Intraday auctions - Are your algorithms ready for them ?

White paper - by Neonet Securities & LiquidMetrix

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In this white paper, Neonet and LiquidMetrix review the midday auctions and in particular the announcement of London Stock Exchange to offer midday auctions from late 2015. With a contribution from Brian Schwieger, Head of Equities at London Stock Exchange.

We analyse the potential of auctions as an alternative option to trading in dark pools in the light of Mifid II, both from a best execution and anti-gaming perspective. We include statistical support, documenting the current trading pattern around the monthly auctions currently scheduled for FTSE 100 stocks to support future and option contract expiry.

Background

Intraday auctions are already common in some primary markets across Europe and there are plans to widen their use in 2015. London Stock Exchange announced that it will offer midday auctions from late 2015. Intraday auctions should be viewed as another initiative by market participants to provide dealing solutions under the new MiFID II regulations, due to come into force in 2017. With the focus of buy and sell side communities on MiFID II, intraday auctions may provide an alternative option in the perennial search for liquidity. They could also provide an alternative to dark pool trading, especially as such trading is set to be capped under the new MiFID II proposals.

The new regulation will limit each dark pool to trade a maximum of 4% in an individual security before capping the stock on that venue. Also the overall cross-venue combined European dark trading in any single stock will be limited to 8% of average daily volume. There is a waiver for these two dark caps: placing large-in-scale orders and trading in auctions.

Consensus is forming on a European-wide intraday auction time slot of 12.00 UK, thus creating a potential alternative for trading blocks and rebalancing portfolios. Intraday auctions are a response to the demand from buy-side participants for neutral, infrastructure-led solutions for trading in large blocks, and so can be considered an alternative to dark trading. It comes with the additional benefit of being an auction which contains a random element that distinguishes itself from continuous trading and could be a potential option of avoiding the HFT information leakage / gaming problem in a similar fashion to Turquoise Uncross.

In addition, some funds use midday London times as a marker to fix benchmark prices for their investors, and an auction would in theory allow them to benchmark against transparent, current prices. In Sweden, it is common for fund managers to use the price at local time 16.00 as a benchmark (NAV) when trading in and out of positions. This is an odd way of benchmarking that creates unnecessary aggressive trading. A far better solution would be for Nasdaq to introduce an auction at this time, followed by other exchanges, to adapt to local fund manager's needs.

London Stock Exchange's intraday auction

Intraday auctions can be different from an open or closing auction in terms of what market data is disseminated by the exchange. In particular, for London Stock Exchange's intraday auction, the available information is restricted to Level 1 indicative price and size in order to decrease information leakage, i.e. only best bid and offer and matching volume is displayed (as opposed to a closing auction that discloses all posted orders at all levels). Circuit breakers (1%) and normal exchange monitoring is in place to ensure that intraday auctions are not being used as a forum for gaming. London Stock Exchange's believe that this intraday auction could become a viable additional mechanism to trade blocks during the day. The auction on London Stock Exchange will start at 12:00 and run for a minimum of 2 minutes plus a random time of 0 to 30 seconds.

The auction process will be like that used in London Stock Exchange's opening and closing auctions. At the commencement of the auction call at 12.00, all orders that have been parked

for that specific auction will be injected immediately. Orders may then be entered, modified and deleted during an auction call - but no automated execution occurs.

Throughout the entire period, the London Stock Exchange's will disseminate the most up to date indicative auction uncrossing price. This will be updated whenever orders are added, deleted or modified. At the end of the auction period, the balance of buy and sell orders will be used to calculate the uncrossing price and continuous trading will recommence.

Brian Schwieger, Head of Equities, London Stock Exchange:

This is a very significant change to the trading day, following a detailed consultation with market participants. The introduction of the intraday auction is in direct response to demand from buy-side participants for neutral, infrastructure-led solutions for trading in large blocks. The auction will allow participants to place orders in a truly confidential, yet price-forming environment via a well understood mechanism.

