pool of liquidity for block trading. See: TABB Group (2019), 'US Institutional Equity Trading 2019 Liquidity: Blocks, Algos, Analytics and Impact', Research Paper, https://research.tabbgroup.com/report/v17-038-us-institutional-equity-trading-2019-liquidity-blocks-algos-analytics-and-impact

with a contra-side order, traders are not required to execute the trade until they have reconfirmed trading intent. When two orders match, a negotiation period is triggered. During this pre-defined time window both counterparties must decide whether to firm up (i.e. execute the trade with a specified quantity) or to decline (walk away from) the interest.[24]

Another notable innovation is the sweep order. Sweep orders automatically allow traders to first send an order to one order book before moving to another order book if they only achieve partial execution. A common type of sweep order is a dark-lit sweep order, which first interacts with liquidity in a dark pool before filling any remaining balance in the lit order book.

3.4.4 Auctions

Auctions are another way to trade large blocks. Trading venues have been developing different on-venue trading mechanisms to limit the market impact of large-sized block orders. Frequent batch auctions (or periodic auctions) have become popular in some markets, but remain a very small market share.

There are many variants of auctions being developed. Typically, orders submitted to an auction remain hidden, but when the auction is triggered indicative prices and volumes will be displayed meaning that they can sometimes qualify as pre-trade transparent venues from a regulatory perspective. Auctions reduce the advantages that fast traders have over slow traders, and reduce the risk of orders being picked off by HFTs because individual orders are not revealed.

3.5 Comparison of block trading across financial markets

This section compares block-trading practices across financial centres.

3.5.1 Brazil

In Brazil, block trading occurs on the lit order book as regulation requires that all trades in listed stocks must be sent to the exchange.

As noted above, CVM's regulations require that the exchange adopts 'special procedures' in the case that large blocks are traded in the lit order book.

The execution of large-size trades in Brazilian equity instruments through the continuous lit order book is supported by 'Disclosed quantity – iceberg orders'. The iceberg orders allow participants to trade a large size of a given security without exposing the whole amount to the market at once. Box 3.2 explains how these order types work in practice.

[24] The rise in conditional orders is directly linked to the advancement of algorithmic interaction between the liquidity-seeking broker algorithms and the venues that offer conditional orders. See Global Trading (2019), '79% Of Largest Buy-Side Firms Are Using Conditional Orders', June, https://www.fixglobal.com/home/79-of-largest-buy-side-firms-are-using-conditional-orders/

Box 3.2 Disclosed quantity iceberg orders: how do they work?

When the peak of an iceberg order is executed and hidden volume is available, another peak with a new time priority is shown in the book.

The hidden volume of an iceberg order must be completely executed before orders at the next limit in the order book are executed. Therefore, execution of orders limited at less favourable prices is only possible after all orders at that limit are fully executed. However, orders with the same limit as the new peak are executed before the new peak is executed. If multiple iceberg orders are available at the same time, the respective peaks are introduced according to price/time priority.

According to B3's trading procedures manual, the following rules apply for the execution of iceberg orders:

- The disclosed quantity of the peak must be a multiple of the round lot. Round lot multipliers are available from B3's portal.
- When the disclosed quantity of the peak is completely filled, the trading system checks to see whether there is a remainder from the total quantity of the bid or ask. If so, the trading system makes this a new disclosed quantity of the peak, which loses priority in the central order book compared with already registered orders at the same price.
- If the disclosed or total quantity of a bid or ask is decreased, or the total quantity is increased without any change to the disclosed quantity of the peak, the bid or ask will not lose priority in the central order book compared with already registered orders at the same price.
- Disclosed quantity (iceberg) orders cannot be registered during an auction. Disclosed quantity orders registered before the start of an auction must comply with the priority rule for the quantity publicly quoted when they join the auction. If an order is modified, the total quantity of the order must be disclosed to the market.

Source: B3 (2019), 'B3's Trading Procedures Manual', December, p. 33.

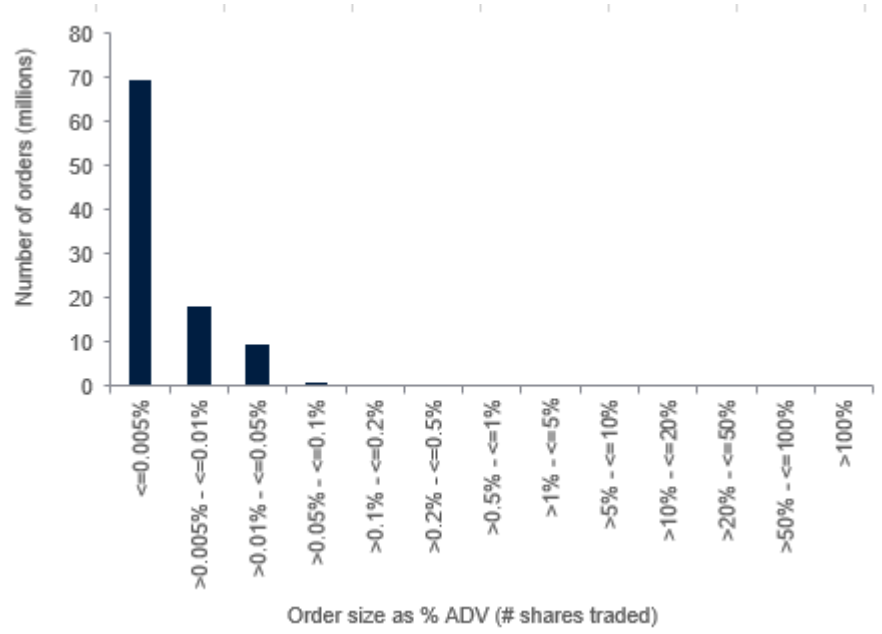
We understand from B3 that in some cases, block trades may occur through investors identifying counterparties for blocks via phone or electronic messaging with broker-dealers. After agreeing on a price (within the prevailing bid–ask spread), the trade is executed on the exchange as a 'direct cross'.

Based on analysis of B3 data we make the following observations.

- The average trade size in Brazil in December 2019 was approximately R$9,667. As discussed in section 2.3, average trade size has reduced considerably since 2010.
- There is considerable variation in average trade size across stocks. Figure 3.1 presents the distribution of order sizes in 2019 and gives an indication of the frequency of the proportion of large orders submitted to the lit order book. In 2019, approximately 0.02% of orders were larger than 1% of the average daily volume (ADV). 0.001% of orders were for a block size larger than 10% of ADV.
- As expected, the success rate of orders (i.e. the ratio of orders that are executed) generally decreases with trade size. The average fill rate for the largest 20% of equity trades (in terms of size) was 28.3% in August 2019 to December 2019, compared with 44.4% for the smallest 20% of equity trades for the same period (see Figure 3.2).
- Data on individual order sizes and special procedure auctions is likely to understate the true level of demand for large trades, as investors in Brazil may also divert some order flow via brokers who split up the orders to minimise execution risk.

- Stock holding in Brazil is highly concentrated. As at December 2019, there were approximately 8,400 investors holding positions larger than 100% of the average daily value traded in a given stock. These large positions represented 48% of the total volume held in the CSD (R$1.1tn).[25]

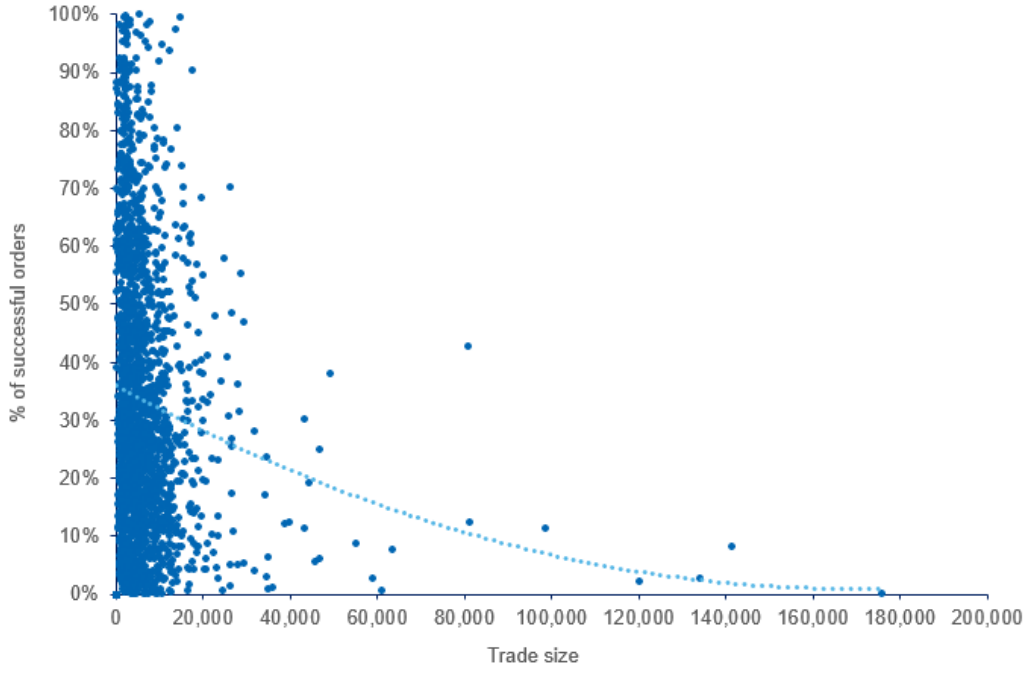
Figure 3.1 Distribution of order sizes in 2019



Note: Data covers a representative range of Brazilian equities from January to December 2019. Order size (in number of shares traded) has been divided by ADV (# of shares) for the relevant stock to allow comparability of order size across stocks.

Source: Oxera analysis of B3 data.

Figure 3.2 Equity trading in Brazil: fill rates, by order size



[25] Based on data provided by B3.

Note: The percentage of successful orders is estimated as the ratio between the number of trades and the number of orders for a given stock-month combination from August to December 2019. Observations resulting in a ratio above 100% are excluded. The trade size is estimated as volume traded (in value terms in local currency, R$.) divided by the number of trades for a given stock-month combination from August to December 2019. The dotted line represents a quadratic trendline.

Source: Oxera analysis based on B3 data.

3.5.2 Europe

In Europe, there has been a lot of innovation among trading venues in recent years to facilitate block trading. This has been driven by technological developments, increasing pressure to reduce trading costs, and regulatory change (mainly centred around the introduction of waivers in EU regulation for LIS trades from pre-trade transparency requirements). In this section, we define large block trades as trades that meet the LIS threshold, as set out by the EU's second Markets in Financial Instruments Directive (MiFID II).[26]

Prior to 2018, block trades in Europe were predominantly executed in two venues: ITG POSIT and Liquidnet. Since 2018, and following the introduction of the EU Markets in Financial Instruments Directive (MiFID II), new platforms, such as Turquoise and CBOE LIS, have attracted a significant volume of block trades.

New initiatives and innovations to facilitate block trading in Europe can be grouped into the following categories.[27]

- **New venues, focused on facilitating block trades**—examples include Turquoise Plato Block discovery, BATS LIS and Euronext Block. A common feature among these new venues is the use of conditional order types. Turquoise Plato and BATS LIS actively monitor investor behaviour to limit the likelihood of walking away from the conditional order commitment. Euronext Block has adopted an auction-style algorithm to match orders on a pro rata basis, where members benefit from size priority in the matching process, improving fill rates for larger blocks and reducing the impact of interacting with smaller orders.[28] These conditional order types reward traders willing to offer up large trade sizes to the market by allowing them to trade without the risk of other investors anticipating or front-running their order flow.
- **New order types, to encourage the trading of blocks on exchanges**—for example, the order books of LSE, BATS Chi-X, Nasdaq and Deutsche Börse have built in LIS order types (designed to meet the regulatory LIS waiver).[29] These order types can remain hidden even if partial executions reduce the order size below the LIS threshold. Despite these features, we understand that the buy side has been somewhat reluctant to use these order types because their orders will be exposed to HFT activity [30] and may therefore be detectable by other

[26] Under the European Commission's Delegated Regulation 2017/587, the LIS thresholds range from €15,000 for shares with an average daily turnover of less than €50,000 to €650,000 for shares with an average daily turnover of over €100m.
[27] Comerton-Forde, C. (2018), 'Shedding light on dark trading in Europe', https://cepr.org/sites/default/files/Comerton-Forde%2C%20Carole%20paper.pdf
[28] Euronext website, 'Euronext Trading Services', https://www.euronext.com/en/trade/euronext-trading-services
[29] Orders that are LIS compared with the normal market size are subject to waivers for pre-trade transparency, regardless of which venues (MTF or Regulated Market) they are traded on. Larger orders would be costly to execute immediately if sufficient liquidity were not available, but they would also be particularly vulnerable to front-running if subject to pre-trade transparency while sitting in the order book. Source: EU Regulation (2017/587), Annex II.
[30] See, for example, Comerton-Forde, C. (2018), 'Shedding light on dark trading in Europe', p. 13.

traders using order anticipatory strategies.[31] Typically, the buy side is more comfortable resting displayed orders in venues where they encounter liquidity, which is why many exchanges have introduced functionalities (similar to dark pools) to reduce the likelihood of the orders being detected. For example, in November 2015, the LSE introduced a Midpoint Pegged Order that allows users to define a minimum execution size. It also allows users to pause executions if the price deviates from a specified range. In December 2015, Deutsche Börse launched Volume Discovery Orders, which are enhanced iceberg orders that allow the hidden part of the iceberg to be executed against other volume discovery orders at the midpoint of the order book (there is also a user-defined minimum execution size);[32]

- **Innovation in auction design**—some platforms have developed on-exchange Request for Quote (RFQ) trading procedures to facilitate block trading. As liquidity has become more fragmented, trading large-size orders on lit exchanges can be challenging. RFQ mechanisms can facilitate liquidity access for large orders as they allow buy-side requesters to send enquiries simultaneously to multiple liquidity providers. For example, with Xetra Enlight, Deutsche Börse orders a RFQ service for on-exchange execution of LIS transactions;[33]
- requesters send a private RFQ to either all registered market makers or to individually selected market makers;
- requested market makers receive the RFQ and respond with a firm quote that is visible only to the requesting member. The quote can be continuously updated during the RFQ event;
- requesters can accept quotes by either automatically selecting the best quote response of all quote responses or by selecting a single quote response from a specific market maker.

Some exchanges have developed hybrid models combining auctions with RFQ procedures. For instance, LSE has developed an Auction RFQ model, where hidden book orders are consolidated with RFQ quotes as available liquidity. Once certain conditions are met, an auction will commence after which the Auction RFQ Model will execute against the best available quotes and/or orders to achieve the full requested size.[34]

While these innovations create opportunities for institutional investors, they also bring new challenges, such as fragmentation of liquidity. This is

[31] For example, high-frequency trading often relies on pinging: sending small orders to obtain information about hidden demand and supply on an exchange. Once such an order is executed, a ping or series of pings alerts the algorithm about the potential presence of a large order. As HFT algorithms became better at detecting hidden information, investors sought to execute orders on other venues with more limited pre-trade transparency or with other mechanisms to reduce the impact of HFT. See Vaananen, J. (2015), 'Dark Pools and High Frequency Trading'.
[32] The Volume Discovery Order functionality is activated simply by entering a second limit for the iceberg order. That limit will be matched against the midpoint price. The hidden quantity of the iceberg order is then available for matching at the current midpoint price with other Volume Discovery Orders according to price/time priority, provided that the minimum size requirement (MEQ) is fulfilled. The peak remains in the visible book. The limit of the iceberg order (peak) determines the matching priority for the execution at midpoint price. Only Volume Discovery Orders match against each other at the midpoint price—for example, Limit or Market Orders from the CLOB cannot match at midpoint. When the Volume Discovery Order is matched the corresponding size of the hidden part of the iceberg order is deleted. See Deutsche Börse (2017), 'Xetra: Volume Discovery Order', January, https://www.deutsche-boerse-cash-market.com/resource/blob/265854/fa92673adfeead43ab3e11e269a50a53/data/Factsheet-Volume-Discovery-Order_de.pdf
[33] Deutsche Börse (2019), 'Xetra Enlight: Request for Quote (RFQ) service for large-in-scale transactions in equities, ETFs and ETPs'.
[34] LSE (2019), 'Service and technical description – Request for Quote'.

particularly problematic for block trades as the probability of execution is already lower than for smaller trades and further (block) trading fragmentation may make it even more difficult for investors to find counterparties.

Table 3.2 provides some examples of exchange-led innovations and Box 3.3 describes in more detail the mechanics for two of the largest European infrastructure providers for block trades: Liquidnet (with a market share of 48.4% for on-book LIS trading) and Turquoise Plato (with a market share of 16.7% for on-book LIS trading).

