Shedding light on dark trading in Europe

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European equity markets look very different today compared to how they looked prior to the introduction of the Markets in Financial Instruments Directive (MiFID I) in 2007. Trading is fragmented across many venues. Technology and high frequency trading feature prominently. Trade sizes have plummeted and substantial activity is conducted without pre-trade transparency. The trading environment is more complex, and the responsibilities of buy-side traders have been elevated.

The implementation of MiFID II in January 2018 will fundamentally alter the trading landscape again. New restrictions on dark trading and the closure of Broker Crossing Networks will force the buy-side to find new ways to source liquidity and manage execution costs. A range of new market initiatives are being rolled-out to cater to these needs, including new block trading facilities and high frequency auctions which qualify as pre-trade transparent venues. The buy-side need to start changing their trading behaviour now in order to ensure the transition to the post-MiFID II world is a smooth one.

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Background: Where are we now and how did we get here?

European equity markets have been fundamentally transformed over the last decade. The Markets in Financial Instruments Directive (MiFID I), implemented in November 2007, heightened competition for the provision of equity trading services. Incumbent exchanges, the primary listing venues, quickly lost market share to new entrants. Today, the primary listing venues typically account for only 50 and 60 percent of consolidated volume in stocks listed on their own market.

MiFID I created two categories of trading venues: Registered Markets (RMs) and Multilateral Trading Facilities (MTFs). These venues are required to publish bid and offer prices and volumes, unless they meet the criteria for one of four pre-trade transparency waivers: the reference price waiver, the negotiated trade waiver, the order management facility waiver and the large-in-scale waiver (see Table I for details of these waivers). Many MTFs operate without pre-trade transparency under the reference price waiver. Brokers are also able to operate Broker Crossing Networks (BCNs) and Systematic Internalisers (SIs). BCNs are able to match client orders internally without providing pre-trade transparency. SIs allow brokers to internalise customer order flow, with limited quoting obligations. Under MiFID I, new MTFs and BCNs proliferated, leading to rapid growth in the share of volume executed without pre-trade transparency, colloquially referred to as dark trading.

