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Taming HFT risks

for safe and efficient trading

The attitude towards High Frequency Trading (HFT) has changed for the worse. Its nature is often regarded as inherently irresponsible and potentially disruptive.

I believe that its demonisation and the fear of possible dangers of HFT to the markets has been blown way out of proportion. The reason, in my view, lies in the perception of risk management.

There is too much emphasis on the word “risk”. The word sends danger signals paralysing the brain while the “management” part of the phrase is almost neglected. But, let us be rational about dangers provoked by HFT. These arise from the huge numbers of transactions and their high frequency. Thus, risk-management logically means restricting the number of orders and their frequency.

Straightforward methods of reducing risks are usually referred to as “fat finger” checks. The term is inelegant and unpleasant: this somehow matches the attitude to HFT.

But why don't we recall some positive things associated with HFT? It usually brings in liquidity and improves market efficiency as algorithmic traders use minimal spreads. They also invest a lot into technological development pushing forward the progress.

How do HFT operators make money? There are two well-known strategies widely used which are market-making and statistical arbitrage. Arbitrage usually means taking reverse positions in highly correlated instruments of similar nature. Such positions don't bring along high market risks. Yet in real life, especially if arbitrage positions are placed at different trading venues (or even in different segments of the same venue) traders have to provide collateral for each separate position. This raises the requirement for additional funds and forces devising more complex algorithms.

But it is precisely the management of risks that can reverse the situation. There are techniques and technology to control market risks pre-trade and online. That means using minimal collateral through netting opposite positions in correlated instruments: this allows maximising positions' volumes at low risk.

The same applies to derivatives trading. Despite the fact that HFT positions do not involve high market risk, rough margining demands excessively high collateral, which is incompatible with the overall position.

The explanation may be the common attitude to real risk calculation as a costly mathematical task. It is easy to assume that it leads to much more latency. The easy

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Module	Description	Internal Latency	% of exchange latency on collocation
FIX2MICEX	FIX-cover for Moscow Exchange stock market (ASTS platform)	45 mcs	7.5%
FIX2CETS	FIX-cover for Moscow Exchange currency market (ASTS platform)	45 mcs	7.5%
FIX2Plaza2	FIX-cover for Moscow Exchange derivatives market (SPECTRA platform)	60 mcs	7.5 %
FIX2LSE	FIX-cover for LSE stock market (over native API)	15 mcs	10% (faster than native protocol with fat-fingers at LSE)
MICEXPreTrade	Solution which is integrated inside native API of Moscow Exchange (ASTS platform)	3 mcs	0.5 %
FIXPreTrade	FIX-proxy for any FIX environment	30 mcs	-

shortcut is a compromise for rough but fast pre-trade margining.

It is not a fair shortcut. Investing in infrastructure may be easy. You can go on a shopping spree, use new servers with the latest processors and the best collocation available from the exchange. Implementing fat finger checks is easier than understanding the nature of HFT trading. But you can't do the best for your client without addressing your client's trading pattern.

When you search for a better way to implement your client's strategy you may be surprised but the technology is already here. What is the principal calculation cost of real market risk check of complex positions? It is the pre-trade analysis of different scenarios of client orders' execution.

Is it possible to set up your infrastructure to reduce this factor to a minimum? Yes, absolutely. The trick is to split a risk processing module in two: one is a risk parameters' calculation module working post-trade and another is a so-called fast pre-trade module.

The first one calculates position parameters and scenarios and either permits trading or blocks it. The second one receives a signal for permission and performs fat finger checks. The checks make sure there is a sufficient financial reserve for trading.

In this scheme, the time-intensive part (calculation of risk parameters and scenarios) is excluded from the transaction chain.

It goes without saying that such a risk parameters calculation module needs to receive all orders and trades in a drop copy mode as well as the market data. It is also obvious that the quality of calculation greatly

depends on the speed of receiving this information. Thus, from the technological point of view, this module should be placed as close to the source of data as possible (most likely, at the exchange itself). But, due to the fact that post-trade calculation is done outside the transaction chain and does not affect execution speed you can employ any appropriate technique of risk calculation.

In our trading solutions, for instance, we employ techniques for operations which rely on the following:

- margin trading;
- portfolio margining (SPAN-like approach);
- netting of local shares and ADRs\GDRs;
- netting of equity and derivatives' positions;
- unified cash account for all markets.

All these techniques support multi-currency operations, take into account working orders, broker and exchange commissions.

To ensure proper pre-trade control in the fast pre-trade module we select appropriate settings. Knowing the latency for a given infrastructure we choose flood control and order volume settings. This prevents sending orders of higher total volume than a specified amount in the period of time between sending a transaction to exchange and receiving a signal about the updated position from the post-trade module.

Of course, the said amount raises the amount of collateral. However, the client still enjoys significantly lower finance requirements due to netting algorithms and portfolio margining.

It is also possible to switch on P&L checks and checks for instruments acceptable for the trader.

The business consequences of this approach may be summarised as follows:

- the client starts performing more transactions (the exchange and the broker get more commissions);
- the client spends less money on financing his/her operations and reduces both his/her costs and complexity of algorithms. The resulting efficiency of your client's trading improves.

As it is necessary to take into account different infrastructure peculiarities for proper installation of the fast pre-trade module we have developed several approaches. In the table above are the available options, their technical descriptions and internal latency.

All solutions listed in the table above are employed by ARQA clients in their day-to-day operations, and all figures are based on average results.

As I have already mentioned all these solutions are used to service HFT clients. In my view, the essential condition of success lies precisely in the fact that these technologies and basic techniques balance the interests of HFTs, exchanges and brokers. The principal component of this balance is understanding each party's business requirements and applying risk-management as an instrument of risk control for a well-understood trading pattern adapted to existing infrastructure and not to the fear of the unknown and the terrible.