



Darren Toulson, Head of Research at LiquidMetrix explains the methodology behind the Counterparty Profitability Measure and how much you could be losing to ‘Toxic’ counterparties.

A central fear any buy-side trader will have when trying to execute a large order is being exposed early on in the trade to ‘toxic’ venues or counterparties. Imparting too much information too quickly to the wrong people will make your implicit trading costs higher or worse, it may make finding liquidity at all a challenge.

The idea that certain market players seek out large buy-side orders to game has been given credence by recent books, articles and media attention focussing on predatory HFT algorithms and opaque anti-gaming logic in some dark pools. Because of this, there’s pressure on buy-sides, sell-sides and execution venues to demonstrate they are not falling prey to, or inadvertently encouraging, such gaming.

But what is meant by ‘Toxicity’? A common perception is that certain counterparties exploit fast connections, privileged access or smarter algorithms to ‘game’ less sophisticated trading styles. How can a participant see if this is the case with their own trades?

Let’s consider two approaches that buy-sides might use when trying to identify fill level toxicity:

A. Indirect Approach – Broker / Venue fill profiling to identify toxicity

One way to characterise ‘toxic’ trades is to think what we might expect from a ‘good’ set of trades, for instance:

- When our orders access multiple lit markets they should obtain at least as much liquidity as was available on all lit venues at the time of first order submission. Ideally they should capture more if dark pools or other hidden order types are being accessed. Otherwise this is a sign that HFTs might be gaming orders and either stealing or cancelling liquidity in the milliseconds our orders are taking to execute.
- When our orders execute aggressively on mid-point matching dark pools, we should expect little or no short-term (less than 1 second) impact on liquidity in lit markets. Otherwise it might be that our counterparty on the dark venue was a market maker (or predator) who used information from our trade to adjust their own resting orders or trade ahead of us on lit markets.
- When our orders execute passively on mid-



point matching dark pools, we should expect them to capture close to 50 percent of the market wide BBO spread (not just the primary market spread). Otherwise the aggressor may be timing orders to take advantage of dark pools with market data latency problems or where matched reference prices don't reflect market wide fair prices.

When orders execute passively, we would prefer as little correlation as possible between our trades and large changes to the market wide mid-price. Otherwise it's possible that our trade was 'picked off' at an adverse price just as the market moves sharply (adverse selection).

This type of 'qualitative' approach doesn't always produce clear 'smoking guns' (though sometimes it does!) but it does provide a good way of assessing the relative performance of different brokers / algos / venues and giving some assurance that trades executed through these different channels are doing what they should do and are not harming your overall trading performance.

B. Direct Approach – Counterparty Profitability Measure to Identify Toxicity

Returning to the central concern around predatory short-term trading styles, much of the fear is that the counterparty to our trades might be making quick, riskless profits at our expense. Whether this profit is coming from 'latency front running' lit market orders, gaming reference prices in dark pools or some other means is immaterial.

Consider two common examples of 'toxic' behaviour:

- A primary reference price moves sharply and a resting buy-side order on a dark pool that references this price is hit at that exact instant; we can assume that usually the buy-side passive order will trade at the less favourable (stale) price.
- A lit aggressive buy-side SOR order is 'gamed' causing it to go deeper into the order book than intended; there follows a price reversion after the lit trade has executed.

In both cases (and others scenarios described

in the previous section) the counterparty to the buy-side order has probably obtained a short-term profitable position. But how profitable?

The obvious way of measuring this is to simulate a simple short-term market making model that will balance (trade out) positions obtained as a result of being counterparty to all trades done by a certain buy-side. Obviously this needs to be done somewhat realistically, simply looking at mid prices a fixed time after each fill doesn't really tell us if the counterparty to your trades could have realistically traded out and made a 'fast buck'. However, by simulating trading outcomes of limit orders placed by market making / trading strategies with some kind of short term inventory / risk model, we can get an idea of how much profit a basic algorithm might make by being counterparty to your trades.

What we have found when we look at real client data, is that this LiquidMetrix Counterparty Profitability Measure (CPM), which directly tries to answer the question 'how much is the other party profiting from trading with me' is actually a very good 'general toxicity indicator'. That is, if you look more closely at groups of buy-side trades on a venue, algorithm or broker that has a high CPM associated with them, then you usually find within those trades some of the specific 'gaming' problems identified in the previous section.

Conclusion

One way of defining toxicity is seeing whether your (toxic) counterparty can consistently make short-term riskless profits for themselves at your expense when you trade. This is not always a bad thing, you expect to pay something for liquidity. However, some of the types of gaming relating to high frequency price movements or reference price arbitrages highlighted in the media are more than simply a liquidity provider being compensated for providing liquidity. So having a way of identifying, quantifying and hopefully then avoiding or mitigating the risks of trading with such 'toxic' counterparties is going to be key to answering the question "How much money (if any) does your fund lose to HFT / toxic counterparties". ■