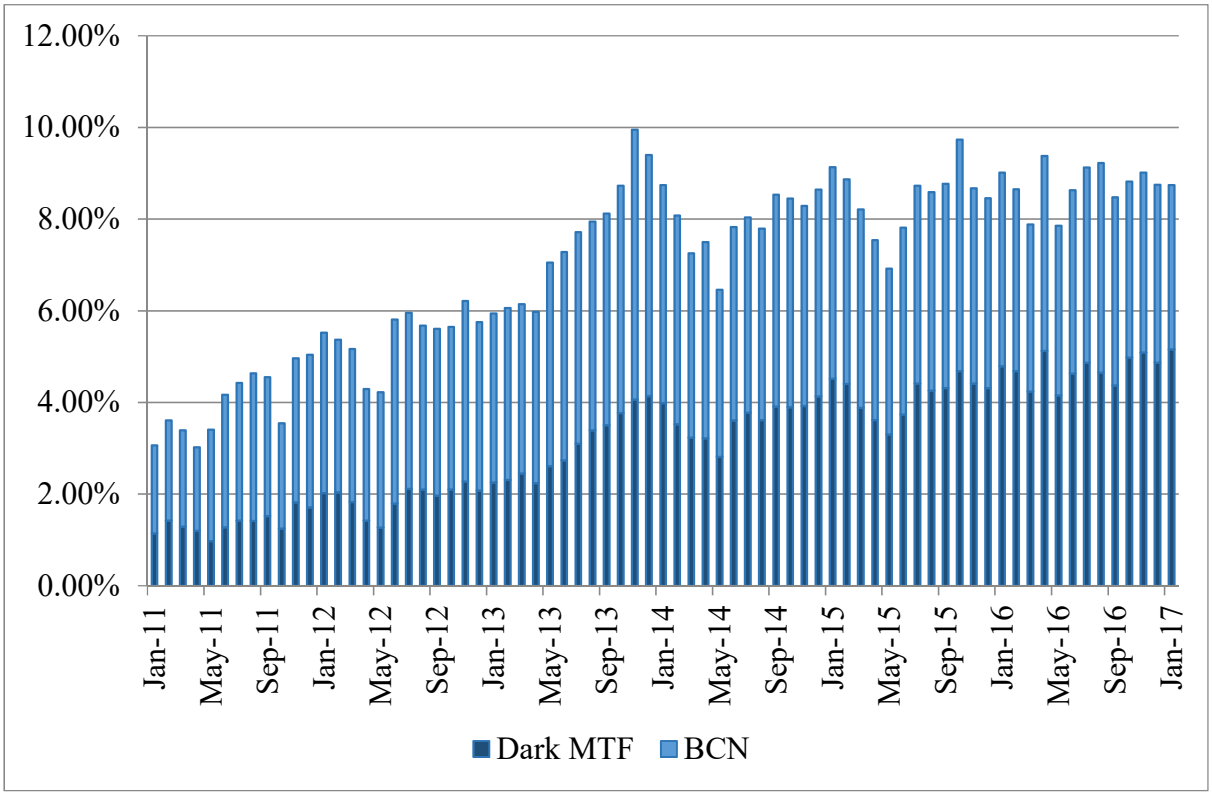
Table I. Pre-trade transparency waivers

Waiver	Explanation
Reference price	This waiver is available to systems that determine price by reference to prices generated by other systems. The reference price must be widely published and should be regarded by market participants as being a reliable reference price. Under MiFID I, the reference price may be the bid, offer or midpoint price. Under MiFID II the reference price must be the midpoint price.
Negotiated trade	This waiver is available to systems that formalise negotiated transactions provided that transaction takes place at or within the current volume-weighted spread, or is subject to conditions other than the current market price of the share (e.g. a volume weighted average price transaction).
Order management facility	This waiver can be used when orders are held in an order management facility maintained by a RM or MTF pending those orders being disclosed to the market
Large-in-scale	This waiver can be used when an order is considered to be large-in-scale compared with normal market size. The minimum size thresholds are set with reference to average daily turnover. See Table II for details of these thresholds.

Source: ESMA

Figure 1 reports estimated growth in dark MTF and BCN market shares. During the period January 2011 to January 2017 dark trading increased from around 3% to 8.75% of consolidated volume (Rosenblatt Securities).

Figure 1. Estimated market share for Dark MTFs and BCNs



Source: Rosenblatt Securities

Technology also played a critical role in the transformation of the equities market. Fragmentation created opportunities for traders to exploit pricing differences across trading venues. Proprietary traders, using high frequency trading (HFT) strategies, quickly emerged as significant players in the market accounting for 24 to 43% of consolidated volumes.[1] Traditional investors in the market also adopted more sophisticated trading technology, in the form of execution algorithms and smart order routers, to source liquidity across the numerous trading venues. The outcome of the growth in HFT and increased use of execution algorithms was a large decline in average lit trade sizes from around €30,000 to €40,000 before MiFID I (Credit Suisse) to around €5,000 to €6,000 (Rosenblatt Securities).[2]

These changes took place against the backdrop of the financial crisis. As a result, the sell-side was less willing and/or less able to provide capital to facilitate large trades. Similarly, the buy-

[1] See ESMA (2014) for details.
[2] A similar transformation in equities trading occurred in the U.S. and Canadian markets which also implemented regulations promoting competition for trading around the same time as MiFID I was adopted.

side became more cautious about the use of block trades due to the high levels of volatility in the market.

European equities markets today are far more complex than they were prior to the introduction of MiFID I. The growth in HFT has heightened concerns among traditional investors about information leakage and order anticipation which can lead to higher market impact costs. However, competition for trading services has reduced the explicit costs of trading, and has created a range of alternative trading models aimed at meeting the needs of different types of traders/investors. The Credit Suisse Composite Cost Index, which represents the change in actual transaction costs, adjusted for trade size and execution style, indicates that implicit costs have fallen substantially since the introduction of MiFID I.

The planned implementation of MiFID II in January 2018 has unleashed a new phase of market reforms and change. It will take some time before the implications of these changes are completely understood. This paper explores issues related to changes in dark trading arising due to MiFID II with a focus on the impact on the buy-side.

What the buy-side want: Sourcing liquidity

The objectives of a buy-side trader are simple: to source sufficient liquidity whilst minimising information leakage and price impact. Meeting these objectives has undoubtedly become more challenging in the post-MiFID I world. Traders must now source liquidity from a large number of lit and dark trading venues. As the number of venues increases, this task becomes more difficult. Traders must also navigate the costs and benefits of the different types of venues that are available to them. To be successful, buy-side firms must invest in more sophisticated analytics tools to enable them to demonstrate execution quality and develop forward looking tools to enhance execution outcomes.

When sourcing liquidity, buy-side traders must trade-off the probability of execution against the likelihood of information leakage. Ideally buy-side traders want to find natural liquidity (i.e. other long term investors), and to minimise the cost associated with intermediation. Block trading is highly desirable, as it enables firms to execute a large volume of stock without information leakage. However, block liquidity is difficult to find, so the probability of securing block executions is low.

An alternative approach to sourcing liquidity is to use execution algorithms which break up large ‘parent’ orders into small ‘child’ orders. Here the trader can influence the probability of execution through their choice of algorithm which determines the aggressiveness of the order placement strategy, size of the child order and the extent to which they use lit vs. dark venues. More passive strategies, smaller child orders and greater use of dark liquidity will reduce information leakage and the possibility for order anticipation, but will increase the time taken to execute the order and increase the risk of non-execution. When breaking up ‘parent’ orders

into multiple 'child' orders and executing them over time, buy-side traders face the risk that high frequency traders engage in order anticipation strategies.[3]

Recent academic research suggests that such strategies can substantially increase the price impact of large institutional trades.[4] These studies show that if other traders are able to step-ahead of or back-run large orders, institutional investors will be adversely affected.

Attempts by the buy-side to reduce the possibility of order anticipation has contributed to the shift in activity to dark venues and a reduction in average trade sizes on both lit and dark venues. Traders will first seek execution in low cost, low immediacy venues, such as midpoint dark pools, but as their demand for immediacy increases they will shift orders to dark venues which allow more aggressive pricing. If they fail to execute in the dark they will shift order flow to lit venues which offer higher immediacy, but also higher cost.[5] As a consequence of traders' preferences for dark execution when immediacy is low, trades that are executed on lit venues tend to be more informed on average, than trades executed in the dark.[6]

Flexibility to use block, dark and/or lit liquidity depending on the traders demand for immediacy is critical to ensuring buy-side firms are able to achieve the best possible trading outcomes for their clients.