Figure 3.3 provides an overview of where block trades are executed in Europe. We observe that:

- block trades represented 5.3% of the total value of equity traded in the first half of 2019. There has been a declining trend in block trading in Europe. Potential reasons for the reduction include a rise of algorithmic trading (and more slicing and dicing of large orders)[35] and growing capital requirements for brokers (making holding of inventory of large blocks more capital-intensive). The proportion of block trades as a share of the total value of equity traded decreased from 10.2% in January 2018 to 4.4% in July 2019, with a spike of 12.7% in May 2018; [36]
- the majority of block trading takes place in the OTC markets (82% of total block trades over the period January 2018 to July 2019);
- block trades represent 27.4% of the value traded in dark pools from January 2018 to July 2019;[37]
- in Europe, there is currently only one dark pool (Liquidnet) that specifically restricts trading to large (block) orders only. It has a market share of 6% of total volume traded on European dark pools;[38]
- on-venue dark trading represents 12.4% of the value traded in large blocks from January 2018 to July 2019. This is significantly higher than the share of on-venue dark trades for normal size orders (4%), for the same period.

[35] Various studies have commented on how the rise of algorithmic execution has reduced the frequency of block trades in both European and US markets. Compared with human traders, algorithms typically execute in smaller quantities and more often. As algorithms have become more popular, with both trading desks and investors, the market is seeing fewer block trades. This influence of HFTs leads to big changes in equity trading, including a significant reduction in trade size. Traders navigate the issue in different ways, for example seeking out alternative non-lit trading mechanisms, breaking up big trades into smaller size trades, and potentially cancelling the rest of the order when faced with significant price fluctuations. See Hondt, C.D. and Baker, G. (2005), 'The information value of block trades in a limit order book market', June, https://pdfs.semanticscholar.org/c56a/981783e3904eb31028315639e659a23a6fa5.pdf

[36] See, for example, Hollands, C. (2016), 'Bringing back the block: Is block trading making a comeback?', March, https://blogs.thomsonreuters.com/answerson/bringing-back-block-trading/. One possible explanation for the spike around May 2018 could be the market response to the introduction of the dark trading cap, which limits the amount of trading in dark pools—block trades do not count towards the cap—and was implemented during the course of 2018.

[37] Equity trading in European dark pools is split in two categories: i) LIS orders that are executed in a dark order book, and ii) dark orders (below the LIS threshold) that are executed under the midpoint reference waiver as defined in MiFID II. From January 2018 to July 2019, 27.4% of the total value traded in dark pools consisted of LIS orders. Source: Refinitiv data.

[38] European Central Bank (2017), 'Dark pools in European equity markets: emergence, competition and implications', https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op193.en.pdf

Table 3.2 Examples of trading mechanisms aimed to facilitate block trades in Europe

Trading venue	Hidden orders	Auctions	Dark Pools	Additional points
Euronext	Y	Y	N	• Euronext LIS—without displaying price or volume, hidden orders can interact with the lit liquidity of Euronext's COB, including the undisclosed part of iceberg orders. Hidden orders can be either limit, pegged to the BBO, or pegged to the midpoint. Minimum quantity thresholds are available.[1] • Euronext Block—randomised auctions to protect execution price and maximise liquidity for block trade execution. Supports both conditional and firm order types.[2]
LSE (part of LSEG)	Y	Y	N	• LIS on SETS—hidden orders that exceed LIS thresholds interact with lit and dark contra liquidity. Qualifies for LIS waiver. Although permitted, hidden orders are rarely used.[3] • LSE intraday auction—executions are pre-trade transparent but display only indicative price and volume. Auction occurs over a two-minute window at midday. • LSE has developed an Auction RFQ model with Order Book Sweep where hidden book orders are consolidated with RFQ quotes as available liquidity. Once certain conditions are met, a random period will commence after which the Auction RFQ Model with Order Book Sweep will execute against the best available quotes and/or orders to achieve the full requested size.
Turquoise (part of LSEG)	Y	Y	Y	• Turquoise also provides a conditional order matching service called Turquoise Plato Block Discovery that matches hidden conditional block orders using a periodic auction mechanism. This has grown in popularity since 2017.
Nasdaq Nordic	Y	Y	Y	• Nasdaq LIS—Nordic LIS block orders interact with all lit orders as well as other non-displayed orders. They remain non-displayed until executed. Block orders that have been partially filled remain hidden even after the remaining order size falls below the LIS order size.[4] • Nasdaq Auction-on-Demand—executions are pre-trade transparent but display only indicative price and volume. Users can set minimum execution size.[5]
Deutsche Börse	Y	N	N	• DB Volume Discovery Orders—enhanced iceberg order allowing block execution within the lit book. Hidden part of iceberg executed against Volume Discovery Orders at midpoint of book. Optional minimum executable size. Qualifies for LIS waiver. • Deutsche Börse also provides a LIS RFQ trading mechanism called Xetra EnLight.[6]
UBS MTF	N	Y	Y	• UBS MTF offers a choice to its members. When submitting a LIS order a member may instruct UBS MTF that orders must match against other orders exclusively under the LIS waiver.[7]

Trading venue	Hidden orders	Auctions	Dark Pools	Additional points
				• On the periodic auction segment, UBS MTF accepts limit orders only. Members of UBS MTF have the ability to set a Minimum Acceptable Quantity and Limit Price on all orders.
Sigma-X MTF	N	Y	Y	• Similar to UBS MTF.
Aquis	Y	Y	N	• Restriction on aggressive proprietary trading activity to prevent front-running.[8] • Market at Close order type allows traders to enter orders for matching at the same price as the primary market closing auction.
CBOE	Y	Y	Y	• CBOE also operates an indication of interest (IOI) and execution platform, CBOE LIS. • CBOE Periodic Auctions—executions are pre-trade transparent but display only indicative price and volume. Randomised intraday auctions. Allocations on price-size-time priority.
Instinet BlockMatch	N	N	Y	• Instinet also offers RFQ- and IOI-based models for executing block trades.
Liquidnet	N	N	Y	• Liquidnet also runs a block-crossing system (see Box 3.3).
ITG POSIT	N	Y	Y	• ITG POSIT also operates an IOI-based platform.

Note: This is a non-exhaustive list. We have considered only a select number of main market infrastructure providers and/or venues that have facilitated block trading through different innovations in Europe. [1] Euronext (2019), 'Two complementary solutions for enhanced dark liquidity on cash equities'. [2] Euronext (2019), 'Two complementary solutions for enhanced dark liquidity on cash equities'. [3] Comerton-Forde, C. (2018), 'Shedding light on dark trading in Europe', https://cepr.org/sites/default/files/Comerton-Forde%2C%20Carole%20paper.pdf. [4] Nasdaq website, 'Nordic LiS Block efficient execution of large orders directly in the Central order book', https://www.nasdaq.com/solutions/large-in-scale. [5] Nasdaq website, 'Nasdaq Auction on Demand', https://www.nasdaq.com/solutions/auction-on-demand. [6] Xetra website, 'Xetra EnLight', https://www.xetra.com/xetra-en/trading/trading-models/xetra-enlight-en. [7] UBS MTF (2019), 'UBS MTF, FIX Interface'. [8] Acquis Exchange (2016), 'THE TRADE: AQUIS TO BAN PREDATORY HFTS', February, https://www.aquis.eu/trade-aquis-ban-predatory-hfts/

Source: Oxera.

Box 3.3 Case studies: Liquidnet and Turquoise Plato

Liquidnet: a buy-side crossing network for block trading

Liquidnet acts as a broker providing a buy-side crossing network by embedding technology into buy-side order management systems. This is different from Turquoise Plato where the buy side instructs a broker to send an order onto the venue. Liquidnet customers are primarily buy-side institutions, such as pension and mutual funds. Liquidnet is different from other dark pools and multilateral trading facilities (MTFs) in that the latter usually perform small executions typically handled by exchanges, while Liquidnet focuses on large block executions.

How does it work?

- Liquidnet is an example of a block crossing system, where the prices are hidden and the execution price is determined with reference to the market price. This is referred to as a 'non-displayed market' and it protects the institution block orders from HFTs and other intermediaries.
- The system allows buy-side investors to trade large orders while minimising or eliminating adverse price movements, thus reducing market volatility and institutional trading costs.[39]

Drawbacks of model

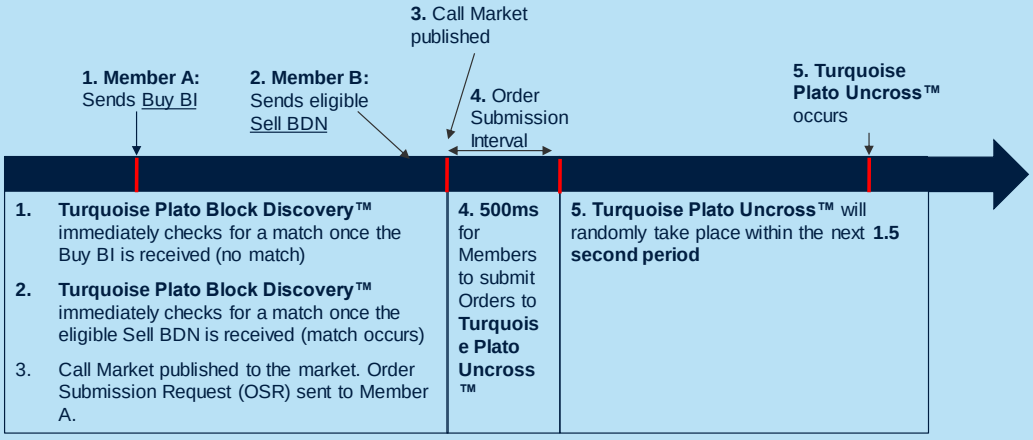
- There may be a natural limit to the number of block-oriented dark pools, because a dark pool needs to amass a sufficient number of large orders to be able to match them; the more restrictive the minimum order size threshold, the fewer potential matches there are. In the past, there were more block-oriented dark pools, but some exited the market because they were unable to consolidate sufficient volumes. BlockCross was a block-oriented dark pool that was active between 2009 and 2012 and closed due to problems attracting sufficient liquidity. Pipeline was another dark pool that restricted trades to those above a minimum order size, but it shut down in 2012.

Turquoise Plato Block Discovery: a conditional order service aimed at trading larger blocks

Interacts with Plato Uncross (periodic auction facility) and matches conditional orders at randomised intervals. Includes size priority in the matching logic and user defined minimum execution size.

It facilitates the trading of larger 'Parent' or 'Block' Orders by seeking and identifying block matching opportunities, between Block Indications (with a quantity above or equal to the Minimum Indication Size threshold) and Block Discovery Notifications (BDN). Where matches are identified, participants are required to convert their Block Indications by submitting firm Qualifying Block Orders, designated as eligible for existing Turquoise Plato Uncross events that already exist as part of the Turquoise Plato Order Book to trade at the Midpoint of the Primary Best Bid and Offer (PBBO).

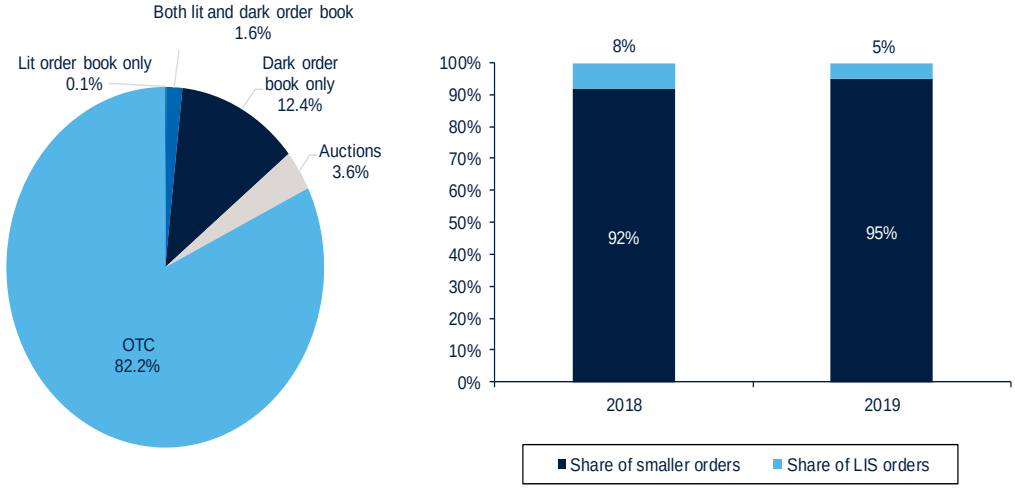
The diagram below shows how the Turquoise Plato Uncross works, when initiated by a Turquoise Plato Block Discovery continuous match:



Source: 'Liquidnet trading information', https://qed.eu/old-files-dir/01Liquidnetinfo.pdf; European Central Bank (2017), 'Dark pools in European equity markets: emergence, competition and implications', https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op193.en.pdf; Turquoise (2019), 'Turquoise trading service subscription',

https://www.lseg.com/sites/default/files/content/documents/Turquoise%20Trading%20Services%20Description%203.35.5%20FINAL.pdf

Figure 3.3 Block trading in Europe



Note: Blocks are defined as trades that are LIS as defined by MiFID II. The left-hand chart shows the split of LIS trades by trading mechanism based on value traded. The OTC category refers to trading not taking place of a trading venue. The right-hand chart shows the share of LIS trades (across all trading mechanisms) as a share of total equity trades in the EU. The shares are estimated based on the average monthly market share over the year for 2018 and from January to July for 2019.

Source: Oxera analysis based on Refinitiv data.

3.5.3 USA

In the USA, a block trade is defined as a trade over 10,000 shares or over $200,000.

There are around 40 alternative trading venues trading block equity trades. These range from independently run systems, such as Bids or Liquidnet, to broker-dealer crossing pools, such as Goldman Sachs' Sigma X and Credit Suisse's Crossfinder, and a range of other alternative trading systems. This indicates a relatively higher level of fragmentation compared to the EU.

Similar to Europe, block trades only make up a small share of the trading in dark pools. In the USA, the top five dark pools (in terms of largest average trade size) make up less than 3% of the total volume executed in dark pools.[40]

Research by the Tabb Group identifies 33 such trading systems offering electronic OTC equity trading.[41]

[39] To give a concrete example of the benefit, if an institution were to introduce a buy order with a principal value of €995,844 (average trade size on Liquidnet) into a market designed for €8,244 principal value orders (average trade size on NYSE Euronext), this would immediately lead to adverse price movement against the institution, as HFTs and other market intermediaries would buy up stock ahead of the institution and sell it back to the same institution at a higher price. Trades of this size simply cannot take place on the existing 'displayed' exchanges without a negative impact for long-term investors and increased market volatility. During volatile trading conditions, introducing a large block order into an exchange market increases volatility as short-term speculators trade ahead of the block order.

[40] European Central Bank (2017), 'Dark pools in European equity markets: emergence, competition and implications' https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op193.en.pdf

[41] Flanagan, T. (2012), 'The State of Block Trading', *MarketsMedia*, https://www.marketsmedia.com/state-block-trading/

A study from Bloomberg Tradebook shows that block volume as a percentage of total continuous trading volume declines with the average daily volume in the continuous market. [42]

In the USA (as in Europe), block trading also takes place on lit venues as non-displayed (i.e. hidden) orders. One study has found that non-displayed order types are the most commonly used order types on exchanges,[43] and these order types may account for as much as 11–14% of exchange-based volume.[44] There is no indication that hidden orders are as popular in Europe as in the USA.

In the continuous lit order book, blocks tend to trade during the first and last half hour of the day. In fact, blocks are almost three times more likely to be executed during those times than in the middle of the day.[45] The same study has estimated that there is immediate price impact (10 seconds) on the mid-quote after the block execution. One might think this is a temporary impact, but the major exchanges do not show any signs of reversions within the next 100 seconds.[46]

3.5.4 Other financial centres

In Australia, block trades are exempt from pre-trade transparency rules if above AUD1m in size for the most liquid shares, AUD0.5m for comparatively liquid shares and AUD0.2m for other shares.

Data published by the Australian Securities and Investments Commission (ASIC) shows that dark trading accounted for approximately 30% of total value traded in September 2019, up from approximately 25% in September 2011.[47] Block size trades accounted for approximately 60% of all dark turnover in September 2019. This is compared to Europe where block trading represents only 27.4% of the value traded in dark pools from January 2018 to July 2019

It is important to note that equity trading in Australia is less fragmented than in Europe and the USA. In Australia there are two main trading venues, ASX and Chi-X. ASX Centre Point (a midpoint matching dark pool) is the largest dark trading venue in the Australian market.[48]

ASX has adopted several of the innovations described above, including:

- allowing traders to specify a Minimum Acceptable Quantity (MAQ), meaning that a block order is executed only if matched against a single opposing order at least as a large as the MAQ;
- developing dark-lit sweep orders between ASX Centre Point and ASX TradeMatch (main lit order book) which allow traders to automatically route unfilled balance to the lit order book. ASX also allows resting orders to be dual-posted in Centre Point and TradeMatch;

[42] See Phadnis, K., 'reading the electronic tape: block trading in today's electronic markets' Bloomberg Tradebook, https://data.bloomberglp.com/tradebook/sites/6/91716_BlockTrading-WP.pdf
[43] Mackintosh, P. (2014), 'Demystifying Order Types', KCG Market Insights, September.
[44] U.S. Securities and Exchange Commission (2015), 'U.S. Equity Market Structure: Making Our Markets Work Better for Investors', public statement, 11 May, https://www.sec.gov/news/statement/us-equity-market-structure.html#_edn65
[45] See Phadnis, op. cit.
[46] Ibid.
[47] Australian Securities and Investments Commission (2019), 'Equity market data for quarter ending September 2019', https://asic.gov.au/regulatory-resources/markets/market-structure/equity-market-data/2019/equity-market-data-for-quarter-ending-september-2019/
[48] Australian Securities and Investments Commission (2015), 'Review of high-frequency trading and dark liquidity'.