The 12.00 timing is based on market feedback, matching the current intraday auction in Germany. We are aware that institutional investors hope it will encourage European markets to follow suit, creating over time a significant and harmonised pan-European focus for liquidity at midday across the continent. The intraday auction will go live in late 2015, giving market participants opportunity to update and reconfigure their own systems.

As with the current opening and closing auction, there will be no additional fee or extra direct cost imposed on customers in order to take part in the auction. The auction will apply to all SETS equity securities.

Algorithms & auctions in general

The standard procedure for all customer algorithms during primary market auctions (open, close, volatility, intraday) is to withdraw all volumes from MTFs and dark venues and instead participate in the primary market auction. The reasoning for this is twofold:

1 Dark pools are using the primary market reference price, so when the primary market is in auction, no matching will occur.

2 If orders were left on book in a dark pool, there would be a risk that prices might revert or experience a sudden discontinuity when the market resumes continues trading.

Schedule driven algorithms & intraday auctions

Participate/Volume-in-Line style algorithms take part in the market with volume at a 'target POV' rate. Participation style algorithms should aim to take a 'target POV' of all volume traded across all venues at any moment, including the volume traded in an intraday auction.

It logically follows that this kind of algorithm will also look at the volume at the intraday auction crossing price and aim to be in line with the specified target participation rate. As with closing auctions, the algorithms should not be first to disclose volume in the auction nor obviously adjust their participation rate. Some will choose to send their auction volume as late as possible during the auction in order to prevent others from acting on the information. London Stock Exchange's initiative, which uses a two-minute auction time with an additional random 0 to 30 seconds, will enforce order entry just before 2 minutes have passed to ensure they are part of the auction.

The main components of VWAP algorithms are slightly different, relying as they do on historical curves rather than current participation rates. Such algorithms aim to calculate the relative volume distribution rather than the actual auction volume. If, for example, trading volume in a particular stock up to the first intraday auction has been higher than normal, the expected auction volume would be adjusted accordingly. The nature of a VWAP algorithm is that auction volumes, and other, unpredicted market events, will have a relatively low impact on the actual over-the-day trading pattern, although will ideally be adjusted on expected higher- or lower-

than-average volume days (eg. option expiry and half days). A Participation algorithm has built in protection so it will not risk entering a disproportionally high volume into the market (it participates with existing volumes). For VWAP, there is a scheduled volume part to fit in, but it is highly recommended to limit the participation rate in intraday auctions to avoid exposing its intent.

Opportunistic algorithms & intraday auctions

Opportunistic algorithms (Dark, IS, Would Be Done, Capture) and schedule-driven algorithms with opportunistic components, target arrival price and have the mandate to 'grab liquidity' if the price is attractive. Often this kind of algorithm has a calculated 'fair value' price against which trading decisions are made. This fair value price could be based on the mid-price at arrival, on an offset from arrival price, from the bid/mid/ask or a price that is determined from a short-term alpha model. The end result is a price that might include a deviation from the current market price which the algorithm is prepared to accept in order to execute a bigger part of the order immediately instead of bearing market risk. These algorithms can, with the introduction of intraday auctions, send all such 'Would be done' volume to the primary intraday auction with the limit price set to the target price. The only thing that will prevent the algorithm from taking advantage of the intraday auction is if the user has selected a MAQ (Minimum Accepted Quantity), MIS (Minimal Initial Size) or MES (Minimal Execution Size). All these volume restrictions may prevent auction participation since volume can't be guaranteed. As with Turquoise Uncross™, the randomised timing of the auction and the fact that orders not in line with the crossing price will protect the order from visibility, should be sufficient protection for the order. One could argue that to disable MAQ is a valid option that the user should be able to set - to ignore volume restrictions when trading in auction pools.