Regulatory attitudes: Safeguarding well-functioning markets

The previous section highlights the importance of block and dark trading to the buy-side. Despite its importance, regulators in Europe and around the globe have expressed concern about the rapid growth in dark trading over the last decade. Regulator concerns tend to focus on its impact on aggregate market quality – namely price discovery and liquidity. Both of which are critical to well-functioning markets.

Price discovery may be impacted because dark venues reveal less information about the trading process.[7] Post-trade reporting of both lit and dark trades contributes to price discovery, however, more information is revealed by lit venues than dark venues. When limit orders are submitted to a lit venue, information is immediately available to other investors. In contrast, investors are unaware when dark orders are submitted. Even when a dark order is executed, less information is revealed to the market than a lit order. Other investors do not know the size of the original order, how long it has rested in the market, and if the order is executed at

[3] According to the Securities and Exchange Commission, order anticipation "involves any means to ascertain the existence of a large buyer (seller) that does not involve violation of a duty, misappropriation of information, or other misconduct. Examples include the employment of sophisticated pattern recognition software to ascertain from publicly available information the existence of a large buyer (seller), or the sophisticated use of orders to 'ping' different market centers in an attempt to locate and trade in front of large buyers and sellers."
[4] See for example van Kervel and Menkveld (2015) and Korajczyk and Murphy (2014).
[5] Menkveld, Yueshen and Zhu (2017) provide empirical evidence supporting this 'pecking order' among venues. They do this by examining changes in venue market shares at times when trader immediacy increases (e.g. increases in VIX, earnings and macro news announcements).
[6] Zhu (2014) provides theoretical support for this outcome, and Comerton-Forde and Putnins (2015) provide empirical support.
[7] Dark venues typically set prices based on prices displayed in lit venues.

midpoint they are unable to identify whether the trade was initiated by the buyer or seller. These features reveal information to the market and are precisely why dark trading is attractive to the buy-side – but the reduction in information about the trading process may contribute to slower price discovery. This issue becomes particularly pronounced when large volumes of trades are executed in the dark and if dark and lit venues attract different types of order flow. For example, if dark venues predominantly attract uninformed order flow (i.e. order flow with low demand for immediacy) as discussed in the previous section, then the residual order flow on the lit venues will be highly informed which may result in wider bid ask spreads, as limit order providers seek to protect themselves from trading with informed traders.

Concerns about the impact of dark trading on liquidity are related. Displayed limit orders reveal information and provide a free-option to other traders. If dark orders have equal priority with lit orders, there is little incentive to display limit orders. Therefore, regulators are concerned that if dark trading is unrestricted, displayed (and accessible) liquidity will decline. This would result in wider bid ask spreads and lower displayed depth.

There is only limited theoretical and empirical evidence supporting or rejecting these arguments. On price discovery, one theory finds that reducing the number of uninformed traders on lit venues will harm price discovery if it discourages investors from undertaking research to learn private information, while another shows that it will improve price discovery if all investors have the same information.[8] Recent empirical work suggests that there is a tipping point at which price discovery may be harmed if the level of dark trading is too high.[9] The empirical evidence on the association between dark trading and liquidity is mixed.[10] However, the evidence suggests that not all types of dark trading are the same. For example, block trades do not have any impact on price discovery.[11]

One area of shared concern for regulators and buy-side firms is the operational transparency of dark venues. Unlike exchanges, dark venues are afforded significant flexibility on how their venues are operated, and disclosure requirements about how the venues are operated are relatively low. As a result, there is a high degree of uncertainty about exactly how dark venues match order flow and who is allowed to participate in each venue. This issue has received considerable attention following the announcement of numerous cases of misconduct in US dark pools.[12] A common theme amongst these cases is miscommunication about the types of traders allowed to participate in these pools. Investors were typically led to believe that the pools were free from high frequency and proprietary order flow, when in fact they were not. These cases have led to improvements in the operational transparency of dark venues and have contributed to the buy-side demanding more information about the operations of dark venues.

[8] See Kyle (1981, 1989) and Zhu (2014) for details.
[9] See Comerton-Forde and Putnins (2015).
[10] See Buti, Rindi and Werner (2011), Nimalendran and Ray (2014), Ready (2013) and Kwan, Masulis and McInish (2015).
[11] See for example Ready (2013) and Comerton-Forde and Putnins (2015).
[12] See for example *In the Matter of ITG Inc. and Alternet Securities Inc.*, Securities Exchange Act Release No. 75672 (Aug. 12, 2015), *available at* https://www.sec.gov/litigation/admin/2015/33-9887.pdf, *In the Matter of UBS Securities LLC*, Securities Exchange Act Release No. 74060 (Jan. 15, 2015), *available at* http://www.sec.gov/litigation/admin/2015/33-9697.pdf.