- allowing broker-dealers to prioritise crossing their own internal flows within Centre Point ahead of other orders in the queue.

4 CVM proposal for block trades: an assessment

4.1 Introduction

CVM is proposing to change the existing requirement for equity trading in Brazil to be conducted on an exchange by allowing large blocks to be traded in OTC markets.

The reforms proposed by CVM are intended to improve the functioning of secondary equity markets in Brazil. This section evaluates different policy options for the Brazilian market from a market design perspective.

4.2 Economic framework

Block trading raises several issues from a market design perspective. Since the same stock can be traded both in small and large sizes, changes to the regulation on block trading will impact the overall functioning of the market and not just block trading activity.

This section sets out the economic framework for assessing the impact of regulatory change on the functioning of equity markets in Brazil.

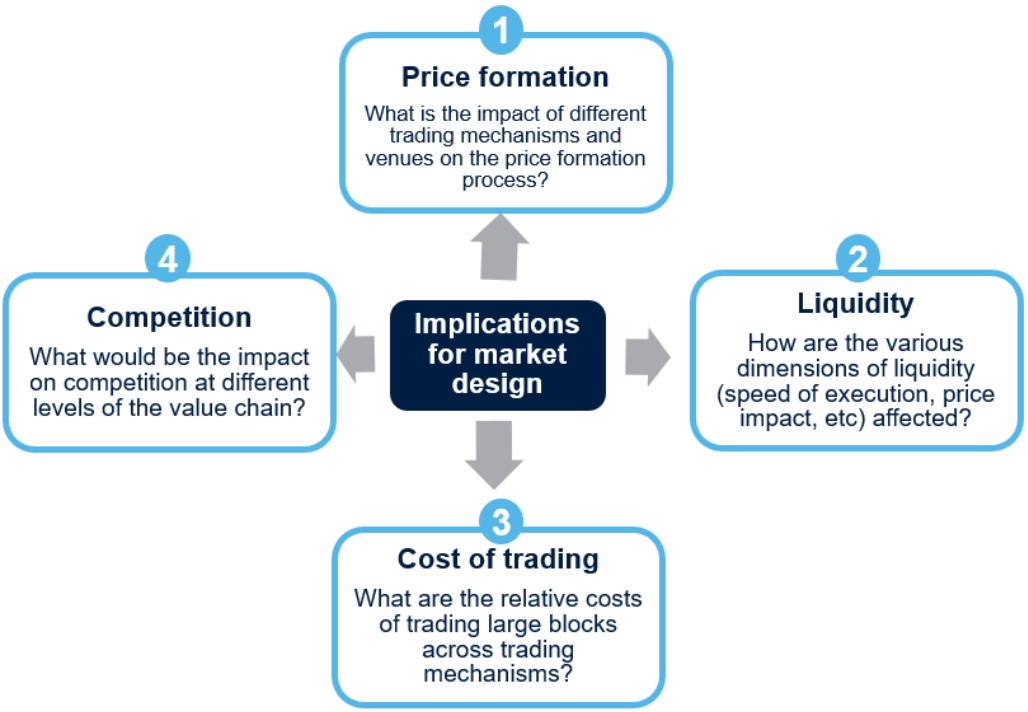
CVM's ultimate objective is to support and facilitate the efficient functioning of the market. A well-functioning equity market is one that delivers high quality price formation and a good provision of liquidity.[49] As part of the assessment of the functioning of the market, it is important to analyse the cost of trading and ensure that competition is working effectively, at different levels of the value chain.

We can review the impact of CVM's proposal (as well as alternative ways of facilitating block trading) on the market design for equity trading by assessing the relative impact on:

- price formation—what are the benefits of large blocks being traded on different types of venues on the price formation process?
- liquidity (implicit costs of trading)—how are the various dimensions of liquidity (speed of execution, price impact, etc.) affected?
- cost of trading—what are the relative costs of trading large blocks across trading mechanisms?
- competition—what would be the impact on competition for equity trading services at different levels of the value chain?

[49] See Oxera (2019), 'The design of equity trading markets in Europe', March, https://www.oxera.com/publications/trading-markets-europe

Figure 4.1 Economic framework to assess the impact of CVM's proposals on market functioning



Source: Oxera.

4.2.1 Impact on price formation

The effect on price formation of block trading depends on:

- the degree of pre- and post-trade transparency of the trade (which will vary depending on where the block is traded). The quicker the information flows to other participants the more it will be likely to contribute to the price formation process. Pre-trade transparency helps price formation by allowing market participants to infer the relative balance of trading interest from the orders of other traders. If post-trade information is of good quality and information is disseminated very quickly, post-trade information can also provide useful price formation for the next trade;
- the degree to which the trade is information-motivated.[50] If block trades are information-motivated, then allowing execution away from a lit venue could delay price discovery (if the order would otherwise have been publicly displayed on the lit venue).

There is a vast body of literature on the relative contribution that different venues make to the price formation process. The main insights can be summarised as follows.

- **lit venues** contribute to price formation as the order flow to and from the CLOB, including limit orders, conveys private information on a

[50] Information-motivated trades are triggered by an attempt to profit from private information. For further discussion of information asymmetries in financial markets, see for example, Bagehot, W. (1971), 'The Only Game in Town', *Financial Analysts Journal*, **27**:2, pp. 12–22; Grossman, S. and Stiglitz, J. (1980), 'On the Impossibility of Informationally Efficient Markets', *The American Economic Review*, **70**:3, pp. 393–408; Kyle, A. (1985), 'Continuous Auctions and Insider Trading', *Econometrica*, **53**:6, pp. 1315–1335. and Glosten, L. and Milgrom, P. (1985), 'Bid, ask and transaction prices in a specialist market with heterogeneously informed traders', *Journal of Financial Economics*, **14**:1, pp. 71–100.

transparent basis to all participants. As lit venues tend to have larger pools of liquidity, they also contribute to price formation through the relatively larger volumes of trading activity. Some empirical evidence suggests that new-entrant lit trading venues such as MTFs can contribute to price formation, even with lower levels of activity, by providing services that are particularly attractive to informed traders.[51]

- there has been considerable debate in the academic literature regarding the impact of **dark pools** on price formation. Dark pools generally provide little or no price discovery since most of them match buy and sell orders at prices derived from the primary lit exchanges—in other words, dark pools use the price formation process of lit markets. While dark trading protects investors from market impact, this is mainly relevant to large trades—it does not contribute to price formation.[52]

  However, the academic literature also recognises the effect that dark pools can have on price formation in segmenting informed traders (those seeking to profit by trading off private information) and uninformed traders (those motivated to trade by a need to rebalance portfolios and smooth their consumption streams over time). A certain amount of dark trading could help to the extent that it helps to reduce the pricing errors of uninformed traders on lit markets and it aids the self-selection of informed traders on lit markets and uninformed traders in the dark markets.

  Lit venues are particularly appealing to informed traders, who value immediacy and certainty of execution in order to maximise the gains for their price information. Conversely, dark pools appeal to uninformed traders, for example, by offering price improvement. A concentration of informed traders on lit venues can have positive consequences for price formation but this can come at the expense of lower liquidity.

  Some empirical studies on the impacts of dark trading appear to confirm the prediction regarding segmentation of traders.[53] However, other studies find evidence of a significant informed trader presence in dark pools.[54]

- There is a debate about the impact on price formation of newer periodic **auction trading systems**. These systems can vary in their level of pre-trade transparency and price determination. Some auction designs allow

[51] A recent example is Ibikunle, G. (2018), 'Trading places: Price leadership and the competition for order flow', *Journal of Empirical Finance*, **49**.

[52] See, for example, Petrescu, M. and Wedow, M. (2017), 'Dark pools in European equity markets: emergence, competition and implications', European Central Bank Occasional Paper Series No. 193., Tables B1 and B2; and Sun, Y., Ibikunle, G. and Mare, D. (2017), 'Light versus Dark: Commonality in Lit and Dark liquidity'.

[53] For example, Comerton-Forde and Putniņš (2015) find that dark trades tend to be less informed than trades on the lit market, with low levels of dark trading potentially beneficial for price formation. See Comerton-Forde, C. and Putniņš, T.J. (2015), 'Dark trading and price discovery', *Journal of Financial Economics*, **118**. This segmentation is also noted in a European context by Brugler (2015) and Degryse et al. (2015). See Brugler, J. (2015), 'Into the light: Dark pool trading and intraday market quality on the primary exchange', Bank of England Working Paper No. 545; and Degryse, H., De Jong, F. and van Kervel, V. (2015), 'The Impact of Dark Trading and Visible Fragmentation on Market Quality', *Review of Finance*, **19**:4, pp. 1587–1622. Zhu (2014) presents a model in which the presence of a dark pool causes the market to segment between informed and uninformed traders. Informed traders are attracted to the lit venue where they can achieve more certain execution. Conversely, uninformed traders opt to trade in the dark pool where they can trade at lower cost. A concentration of informed traders on the lit venue will improve price formation but will increase adverse selection costs and increase spreads. See Zhu, H. (2014), 'Do dark pools harm price discovery?, *Review of Financial Studies*, **27**.

[54] Nimalendran, M. and Ray, S. (2014), 'Informational linkages between dark and lit trading venues', *Journal of Financial Markets*, **17**, pp. 230–261.

the price to be determined based on the demand and supply during the call period, however others lock in the auction price at the start of the auction period without providing a mechanism to break the lock, and therefore do not contribute to price formation.

- There is limited empirical research on the impact of OTC markets on price formation. Theoretical papers of brokerage intermediation originally focused on the role of the broker in mitigating adverse selection costs faced by large traders. Market microstructure research suggests that the 'upstairs market' worked as a signalling device for traders to show their trading intentions for reasons other than private information, with reputational impact playing a big role in minimising price impact. Following the introduction of alternative on-venue trading mechanisms to facilitate similar market outcomes for the institutional investors the situation is now less clear-cut.

Trades not subject to pre-trade transparency rules fragment trading information. Such fragmentation could impede price formation as fewer market participants come together at any one lit trading venue. Table 4.1 summarises the transparency requirements across venues. In the OTC markets there is often some more flexibility on ex post transparency, particularly around how quickly information is released to the market.

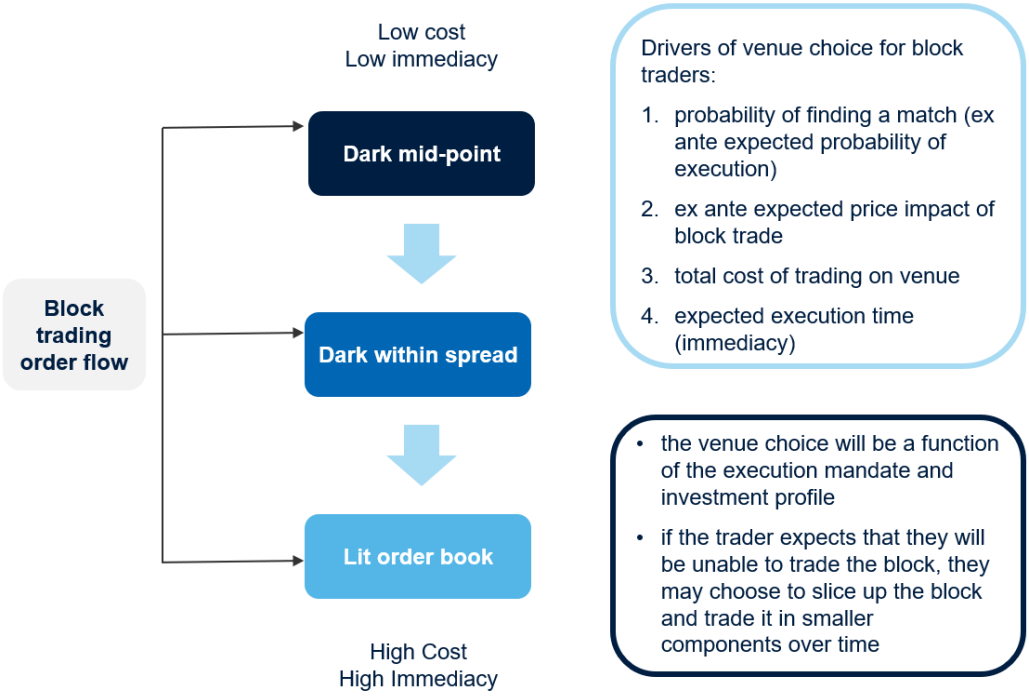
Table 4.1 Levels of pre- and post- trade transparency

	Pre-trade transparency	Post-trade transparency
Visible order in CLOB	Aggregate number of orders and volume for at least the top of the order book	Trades published as soon as executed
Hidden order in CLOB	Only top of order is visible in order book	Trades published as soon as executed
Auction	Varies depending on auction mechanism. Some auctions report indicative quantity and uncrossing price	Uncrossing price and quantity published at end of auction
Dark pool	None	Trades published as soon as executed (within microseconds)
OTC	None	Trades published as soon as executed (often some flexibility around timing)

Source: Oxera.

The pecking order theory for block trades postulates what would be investors' preference for execution of large trades considering the dimensions of cost, immediacy and likelihood of order execution. This would indicate that block traders naturally want to trade in the dark if allowed. This causes a tension for policymakers given the importance of price formation for well-functioning markets. The key question is how much dark block trading should be allowed from a public policy perspective.

Figure 4.2 Pecking order for block trades



Note: This figure shows the typical pecking order for block trades, and their relative contribution to price formation. Trading venues offering dark trading at the midpoint are at the top. Trading venues offering dark trading within the spread (but not at the midpoint) are in the middle. The lit markets are at the bottom. 'Dark' in this figure refers to a trade in a venue without pre-trade transparency.

Source: Oxera.

Thresholds for dark trading

It is widely recognised in the market microstructure literature, and among market regulators, that there is a limit to the amount of dark trading that can happen in a market before price formation and liquidity are impaired.

For example:

- in the UK, analysis by the Financial Conduct Authority (FCA) found that market quality could be harmed if dark trading (of any size) exceeds 15% as a proportion of total trading value;[55]
- in Australia, a study by Comerton-Forde and Putniņš found that deterioration in informational efficiency starts to occur when dark trading (of any size of trade) in a given stock exceeds around 10% of value traded. The same study also examined the impact of executing large blocks away from the lit venue. Here, the authors find that maximum informational efficiency occurs around the point at which block trades account for approximately 15% of total dollar volume, although the total impact on informational efficiency remains positive until block trades account for approximately 40% of total dollar volume;[56]

[55] Financial Conduct Authority (2017), 'Aggregate market quality – Implications of dark trading', https://www.fca.org.uk/publication/occasional-papers/op17-29.pdf
[56] Comerton-Forde, C. and Putniņš, T.J. (2015), 'Dark trading and price discovery', *Journal of Financial Economics*, **118**. The ASIC re-examined this paper a few years later, based on more up-to-date data, and found inconclusive results. See Australian Securities and Investments Commission (2013), 'Dark liquidity and high-frequency trading', ASIC Report 331.

- in the USA, a study from the CFA Institute found that market quality initially improves but then declines as dark trading increases. The authors conservatively estimated that when a majority (>50%) of trading in a stock occurs in un-displayed venues (either dark pools or OTCs), market quality deteriorates;[57]
- in the EU, the European Securities and Markets Authority (ESMA) has implemented a cap on dark trading that limits the volume of certain transactions that can be executed on dark pools to 4% at the trading venue level and 8% for all EU trading venues.[58] Some transactions, including large trades (under the so-called LIS waiver) are excluded from this cap.[59]

In sum, these studies would suggest applying a threshold to limit dark trading. in the region of:

- 10–15% of total trading activity on the market; or
- up to 40% if the dark trading activity is limited to block trades only.