Analysis of existing scheduled intraday auctions

For the UK market, there is already a planned regular intraday auction to support future and options expiries on ICE contracts. Every third Friday of the month at 10:10 AM, continuous trading in FTSE 100 stocks is halted and a 5 minute intraday auction is held, the uncrossing price of which provides a reference price for the expiring derivatives.

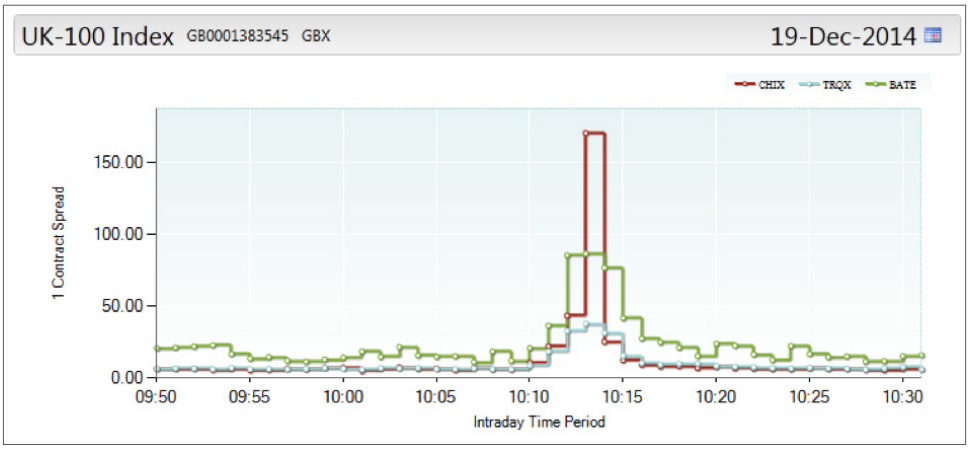
Although this is not quite the same as the new intraday auctions, it does give some idea of what happens both on the London Stock Exchange and other venues (MTFs) when London Stock Exchange's schedules a planned auction interrupting intraday continuous trading.

The screenshots on the next page summarise what happened to spreads, resting liquidity and trading volumes on the MTFs during the December 19, 2014 Exchange Delivery Settlement Price (EDSP) auction, results being averaged across all FTSE-100 stocks.

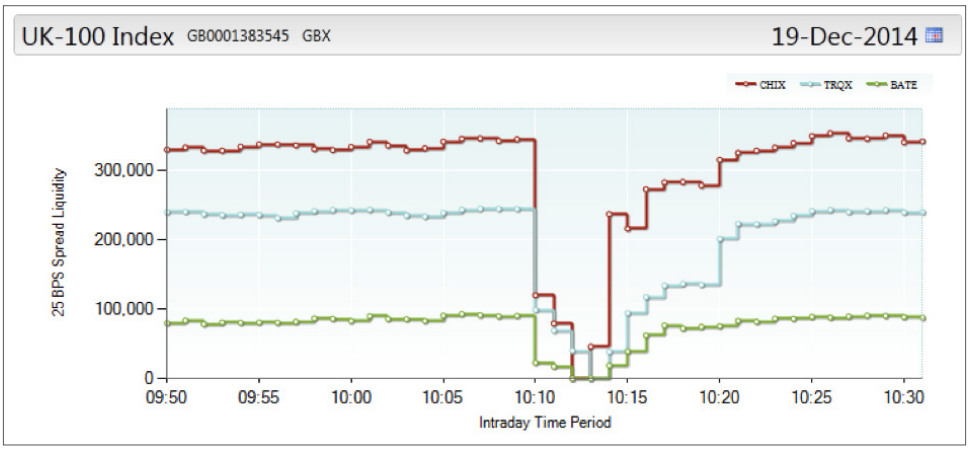
Interestingly, trading behaviour during EDSP auctions has changed somewhat over the last five years. Five years ago, during EDSP auctions, although there was often a reasonable amount of resting order liquidity left on MTF order books by participants, little or no actual trading occurred. No-one seemed willing to trade on the MTFs whilst there wasn't a continuous London Stock Exchange trading reference price.