Regulatory actions around the globe

Although the focus of this paper is on the European equities markets, it is helpful to provide a global context for the regulatory environment. Like the European markets, other developed markets have experienced rapid growth in the level of dark trading since competition for equities trading has been introduced. At its peak, dark trading accounted for 15% of consolidated volume Australia, 10% in Canada and 18% in the US.[13]

Changes in Canada and Australia

The Canadian regulator was the first to regulate dark trading in October 2012, followed by the Australian regulator in May 2013. The approach taken in Canada and Australia was broadly consistent – for trades below specified trade sizes, trades executed in the dark were required to offer a minimum level of price improvement relative to the displayed quotes. In Canada, minimum price improvement was defined as a tick size or half a tick when the stock was trading at its minimum tick size. In Australia, it was defined as one tick or the midpoint of the displayed quotes. The motivation for introducing these rules was also similar across the two markets. The rules aimed to reduce the overall level of dark trading, and therefore limit its impact on price discovery and liquidity. It also aimed to encourage displayed liquidity by ensuring that displayed liquidity must be executed ahead of dark orders at the same price. The impact of these rules was dramatic and immediate. In Canada, the level of dark trading fell from 9% to 5%, and in Australia it fell from 15% to 10%. However, there was little impact on overall market quality, as measured by spreads and depth.[14]

At the same time, the Australian regulators also reduced the minimum size requirements for block trades in less liquid stocks. Block trades may occur at any price. Unsurprisingly this change led to an increase in block trading.

Changes in the U.S.

The US regulatory approach to dark trading has been relatively light touch. Although the Securities and Exchange Commission (SEC) has published consultation papers to solicit industry feedback, to date no restrictions on dark trading have been imposed. However, in November 2015, the SEC proposed a significant increase in the disclosure obligations for Alternative Trading Systems (ATSs), requiring them to publicly report details about their operations including fees, trading services, use of market data, fair access standards, and details of their smart order routers and algorithms. In addition, commencing in May 2014 Financial Industry Regulatory Authority (FINRA)[15] required all ATSs to report aggregate weekly volume information and number of trades, by security. These enhanced disclosures and

[13] For Canada and Australia these numbers include dark trades below block size and in the US this includes all trades in dark pools. For Canada these statistics are from Devani, Anderson and Zhang (2015), for Australia they are from ASIC Report 394 and the US from Rosenblatt Securities.
[14] See Devani, Anderson and Zhang (2015) and ASIC Report 394 for further details.
[15] FINRA is an independent, not-for-profit organization authorized by Congress to protect America's investors by making sure the broker-dealer industry operates fairly and honestly.

additional data have helped to raise investor confidence in dark trading, and also helped to inform the debate about appropriate regulation.

Proposed changes in Europe

The dark trading rules that form part of MiFID II, are by far the most restrictive. The objectives of MiFID II include enhancing pre-trade transparency and forcing trading onto RMs, MTFs and SIs. These objectives are achieved through a number changes:

1. The scope of the reference price waiver has been narrowed. Reference price trades will only be allowed at midpoint, whereas under MiFID I they are also allowed at the bid and offer.
2. The reference price and negotiated trade waivers will become subject to the so-called double volume caps, which limits the use of these two waivers to:
    - 4% of volume in a stock in a single dark pool; and
    - 8% of the volume in a stock across all dark pools.

    The caps apply only to transactions taking place on RMs and MTFs — and not to SI or Over the Counter (OTC) transactions.

3. BCNs will be abolished, requiring brokers seeking to execute client-to-client matches to send these orders to either RMs or MTFs.
4. SIs will still be allowed, but the requirements will become more onerous:
    - Any firm which deals on its own account on a "frequent systematic and substantial basis" must be registered as an SI.[16]
        - For liquid equity instruments SIs will be required to make public firm quotes.
        - For illiquid equity instruments SIs must make quotes available to its clients on request.
    - Publicly available quotes are only required for orders below standard market size, and must be made for volumes equal to a minimum of 10% of standard market size. SIs may provide liquidity in larger size at their own discretion. The SI may select the clients to whom it gives access to its quotes, provided it does so in an objective and non-discriminatory manner.
    - SIs may only cross client flow against internal orders not to execute client-to-client matches.

MiFID II will also alter the minimum size thresholds for trades using the for Large-in-Scale (LIS) waiver. The size requirements were lowered for low volume stocks, but increased for the most active stocks in the market. Details of these thresholds are provided in Table II.

[16] The regulations define quantitative criteria for what constitutes frequent and substantial for different types of instruments.

Table II. Large-in-scale threshold definitions

Average daily turnover (EUR)	Minimum order size qualifying as LIS	
	MiFID I	MiFID II
< 50k	50,000	15,000
50k - 100k	50,000	30,000
100k - 500k	50,000	60,000
500k - 1m	100,000	100,000
1m - 5m	250,000	200,000
5m - 25m	250,000	300,000
25m - 50m	400,000	400,000
50m - 100m	500,000	500,000
> 100m	500,000	650,000

Source: ESMA

Likely impact of changes in Europe

The narrower scope for the reference price waiver is consistent with the price improvement rules introduced by the Australian and Canadian regulators. Experiences in these markets suggest that the buy-side is able to adapt to this change relatively easily and without a substantial change in trading strategies.