Thresholds for acceptable levels of dark trading may vary at a stock level as a function of the minimum size of the dark orders, stock's liquidity, and how dark trading affects price formation in the lit market. Some research suggests that low-volume stocks may exhibit a relatively higher tolerance for dark trading before price formation is impaired, compared to high-volume stocks.[60] Two potential reasons may be:

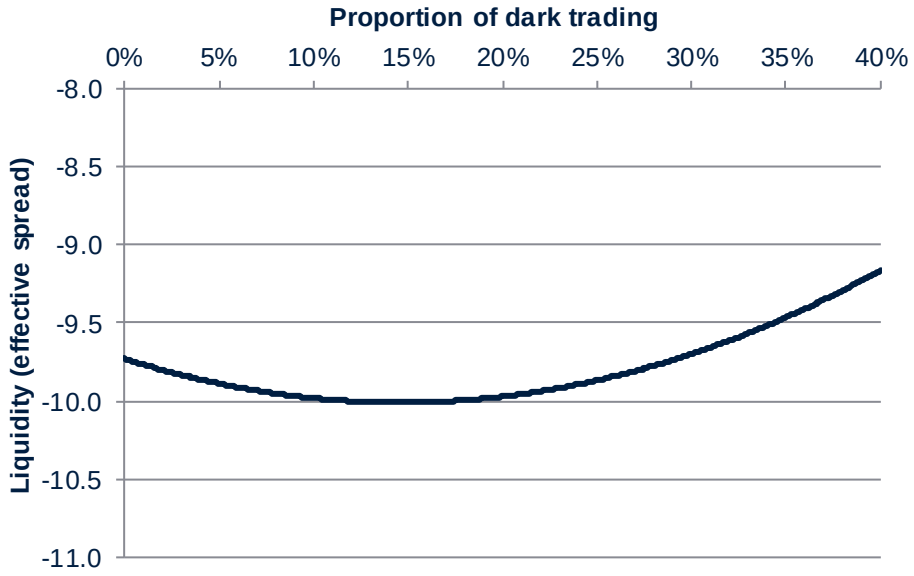
- the low-volume stocks are characterised by a lower volume of informed trading activity (as there is less research and information gathering being conducted) compared to high-volume stocks. This means that adverse selection in the lit venue is lower and therefore dark trading (which segments uninformed and informed investors) will have less of an impact on price formation.
- the low-volume stocks considered in the above empirical analysis are predominantly traded in a broker-dealer market away from the lit order book. Since the majority of price formation does not occur in the lit venue, an increase in dark trading does not harm price formation as much. This is consistent with the higher threshold observed for block-trades as well. Comerton-Forde and Putniņš (2015),[61] show that having some block trades executed away from the lit market (up to approximately 40% of volume traded) can be beneficial to price formation. The benefits could be due to upstairs block brokers tapping into liquidity that would not otherwise be expressed in the limit order book. In Brazil, there is no 'upstairs' broker-dealer market. As such, it is difficult to conclude based on existing analysis what the threshold would

[57] Dark trading in this analysis is defined as 'aggregate un-displayed trading'. It consists of: dark pools, internalisation, other OTC transactions reported to the NASDAQ TRF, and off-exchange volume reported to the NYSE TRF. See Preece, R. (2012), 'Dark Trading: Is It Hurting Market Quality?', CFA Institute, https://blogs.cfainstitute.org/marketintegrity/2012/11/19/dark-trading-is-it-hurting-market-quality/
[58] The purpose of the double volume cap mechanism is to limit the amount of trading under certain equity waivers to ensure that the use of such waivers does not harm price formation for equity instruments. More specifically, the double volume cap limits the amount of dark trading under the reference price waiver and the negotiated transaction waiver as defined under MiFID II.
[59] European Securities and Markets Authority website, 'MIFID II: ESMA PUBLISHES DOUBLE VOLUME CAP DATA', https://www.esma.europa.eu/press-news/esma-news/mifid-ii-esma-publishes-double-volume-cap-data
[60] Financial Conduct Authority (2017), 'Aggregate market quality – Implications of dark trading', https://www.fca.org.uk/publication/occasional-papers/op17-29.pdf
[61] Comerton-Forde, C. and Putniņš, T.J. (2015), 'Dark trading and price discovery', *Journal of Financial Economics*, **118**.

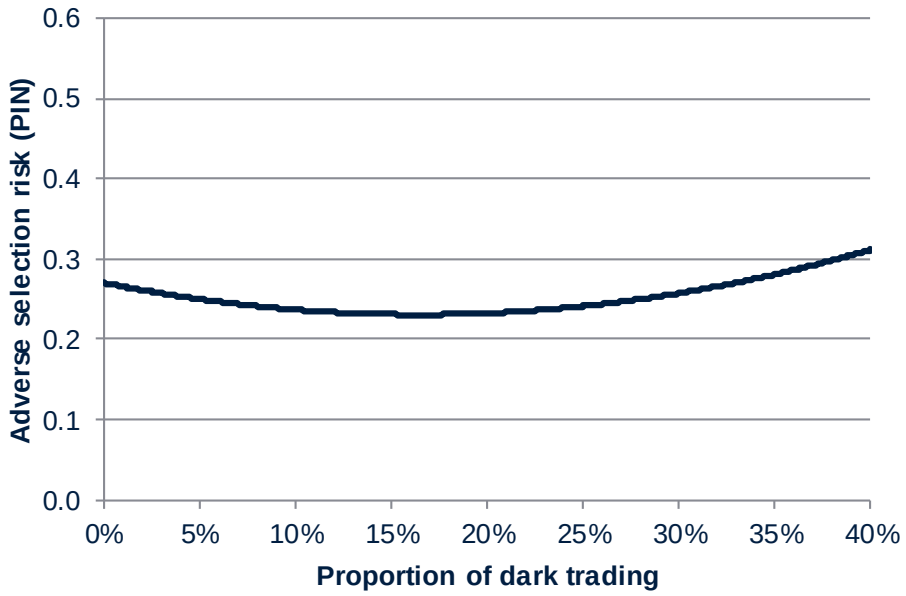
be at the stock level in the Brazilian context (we discuss this further in section 4.3.4).

Figure 4.3 Effect of dark trading on market quality

Panel A: liquidity



Panel B: adverse selection risk



Note: The figure plots the estimated effects of dark trading on market liquidity, with effective spread (Panel A) and adverse selection risk (Panel B) used as a proxy for market liquidity. The estimated effects are obtained from the results of panel regressions as described in Tables 3 and 4 of the FCA's paper. The sample consists of 288 FTSE 350 stocks trading simultaneously on the four main London exchanges/trading venues—the London Stock Exchange, BATS, Chi-X and Turquoise—between 1 June 2010 and 30 June 2015.

Source: Financial Conduct Authority (2017), 'Aggregate Market Quality Implications of Dark Trading', Occasional paper 17.

As discussed in section 2, Brazil is a much smaller market than the USA, France, Germany and the UK. The overall volume traded is much lower and

the lit market is less fragmented. The empirical studies referenced above have been conducted based on data in large financial markets. Separate empirical analysis may need to be undertaken to tailor these thresholds to the Brazilian market.

4.2.2 Impact on cost of trading

It is also important to understand how the different trading mechanisms that could be available to facilitate block trading would affect the cost of trading for the end-investor. The cost of trading includes both explicit costs (e.g. fees) and implicit costs (e.g. bid–ask spread cost, price impact).

As discussed in section 4.2.1, block traders seek trading solutions that minimise their explicit and implicit costs and price impact (to help them deliver best execution for their clients).

Feedback from fund management firms trading block trades indicates that their first preference from a cost of trading perspective is to look for a counterparty to their trade on a venue that offers a midpoint solution. In that case, the cost of trading would be limited to a trading venue fee.

Here, dark pools have an advantage over OTC and lit markets as they price at the mid-price.

In OTC markets, the block trader may pay a higher fee because the broker takes a risk and provides immediacy. The price that the block trader pays in OTC markets is not the mid-price but a risk price—an OTC broker typically charges a spread for taking on the risk of the trade, if acting on a principal basis. While the buy-side trader may still get a price improvement compared with the bid or ask in the CLOB on the lit market, it is unlikely to be the mid-price. Tighter capital rules on brokers have also made it costlier for brokers to take on risk in recent years, and this is reflected in their prices and service offering.

The probability of finding a matching counterparty on a venue is also of critical importance. If the trader is unable to find a counterparty after a few days (or based on experience from previous efforts) they may seek help from a broker, at which point the higher fee is more acceptable.

Lit markets are less attractive for investors trading large sizes due to price impact (as discussed in section 3).

Hidden orders have tended to be less popular in the EU partly due to liquidity imbalances in the order book—i.e. there may not be sufficient (small) orders in the book for the large order to execute without a temporary price impact.

In sum, executing block trades on a dark pool trading venue is likely to be most cost-efficient, unless it takes too long to match the trade on a dark pool and the block trader attaches a high value to immediacy—in that case, trading OTC could be better option.

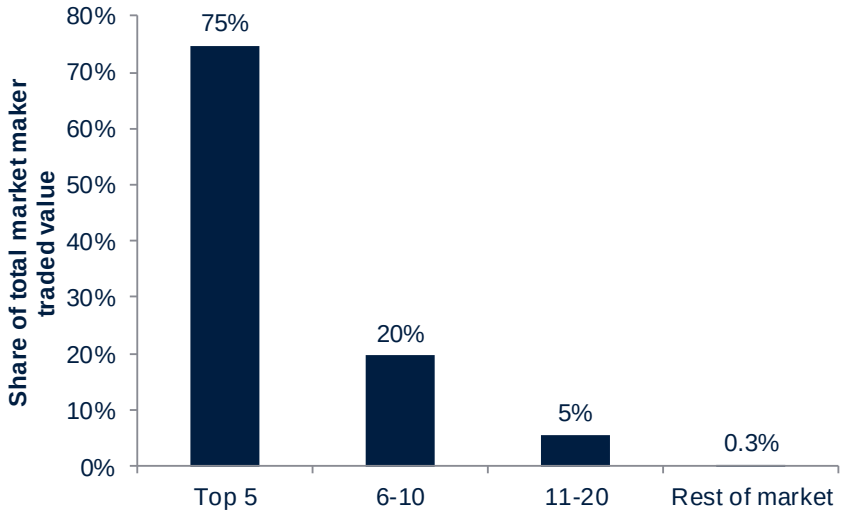
4.2.3 Impact on competition

The advantage of a venue-based solution for facilitating block trading (such as a dark pool) is that it provides access to all brokers, irrespective of size, on a non-discriminatory basis. In other words, in principle, it enables all brokers to compete to execute block trades on behalf of investors.

This contrasts with the market for OTC trading. One of the important economics characteristics of equity trading markets is the existence of network effects. This is where the benefit that one user receives from a network increases with the number of users of the network. Network effects favour large scale because a large market offers more likelihood of matching buyers and sellers. It is likely that only the larger brokers would have sufficient scale to be able to offer OTC trading for block trades.

As noted in section 2, overall market-making activity by brokers is quite low in Brazil (see Figure 2.3) and the Brazilian market is already highly concentrated among a small number of brokers (see Figure 4.4).[62]

Figure 4.4 Market shares of market makers in Brazil, 2019



Note: Data provided by B3 shows 28 active market makers in 2019. These market makers were ranked according to their share of total market maker traded value (R$) in 2019.

Source: Oxera analysis of B3 data.

Given the already concentrated nature of market-making activity, if CVM were to propose an OTC-based solution it would need to ensure effective competition in the broker market.

High levels of concentration in the OTC broker market may also lead to a market structure similar to the broker crossing networks (BCNs) that previously operated in Europe. In this situation, the remaining large brokers would compete with the trading venues for order flow by crossing client orders internally or with opposing client orders from other large brokers.

In the European context, regulators have emphasised a distinction between a large BCN-style market structure and regulated trading venues. An important difference is that on-venue market structures (such as exchanges) are generally required to provide transparent and non-discriminatory access to any

[62] Across all traded stocks, the average Herfindahl–Hirschman Index (HHI) for market making in December 2019 was 5,888. HHI is a metric commonly used by competition authorities to assess the degree of concentration in a market. The HHI is calculated by adding together the square of each firm's market share, for all firms in the market. In this scenario, the market shares are each individual market maker's share of total market-making activity. By construction, the HHI is bounded between 0 and 10,000, where 10,000 represents a monopoly. The European Commission has recommend that markets with HHIs of below 1,000 are unlikely to raise concerns regarding concentration. See European Commission (2004), 'Guidelines of the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings', February, *Official Journal of the European Union*, (2004/C 31/03).

participant, whereas the BCNs generally provide access on the basis of commercial incentives.

4.2.4 Impact on liquidity

Liquidity is another key metric of a well-functioning equity trading market.[63] A liquid market enables participants to easily buy and sell shares without delay and price impact. A liquid market is characterised by its ability to absorb large trading volumes without substantial price movements.

Having more than one lit venue typically results in trading fragmentation (i.e. a stock is traded in more than one venue), but does not necessarily result in liquidity fragmentation. In principle, brokers can connect to multiple lit venues to search for the best execution of their orders. Pre-trade transparency enables brokers to employ smart routing algorithms to observe the books of the lit venues and to achieve best execution. In order words, if the order books are transparent and a sufficient number of brokers have access to all lit venues, then market participants trade in a consolidated pool of liquidity.

Dark trading is different. If an investor decides to send a block trade to dark pool A, then this block trade will not be visible to other investors who may send their block trade to dark pool B or to a broker for OTC trading. In other words, dark trading fragmentation results in liquidity fragmentation, not only between the lit venues and dark pool venues, but also between different dark pool venues, and between dark pool venues and OTC.

The more dark pool venues and OTC brokers there are, the smaller the probability of matching a block trade in the dark. In other words, everything else being equal, the probability of matching block trades is higher when there is one dark pool of liquidity than if the liquidity is dispersed in OTC and dark pool venues. We note that conditional orders (explained in section 3), offered by dark pool venues, may still enable brokers to use multiple dark pools for the same block trade at the same time, which potentially creates one liquidity pool for dark trades.

Block traders will be attracted to venues with a high probability of matching. This suggests that there needs to be a sufficient critical mass of liquidity for successful order matching in the dark. To inform the discussion of whether the Brazilian market is large enough to sustain a dark pool venue (without undermining liquidity and price formation in the lit venues), we use insights from other financial centres, in particular from Europe. Figure 4.5 compares the volume traded in all European dark pools with two scenarios for dark trading in Brazil: the equivalent amount that might be expected from a 10% and a 40% threshold for dark block trading in Brazil.[64]

Figure 4.5 also shows the trading volumes of two dark pools in Europe (SG CIB AlphaY and SLS) that were unsuccessful in obtaining the critical mass of liquidity. SLS is particularly interesting because it specialised in block trades only. The lower threshold of 10%, which would be equal to R$763bn of trading volume in the period 2015–18, is significantly higher than the volumes of the

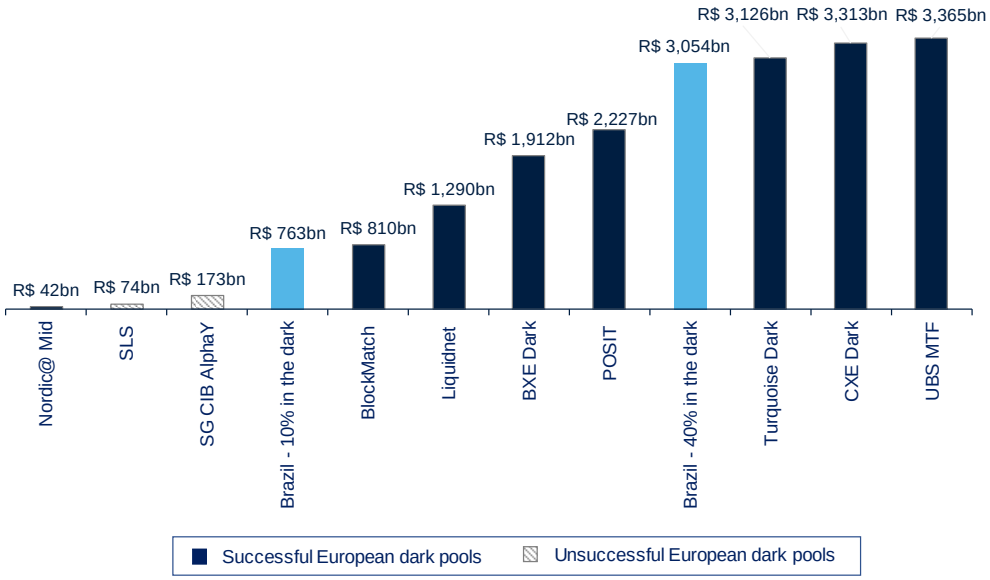
[63] There are several different dimensions of liquidity: width (cost of immediate consumption, e.g. bid–ask spread); depth (volume of orders posted at each price); immediacy (time taken for the execution of an order at a given price); and resilience.
[64] Based on B3 data, we have estimated total value traded across all stocks from 2015 to 2018. We have hypothetically estimated the volume traded in the dark, considering the acceptable range of 10–40%, as discussed above. We have then compared this value with the total volume traded across main European dark pools for the same period. Our sample of European dark pools consists of: BXE Dark, BlockMatch, CXE Dark, Liquidnet, Nordic@ Mid, POSIT, SG CIB AlphaY, SLS, Turquoise Dark, and UBS MTF.

two dark pools in Europe that were unsuccessful, which were R$74bn and R$173bn respectively over the same period.[65]

This is also considerably higher compared with the volume traded in ASX Centre Point (a well-functioning dark pool facility in Australia) in the period 2015–18, which was R$18.8bn.[66]

This could suggest that even a relatively low threshold in the region of 10–15% as a proportion of total trading value would be sufficient to support a dark pool in the Brazilian market. We note that this assumes no trading of block trades OTC—allowing block trades to be executed OTC would reduce the volume of block trades available for dark pools and could then reduce the viability of dark pools.

