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Bid Offer Dark Pools – a Free Lunch?

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Bid Offer Dark Pools – a Free Lunch?

Key Points

- MTF Dark Pools have, until recently, matched all trades using primary market mid price.
- More recently some MTF Dark Pools have started offering matches at Primary market or EBBO 'touch prices', which we will refer to as 'BBO Dark Pools'.
- BBO Dark Pools will match incoming aggressive orders at the touch price that would be obtained by sending the order to a lit venue at that time.
- We examine the pros/cons of using a BBO Dark Pool as opposed to sending aggressive orders to lit markets.
- We find that, as well as generally lower fees for executing on BBO Dark Pools as opposed to lit venues, there are two additional benefits that we can quantify using actual trade data.
 - There is an overall price improvement when using BBO Dark Pools to execute trades larger than the lit volume available at EBBO.
 - There is reduced market impact when aggressively trading on BBO Dark Pools compared to lit venues. We find that high frequency market impact (100ms post trade) is several times lower and longer term impact (1 minute post trade) is approximately halved when sending an aggressive order to a BBO Dark Pool rather than a lit venue.

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Background

Until a couple of years ago, all executions on MTF Dark Pools in Europe were matched using the mid price of the primary lit market.

More recently, some MTF Dark Pools have begun to offer the option of matching orders based on Primary or EBBO **touch prices** rather than mid prices. In these new pools, incoming aggressive buy orders are matched with a resting sell order at the offer price of the lit market.

We will refer to pools offering such matching as '**BBO Dark Pools**' and at the time of writing, Dark Pools offering *BBO Matching* include SIGMA X MTF, UBS MTF and Instinet BlockMatch.

The benefits for the passive side of executing a dark trade in a BBO Dark Pool as opposed to matching at mid price are fairly obvious. Rather than splitting the spread with the aggressive side of the trade, as they would in a pure mid-point Dark Pool, the passive order will capture the 'whole spread' as recompense for providing liquidity, i.e. the same reward they would get for providing liquidity in a lit venue but without needing to 'show' the size of their resting order.

But how about the **aggressor**? Clearly it would be better for the aggressor, wherever possible, to get a mid-price match on a mid-point matching Dark Pool if that option is available. But if that option has been tried and there is currently no resting liquidity on any Dark Pools for a mid-price match, and the trade must be done now, then the two principal remaining options are:

- sending their order to try to match at bid/offer touch price on a BBO Dark Pool or
- sending it to a lit venue.

Which is the better option?



Advantages and Disadvantages of BBO Dark Pools

Let's consider the pros and cons of sending an **aggressive order** to a BBO Dark Pool or to a lit venue.

- **Execution Certainty** - By making the provision of liquidity more attractive for the passive side of the order, a BBO Dark Pool is likely to encourage more liquidity to be provided more consistently than a pure mid price matching dark pool and therefore is likely to offer a better overall probability of getting a match. However, by definition, and ignoring latency effects, a lit venue offers (almost) certain execution at the displayed price so without any other advantages it would be unusual to take the less certain option of sending an order for a possible match in a BBO Dark Pool when a lit match at the same price is available.
- **Exchange Fees** - The exchange fees for the **aggressor** matching on BBO Dark Pools are currently quite a bit lower than the fees of sending aggressive orders to lit venues (including the lit MTFs). So, as long as the same execution price is achieved (which should be the case) then the total cost of an order will be cheaper when using the BBO Dark Pools.
- **Market Impact** - An advantage to the **aggressor** of a traditional mid price matching dark pool trade is that, in theory, the mid price match will mask the side (buyer/seller) of the aggressor and so will lead to much lower (possibly zero) market price impact¹. However, in the case of a touch price match on a BBO Dark Pool, the side of the aggressor is clear to anyone watching the trade tape and so market participants providing liquidity in lit markets might see these aggressive buy/sell trades occurring on BBO Dark Pools and adjust their quotes in lit markets, causing price impact. So, there is likely to be some market impact when executing aggressively on a bid/offer pool, but intuitively it might be less than sending the equivalent order to a lit venue.
- **Size improvement.** Most BBO Dark Pools will match at touch bid/offer prices regardless of the size being traded. So it is possible that an order matched at touch price on a BBO Dark Pool will actually provide the aggressor a fill with more volume than could be matched on lit i.e. without having to match 'down the book at worse prices'. Where this happens, this is an effective price improvement for the **aggressor**.