In contrast, the double volume caps are highly contentious and will have a dramatic and likely adverse effect on market quality. The caps will be assessed by the European Securities and Markets Authority (ESMA) on a 12-month rolling basis within five working days of the end of each calendar month. If the volume on a single venue exceeds 3.75% or the volume across all dark venues exceeds 7.75% ESMA will publish another report within 5 days of the 15th of the calendar month. The competent authority will, within two working days of this report being published, suspend trading on a single venue if its volume exceeds 4%; and/or on all dark venues if the aggregate volume exceeds 8%. These suspensions will remain in place for a period of six months – essentially prohibiting dark trading on the specified venue, or across all venues for that period.

Clearly such a blunt instrument will significantly disrupt the usual trading strategies for institutional investors, and as result impact their execution costs.

So how likely is it that these caps will be breached? It is difficult to answer this question with certainty because the current data being captured reflects MiFID I rather than MiFID II requirements. This means that estimates of the volume of trades using the reference price waiver are overestimated because (i) it allows trading at the bid and the offer, rather than only midpoint; and (ii) the current flexibility on the reference price waiver means that trades which will be reported under the LIS waiver next year, may currently be reported using the reference

price waiver. However, there is unlikely to be any adjustment for these data problems when ESMA calculate the caps on day one of the MiFID II implementation.

Overlooking these data issues, a November 2015 report by the London Stock Exchange indicates that trading in 100% of FTSE 100 stocks and approximately 80% of stocks in other major European indices currently exceed the 8% aggregate cap.[17] Analysis by Credit Suisse, which strips-out trades that qualify for the LIS waiver, shows that over the period January to March 2016, a little over 60% of FTSE 100 and FTSE 250 stocks exceed the 8% cap. These results show that unless there is a change in dark trading volumes over the remainder of 2017, the majority of liquid stocks will be prohibited from trading in the dark under the reference price or negotiated price waiver. However, it is unlikely that any single venue will exceed the 4% cap, and it is expected that individual venues will manage the activity executed on their venues to ensure that the do not become subject to a six month shut-down.

Brokerage firm ITG, has investigated how such a prohibition on dark trading may impact different types of algorithmic trading strategies. Four strategies were examined: scheduled (e.g. TWAP, VWAP and participation), dark liquidity seeking, implementation shortfall and liquidity seeking. Unsurprisingly dark liquidity seeking strategies had the highest use of dark at around 62% and a further 18% dark LIS. However, all strategies used non-trivial levels of dark trading. Scheduled algos had the lowest usage at 22% dark and 2% dark LIS. The use of dark was not related to parent order size, but instead was related to execution style. The ITG analysis shows a clear link between parent order size order and the use of LIS. A significant fraction (between 20% and 31% depending on strategy), of all parent orders were too small to qualify for the LIS waiver. Therefore, when the caps are implemented in 2018, the trading strategies of many buy-side firms will be need to be radically altered.[18]

There continues to be considerable uncertainty about how brokers will transition away from BCNs to either MTFs or SIs. It seems unlikely many brokers will convert their pools to MTFs due to the costs and resulting loss of control over who has access to orders and how orders are matched. However, the SI regime only allows matching client orders against internal orders and not client-to-client executions. Nevertheless, the SI regime provides considerable scope for banks and proprietary trading firms to offer significant liquidity to their customers. The regime also fits well with the business models of HFT firms, enabling them to offer public quotes for small sizes, and bespoke quotes on larger sizes where they have discretion over the order flow. It is likely that SIs will become an important destination for smart order routers. Unlike RMs and MTFs, SIs will be allowed to trade in price increments smaller than the harmonised minimum tick size schedule. Evidence from the U.S. suggests that this pricing flexibility will place SIs at an advantage, particularly in stocks whose spreads are constrained by the minimum tick size.[19]

[17] See LSE presentation, Transparency for equity instruments, November 2015.
[18] See https://www.itg.com/thinking-article/mifid-2-impact-dark-caps-algorithmic-trading-strategies/ for further details of this analysis.
[19] See Kwan, Masulis and McInish (2015).

Rosenblatt Securities estimate that SIs currently account for a little over 1% of consolidated volume. However, it is anticipated that this number will grow as BCNs transition to SIs, and new SIs are established over the remainder of 2017.

Concerns have been raised by ESMA about the potential creation of networks of interconnected SIs. ESMA suggests that such networks are inconsistent with the spirit of MiFID II.[20] It is unclear at this stage, how this will play out. However, it is clear that "SIs may undertake matched principal trading only on an occasional basis"[21] and therefore any such networks would not be able to facilitate matched principal trading, or other types of back-to-back transactions.

How is Europe responding to MiFID double caps?

The previous section highlights the dramatic impact that the double caps will have on the European markets. The threat of the double caps has focussed everyone's attention on finding alternative trading strategies. A recent survey by Liquidnet indicates that 40% of 53 European-based Global Heads of Dealing intend to increase their use of LIS waiver post-MiFID II.[22] Therefore, it is not surprising that numerous participants in the market have responded with a range initiatives aimed at catering to the needs of the buy-side in the presence of the restrictions on dark trading that will take effect in January 2018.

