TraderServe Briefing Note

Sold a Dummy: Why exchange test symbols fail as a solution to MiFID II algorithm testing requirements for investment firms

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Under MiFID II, European trading venues are obliged to offer their members access to an environment with which they can test their algorithms so that in live markets they avoid contributing to or creating disorderly trading conditions[1]. Two options are allowed:
"(a) simulation facilities which reproduce as realistically as possible the production environment, including disorderly trading conditions, and which provide the functionalities, protocols and structure that allow members to test a range of scenarios that they consider relevant to their activity;
(b) testing symbols as defined and maintained by the trading venue. " (ibid **Art 10, 2**).
We explain briefly here that, while Option (b) will certainly enable a venue to fulfil its own regulatory obligations, it is of little value to the venue's members who must certify to each European trading venue that their algorithms have been suitably tested to avoid contributing to or creating disorderly trading conditions and explain how this has been done, prior to any deployment or substantial update of a trading algorithm or trading strategy.

Do Dummy Symbols offer a Realistic Market?

ESMA's Final Report on the MiFID II Consultation offers some clarity on the testing required under the new regulations: "The purpose of testing for disorderly trading conditions is to recreate real market conditions to ensure the well-functioning of algorithms under changing circumstances".[2] Furthermore "ESMA was of the opinion that the scenarios selected by trading venues should be appropriate to the nature and scale of the trading activity that takes place on them. They should be comprehensive in terms of functionalities, protocols and structure and should be as close as to real market conditions as possible, including disorderly market conditions (ibid. **3.2.35**)." Some respondents to the Consultation exercise suggested "the use of fictional test 'symbols' to undertake testing where different algorithms may interact with each other in a live trading environment to be sufficient in meeting such an objective." (ibid **3.2.36**) We fully support ESMA's view that "to reproduce real market conditions in a non-live environment, …the simultaneous interaction with other relevant market players is a prerequisite" (ibid **3.2.36**), (NOTE: see our companion piece on the shortcomings of market replay in this context)[3]. However there is no guarantee that the sort of algorithmic interaction facilitated by test symbols alone will produce a sufficiently realistic dummy market for testing an algorithm's disposition to create or contribute to market disorder. **Unless the venue provides a plausible mechanism to produce realistic market microstructure, the market with which an algorithm interacts cannot offer an adequate test**.

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[1] *MiFID II EC Delegated Regulation 14 July 2016 RTS7 supplementing 2014/65/EU specifying organisational requirements of trading venues* **Art 10, 1,2**
http://ec.europa.eu/finance/securities/docs/isd/mifid/rts/160714-rts-7_en.pdf
[2] *ESMA Final Report Draft Regulatory and Implementing Technical Standards MiFID II/MiFIR* - **3.2.33**
https://www.esma.europa.eu/sites/default/files/library/2015/11/2015-esma-1464_-_final_report_-_draft_rts_and_its_on_mifid_ii_and_mifir.pdf
[3] *Played Out: Why market replay fails as a solution for MiFID II algorithm testing – Extended Version*
http://www.traderserve.com/pdf/_PlayedOut-TraderServeBriefingNote-9thSeptember2016-ExtendedVersionwithexample

If there is no guarantee of realism here then no amount of dummy symbol testing can establish the algorithm's fitness in live trading, and the market participant cannot certify that the algorithm has been suitably tested to avoid contributing to or creating market disorder.

How can Dummy Symbols reliably offer Suitable Stress Tests?

In RTS 6 the obligations of investment firms include testing any algorithm used for trading to ensure that it "does not contribute to disorderly trading conditions, continues to work effectively in stressed market conditions…"[4] Thus a firm testing an algorithm needs to be confident that the algorithm has met difficult conditions, including ideally those that might pose problems for it. ESMA's Final Report is explicit on this point: "The facilities offered by trading venues for these purposes should also permit testing a range of scenarios the users consider suitable to their activity."[5]. But a testing symbol is not a controlled environment: its behaviour as a market will depend entirely on which algorithms are trading on it. These cannot be guaranteed, therefore, to produce a stressed market at any time, still less the sort of stressed market that the investment firm believes is suitable to threaten the stability of the particular algorithm under test.

How to cope with Algorithms running on Multiple Markets?

There is another key concern over the capacity of testing symbols to create realistic and suitably stressed markets through the interaction of its participant algorithms. This is that many of the algorithms used by investment firms trade multiple markets simultaneously, including very common smart order routers and statistical arbitrage strategies. Now, even if all the markets required for a single multi-market algo are available as testing symbols on the various trading venues, and even if they all somehow manage to exhibit realistic microstructure (which they can only do by accident), there is no way for the investment firm to ensure that those markets are **coordinated** and that the multi-market scenario itself is realistic. So the testing symbols cannot provide a satisfactory test of the multi-market algorithm's disposition to create or contribute to disorder in one or more of its markets.

Conclusions

The non-live testing of algorithms to avoid disorderly trading requires allowing them to interact with other algorithms, but it also requires a way of building a suitable representation of a real market both in normal and stressed conditions. While a testing symbol allows interaction it cannot guarantee realistic microstructure or the creation of suitably stressed or disorderly conditions. With multi-instrument algorithms the problem is worse because the relative market movements of the testing symbols (even if they all exist) is another aspect where realism, to say the least, cannot be assured. An exchange member required under RTS 7 to certify that its algorithms have been adequately tested to avoid contributing or creating market disorder cannot rely on the exchange's test symbol, however useful this may be for other purposes, but needs to investigate a proper realistic and responsive simulation environment in line with Option (a) above.

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[4] *MiFID II EC Delegated Regulation 19 July 2016 RTS6 supplementing 2014/65/EU specifying the organisational requirements of investment firms engaged in algorithmic trading* **Art 5, 4 (d)**
http://ec.europa.eu/finance/securities/docs/isd/mifid/rts/160719-rts-6_en.pdf
[5] *ESMA Final Report Draft Regulatory and Implementing Technical Standards MiFID II/MiFIR* - **3.2.35**
https://www.esma.europa.eu/sites/default/files/library/2015/11/2015-esma-1464_-_final_report_-_draft_rts_and_its_on_mifid_ii_and_mifir.pdf