More recently, however, as seen in these screenshots or Dec 2014, we can see that not only is there some resting liquidity left on MTFs (albeit with wider spreads) for the first two minutes of the EDSP auction there is definite evidence of trading activity, with non-trivial amounts being executed on TRQX and CHIX, despite London Stock Exchange being in auction. Clearly some participants are now more comfortable to trade on MTFs during London Stock Exchange auctions.

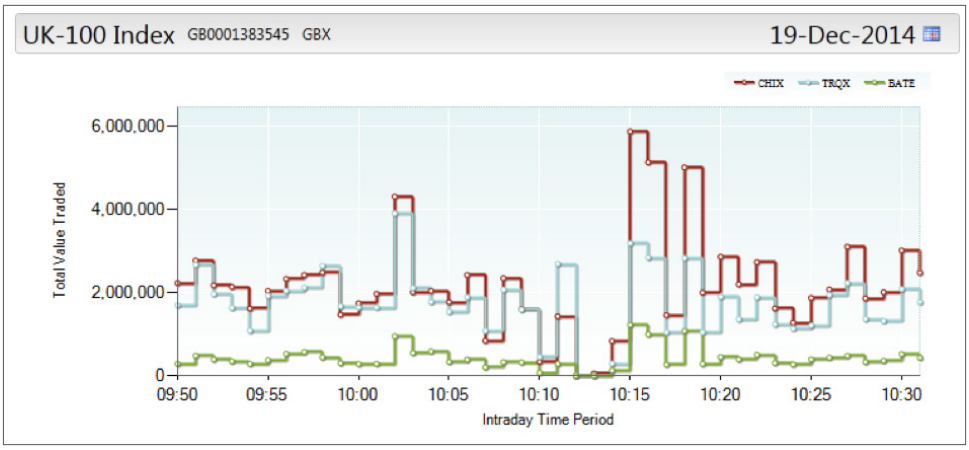
It is unclear who the participants trading during the current EDSP auctions are. It might be that 'agency' broker algorithms still avoid trading during the EDSP auction, and what we are seeing is simply some prop traders / market makers covering implied price movements in UK stocks that will be occurring as other European markets remain open and in continuous trading. It will be interesting to see what the trading and liquidity patterns on the MTFs will be during the newly regular intraday auctions will be and whether MTFs will offer any viable liquidity/trading volumes.



1 Contract MTF Spreads during EDSP auction at London Stock Exchange 25BPS



MTF Liquidity during EDSP auction



MTF value trading during EDSP auction

Data source: LiquidMetrix

However, if for now we assume that most 'agency' participants decide to not to code their algorithms to trade any significant volumes on the MTFs during London Stock Exchange's auction period, then the main technical challenges for agency trading algorithms will be to decide how much to post into London Stock Exchange's auction and what, if anything, participants should do in terms of post trade analysis to ensure that the auctions they are participating in are not being 'gamed' by other participants.

Volume estimation / pre-trade estimates

For participation style algorithms it will be important to have an estimate, at a given point in time, of the total uncrossing volume that today's London Stock Exchange auction will generate. This estimate will evolve over the day:

- At start of day, the estimate can only be based on historical data for that stock.
- As trading progresses for the current trading day, this estimate could be updated based on actual trading volumes observed in continuous / dark trading leading up to the auction.
- Once the auction starts, there will be a continuously updating estimate (published by London Stock Exchange) of the expected uncrossing volume of the auction.

Start of day predictions based on historical, stock specific auction volumes, such as the LiquidMetrix AlgoFuel estimates, are fairly straightforward to produce. There will be some challenges in the days immediately following the launch of London Stock Exchange's intraday auctions due to scarcity of historical data and indeed the volumes will change as participants refine their algorithms, but estimates should start to settle down as hard data becomes available.