These initiatives can be divided into three categories: new LIS venues, new or modified order types to facilitate LIS trades on exchanges, and high frequency and intraday auctions. Table III provides a summary of these initiatives.

[20] A copy of a letter sent from ESMA to the European Commission on 1 February 2017 is available at: https://www.esma.europa.eu/press-news/esma-news/esma-writes-european-commission-mifid-ii-systematic-internalisers-operating

[21] European Commission Delegated Regulation on 25 April 2016.

[22] Liquidnet, The New Dark Age: A recalibration of European Dark Trading.

Table III. New initiatives to avoid impact of trading restrictions imposed by double caps

Initiative	Launch date	Parties involved	Trading mechanism	Users	Trading volume	Average trade size
New LIS venues						
Turquoise Plato Block Discovery	October 2014 as Turquoise Block Discovery. Renamed following cooperation agreement with Plato Partnership in September 2016	Turquoise (majority owned by LSE) and Plato Partnership (not-for-profit consortium comprising buy and sell side)	Conditional order service aimed at trading larger blocks. Interacts with Plato Uncross and matches conditional orders at randomised intervals. Includes size priority in the matching logic and user defined minimum execution size	As at November 2016, 23 sell-side firms offer access. As of March 2017, the Plato Partnership included 15 large buy- and sell-side firms.	ADV in February 2017: €119m (€13.2b matched since launch in 2014)	For February 2017: €768,783
BATS LIS	December 2016 for sell-side. March 2017 for buy-side.	Partnership b/n BATS Europe and US-based BIDS Trading (operator of broker-sponsored block trading facility)	An IOI negotiation and execution platform. Platform interacts with buy-side and sell-side to firm up IOI. Sell-side and buy-side can send IOIs. Must meet LIS thresholds.	As at March 2017, 14 Direct LIS Brokers and 19 Designated Broker (i.e. has an agreement with a Buy Side firm to offer execution and clearing services).	ADV in week ending 17 March €22.96m	n/a
Euronext Block (will replace Smartpool, Euronext's existing dark pool aimed at smaller dark trades)	Scheduled: mid-2017 (pending approval)	Euronext and US-based Fintech AX Trading	Will accept firm and conditional orders that meet LIS threshold, using an auction-style algorithm to match orders on a pro-rata basis. Users may send IOIs, with users controlling content and distribution	Available to all Euronext users.	Not yet operating	Not yet operating
New or modified LIS order types on exchanges						
LIS on SETS	November 2015	LSE	Hidden orders that exceed LIS thresholds interact with lit and dark contra liquidity. Qualifies for LIS waiver	n/a	Total value traded for first four months of 2016 approx. £200 million	n/a
DB Volume Discovery orders	Launched December 2015	Deutsche Börse	Enhanced iceberg order allowing block execution within lit book. Hidden part of iceberg executed against volume discovery orders at midpoint of book. Optional minimum executable size. Qualifies for LIS waiver.	n/a	n/a	n/a
Euronext hidden and enhanced icebergs	Late 2016	Euronext	Similar to DB Volume Discovery Orders. Allows size of "peak" to be randomised. Qualifies for LIS waiver.	n/a	n/a	n/a

High frequency and intraday auctions						
BATS Europe periodic auctions	October 2015	BATS Europe	Executions are pre-trade transparent but display only indicative price and volume. Randomised intraday auctions with prices set b/n EBBO. Minimum order size €3,000. Allocations on price-size-time-priority.	As at November 2016, 12 brokers participating regularly	ADV in January 2017: €1,6245,554	For January 2017: €13,563
Nasdaq Auction-on-Demand	Scheduled: June 2017	Nasdaq	Executions are pre-trade transparent but display only indicative price and volume. Auctions are triggered on demand by crossing orders. Auction will uncross at the price within PBBO which maximises volume. Allocations on broker-size-time priority. Users can set minimum execution size. Speed bump on cancellations and modifications	n/a	Not yet operating	Not yet operating
LSE intraday auction	March 2016	LSE	Executions are pre-trade transparent but display only indicative price and volume. Auction occurs over two minute window at midday	n/a	£5 million per day during first 2 weeks of operations	£20,900