Figure 4.5 Total volume traded in the dark (2015–18)



Note: The values presented in this chart show the total volume traded across main European dark pools from 2015 to 2018. The corresponding values for the Brazilian market are based on the assumption that between 10% and 40% of total volume traded can be transacted in the dark, as indicated by the thresholds summarised above. The values reported in this chart are denominated in R$. The volume traded in European dark pools (reported in euros) from 2015 to 2018 was converted to R$, using ECB reference exchange rates from 2015 to 2018.[67] The annual exchange rate is estimated as a simple average of daily exchange rates for a given year. Average annual exchange rates are then multiplied by the annual euro-denominated volume to obtain the volume traded in R$ for a given year.

Source: Oxera analysis based on B3 data for Brazil and Liquidmetrix data for European dark pools.

It is also important to look at the volume of dark trading per stock. While there may be sufficient capacity at the market-wide level, it is also important to ensure that there is sufficient liquidity at the stock level. As explained in section

[65] These two venues exited the market in November 2017 and November 2018. SLS was a venue specialising in block trading, transacting large orders significantly higher than the LIS threshold in Europe. Traded volume (denominated in euros) was converted to R$ using ECB reference average exchange rates for the period of analysis (2015–18).
[66] This value represents the sum of quarterly volume traded in ASX Centre Point Australia from Q1 2015 to Q4 2018. See ASIC, 'Equity market data', https://asic.gov.au/regulatory-resources/markets/market-structure/equity-market-data/. The AUD-denominated values are converted to R$ based on the ECB reference average exchange rates for the period of analysis, namely 2015–18.
[67] See European Central Bank website, 'European Central Bank - Statistical Data Warehouse - Quick View', http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=120.EXR.M.BRL.EUR.SP00.A

2, trading activity in Brazil is highly concentrated in a small number of stocks—the top 20 stocks in terms of trading activity account for 50% of the total trading value.

As expected, the demand for block trading in Brazil is typically much higher in more liquid stocks. This is consistent with the empirical findings obtained by various academic and regulatory studies. For instance, a study by the U.S. Securities and Exchange Commission (SEC) in 2018 found that stocks with lower ADV had a smaller percentage of block trades than securities with larger trading volume.[68] Another study from Bloomberg Tradebook also shows the percentage of block trading increasing with average daily volume. [69] One explanation for this trend is that more institutional interest exists for liquid stocks given that they tend to have a larger market cap or cheaper price. This attracts larger portfolio positions, hence, the larger trade sizes.

Similarly sized orders are also observed for less liquid and smaller stocks, albeit to a lesser extent. Indeed, in Brazil we observe the existence of large trades for stocks with a relatively low market capitalisation as well. For example, there were 37 stocks for which trade sizes of greater than R$30,000 were submitted in 2019.[70] The smallest size of stock (based on market capitalisation) was R$35.1m (equivalent to €7.7m) and the monthly volume traded for the least traded stock, was R$31,179 (equivalent to €7,066).[71]

In other financial centres, dark pools have been successful in covering a wide range of stocks. For example, in Europe, dark pools offer trading services in less liquid stocks as well as the more liquid ones.

The average volume traded per month at the instrument level ranges from R$2.2m to R$30.1m (€0.6m to €8.0m) across the main European dark pools.[72] However, more in-depth analysis of trading activity on a major European dark pool (Liquidnet) in Q1 2019 suggests that trading still occurs in relatively illiquid stocks (see Table 4.2). For example, during the period of analysis the total monthly traded value of the least-traded stock on Liquidnet was €2,445 (equivalent to R$10,559)—this is lower than the monthly value traded for the least-traded stock in Brazil over the same period, which was R$40,987 (equivalent to €9,266).

Likewise, some instruments were traded on only one day during Q1 2019.

[68] U.S. Securities and Exchange Commission (2018), 'Empirical Analysis of Liquidity Demographics and Market Quality For Thinly-Traded NMS Stocks', https://www.sec.gov/files/thinly_traded_eqs_data_summary.pdf
[69] See, for example, See Phadnis, K., 'READING THE ELECTRONIC TAPE: BLOCK TRADING IN TODAY'S ELECTRONIC MARKETS', Bloomberg Tradebook, https://data.bloomberglp.com/tradebook/sites/6/91716_BlockTrading-WP.pdf
[70] This value represents the number of unique stock-month combinations with a trade size greater than R$40,000, from January to December 2019.
[71] The R$-denominated values are converted to euros based on the ECB reference average exchange rates for the period under consideration.
[72] The euro-denominated values are converted to R$ based on the ECB reference average exchange rates for the period of analysis.

Table 4.2 Trading activity

	Liquidnet
Total traded value of least-traded stock[1]	R$10,559 (€2,445)
Minimum trading days[2]	1
Average trading days	9
Market capitalisation of smallest Euronext company traded on venue[3]	R$94.6m (€22m)
% of active Euronext stocks traded[4]	28%

Note: [1] Includes all stocks that were traded at least once on the respective venue in Q1 2019. [2] Fewest days a stock was traded on the venue during the period. There were 63 trading days across the whole period. [3] Includes all Euronext Cash Market listed equities (Euronext Access, Growth and Main Market). [4] Includes all Euronext listed stocks traded at least once on Euronext in Q1 2019. The euro-denominated values are converted to R$ based on the ECB reference average exchange rates for the period under consideration (first quarter of 2019).

Source: Oxera analysis of Liquidnet and Euronext Cash Market data.

4.3 Summary and implications for policy design

This section summarises our assessment of CVM's proposal to facilitate block trading by allowing large trades to take place in the OTC markets.

CVM's policy objective is to ensure a well-functioning equity market in Brazil. This is a market that delivers high-quality:

- price formation—the process of determining the price of an asset in the marketplace;
- liquidity—the ability of traders to easily buy or sell assets.

While it appears that more could be done to facilitate the liquidity of trading in stocks of large sizes (block trades), it is important to keep in mind the overall functioning of the market and price formation.

This raises a number of interesting policy questions from a market design perspective:

1. What are the different trading mechanisms that have developed to facilitate the trading of large blocks?
2. Given the preference for block traders to trade in the dark, what is an acceptable threshold of dark trading that could take place before market quality and price formation are impaired?
3. Once this threshold for dark trading has been set, what is the most efficient market design for the trading of block trades in the dark? What are the advantages and disadvantages of promoting on-venue dark solutions over OTC markets for the trading of large blocks? Is the Brazilian market large enough to sustain on-venue dark solutions?
4. What should be the minimum size threshold for a large order to be classified as a block trade?

We explore each question in turn.

4.3.1 Q1) What trading mechanisms have developed to facilitate block trades?

In section 4.2, we reviewed the different trading mechanisms that have developed across financial centres to facilitate block trading.

A common theme from our analysis is that investors trading in large sizes want to hide their trading intentions by trading in the dark (i.e. without pre-trade transparency) to avoid price impact.

Options include the use of hidden orders, dark pools, OTC markets and auctions.

In section 3, we also reviewed the advantages and disadvantages of policymakers favouring each option by considering their impact on price formation, cost of trading, competition and overall liquidity. We make the following observations for each dimension.

- Price formation—the higher the quality and speed of post-trade transparency in the market, the better it would be for price formation. Trading solutions that operate in the lit order book (e.g. hidden orders, conditional orders) are likely to be better for price formation, than off-venue solutions that do not offer pre-trade transparency (e.g. OTC markets). To some extent, dark trading could still be beneficial for price formation in the lit market since it helps reduce the volatility and pricing errors of uninformed traders on lit markets.
- Cost of trading—on-venue dark trading mechanisms offering mid-price solutions typically provide the lowest cost of trading for institutional investors for block trades.
- Competition—due to network effects, OTC trading is likely to result in a limited number of brokers being able to offer OTC trading for block trades. The brokerage market is already concentrated in Brazil. In contrast, on-venue dark trading solutions would enable many brokers to participate.
- Liquidity—block trades will seek to trade in ways that minimise price impact. The impact on the liquidity of the overall market will depend on the fragmentation of pools of existing liquidity and how the pools of block liquidity develop (the less fragmentation the better, particularly in a small financial centre).

CVM's current proposal is to allow OTC trading for block trades. Our analysis suggests that on-venue dark solutions would be preferable from a market design perspective. OTC trading could be allowed if it did not undermine the viability of dark pool trading and other on-venue solutions for dark trading—i.e. the Brazilian market would need to be sufficiently large to sustain both OTC and dark pool trading.

4.3.2 Q2) What is an acceptable threshold of dark trading that could take place before market quality and price formation are impaired?

Given the preference for block traders to trade in the dark, the next logical policy question is to evaluate what is an acceptable threshold of dark trading that could take place before market quality and price formation are impaired.

In section 4.2.1, we discussed how regulators and the market microstructure literature recognise that there is a limit to the amount of dark trading that can happen in a market before price formation and liquidity become impaired.

We identified that, in general, dark trading does not contribute to price formation, however a certain amount could be beneficial to the extent that it helps to reduce the pricing errors of uninformed traders on lit markets and it

aids the self-selection of informed traders on lit markets and uniformed traders in the dark markets.

The next policy question is what is this acceptable threshold beyond which dark trading impairs market quality? This is an empirical question that has been examined in other markets.

Previous studies estimate that the threshold for dark trading should be in the region of 10–15% of total trading at the market level, possibly up to 40% if dark trading is limited to large blocks, and ranging from 9–30% depending on the liquidity at the stock level.

The overall size of the market and the total volume of lit trading at a stock level are also important for price formation and market quality.

As discussed in section 2, Brazil is a much smaller market than the USA, France, Germany and the UK. The overall volume traded is much lower and the lit market is less fragmented. The empirical studies referenced above have been conducted based on data in large financial markets. Empirical analysis may need to be undertaken to tailor these thresholds to the Brazilian market.

4.3.3 Q3) If some dark trading is allowed, what would be the most efficient market design for the trading of block trades in the dark?

In Q1) we concluded that on-venue dark solutions[73] would be preferable from a market design perspective. We also recognise that the on-venue dark solutions will be more successful and therefore effective if there is a higher probability of matching traders wishing to buy and sell orders of large sizes.

Given economies of scale and network effects, traders benefit when block liquidity is more concentrated, as this increases the probability of execution, reduces search costs, and increases the chance of securing the best possible price.

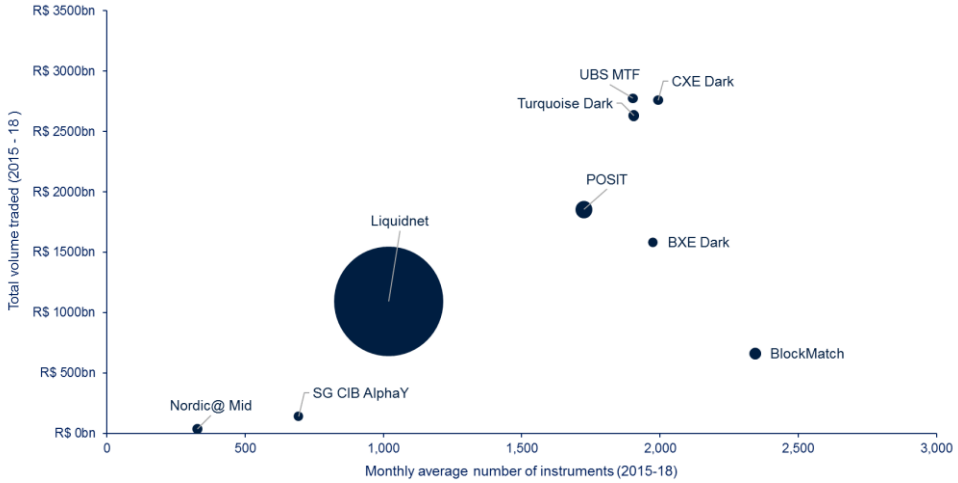
As the Brazilian market is not large, there is also a question about the capacity for on-venue dark solutions in Brazil. To be successful, the pools of block liquidity need to be sufficiently large to attract order flow.

The capacity of on-venue dark trading will increase if block traders are able to access multiple trading mechanisms at the same time (i.e. if they can multi-home[74]). New innovations, such as conditional orders being developed in Europe, may help to deliver this.

Figure 3.11 shows the total volume traded across main European dark pools from 2015–18 (y-axis) and the monthly average number of instruments traded in those venues from 2015–18 (x-axis). The size of the bubbles shows the median trade size.

[73] Here on-venue dark solutions refers to any mechanism delivered by a trading venue to facilitate block trading. This includes variations of hidden orders, dark pools, and auction facilities.
[74] A user who joins only one network is said to 'single-home', whereas a user who joins more than one network is said to 'multi-home'. Multi-homing is an important determinant of competition in two-sided networks in general. With the rise of MTFs and other trading venues competing for order flows with regulated exchanges, European markets have observed an increasing level of multi-homing in trading: a significant number of brokers have access to multiple trading venues. The choice of venue normally depends on the type and size of the trade, and best execution is guided by factors such as trading fees, transparency requirements, and various liquidity priorities measured by spreads and market impact costs.

Figure 4.6 Relative size of European dark pools



Note: The y-axis shows the total volume traded across main European dark pools from 2015–18. The total volume traded presented in this chart is denominated in R$. Volume traded in European dark pools (reported in euros) from 2015 to 2018 was converted to R$, using ECB reference exchange rates from 2015 to 2018. The x-axis shows the monthly average number of instrument traded in those venues from January 2015 to December 2018. The size of the bubbles shows the median trade size.

Source: Oxera based on analysis of data from B3 and Liquidmetrix.

Trading venues need to attract sufficient trading to cover the fixed costs associated with operating a trading venue. This informs the discussion on the extent of potential competition at the venue level that the market can support. How many venues can effectively exist to sustain on-venue dark trading for large orders in Brazil?

In Europe, we observe that block trading is much more concentrated than trading of normal-size orders. A significant proportion of on-venue dark trading for large orders is carried out by three venues (Liquidnet, Posit and Turquoise Plato). In fact, more than 77% of the value of on-venue large block trading in Europe takes place on Liquidnet and Posit. This is likely to be for two reasons:

- first, externalities and economies of scale imply that block-traders benefit when liquidity is consolidated in one venue, increasing the probability of execution, securing a better price (lower spread) of execution, and reducing search costs;
- second, examples from the European market suggest that there may be a natural limit to the number of dark pools specialised on block-trade execution, because a dark pool needs to amass a sufficient number of large orders in order to be able to match them. In the past, there were more block-oriented dark pools in Europe, but some exited the market because they were unable to consolidate sufficient volumes.[75]

As noted in section 3, the trend of larger parent orders being split into smaller child orders means it is difficult to quantify the demand for dark trading in Brazil without further analysis. However, considering the structural differences between Europe and Brazil (e.g. the overall volume traded in Brazil is much lower and the lit market is less fragmented) the number of venues for block

[75] BlockCross was a block-oriented dark pool that was active between 2009 and 2012 and was closed due to problems attracting sufficient liquidity. Pipeline was another dark pool which restricted trades to those above a minimum order size, but it shut down in 2012.

trading in the dark that would be sustainable is likely to be lower in Brazil than in Europe.

The other question is whether on-venue dark solutions would be sufficient to support the liquidity for *all* Brazilian stocks. As discussed in section 3, dark pools in Europe provide a good coverage of stocks. Furthermore, the demand for block trading in Brazil in 2019 has been mostly for the larger more liquid stocks.

Although on-venue dark solutions would be preferred (over OTC trading), what would be the advantages and disadvantages of allowing block trades to be executed OTC as well? One option could be to set a very high trade size threshold for trading block trades OTC and a slightly lower trade size threshold for trading block trades in a dark pool—in other words, only very large block trades could then be traded OTC. Another option would be to allow only block trades in relatively illiquid stocks to be traded OTC.

OTC trading could be useful for block trades in more illiquid stocks, i.e. stocks that have too little trading for trading in dark pools to be viable. European experience suggests that it is also possible to trade illiquid low volume stocks in on-venue dark facilities so the case for OTC trading becomes less relevant (and that in any case demand for block trades in smaller stocks is more limited). Moreover, there is little that a regulator can do at the lower end of the tail of the distribution if there is little demand to trade the stock. If a trader owns a big chunk of a stock that others are not interested in trading, the chances are that selling it is not going to go well. From an economic perspective this is not an issue and consistent with a well-functioning market.

Finally, importantly, one of the main potential disadvantages of allowing OTC trading of block trades is the externality that it imposes on dark pools: given the relatively small size of the Brazilian market, executing some block trades OTC would result in dark trading fragmentation thereby fragmenting dark liquidity and potentially undermining the viability of dark pools.

4.3.4 Q4) What should be the minimum size for an order to be classified as a block trade?

The calibration of the minimum size threshold (i.e. the definition of a ‘block trade’) needs to be mindful of the trade-off between limiting the amount of dark trading, to protect market quality, while ensuring there is sufficient liquidity for traders seeking to trade large orders.