The first two points are fairly clear and un-contentious. Execution certainty is, almost by definition, more uncertain when sending an order to a Dark Pool and exchange fees are definitely lower on Dark Pools (at least at the time of writing).

The potential benefits of the latter two points (reduced market impact, size improvement) *might be true* but really need to be tested in order to quantify any benefit they yield in practice. In the rest of this article, we will test this theory.

¹ *In fact, because most mid matches happen at primary mid rather than EBBO mid and the fact that some algos will take advantage (directly or indirectly) of small arbitrages between PBBO and EBBO by sending aggressive orders to the dark pools, there is still typically a small observed price impact in the direction of the aggressor. We have previously shown this in our article 'Can you hide in the Dark?'*



1. The Sample Sets Used In This Study

To test the theory that market impact is lower when **aggressively** executing on BBO Dark Pools compared with lit markets, we have extracted a set of aggressive trades sent by a single Agency Broker (Neonet) over a month. The trades are all in Swedish stocks and were sent to a mixture of:

- two BBO Dark Pools: Goldman Sachs SIGMA X MTF and UBS MTF (SGMX, XUBS)
- two lit markets: Nasdaq OMX Stockholm and Chi-X (XSTO, CHIX).

In order to make sure that we compare like with like we have sub-selected trades of similar sizes, namely SEK 10,000 to SEK 100,000. Within this set, the average trade sizes and the types of stocks traded were similar across execution venues in terms of on-book spreads. So although there may be some bias in the types of trades executed on the different venues, we think it is unlikely to affect the general results we report.

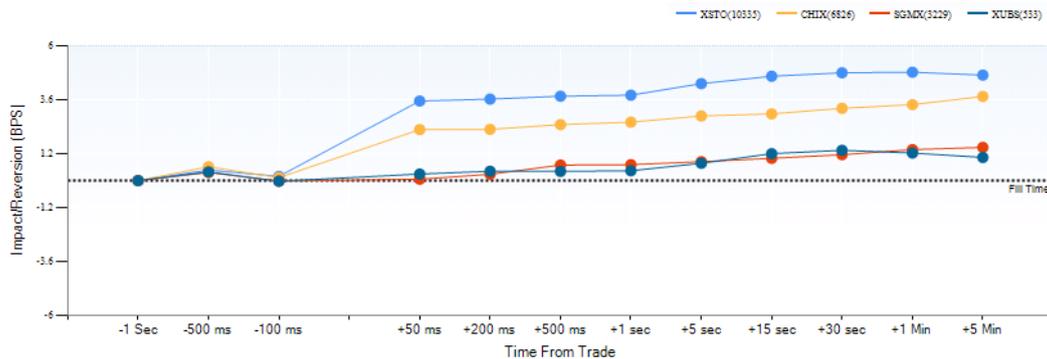
For the second part of the study, looking at whether there is a size improvement relating to aggressive trades on BBO Dark Pools, we take the full set of all European trades of all sizes executed by Neonet over the same month.

The table below summarises the fees applicable for aggressive orders sent to the four venues (correct as of January 2013).

Venue	Type	Aggressive Order Fee
Nasdaq OMX Stockholm	Lit Market	> 1 BPS (composed of a fixed fee of 7.44 SEK plus a variable fee in BPS)
Chi-X Europe	Lit Market	0.3 BPS
Goldman Sachs SIGMA X MTF	BBO Dark Pool	0.1 BPS
UBS MTF	BBO Dark Pool	0.1 BPS

2. Market Impact of Aggressive Trades Sent to Lit Venues Versus BBO Dark Pools

Many market participants would assume that sending an aggressive order to a dark BBO Dark Pool *might* have less market impact than sending the same order to a lit venue. Intuitively this makes sense, but is it actually true and if so can we quantify the difference?



The graph above shows the results of testing this theory on our sample set of trades.

To quantify market impact, we look at the evolution of EBBO mid prices in a window 1 second before and up to 5 minutes after each **aggressive** execution. Within the 5 minute window, we measure the amount of market impact (increase in EBBO mid price following an aggressive buy or decrease in EBBO mid price following an aggressive sell) at various time points. We then average these impacts over all trades in the set.

The results are fairly striking. The graphs show the average EBBO market impact in BPS at various times after a trade. As would be expected for aggressive trades, the results show positive market impact for all 4 venues.