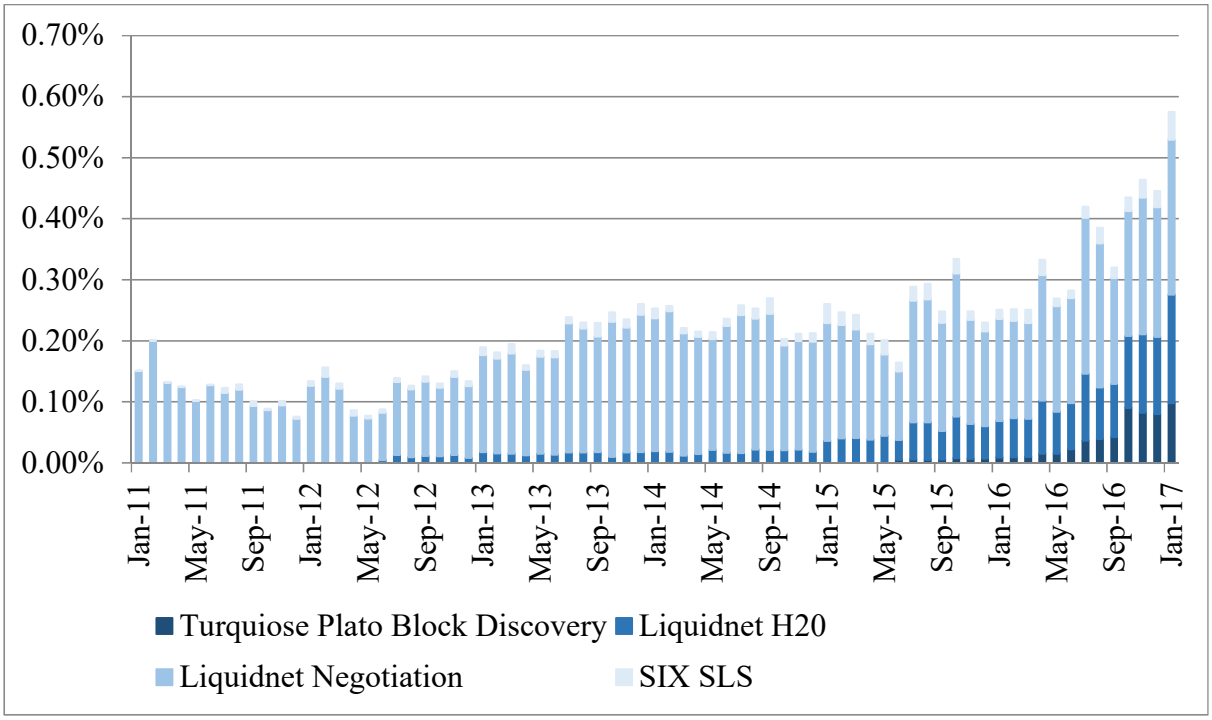
Source: ITG Building Blocks of the Future, Rosenblatt Securities, Turquoise and exchange websites

New LIS venues

Three new LIS venues have been established: Turquoise Plato Block Discovery (TPBD), BATS LIS and Euronext Block. TPBD is a partnership between the LSE's Turquoise and the Plato Partnership, a not-for-profit consortium of large buy- and sell-side firms. BATS LIS is a partnership between BATS and US-based BIDS Trading who operates a broker-sponsored block facility in the US. Euronext Block is a partnership between Euronext and US-based Fintech, AX Trading. The common feature among these new venues is the use of conditional order types. Conditional orders allow investors to rest large undisplayed orders while simultaneously working these orders via algorithms. If a block match is found for the large conditional order, investors are asked to "firm-up" their conditional interest. It is critical that orders do not "fade" or "back-away" at this point. TPBD and BATS LIS actively monitor investor behaviour to limit the likelihood of fade. Euronext Block will adopt an auction-style algorithm to match orders on a pro-rata basis. The use of minimum execution sizes also helps to reduce these risks. These conditional order types appropriately reward traders that are willing to offer large size to the market by allowing them to firm-up their interest without the risk of other investors stepping-ahead of, or anticipating their order flow.

These new venues supplement existing venues aimed at facilitating block trading, namely Liquidnet Negotiation, Liquidnet H20 and SIX Swiss Dark. Each of these venues exhibits average trade sizes substantially above the LIS-waiver thresholds. In January 2017, average trade sizes for these venues were €1,227,784, €466,283 and €136,131 respectively (Rosenblatt Securities). The average trade size for TPBD in February 2017 was €768,783 (Turquoise). Figure 2 reports that these block venues have exhibited considerable growth in market share since mid-2012, with the growth accelerating since mid-2015. This growth may be indicative of an emerging trend toward block trades. However, the growth comes off a very low base so should be interpreted with caution given that these venues account for just under 0.6% of market share.

Figure 2. Estimated market share of block venues



Source: Rosenblatt Securities

Each new venue requires new connections for the sell-side and/or the buy-side. At a time when technology budgets are heavily tilted toward MiFID II compliance issues, new venues will need to provide a compelling case as to why firms should connect to another LIS venue.

New or modified order types to facilitate LIS trades on exchanges

The LIS waiver has been built into the order books at LSE, BATS Chi-X, Nasdaq and Deutsche Börse for some time. These order types can be placed via DMA, so the buy-side do not need to wait for brokers to connect to these venues. A key feature of the LIS order type is that the order can remain hidden even if partial executions reduce the order size below the LIS threshold. Despite these features, the buy-side has been somewhat reluctant to use these order types due to the fact that their orders will be exposed to all types of liquidity on an exchange, and may therefore be detectable by other traders using order anticipation strategies. Typically, the buy-side are more comfortable resting displayed orders in venues where they will only encounter natural liquidity.

Over the last 18 months, exchanges have introduced new functionality to these order types to reduce the likelihood of the orders being detected. For example, in November 2015, the LSE introduced a Midpoint Pegged Order which 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. These are enhanced iceberg orders that allow the hidden part of the iceberg to be executed against volume discovery orders at the midpoint of the order book. This order type also features a user-defined minimum execution size.

Importantly these order types qualify for the LIS waiver, and therefore do not contribute to the double cap volume calculations.