As explained, in Europe, a block trade typically refers to orders that are large in scale (LIS) compared with the normal market size. The minimum size for an order to qualify as LIS is determined at the instrument level, with more liquid instruments having a higher threshold, depending on the average daily turnover of shares admitted to trading on a regulated market for that instrument.[76]

The CVM would need to undertake empirical analysis to calibrate the level of minimum size thresholds that would be expected to meet their objective of limiting dark trading to a set threshold (e.g. 10-15%) of total volume traded.

[76] The minimum size thresholds range from €15k for instruments with an average daily turnover of less than €50k, to €400k for instruments with an average daily turnover of between €25m and €50m. For less liquid instruments, an order must be at least 10% of the average daily turnover for that instrument to qualify as LIS. See Article 5 of the EU Markets in Financial Instruments Regulation (MiFIR), EU Regulation (2017/587), Annex II.

In deciding on the thresholds to set it is relevant to consider the implications that the magnitude of the minimum block-size threshold has on market quality.

If the minimum size threshold is set too high, then the probability of order execution in the dark would be limited, as dark pools need to accumulate a sufficient number of large orders to be able to match them.

If the minimum size threshold is set too low, the probability of order execution in the dark would increase, and if the volume of dark trading were to grow significantly this could affect price formation. However, this could be corrected by imposing a cap on dark trading volumes at the stock level, to prevent deterioration of market quality in the lit.

The calibration of the minimum size threshold should be based on an empirical assessment of the future demand for block trading in Brazil and the expected distribution of trade sizes.

One could consider the current observed distribution of equity trading activity in Brazil. However, this approach is likely to underestimate the magnitude of future block trading activity as many orders (referred to as parent orders) are currently being split up into multiple child orders. If block trading were allowed, it is likely that at least some of these parent orders would not be split up into child orders. It would therefore be useful to also analyse the current distribution of trading activity at the investor level to capture parent orders. Initial analysis suggests that the parent orders for institutional investors are on average 79.5 times larger than the corresponding child orders (see Box 4.1).

Box 4.1 Parent and child orders

The CSD in Brazil contains data on the net position of investors over different time periods. For example, if the CSD shows that an investor conducted 10 individual R$100,000 buy trades over the course of a single day in a given stock, then this could imply an underlying trading intention of R$1m.

A comparison of the net position data with the current distribution or orders gives some indication of the potential differences between the size of parent orders and child orders (i.e. those orders that are split up into a series of smaller trades).

B3 collected some data on net investor positions for stocks in the IBrX100 Index in 2019. They grouped the trading activity into two groups: (1) day trades – defined as those with a net end of day position of zero; and (2) directional orders – defined as those positions with non-zero volume bought or sold at the end of the day.

For directional trades a parent order is defined as the average daily net CSD position and the child order is the average size of the individual orders that generated the net position change.[77] 61.7% of the sample of directional orders were orders from institutional investors and 40.4% were from individual investors.

An initial analysis of this data indicates a considerable difference between parent and child order sizes. In the sample data for 2019, the parent orders for institutional investors were on average 79.5 times larger than the corresponding child orders. In comparison, the parent orders for individual investors were on average 2.5 times larger than the child orders.

Source: Oxera based on information provided by B3

[77] It should be noted that using daily net position changes will itself underestimate the true size of block trading intentions, if investors execute large directional trades over periods longer than 1 day.

5 Clearing requirements

5.1 What is clearing?

Clearing refers to the management (risk management, transaction monitoring, netting) of a transaction after the matching of a buy and sale trade and prior to the legal fulfilment of the respective obligation.[78]

In the post-trade process, clearing entails the calculation of net obligations that arise from a securities trade. Dependent on the instrument, jurisdiction and circumstances of parties to a trade, clearing can be undertaken by an intermediary or in-house.

Specifically, there are two forms of clearing:

- clearing via a CCP, where the CCP becomes the counterparty to both the buyer and seller through a process known as *novation*. The CCP takes on and manages the counterparty risk, ensuring the performance of the open contract;
- clearing on an OTC (or bilateral) basis, where the original buyer and seller remain legal counterparties to each other.

A CCP can be defined as an entity that interposes itself between the transaction counterparties in order to assume their rights and obligations, acting as the direct or indirect buyer to every seller and the direct or indirect seller to every buyer. This is done in a process known as *novation*, where the contract to trade between buyer and seller is replaced by separate agreements, where both the buyer and seller only have contractual obligations to the CCP and no longer to each other. As a result, the CCP takes on and manages the counterparty risks that parties to the trade would have otherwise borne.

In most jurisdictions and cases, settlement is conducted on a delivery-versus-payment (DVP) regime, where the delivery of securities is dependent on payment by the buyer.[79] However, under DVP, parties to a trade are still exposed to market risk, which is defined as the loss that one side would incur due to one side defaulting on the transaction, and an adverse market move occurring in the interim, affecting the value of the securities. If a transaction is CCP-cleared, the CCP would take on and manage the market risk.

To clear via a CCP, a broker provides a deposit in the form of cash or highly liquid securities to the CCP as insurance for financial losses should the broker fail to honour its contract with the CCP.[80] This might occur, for example, if the broker goes bankrupt between entering into the contract with the CCP and delivering the security or payment to the CCP. In the event of default, the CCP would first call on posted margin and other funds from defaulting members to fulfil its obligations. If these funds prove insufficient, the CCP can call on its own resources, funds from non-defaulting members, as well as other resources

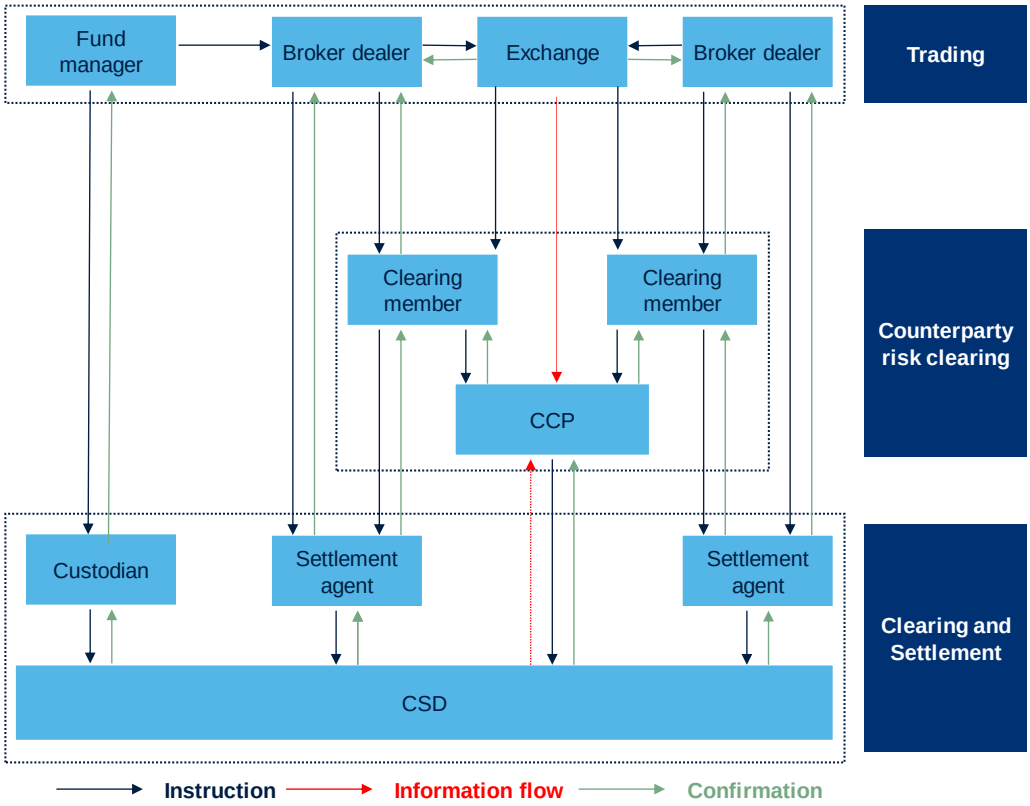
[78] The role of clearing in securities markets is well documented. See, for example,
Bank for International Settlements (2012), 'Principles for financial market infrastructures', April;
Duffie, D. and Zhu, H., (2011), 'Does a central clearing counterparty reduce counterparty risk?', *The Review of Asset Pricing Studies*, **1**:1, pp. 74–95; Bank of England (1999), 'Central counterparty clearing houses and financial stability', *Financial Stability Review*, **6**, June.
[79] Bank for International Settlements (1992), 'Delivery Versus Payment in Securities Settlement Systems', September.
[80] If the broker is not a clearing member, it will work with a clearing broker.

including, for example, the remainder of CCP equity, central bank guarantees, or insurance, in a tiered order of collateral.[81]

In the value chain of the trading process, CCP clearing plays a critical role between the execution of a trade and its settlement. The core function of CCP clearing is to ensure the conclusion of the settlement process by taking on and managing the counterparty risk that both market participants face in the event of default of a clearing member.

Figure 5.1 illustrates the value chain of a trade from trading and verification through to clearing and settlement.

Figure 5.1 Value chain for trading and post-trading (stylised)



Note: The arrows in this figure show the provision of flow-related activities only. This is a stylised example. In Brazil, there are some specific characteristics not captured in this figure—for example, Brazil has a beneficiary owner account system and the cash portion of the settlement is undertaken by the clearing house rather than the CSD.

Source: Oxera report for Comissão de Valores Mobiliários. Full reference: Oxera (2012), 'What would be the costs and benefits of changing the competitive structure of the market for trading and post-trading services in Brazil?', June, p. 5.

The benefits of CCP clearing to both investors and the wider market have been well-documented in the literature.[82] Investors and traders benefit from factors such as:

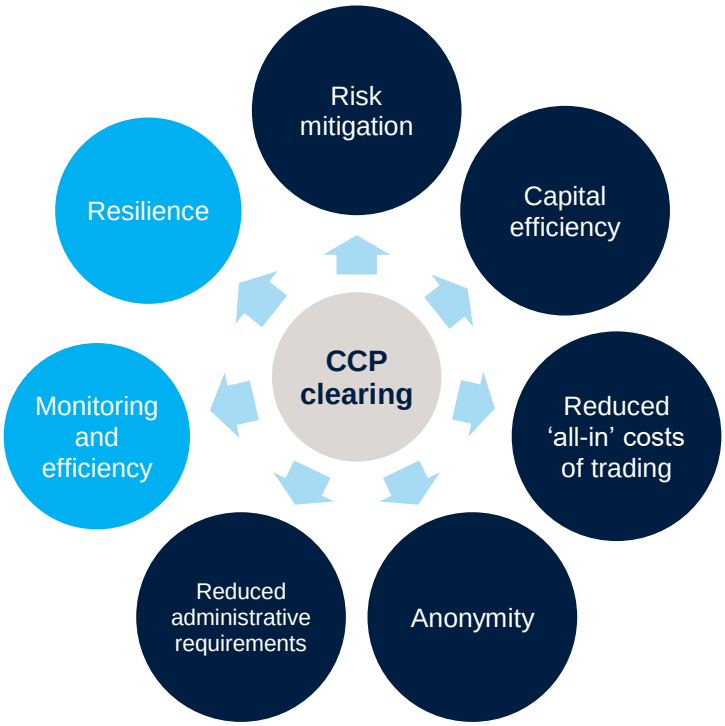
[81] For more details, see Oxera (2014), 'Global cost benchmarking of cash equity clearing and settlement services', p. 44.
[82] See, for example, BIS (2017), 'The European central counterparty (CCP) ecosystem', May; Duffie, D. and Zhu, H., (2011), 'Does a central clearing counterparty reduce counterparty risk?', *The Review of Asset Pricing Studies*, **1**:1, pp. 74–95; Biais, B., Heider, F. and Hoerova, M. (2016), 'Risk-sharing or risk-taking? Counterparty risk, incentives, and margins', *The Journal of Finance*, **71**:4, pp. 1669–1698;
De Nederlandsche Bank (2013), 'All the Ins & Outs of CCPs',
https://www.dnb.nl/en/binaries/711869_All_Ins_Outs_CCPs_EN_web_v3_tcm47-288116.pdf

- **risk mitigation**—CCPs stand in as the counterparty to both buyer and seller to take on and manage the counterparty and market risk from its trading members. The CCP shields each trading member from the effect of a default on the other side of the trade;
- **capital efficiency**—clearing members tend to benefit from cross-margining (or netting) where clearing trades in multiple assets/securities at the same clearing house, thereby reducing capital deployed to cover margin requirements;
- **reduced 'all-in' costs of trading**—particularly in the trading of equities, utilising CCP clearing allows for the netting of a large number of trades in a single security into one settlement obligation. Buy and sell trades conducted on a single exchange can be netted at settlement, but would not be netted in this way in the case of OTC clearing. In the case of HFTs and arbitrageurs, 'flat' intra-day trading activity could generate no settlement fees;
- **post-trade anonymity**—CCP clearing enables trading on a platform where traders are anonymous;
- **reduced administrative requirements**—brokers can pass on due diligence and clearing obligations to the CCP, rather than having to do these activities themselves.

In addition, there are important wider market benefits from CCP clearing that comprise:

- **monitoring and efficiency**—CCPs have the capacity to monitor and assess counterparty risks through normal course of operations across the market. This is because CCPs observe the net exposures of market participants across all trade activity, including instance of defaults as they occur. CCPs can respond to this information by adjusting margin requirements to account for varying counterparty risk. In the absence of a CCP, information counterparty risk is not centralised or generated based on the widest possible information; rather, each market participant may incur costs to assess this individually. Given a higher propensity for asymmetric information on the true counterparty risk of market participants, there are likely to be inefficient outcomes in relation to areas such as assessment of the risk of a trade and the setting of margin requirements;
- **resilience**—in the absence of a CCP, both sides of the trade are exposed to the counterparty risk—i.e. the failure of the one side to honour the terms of an agreed trade. In cases where a substantial volume of shares are transacted, there are systemic risks that could lead to contagion between intermediaries. CCPs are better positioned to absorb losses than individual market participants. During periods of financial distress, CCPs can act as a backstop/insurance for trades and to maintain confidence in transacting securities.

Figure 5.2 Benefits of CCP clearing in equity markets



Note: Investor-level and wider market benefits in dark and light blue respectively.

Source: Oxera.

5.2 Current regulatory framework in Brazil and CVM proposal

In Brazil, all exchange-traded securities are currently traded on an exchange and cleared with a CCP.[83]

The regulatory framework specifies that the settlement of securities must be done on a DVP basis to eliminate settlement risk.[84] This means that the delivery of securities is dependent on payment by the buyer.[85]

There are also specific regulations relating to post-trade settlement of trades in Brazil that vary from conditions in Europe. For example, a unique characteristic of the Brazilian CSD model is that Brazilian regulations mandate that securities be registered in individual investor accounts under the beneficiary owner's name. That means that the beneficial owner is identifiable by the stock exchange, CSD, the Central Bank of Brazil and CVM.[86]

We understand for the purposes of our assessment that CVM is proposing to exempt OTC block trades from being required to be cleared by a CCP.[87]

[83] B3 Regulamento Câmara - atualização jul/14 Art. 9 states that all operations executed in the cash equities market are liable to be accepted by the clearinghouse.
[84] Regulation: BACEN Circular 3.057/2010. For more information, see B3, 'Guide for Nonresident Investors', http://www.b3.com.br/data/files/F9/56/04/8D/932106108326F006790D8AA8/GUIA-INR-B3.pdf
[85] For more information, see Bank for International Settlements (1992), 'Delivery Versus Payment in Securities Settlement Systems', September.
[86] For more information, see B3, 'Guide for Nonresident Investors', http://www.b3.com.br/data/files/F9/56/04/8D/932106108326F006790D8AA8/GUIA-INR-B3.pdf
[87] CVM (2020), 'PUBLIC HEARING NOTICE SDM No. 9/19'.

5.3 Clearing arrangements for large blocks

In Brazil, all equity trades (including large orders) are currently executed on B3's exchange. All trades of Brazilian equities are therefore cleared through B3's clearing house.

This is different from the equity trading landscape in Europe, where there are multiple trading venues that offer alternative types of trading, such as trading OTC and in the dark.[88]

Despite these differences, equity trades executed on an exchange, MTF or dark pool are generally cleared via a CCP, despite there being no regulatory requirement to do so. The leading European CCPs tend to offer clearing services for trades executed on multiple trading venues. For instance, EuroCCP has direct links to stock exchanges and alternative trading platforms such as Cboe Europe Equities, Turquoise, Equiduct and UBS MTF to facilitate clearing of trades executed on their platform.[89]

In contrast, bilateral OTC trades have not been CCP-cleared in the past. This is partly due to lack of anonymity in OTC trades and, in many cases, trading activity is conducted based on existing relationships between parties. Therefore, investors and traders are in principle able to conduct due diligence themselves and assess the counterparty risk of the other side of a trade.

Over the last decade, there have been shifts in the industry toward a CCP clearing model for OTC trading of equities. These are the result of industry-led initiatives such as Traiana and the extension of its OTC clearing platform, Harmony CCP Connect, to include equity trading (see Box 5.1).

Box 5.1 Traiana initiative

Historically, OTC equity bilateral trades were typically settled between brokers without any CCP involved in the transaction.

