

Liquidity must rise again!

In today's world, markets are connected to each other; orders come and go to the market place with a speed of light. Order books are much more volatile than ever. Maintaining the market liquidity at a stable level is not an easy job anymore. It is time to stop and think about how we can protect and improve liquidity in a changing market environment.

As technology evolved, market liquidity has become a major problem for many exchanges. According to recent statistics, high frequency trading accounts for more than 50% of total equity market volume. So far, humans have gained many glories against computers; however, when it comes to trading, it is hard to compete. There are several trading software products available in the market with ability to connect to all kind of data sources, interpret collected news and financial data, convert them into investment decisions, and make trades just in a few milliseconds. As a normal human eye gazes through the first sentence of a flashing news item, computers have already decided whether it is good or bad, and traded accordingly.

Which order does what?

Orders either provide or consume liquidity. In general, passive orders that are sitting in the order book provide liquidity while active orders that initiate a trade consume liquidity. Let's take a look at the well-known order types in terms of their contribution to market liquidity.

Limit orders trade at a specific price. If there is a better price on the other side of the market at the time of order entry, limit orders become active and consume liquidity; otherwise, they sit in the order book and provide liquidity¹. **Market orders** trade at the best available price. This type of order walks through all price levels until the order quantity is fully matched; therefore, they consume liquidity².

Iceberg orders submit additional quantity when visible order quantity is fully matched; therefore, they provide liquidity.

Stop-loss and take-profit orders trade at best available price when the market hits a certain price level; therefore, they consume liquidity³.

Open quantity orders trade at best available price. This type of order satisfies all quantities on the other side of the market

until the specified price level is reached; therefore, they consume liquidity.

One-cancels-the-other orders automatically cancel the secondary order when the primary order is fully matched. This type of order is kind of hybrid since primary order provides liquidity while secondary order consumes liquidity.

One-activates-the-other orders automatically submit the secondary order when primary order is fully matched. This type of order is also kind of hybrid since primary order provides liquidity while secondary order either provides or consumes liquidity depending on order type and market prices.

All-or-none orders try to match all related orders simultaneously. When the condition is met, a group of orders trades at best available price; therefore, they consume liquidity.

Order cancellation always consumes liquidity.

What should be done?

One of the best ways to maintain market stability is promoting liquidity providers. Market makers are known to be the main liquidity providers and thus benefit from several incentives for

many years. In addition to market making mechanisms, passive orders should also be prioritized and cost less. Here are some ideas that may help to improve market liquidity.

a) Differentiating cost of trade parties

A trade has two parties. The active side initiates the trade and consumes liquidity. The passive side, which provides liquidity, declares its intention to the market and waits for possible matches. Both parties are essential for price discovery. In a balanced market, neither liquidity providers nor liquidity consumers have a negative effect on price dynamics; however, sharp price movements and high intraday volatility is a clear sign of strong influence of liquidity consumers on the market price.

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Member	Buy Side			Sell Side			Exchange	Exchange
	Active	Passive	Total	Active	Passive	Total	Fee (1)	Fee (2)
A	€ 150.000.000	€ 150.000.000	€ 300.000.000	€ 35.000.000	€ 35.000.000	€ 70.000.000	€ 14.800	€ 14.800
B	€ 50.000.000	€ 0	€ 50.000.000	€ 270.000.000	€ 0	€ 270.000.000	€ 12.800	€ 16.000
C	€ 300.000.000	€ 150.000.000	€ 450.000.000	€ 145.000.000	€ 20.000.000	€ 165.000.000	€ 24.600	€ 27.350
D	€ 0	€ 120.000.000	€ 120.000.000	€ 0	€ 320.000.000	€ 320.000.000	€ 17.600	€ 13.200
E	€ 10.000.000	€ 70.000.000	€ 80.000.000	€ 40.000.000	€ 135.000.000	€ 175.000.000	€ 10.200	€ 8.650
Total	€ 510.000.000	€ 490.000.000	€ 1.000.000.000	€ 490.000.000	€ 510.000.000	€ 1.000.000.000	€ 80.000	€ 80.000

Table-1: Differentiating Exchange Fee

If that is the case, exchanges may consider applying different fees for active and passive sides of a trade to correct the instability. This practice is actually performed by some ECNs. Liquidity providers are credited while liquidity removers are debited in these platforms. Since active sides' trade volume is always equal to that of passive sides', differentiation can be done without any net change in the exchanges' total revenue.