Conditional estimates of expected auction volumes, based on knowledge of the current day's trading volume prior to auctions, are probably be based on observing stock specific ratios of morning continuous volumes to auction volumes. For example, if a stock historically has an auction volume that is 10% of the continuous trading volume of that morning (up to the auction) then this ratio can be used along with today's trading volume to refine estimates of predicted mid-day auction volumes as the morning progresses.

Once the auction starts it is probably more helpful to simply use the real time London Stock Exchange published estimated uncrossing volume rather than historical estimates (with the assumption that volumes will not 'spike' at the last few milliseconds of the auction).

Gaming detection / post-trade analysis

For 'opportunistic' or 'IS' style algorithms, getting as much volume done in the auctions as possible is probably the best strategy with the strong proviso that we need to be sure the price we are achieving by doing this is 'fair' and is not being deliberately or accidentally distorted (possibly by our own orders).

There are two things to monitor post-trade:

- We need to be sure that we are not overtly impacting the uncrossing price whilst placing orders ourselves. This can be monitored by computing a price impact by looking at how the timing of our order placements affects estimated uncrossing prices (if at all) in the seconds after we place orders. If there is a strong impact, we may consider posting smaller amounts, posting in smaller chunks or even delaying posting to the last seconds of the auction.
- We need to see if there is any evidence of strong price movements immediately following auctions. There are two potential problems in particular we should look out for:
    - If the auction uncrossing price is significantly different from the prevailing market mid-price prior to the auction and the market mid-price then shows signs of quickly 'mean reverting' to the prevailing mid-price following the auction then this is an indication that the auction price might represent some kind of temporary distorted price which could be to our disadvantage. Certainly if this pattern happens often and the distorted price is more often to our disadvantage we might worry about gaming.
    - If on the other hand the auction uncrossing price is very similar to the prevailing market mid-price but the market mid-price then shows signs of moving very quickly post auction (in either direction), then this might indicate that the auction uncrossing price did not fully reflect implicit information on market movements in other instruments. For instance: if I am buying a UK stock and the price of all other European stocks fell by an average 50BPS during London Stock Exchange's auction period then I would hope that this fall would be reflected in the EDSP auction uncrossing price. If not - and if in fact there was a sharp post auction

correction in lit market mid-price - then it is an indication that I may have obtained a poor price (other more savvy participants may well have cancelled their orders during the auction when they saw the price they would get would not be 'fair'). As with the previous case, if we this type of pattern and a disadvantageous outcome for our orders more often than an advantageous one then this would be a cause of concern.

Best execution?

In a sense, participating in a primary market auction would seem to be a very safe option from a Best Execution point of view in that the price achieved is almost by definition the 'correct' price, at least for the part of an order that is executed in the auction itself.

However, the caveat to this is that, as the examples above illustrate, simply participating in an auction should not really mean that one gets a 'free pass' in terms of Best Execution and there are still things that should be monitored to ensure that prices achieved in intraday auctions are really a net positive to overall order execution performance.

Summary

With the introduction of intraday auctions by London Stock Exchange later in 2015 trading participants will be given additional opportunities to find liquidity. This should be a welcome addition, especially in light of MiFID II restriction on dark pool trading.

Trading algorithms need to be ready to be able to take advantage of this new potential source of liquidity. Participation and VWAP algos need to have good predictions of what proportion of volume is expected to trade in the new auction so trading schedules and participation rates stay on course to track benchmark prices. The strategy for IS or opportunistic algorithms will be to get as much volume done as possible in the new auction, but additional best execution monitoring will be needed to make sure the prices achieved are fair and we are not either impacting the market ourselves or falling prey to some form of gaming.

Indications from analysing existing intraday London Stock Exchange EDSP auctions indicate that there may be a small amount of liquidity and lit MTF trading during the new London Stock Exchange mid-day auctions. Probably in the early days this is unlikely to be of interest to brokers running agency algorithms (it might be of more interest to market makers of prop trading firms).

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