Over the last decade, there has been an industry-led shift in the handling of OTC equity trades toward a CCP clearing model. Leading investment banks have adopted services by Traiana, part of CME Group, to provide cross-asset OTC clearing via multiple CCPs for OTC cash equity trading. This has been primarily driven by the desire to take advantage of netting to reduce settlement costs under bilateral OTC trading.

Specifically, Traiana offers a centralised platform that monitors the entire post-trade clearing cycle and directly links to CCPs such as LCH.Clearnet Ltd and EuroCCP.

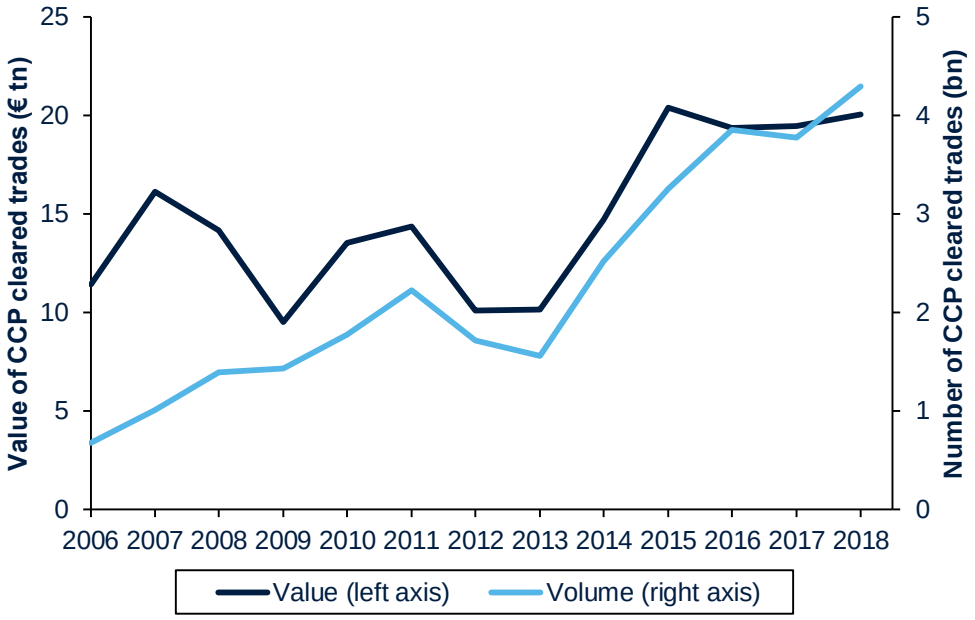
Traiana estimates that its offering can reduce settlement costs by up to USD30m per year in the EMEA region. Other benefits include the reduction of counterparty risk, increased transparency and reduced settlement complications or failures.

Source: Traiana. For more information, see Traiana website, https://www.traiana.com/

These developments have resulted in an increase in the volumes of trades that have been CCP-cleared in Europe over the last decade. Figure 5.3 illustrates an increase of around 140% in the level of cleared equity trades at major CCPs in Europe between 2010 and 2018. Since 2013, there has been a particularly sharp increase in the number of CCP-cleared trades (that has well exceeded the increase in the level of on-exchange equity trades in Europe).[90]

[88] We define dark trading as the absence of pre-trade transparency.
[89] For more information, see EuroCCP website, 'Markets', https://euroccp.com/home/services/markets/
[90] On an annual basis between 2013 and 2018, the number of CCP-cleared equity trades on leading EU CCPs increased by around 2.7bn, vastly exceeding the rise in the number of on-exchange equity trades in Europe, which was around 0.5bn for leading exchanges that are members of FESE, as well as the London Stock Exchange Group and Cboe Europe Equities. A full list of FESE exchanges are available at the FESE website, 'Full members', https://fese.eu/about-fese/#members. Based on FESE and WFE data.

Figure 5.3 Number of equity trades cleared on leading EU CCPs



Note: The chart depicts the value and number of CCP-cleared equity trades across EU member states and the UK through the following CCPs: LCH.Clearnet Ltd, LCH.Clearnet S.A., EuroCCP, Eurex Clearing AG, CC&G, BME Clearing, CCP Austria, KDPW. Not all CCPs and European venues are covered; BME Clearing and KDPW data was not available prior to 2016 and 2011 respectively.

Source: ECB.

It is also the case that CCP clearing is standard practice in other jurisdictions:

- in the USA, the National Securities Clearing Corporation (NSCC) undertakes CCP clearing of all equity trades executed on an exchange.[91] The NSCC additionally ensures the clearing of virtually all equity trades that are between brokers and dealers;[92]
- in Australia, shares traded on an exchange are cleared via a CCP, the Australian Clearing House (ACH). Shares not traded on an exchange can be cleared on an OTC basis.[93]

5.4 Oxera's assessment of CVM proposal

This section considers the two types of OTC block trading and the relevant considerations of CCP clearing of trades in the Brazilian market.

The trading of large blocks OTC could take place with brokers that act on an agency or on a principal basis.

We explore the impact of each in turn and assess the requirement for a CCP clearing obligation in each case.

[91] DTCC website, 'EQUITIES CLEARING - TRADE CAPTURE', http://www.dtcc.com/clearing-services/equities-trade-capture
[92] See, for example, DTCC website, 'NATIONAL SECURITIES CLEARING CORPORATION (NSCC)', http://www.dtcc.com/about/businesses-and-subsidiaries/nscc; and FFIEC IT Handbook InfoBase website, 'National Securities Clearing Corporation (NSCC)', https://ithandbook.ffiec.gov/it-booklets/wholesale-payment-systems/securities-settlement-systems/corporate-and-municipal-securities/national-securities-clearing-corporation-(nscc).aspx
[93] RBA (2008), 'Review of Settlement Practice for Australian Equities', May, p. 2.

5.4.1 Block trading with a broker acting on an agency basis

Figure 5.4 shows the scenario of an agency trade in a simplified setting, where the broker solely acts to facilitate a trade between buy and sell investors.

Figure 5.4 Agency trade

Source: Oxera.

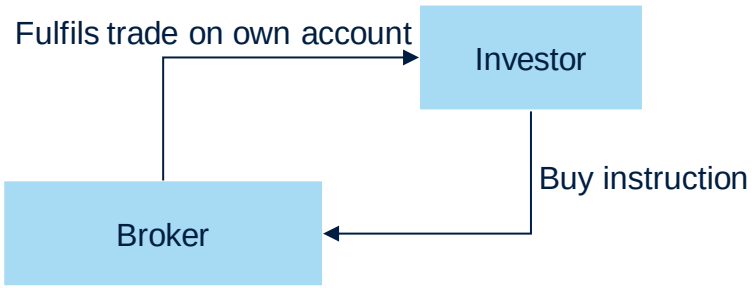
Under an agency mandate, a broker will typically seek to match buy and sell orders for a security through an alternative trading system such as a BCN.[94] In the case of block trading, where a party may seek to offload a substantial volume of shares, the broker could break down the block to match smaller trades, resulting in a large number of trades from a single block. Further, should a residual of unmatched shares remain, the broker could then transact these on a regulated market or MTF.

Under this scenario, the broker does not internalise the position of the trade, but instead facilitates a transfer of securities between market participants.

5.4.2 Block trading with a broker acting on a principal basis

Figure 5.5 shows the scenario of a principal trade in a simplified setting, where the broker acts as the sole counterparty to an investor.

Figure 5.5 Principal trade



Source: Oxera.

Under this scenario, a market participant looking to take on or offload a position in a security would approach their broker and ask for a quote. The broker then trades on its own account, considering the implications of taking on that level of risk of the position. Under a principal trade, the broker does not directly match the trade, but instead interacts only with the market participant.[95]

[94] In the USA, these are typically referred to as electronic communication networks (ECNs).
[95] In the EU, this type of trade is likely to be captured under the Systematic Internaliser (SI) regime after the introduction of MiFID II, which stipulated that equity trades must occur on a regulated market, MTF or SI.

5.4.3 Assessment of a clearing obligation for block trades

In both types of OTC trading, there are wider market benefits from CCP clearing. These include monitoring, efficiency and resilience.

For agency trading, there are additional investor-level benefits from CCP clearing, given the anonymity under which trades are executed. This means that market participants are unable to see the identity of the investor on the other side of the trade and cannot assess the counterparty risk of a trade. CCPs allow market participants to overcome these risks by interposing themselves between buyer and seller, assuming the counterparty risk of both sides of the trade.

The investor-level benefits of CCP clearing for principal trading may be less relevant than under agency trading. This is because, in the case of a principal trade:

- the market participants, such as fund managers, may have trusted long-established brokerage relationships that allow both sides of the trade to assess or already know the counterparty risk in a transaction, avoiding the need for a CCP to interpose itself to either ensure anonymity or contract fulfilment;
- the only parties to the trade are the broker and the investor. Therefore, the investor is not concerned about the counterparty risk of anonymous third-party market participants matching on the other side of the trade.

Despite this, there could still be incentives for some brokers and investors to CCP-clear under principal trading. For instance, smaller brokers may be required by fund managers to CCP-clear trades in order to alleviate any concerns about default risk perceptions. On the other hand, larger brokers may be less incentivised to CCP-clear if default risk perceptions are judged less relevant by clients.

Overall, given that not all market participants may be incentivised to the same degree to CCP-clear, a CCP-clearing obligation could be appropriate if CVM wants the wider market to continue to benefit from CCP clearing.

6 Best execution

6.1 What is best execution, and why does it matter?

Best execution refers to the obligation of an investment services firm (i.e. fund managers and/or brokers) to ensure the best possible result for clients, taking into account price, costs, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of the order.[96]

Best execution is a fundamental component in the regulation of financial services, as it contributes to ensuring investor protection and the integrity of the price formation process and it promotes competition among trading venues.[97]

In particular, best execution aims to regulate the conduct of investment services firms to ensure they are delivering good outcomes for clients. Market participants ensure the soundness, stability and resilience of financial markets, and the transparency of the pricing process if they behave appropriately and act in the best interests of their clients.

This is especially important for retail investors—particularly in the cash equity market—who, generally speaking, are likely to be less informed than institutional investors and, thus, more at risk of the fund manager and/or broker not acting in their best interest.[98] It is therefore important that best execution policies reflect the different levels of client sophistication by tailoring the requirements according to the client category.

Moreover, as Brazil is introducing competition at the trading venue level, best execution plays an even more important role as it ensures that decisions on which venue to execute trades are taken with the interest of the client in mind.

6.2 Current regulatory framework and CVM's proposal

The current best execution regime in Brazil is described in Articles 19 and 20 of CVM Instruction No. 505. This requires an intermediary to consider the following factors when assessing and determining best execution:[99]

- price;
- costs;
- speed of execution;
- certainty of execution and settlement;
- order size;
- nature;
- any other criteria that are relevant to the execution of the order.

[96] See, for example, European Parliament and Council (2014), Directive 2014/65/EU, Article (91), *Official Journal of the European Union*, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014L0065&from=EN.
[97] For a further discussion see, for example, a thematic review conducted by the UK regulator: Financial Conduct Authority (2014), 'Best execution and payment for order flow', July, https://www.fca.org.uk/publication/thematic-reviews/tr14-13.pdf
[98] This concept is commonly referred to as the 'principal–agent problem'. For a further discussion of this subject applied to best execution, see, for example, McCleskey, S. (2004), *Achieving market integration: best execution, fragmentation and the free flow of capital*, Butterworth-Heinemann, pp. 7–13.
[99] Comissão de Valores Mobiliários (2011), Instruction 505, Article 19, https://www.agorainvest.com.br/uploads/Institucional_Investor/CVM%20505.pdf

The current regime applies the same requirements to retail and institutional investors. However, CVM is proposing to change this by proposing to introduce specific requirements for retail investors. We understand that the current rules for institutional investors will continue.

The proposal is that the best execution requirements for retail investors—defined as all those investors that do not fall under the definition of a 'qualified' (i.e. institutional) investor—would be based on the total cost of the trade, including 'the price of the financial instruments and the costs relating to the execution'. Costs relating to the execution would include 'any and all expenses borne by the investor'.

A best execution approach for retail investors based on the total cost of the trade—commonly referred to as 'total consideration'—means that if venue A offers an instrument for 120 and the costs of execution on that venue amount to 10, while venue B offers the same instrument for 123 and the costs of execution on venue B amount to 5, then the retail order would be directed to venue B. This is because venue B offers a lower total consideration (128) compared with venue A (130) and, therefore, it delivers the best possible result for the retail client.[100]

CVM has acknowledged the alternative approach in the USA, as set out in Regulation National Market System (Reg NMS), and does not consider that this regime is appropriate for the Brazilian market. The US approach requires the automatic routing of orders between trading venues, with a greater focus on price.

In the following sections, we assess CVM's proposal, highlighting some areas of concern and potential unintended consequences. Then we set out how markets in Europe have dealt with best execution obligations in official rules and in practice.

6.3 Oxera's assessment of CVM's proposal

This section considers the potential unintended consequences of CVM's proposed rules on best execution. In particular, we identify two main areas of CVM's proposal that could lead to some unintended consequences: the strict 'total consideration' approach for retail orders, and the uncertainty regarding what is included and/or excluded under execution costs.

The key messages are that:

- a best execution regime solely based on price and costs may be too restrictive for more sophisticated investors, who may value speed and other factors more in some instances;
- other factors such as speed and certainty of execution may be more relevant than net price under a scenario of financial distress;
- if total consideration includes broker fees, brokers would then be able to lower their fees for a given venue to direct order flow there and thereby distort competition between venues;

[100] See, for example, Casey, J.P. and Lannoo, K. (2009), 'The MiFID Revolution', *Cambridge University Press*; and European Commission (2006), 'Frequently asked questions on Mifid: draft implementing "level 2" measures', https://ec.europa.eu/commission/presscorner/detail/en/MEMO_06_57

- if there are multiple trading venues, each connected to their own CCP, a trader can potentially benefit from netting if they concentrate all trading activity on one venue.

We conclude that, while price and cost are likely to be the most relevant factors for orders from retail investors, it is important that best execution rules maintain a well-rounded view, taking into account other factors where relevant. Moreover, we highlight several areas that CVM should consider thoroughly, such as brokers' fees, and the impact of rebates and discounts.

6.3.1 Unintended consequences of a strict total consideration approach for retail orders

While best execution rules for institutional investors under CVM's proposal consider several factors when assessing best execution, for retail investors CVM's proposal only focuses on total consideration—e.g. price and direct costs. Therefore, CVM excludes the possibility of taking into account other execution factors, such as speed and certainty of execution.

On the one hand, retail investors are likely to execute small orders that will not influence the underlying price of the securities traded. Therefore, retail traders, unlike institutional traders, are more concerned with transaction costs rather than with the market impact of their transaction.[101] Due to these characteristics, the main execution factor for such orders is likely to be net price. On the other hand, while this may be the main factor for the majority of retail orders, it is important to examine the possible scenarios where a strict total consideration approach may not be sufficient.

First, there is a wide spectrum of retail investors, ranging from casual to sophisticated. Retail investors' position on this range depends on, for example, the investor's knowledge and experience, level of information, frequency of trading, and value and volume of executed orders.[102] For example, certain types of sophisticated retail investor such as day traders may have execution preferences that are similar to those of institutional investors. If they believe that they have superior information, speed of execution may be considered a more important execution factor than price.[103] In a market structure with multiple trading venues, each with their own separate post-trade infrastructure, day traders may also have an incentive to concentrate their trading on a single venue to benefit from netting. This would ensure that their net end-of-day position is minimised and would save on settlement costs.

Second, in a period of financial distress retail investors may value other factors more than total consideration. Notably, financially distressed stocks are usually small cap stocks and prone to liquidity shocks—small cap stocks are a type of stocks a retail investors could trade.[104] Under such a scenario, features such as certainty and speed of execution may be considered as key factors. Moreover, when the brokers is deciding who to trade with the resilience of the

[101] Macey, J. and O'Hara, M. (2005), 'From Orders to Market', *Yale Law School*, Center for Law, Economics and Public Policy, research Paper, No. 321.
[102] See, for example, Budimir, M., Holtmann, C. V. and Neumann, D. G., 'The design of best execution market', Information Systems, Justus-Liebig-University of Giessen Germany, link: file:///H:/Client/B3/P07518%20Best%20execution%20&%20dark%20block%20trades/1.%20Background%20material/best%20execution%20-%20factors.pdf; CESR (2005), Annual Report, link: 'https://www.esma.europa.eu/sites/default/files/library/2015/11/annual_report_final_version.pdf.
[103] Casey, J.P. and Lannoo, K. (2006), 'The MiFID Revolution', *ECMI Policy Brief*, **3**, p. 67.
[104] Da, Z. and Gao, P. (2010), 'Clientele change, liquidity shock, and the return on financially distressed stocks', *Journal of Financial and Quantitative Analysis*, **45**:1, pp. 27–48, https://www3.nd.edu/~zda/Clientele.pdf

other party might become another fundamental execution factor to consider when placing a retail order in a situation of financial distress.