For an illustration, assume that a security exchange takes 0.004% of trade value from its members as exchange fee. Table-1 shows a member-based trade report on a specific day, where total traded value is 1 billion EUR. In the first scenario, the exchange fee is calculated based on 0.004% fix rate. In the second scenario, the exchange fee rate is 0.005% for the active side and 0.003% for the passive side. As it is expected, members that traded mostly on the passive side of the market pay lower exchange fee in the second calculation; however, total revenue for the exchange is exactly the same in both scenarios.

b) Prioritizing passive order entry

Generally, order matching algorithms process incoming transactions one at a time. Inserting a new transaction while another one is being processed is complicated and a time consuming job – it also creates latency. Nevertheless, prioritizing passive order entry is worth to think over when the market liquidity is at stake. Matching algorithms can be redesigned so that the liquidity providing orders are accepted during the ongoing transaction process.

Let's try to visualize what is meant by "prioritizing". The order book of a security is shown below:

Order Book						
No	Price	Buy/Sell	Quantity	Order Type	Hidden Quantity	Activation Price
1	73,100	Buy	100	Limit	-	-
2	73,075	Buy	100	Iceberg	100	-
3	73,050	Buy	100	Limit	-	-
4	73,025	Buy	100	Limit	-	-
5	73,000	Buy	100	OCO	-	-
6	72,975	Buy	100	OCO	-	-
7	72,950	Buy	100	Limit	-	-
8	72,925	Buy	100	Limit	-	-
9	72,900	Buy	100	Limit	-	-

Waiting Orders						
No	Price	Buy/Sell	Quantity	Order Type	Hidden Quantity	Activation Price
10	73,050	Buy	100	Take-profit	-	73,050
11	-	Sell	500	Stop-loss	-	73,000

Active Order						
No	Price	Buy/Sell	Quantity	Order Type	Hidden Quantity	Activation Price
12	-	Sell	500	Market	-	-

The last order (#12) is a market sell order with a quantity of 500. A classic matching algorithm should behave as follows⁴:

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Start matching of Order#12
Trade#1: Buy side: Order#1, Sell side: Order#12,
Price: 73,100, Quantity: 100
Trade#2: Buy side: Order#2, Sell side: Order#12,
Price: 73,075, Quantity: 100
Trade#3: Buy side: Order#3, Sell side: Order#12,
Price: 73,050, Quantity: 100
Trade#4: Buy side: Order#4, Sell side: Order#12,
Price: 73,025, Quantity: 100
Trade#5: Buy side: Order#5, Sell side: Order#12,
Price: 73,000, Quantity: 100
Cancel Order#6
Complete matching of Order#12
Check for activation
Activate Order#2, create a buy order at 73,075
with quantity 100 (Order#13)
Activate Order#10, create a buy order at 73,050
with quantity 100 (Order#14)
Activate Order#11, create a market sell order
with quantity 500 (Order#15)
Start matching of Order#15
Trade#6: Buy side: Order#13, Sell side: Order#15,
Price: 73,075, Quantity: 100
Trade#7: Buy side: Order#14, Sell side: Order#15,
Price: 73,050, Quantity: 100
Trade#8: Buy side: Order#7, Sell side: Order#15,
Price: 72,950, Quantity: 100
Trade#9: Buy side: Order#8, Sell side: Order#15,
Price: 72,925, Quantity: 100
Trade#10: Buy side: Order#9, Sell side: Order#15,
Price: 72,900, Quantity: 100
Complete matching of Order#15
Check for activation

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Let's see how matching occurs if liquidity providing orders are prioritized⁵:

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Start matching of Order#12
Trade#1: Buy side: Order#1, Sell side: Order#12,
Price: 73,100, Quantity: 100
Check for activation
Trade#2: Buy side: Order#2, Sell side: Order#12,
Price: 73,075, Quantity: 100
Check for activation
Activate Order#2, create a buy order at 73,075
with quantity 100 (Order#13)
Trade#3: Buy side: Order#13, Sell side: Order#12,
Price: 73,075, Quantity: 100
Check for activation
Trade#4: Buy side: Order#3, Sell side: Order#12,
Price: 73,050, Quantity: 100
Check for activation
Activate Order#10, create a buy order at 73,050
with quantity 100 (Order#14)
Trade#5: Buy side: Order#14, Sell side: Order#12,
Price: 73,050, Quantity: 100
Check for activation
Complete matching of Order#12

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In the first scenario, liquidity consuming orders (Order#6 and Order#11) are activated. That causes the security price drop 8 ticks from 73,100 to 72,900; however, in the second scenario, Order#6 and Order#11 are not activated since the price falls only 2 ticks from 73,100 to 73,050, and 73,000 is never touched.

c) Controlling order cancellation

Academic studies show that liquidity providing orders have a strong effect on price dynamics and bid-ask quotes⁶. That is not surprising. Many investors pay a significant amount of money to obtain market depth data and use it as a signal for their trading strategies. Market depth is also important when deciding whether to provide or consume the liquidity. Impatient traders may choose to execute the trade immediately at a relatively disadvantageous price instead of waiting in line for an unpredictably long time. That is why order cancellation should be done responsibly and for a good reason. Frequently entering and cancelling orders without any logical explanation will ultimately wear out the trading system, create confusion and raise intraday volatility.

Impatient investors are sometimes abused by rogue traders with a technique called *spoofing*, which is considered as an illegal trading activity that aims to create a false impression about a security's demand or supply by entering orders with no intention to execute them⁷. The logic behind spoofing is to force the impatient investors to trade on the other side of the market, where the real benefits lie. Orders used in spoofing are never meant to be filled – they are cancelled before matching occurs. This manipulative behavior results in liquidity consumption.

If necessary, assigning a cost to order cancellation can reduce redundant order cancellation and suppress manipulative techniques like spoofing. Some exchanges charge fees to their members for orders that are cancelled or modified⁸. Order execution rates should be taken into consideration when applying such a rule to avoid vandalizing investors with good intention. Order cancellation fees should be considered as an indirect trading cost rather than a punishment.

Another measure that can be taken against the negative effect of order cancellation is to set a minimum sitting time in the order book for orders providing liquidity. This rule is more appropriate for high frequency traders who can enter and withdraw orders within just a few milliseconds.

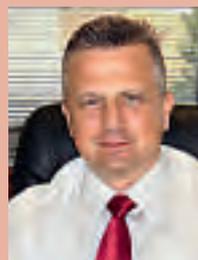
Summing up

Liquidity can be described as the ability of making asset-to-cash or cash-to-asset conversion without any adverse effect on asset price. Recently, markets that are known to be liquid have begun to suffer from sharp price movements and high intraday volatility. Many factors may contribute to this turbulence such as market integration, technological developments, increase in direct market access, and use of high frequency trading. Maintaining the market liquidity at a stable level must

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be a real concern for market operators and regulators. Besides conventional measures like market making mechanism, new ways of improving and protecting liquidity should be investigated and applied.

- 1 Fill-and-kill/Fill-or-kill type limit orders always consume liquidity.
- 2 Market-to-limit-at-best orders only trade at the best available price. Remaining order quantity is converted to limit order with last trading price and sits in the order book. That's why market-to-limit-at-best orders may provide liquidity to some extent.
- 3 Stop-loss and take-profit orders can also be entered as limit orders. If that is the case, they may provide liquidity.
- 4 Activation check is done after completion of a match.
- 5 Activation check is done at every price level when all passive orders at that price are exhausted.
- 6 For more information, please refer to “The Market Impact of a Limit Order”, Nikolaus Hautsch and Ruilhong Huang, SFB 649 Discussion Paper 2009-051
- 7 For more information, please refer to Market Watch Newsletter Issue No. 33, August 2009, Financial Services Authority
- 8 As an example, see the Chicago Stock Exchange regulation at http://www.chx.com/content/Participant_Information/Downloadable_Docs/RuleFilings/ProposedFilings/CHX-2010-19.pdf



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