However, the market impact in the first 50-100 milliseconds after an execution is much lower for the two BBO Dark Pools than for the two lit markets; in fact almost an order of magnitude lower. This is perhaps not so surprising. By sending an order that removes liquidity to a lit market, we will by definition instantly affect EBBO, which is based on that same lit liquidity.

More significant than the high frequency EBBO price movements immediately following a trade is the fact that if we look a full 1 minute after the trades, the impact on EBBO mid price of the lit trades remains about 2-3 times higher than the impact of aggressive trade on the BBO Dark Pools.

So the (semi) permanent impact of a trade on a BBO Dark Pool is 2-3 times less than a lit trade.

3. Size Improvement on BBO Dark Pools

As well as lower market price impacts shown in the previous section, another potential benefit to the aggressor of trades executed on a BBO Dark Pool is the so called 'size improvement'.

This is due to the fact that the matched price on a BBO Dark Pool is always the **touch price** even if the volume matched on the BBO Dark Pool is larger than the volume available on any lit venue.



To quantify this we do the following:

Firstly, we take each EBBO Dark Pool trade (this time of all size trades, not just those between SEK 10,000 - SEK 100,000) and simulate sending a single aggressive order of the same size, side and timestamp to each lit venue (XSTO,CHIX,BATE,TRQX,BURG) at the time of the EBBO Dark Pool trade.

Where there is insufficient volume to fully execute the simulated aggressive order at the best price on a given lit venue, we match down the order book and determine the average volume weighted price that would be obtained by matching the full volume ("effective price"). We collate the simulated effective prices obtained in this way for all venues and then select the venue with the 'best' price. This represents the best price that could have been obtained by sending a single aggressive order to execute on any one lit venue.

We compare this best lit effective price with the price actually obtained in the Dark Pool. We then quantify the number of times the dark pool price was better than the best lit effective price and also the average improvement (in BPS) over all of the BBO Dark Pool executions.

The table below shows how often the trades on the BBO Dark Pools execute at prices better than the best lit effective price and also quantifies this improvement in BPS averaged over all flow sent to that Dark Venue.

Number Of Dark Bid/Offer Trades	% Trades With more Volume than EBBO	BPS Improvement due to extra size
15,248	3.84%	0.19 BPS

About 3.8% of the time the BBO Dark Pool trade is for a volume greater than that available at touch on any 1 lit venue and the benefit of this equates to about 0.19BPS when averaged over all 15,248 trades executed on the Dark Pools.

Conclusions

The two empirical facts we have shown in this study are:

- **Market price impact is considerably lower** when sending an **aggressive** order to a BBO Dark Pool than when sending an aggressive order to a lit venue.
- Around 3-4% of the time, the trades sent to a BBO Dark Pool by Neonet could not have been fully executed on a single lit venue at EBBO price. This 'size improvement' corresponds to an **improvement in price of about 0.2BPS** when using BBO Dark Pools.



As exchange trading fees are also currently lower when sending orders to BBO Dark Pools, it would seem that in all cases, from the point of view of the **aggressor** looking for additional liquidity, an execution on a BBO Dark Pool is preferable to a similar execution on a lit venue in that it will lead to lower costs, less market impact and potential price improvement due to the size of the orders that might execute.

Given this, it would seem that growth in these types of pool in the near future is quite likely.

There are two caveats to this:

- As we said at the beginning of the article, the one key drawback to the aggressor when using a BBO Dark Pool is that execution is less certain than executing on a lit venue. So, the advantages of executing on a BBO Dark Pool must be balanced against the time spent sending an IOC to a BBO Dark Pool and the probability of non-execution.
- So far we have considered purely the interests of the participants in the BBO Dark Pools. If we take this to its logical conclusion and say that all aggressive trades should be sent first to BBO Dark Pools, and if there was significant liquidity posted on the BBO Dark Pools (such that executions occur there), then ultimately price formation on lit markets would suffer. Why would a market participant post liquidity on a lit venue when the 'front of the queue' is always effectively the liquidity resting on the dark pool?

However, at present, from a pure 'Best Execution' point of view, it could be argued that as long as the rate of execution is high, Agency Brokers should at least attempt to access liquidity in these pools ahead of hitting lit venue liquidity when sending aggressive orders as their clients will benefit.