Finally, uncertainty of execution could be a concern in a less liquid trading venue and/or in the trading of illiquid stocks. In fact, brokers may need to cancel the order and place it again on a different venue if the order is not executed due to low liquidity. This process may be time-consuming and may not ensure the best possible outcome for the client. In some cases, retail investors may therefore consider certainty of execution to be more important than the net price.[105]

These considerations highlight the need for a well-rounded approach when setting the general criteria of best execution when executing a retail order.

6.3.2 Unintended consequences of an ambiguous definition of execution costs

Our understanding of CVM's proposal is that rebates which are not passed on to the end investor would not be included as part of total consideration. Rebates refer to per-share returns offered to brokers by many exchanges[106] in order to incentivise them to place resting liquidity-providing orders at their venue. Rebates are part of a system known as the 'maker-taker' model. Exchanges offer a rebate to liquidity-supplying orders (non-marketable limit orders), while they charge a fee to liquidity-demanding orders (marketable orders). Exchanges keep the difference between the fees charged and the rebates.[107]

On the one hand, rebates help new trading venues to raise their market share by attracting more order flow. Moreover, rebates play an important role in the trading of less liquid stocks where incentivising market makers has the most impact. On the other hand, it can create conflicts of interest by encouraging brokers to route their orders to the exchanges with the highest rebates, and not necessarily to the one that will provide the best execution (see Box 6.1) .[108]

[105] For a discussion of this point, see McCleskey, S. (2004), *Achieving market integration: best execution, fragmentation and the free flow of capital*, Butterworth-Heinemann, pp. 19–20.
[106] For example, Turquoise offers returns ranging between 0.2 and 0.29 bps to liquidity providers, while Cboe offers returns ranging between 0.15 and 0.225 bps. The percentage offered depends on the value traded on the venue.
[107] For a broader discussion on rebates see Bullock, N. (2017), 'Taking a second look at the maker-taker model', *Financial Times*, June, https://www.ft.com/content/c1e61bac-497b-11e7-919a-1e14ce4af89b
[108] Bullock, N. (2017), 'Taking a second look at the maker-taker model', *Financial Times*, June, https://www.ft.com/content/c1e61bac-497b-11e7-919a-1e14ce4af89b; and D'Antona, J. (2019), 'Sweetening the Deal: exchange rebates, then and now', *MarketsMedia*, https://www.marketsmedia.com/flash-friday-sweetening-the-deal/

Box 6.1 Routing orders to maximise order flow payments may not be in clients' best interests: empirical evidence

Battalio et al. (2016) shows that, on average, non-marketable limit orders routed to venues offering high rebates execute less frequently and are less likely to trade when prices move in their favour. The findings suggest that brokers routing non-marketable limit orders to the venues with the highest rebates may not be obtaining the best outcome for their clients.

The authors analyse the relationship between fees and limit order execution quality using both proprietary limit order data and the NYSE's TAQ database. They examine the relationship between rebates and three measures of non-marketable limit orders quality: the likelihood of a fill, the speed of fills, and the realised spread associated with fills. They find a negative relationship between the size of the rebates and the order execution quality. In order to control for stock and market conditions, the authors compared pairs of identical limit orders posted on different venues, measuring the time it took each order to fill, as well as the extent to which the order filled, from the time when the pair of orders first co-existed. The results demonstrated that there are instances where routing to the venue with the highest fee diminished the order execution quality.

In addition to the findings based on proprietary data described above, the paper examines data from the NYSE's TAQ database. This analysis showed that realised spreads are greater at venues that post lower rebates. Specifically, the data showed that limit orders on the BX—a venue paying a rebate of 0.14 USD per hundred—realised a spread of 0.0074 USD. In contrast, those limit orders on the three venues charging the highest permissible take fee realised spreads between -.0039 USD and -.0061 USD.

The authors conclude that their results indicate an impact of limit order routing decisions on some measures of limit order execution quality, such that 'routing decisions based primarily on rebates/fees appear to be inconsistent with best execution. There is a significant opportunity cost associated with routing all nonmarketable limit orders to a single venue offering the highest liquidity rebates.'

Source: Battalio, R., Corwin, S. and Jennings, R. (2016), 'Can Brokers Have it All? On the Relation between Make-Take-Fees and Limit Order Execution Quality', *The Journal of Finance*, **71**:5.

In the EU and the USA, most brokers do not directly pass on rebates to their clients, and thus rebates are considered inducement to brokers. If rebates were to be passed through to clients, brokers would generally send limit orders to the venue that maximised the likelihood of execution, as brokers receive a commission only when orders execute. Therefore, under this scenario, the higher rebates that the brokers receive, the lower the commissions the brokers can offer to their clients. However, lower commissions do not necessarily compensate clients for missed profitable limit order executions.[109]

While CVM's proposal is clear on rebates, it does not specify whether the fees and commissions of brokers should be included within the assessment of the total consideration. If brokers' fees and commissions were to be included in execution costs, brokers may be able to adjust their own fees and commissions to favour certain venues. In fact, in some cases, brokers may have enough flexibility and leverage to keep their costs low[110] and, thus, to reduce the total consideration of executing an order at a specific venue. This could enable brokers to justify the placement of an order on one venue rather than on another, distorting competition.

[109] Angel, J.J., Harris, L.E. and Spatt, C. (2010), 'Equity trading in the 21st century', USC Marshall School of Business working paper 09-10; and Battalio, R., Corwin, S. and Jennings, R. (2016), 'Can Brokers Have it All? On the Relation between Make-Take-Fees and Limit Order Execution Quality', *The Journal of Finance*, **71**:5.

[110] Bloomberg, Market Media (2016), 'Brokers face cost-cutting limits', December, https://www.bloomberg.com/professional/blog/brokers-face-cost-cutting-limits/

6.4 Comparison with rules in other markets

6.4.1 Best execution in the EU

The best execution rules set out by CVM are similar to the MiFID rules in the EU. However, there are some differences between CVM's proposal and the MiFID rules.

MiFID stresses the importance of protecting investors by adapting the measures to the 'particularities of each category of investors (retail, professional and counterparties)'.[111] In particular, Article 27 of MiFID highlights the importance of carrying out orders in accordance with specific instructions from the client, if available, and taking into account factors such as 'the size and type of the order and the retail or professional nature of the client'.[112]

Similar to CVM, MiFID specifies that the firm executing an order on behalf of a retail client needs to determine the best possible result in terms of the 'total consideration', representing 'the price of the financial instrument and the costs related to execution'[113]—i.e. the total cost of the trade that CVM refers to when it comes to retail orders.

However, MiFID also refers to other factors that firms may need to take into account besides price and cost. It states that, in some cases, speed, likelihood of execution and settlement, size and nature of the order, market impact, and any other implicit transaction costs may be more important than the immediate price and cost consideration—for example, for a large order in a relatively illiquid share.[114]

These nuances, while probably not applicable to most retail orders, are still important to keep in mind when drafting best execution rules to avoid misinterpretation and misconduct in the treatment of retail orders by firms.

In addition, MiFID specifies that fees and commissions charged to clients by the firm executing an order should not be taken into account when selecting the venues to be included in the execution policy.[115] This means that, under MiFID, brokers do not have the flexibility to adjust their fees or provide a discount on their fees for orders executed on a given venue to direct flow to that venue.

Compared with MiFID I, MiFID II has raised the bar in terms of best execution obligations, requiring firms to take 'all sufficient steps' to achieve best execution—while under MiFID I firms were to take 'all reasonable steps'. It also increases requirements for pre- and post-trade transparency. The change in obligations and the introduction of reports on execution quality, top five venues and top five investment firms has increased the level of responsibility that investment firms have to take with respect to best execution.[116]

[111] European Parliament and Council (2014), Directive 2014/65/EU, Article (86), *Official Journal of the European Union*, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014L0065&from=EN
[112] European Parliament and Council (2014), Directive 2014/65/EU, Article 27(9)a, *Official Journal of the European Union*, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014L0065&from=EN
[113] European Parliament and Council (2016), Commission delegated regulation (EU) 2017/565, Recital 101, *Official Journal of the European Union*, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017R0565
[114] The Committee of European Securities Regulators (2007), 'Best execution under MiFID – Public consultation', February, para. 27.
[115] European Securities and Markets Authority (2007), 'Best execution under MiFID : question and answers', May, p. 9, https://www.esma.europa.eu/sites/default/files/library/2015/11/07_320.pdf
[116] ESMA's peer review of best execution under MiFID I revealed some key issues around the supervision of arrangements and policies of best execution, the firm's ability to prove compliance with best execution rules and the supervision of best execution disclosure and consent (see European Securities and Markets

Box 6.2 Best execution policies in Europe

Investment banks in the EU are required to disclose an 'order-execution policy' document where they outline their approach to provide best execution, as required by MiFID II. A comparison of the execution policy documents of the main investment banks in Europe reveals different approaches to providing best execution according to a firm's size and client profile.

Many investment banks and retail brokers—for example, BNP Paribas, Barclays, Deutsche Bank, Equita, IG and Charles Schwab—provide separate best execution policies for retail and institutional investors. However, some of the largest investment banks apply the best execution policy only to institutional investors. This is likely to be due to the fact that they provide financial services mainly to institutional investors.[1]

Most best execution policies specifically designed for retail investors are based on 'Total Considerations'—as stated in the execution policy documents of HSBC, BNP Paribas, Deutsche Bank and Morgan Stanley. However, they also consider factors other than price and direct costs when placing a retail order.

Notably, the retail execution policy of Deutsche Bank includes the option to consider 'other execution factors such as speed, size, and the likelihood of execution' when appropriate or necessary. Similarly, Morgan Stanley allows for the possibility of considering other execution factors besides the 'primary execution factors'—price, costs and expenses, where relevant. UniCredit states that there may be specific situations where other execution factors may matter more than a total consideration.

Similarly, best execution policies of large retail brokers—for example, Charles Schwab and Fidelity International—are based on total consideration. However, they do include the possibility of including other factors—for instance, Charles Schwab says that other execution factors 'can and should still be considered'. Equita states that the first execution factor considered for retail orders is total consideration, but it also considers the likelihood of execution and any other relevant factors. IG, an online broker, in its best execution policy states that 'for all retail clients the best possible result will be determined in terms of the total consideration', however IG also adds that 'it may determine that speed, and likelihood of execution and settlement may take precedence'.

[1] For example, Goldman Sachs states that the 'policy does not apply to retail clients' (see Goldman Sachs (2019), 'EMEA Securities Division Best Execution Policy Summary', https://www.goldmansachs.com/disclosures/mifid/mifid-prof-clients.pdf). Citigroup also states that 'the policy applies to business conducted with professional clients only' (see Citigroup (2019), 'CITI markets and banking execution policy', https://www.citi.com/icg/global_markets/docs/Citi-Markets-and-Banking-Execution-Policy.pdf)

Source: Goldman Sachs (2019), 'EMEA Securities Division Best Execution Policy Summary', https://www.goldmansachs.com/disclosures/mifid/mifid-prof-clients.pdf; Citigroup (2019), 'CITI markets and banking execution policy', https://www.citi.com/icg/global_markets/docs/Citi-Markets-and-Banking-Execution-Policy.pdf; Deutsche Bank (2019), 'Order execution policy – Corporate and Investment Bank', Retail client annex, https://www.db.com/company/en/media/deutsche-bank-cib-order-execution-policy--retail-client-annex.pdf; Morgan Stanley (2018), 'Order execution policy – professional and retail clients', https://www.morganstanley.com/assets/pdfs/sales_and_trading_disclosures/MSIP_MSBIL_Order_Execution_Policy_Disclosures_Statement.pdf; Unicredit, 'Policy esterna di esecuzione/trasmissione degli ordini', https://content.unicredit.it/content/dam/ucpublic/it/privati/documents/MiFid/5_%20Strategia%20di%20trasmissione%20ed%20esecuzione%20degli%20ordini%20di%20UniCredit%20Bank%20AG.pdf; Charles Schwab (2018), 'Best Execution', https://www.schwab.co.uk/public/schwab-uk-en/nn/legal_compliance/best-execution.html; Fidelity International (2018), 'Best Execution Disclosures 2018', Financial administration services, https://eumultisiteprod-live-b03cec4375574452b61bdc4e94e331e7-16cd684.s3-eu-west-1.amazonaws.com/filer_public/d5/b8/d5b857ff-a8d5-4412-899b-226609f7853b/best-execution-report-2018.pdf; Equita (2018), 'Execution Policy', https://www.equita.eu/en/mifid/execution-policy.html; and IG (2018), 'Summary of order execution policy', https://www.ig.com/usermanagement/customeragreements?igCompany=iggb&agreementType=summary_order_execution_policy&locale=en_GB

Authority (2015), 'Best Execution under MiFID', Peer Review, https://www.esma.europa.eu/sites/default/files/library/2015/11/2015-494_peer_review_report_on_best_execution_under_mifid_0.pdf). MiFID II raised the bar of pre- and post-trade transparency in order to address the identified issues.

A1 Thresholds for dark trading: summary of literature review

Table A1.1 provides a summary of various studies that empirically estimate the minimum accepted threshold of dark trading that can happen in the market before price formation deteriorates.

Table A1.1 Thresholds for dark trading

Source	Estimated threshold of dark trading	Market	Definition of dark trading
ESMA	Implemented a cap on dark trading that limits the volume of certain transactions that can be executed on dark pools to 4% at the trading venue level and 8% for all EU trading venues.	**EU**	Dark trading is the volume traded under the reference price waiver and the negotiated transaction waiver as defined under MiFID II.[117]
FCA	The FCA estimated that market quality can be harmed if dark trading exceeds 15% of overall trading.	**UK**. FTSE 350 index 1 June 2010–30 June 2015	Dark trading in this analysis is the proportion of the stock-day's total pound volume executed in dark pools.[118]
Comerton-Forde and Putniņš (2015), 'Dark trading and price discovery'	The authors find that the deterioration in information efficiency begins to occur when dark trading (of all trade sizes) in a given stock exceeds c.10% of value traded. When considering dark trading that is limited to large blocks, they find that maximum informational efficiency occurs around the point at which block trades account for approximately 15% of total dollar volume. The total impact on informational efficiency remains positive until block trades account for approximately 40% of total dollar volume.	**Australia**. Sample comprises constituents of the ASX-listed stocks 1 February 2008–30 October 2011	Dark trading is defined as the dollar volume traded without pre-trade transparency in ASX and across dark pools.[119] Two subcategories of dark trading: • dark trades are trades executed without pre-trade transparency below block size; • block trades are large trades executed without pre-trade transparency.

[117] European Securities and Markets Authority website, 'MIFID II: ESMA PUBLISHES DOUBLE VOLUME CAP DATA', https://www.esma.europa.eu/press-news/esma-news/mifid-ii-esma-publishes-double-volume-cap-data

[118] The empirical approach involves computing a series of stock-day panel estimations relating the market quality variables (effective spread and adverse selection risk) to dark trading activity and other control variables. See Financial Conduct Authority (2017), 'Aggregate market quality – Implications of dark trading', https://www.fca.org.uk/publication/occasional-papers/op17-29.pdf

[119] Comerton-Forde, C. and Putniņš, T.J. (2015), 'Dark trading and price discovery', *Journal of Financial Economics*, **118**.

Source	Estimated threshold of dark trading	Market	Definition of dark trading
CFA Institute	The author finds that market quality initially improves but then declines as dark trading increases. It conservatively estimates that when a majority (>50%) of trading in a stock occurs in un-displayed venues, market quality deteriorates.[120]	**USA**. Sample of 450 US stocks from Q1 2009 to Q2 2011	Dark trading in this analysis is defined as 'aggregate un-displayed trading'. It consists of: dark pools, internalisation, other OTC transactions reported to the NASDAQ TRF, and off-exchange volume reported to the NYSE TRF.[121]
Farley et al. (2018), 'Dark trading volume and market quality: A natural experiment'	The authors find that following a **34%** reduction in dark trading, the cost of trade (e.g. effective spreads, realised spreads, price impact and quoted spreads) remain unchanged. They also find limited evidence that the prices become less efficient.	**USA**. 2,388 unique stocks from the listing exchanges (NYSE and NASDAQ) from 1 September 2016–30 November 2016	To assess the prevalence of dark trading volume for each stock and day, the authors calculate the dollar value traded off exchange scaled by total traded dollar value – Dark Trading.[122]

Source: Oxera summary based on various sources.

[120] See Preece, R. (2012), 'Dark Trading: Is It Hurting Market Quality?', CFA Institute, https://blogs.cfainstitute.org/marketintegrity/2012/11/19/dark-trading-is-it-hurting-market-quality/
[121] To analyse the relationship between dark trading and market quality, bid–offer spreads and top-of-book depth (the dependent variables of interest) were regressed on internalisation and dark pool volumes and other explanatory variables. The results show that, after controlling for factors known to affect spreads and depth, increases in internalisation and dark pool trading activity are initially associated with declining bid–offer spreads and increasing depth—i.e. improving market quality. However, the relationship is not linear; beyond a certain threshold, it reverses.
[122] Farley, R., Kelley, E. and Puckett, A. (2018), 'Dark trading volume and market quality: A natural experiment'.

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