High frequency and intraday auctions

The third type of initiative, high frequency and intraday auctions, does not rely on the LIS waiver, but instead seeks to provide an alternative approach to trading in a pre-trade transparent setting. Orders submitted to the auctions remain hidden, but when an auction becomes possible indicative prices and volumes will be displayed ensuring that they qualify as pre-trade transparent venues. These types of auctions reduce the advantages of being fast, and reduce the risk of orders being picked-off by high frequency traders because individual orders are not revealed.[23]

In October 2015, BATS Europe introduced randomised, high frequency intraday auctions with prices set between the European Best Bid and Offer (EBBO). Allocations are made on a price-size-priority basis therefore encouraging larger executions. The auction requires a minimum

[23] Budish, Cramton and Shim (2015) provide theoretical support for the use of high frequency batch auctions to enhance market quality.

execution size of €3,000, and larger minimum acceptable sizes may also be set by the user. Early indications are positive, with an average daily volume traded in January 2017 of €16.4m and an average trade size €13,563, well above the average lit execution size over the same month of €5,639 (Rosenblatt Securities).

Nasdaq plans to introduce its own high frequency auction in June 2017. These auctions will occur on demand, when two orders can be matched, but randomisation will also be introduced into this matching process. A speed bump on cancellations and modifications will also reduce the risk of gaming. Orders will be matched on broker-size-time priority, which makes this venue suitable for internal crosses. Nasdaq plans to allow users to specify a minimum executable size.

The LSE launched a single midday auction in March 2016. The motivation for this auction is to provide an additional point in time during the day (in addition to the opening and closing auction) where liquidity can be concentrated. During the first two weeks after launch the auction attracted approximate £5 million per day with an average trade size of £20,900.

Although new connections are not typically required to access these auction mechanisms, significant testing and technology effort is essential. This means the buy-side and sell-side again need to make choices about the allocation of scare technology budgets across the range new trading mechanisms available to them.

Given these auction mechanisms are pre-trade transparent they do not contribute to the double caps.

Closing auctions, which currently account for 15% to 20% of consolidated volume, may also become more attractive in stocks where the double caps take effect in 2018.

New challenges still to be addressed

While these new initiatives create new opportunities for the buy-side, they also bring with them new challenges. A proliferation of new venues will further fragment the market. This is particularly problematic for the block market as the probability of execution is already low, and further fragmentation will make it increasingly difficult for investors to find natural counterparties. It is likely that block aggregation services will be required to help solve this problem. The buy-side and sell-side will be forced to make judgements about which venues, trading mechanisms and order types are likely to be successful, in order to make decisions about where to allocate their scare technology resources. Early movers will to be at an advantage if they are able to demonstrate successful trading outcomes before more new venues are established. Demonstrating the value of a new venue will require significant data interrogation and analysis.

As attention (and activity) shifts to block trades, the buy- and sell-side need to give consideration to how to appropriately measure execution quality. The tools and techniques used to evaluate algorithmic trading strategies may not be directly transferable to block executions. It is unclear what the appropriate benchmark should be for blocks, particularly given that the probability of failing to execute is likely to be high. What is the appropriate way to measure this opportunity cost? And how should this cost be compared against an order that is split into multiple child orders?

Quantifying the cost/benefit trade-off of a block fill against an order worked across multiple days and venues will be a challenge that needs to be addressed quickly, if block trading grows to anticipated levels.

To date there has been little innovation in the mechanisms used to price blocks, with venues typically relying on reference pricing or negotiation. However, volume discovery should also influence price discovery – therefore new pricing tools may emerge.

Looking forward

What should the buy-side do to be ready for MiFID II?

First, they should be acutely aware that trading behaviour during the 12 months prior to January 2018 will determine whether or not the double caps are reached. If the caps are reached dark trading will be shut down for at least six months. Therefore, where possible traders should look for execution opportunities which do not rely on the reference price and negotiated trade waivers. If trades are eligible for the LIS or order management facility waiver then these waivers should be utilised. Careful monitoring of changes in behaviour and the level of activity under each waiver over the remainder of this calendar year will help to inform the buy-side and sell-side about what to expect on January 1, 2018.

Second, the buy-side should carefully evaluate the merits of new venues and new order types to ensure that they understand the costs and benefits of these new trading options, and the extent to which they assist in sourcing liquidity and minimising information leakage. There is a great deal of uncertainty about how to best evaluate the merits of block vs. non-block executions, so new evaluation tools will need to be developed. Further, given the potential fragmentation of block trades across multiple venues, choices will need to be made about how to optimally set the minimum execution sizes and resting times in a specified venue to achieve the best possible trading outcomes. While data analytics will be able to assist with this task, there is likely to be considerable trial-and-error involved as the new venues evolve over time.

Third, the buy-side should begin to have conversations with the sell-side about how algorithms and smart order routers will be adjusted when dark trading is shut down in certain stocks. In stocks where dark trading is banned, new approaches to liquidity sourcing will need to be developed. Historical trading data is unlikely to be helpful in making these changes. Instead, attempts to anticipate and model changes in behaviour by different types of traders/investors may be informative.

Finally, MiFID II will provide a wealth of new data which will assist with evaluation of trading outcomes. The buy-side should consider the most effective ways to exploit these data to their advantage.

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