SIX Swiss Exchange

Trading InfoSnack #15: Mirror, Mirror on the Wall

10 September 2025

Mirror, Mirror on the Wall

Quick Summary

- **Primary exchanges have a circa 4x higher probability of price settings occuring on them compared to the next highest venue**
- **Price mirroring across venues occurs rapidly after price setting, with the geographical one-way latency between venues, but fill dynamics (including probability of trading and relative fill size) mediate where executions occur**
- **For all venues market share is higher and the probability of trading activity occuring on the relevant price level (likelihood of fill) is higher when they are price setting, hence where a price is set is an important liquidity consideration for both posting and aggressing**
- **However, with the execption of Aquis, MTFs exhibit a circa 2x greater drop in the probability of trading activity occurring at the relevant price level when they are price mirroring compared to the primary**
- **Differences in comparative market share and execution quality across venues can be probed by calculating Shapley values across three fundamental liquidity factors (EBBO presence, likelihood of fill, and relative fill size at the EBBO price level)**
- **Trading participants can utilise such a method to gain market-level insights on execution quality between venues**

Introduction

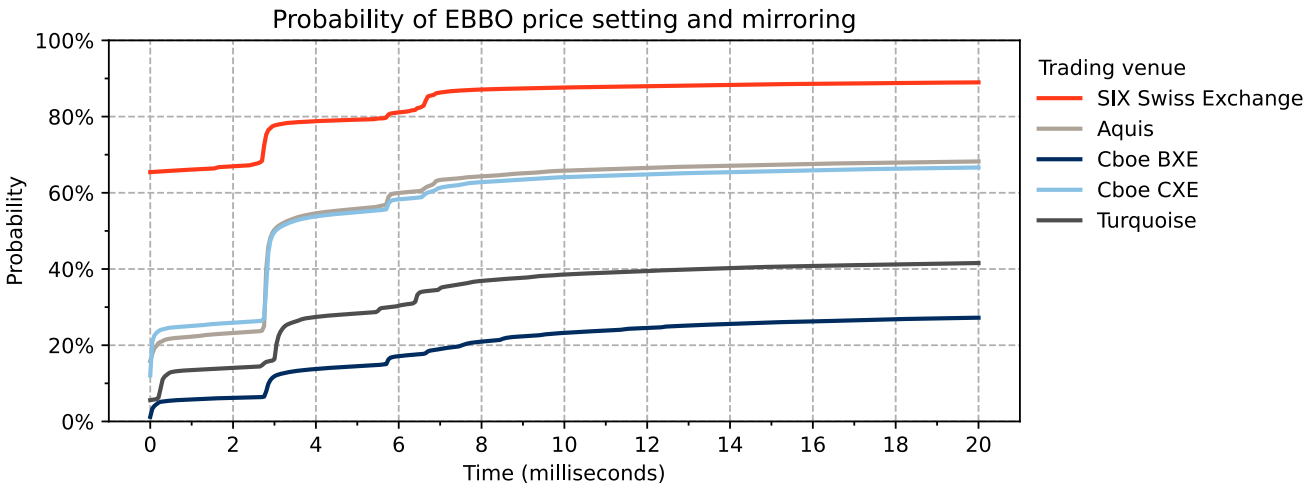
In a fragmented liquidity environment, where trading firms have the option to post orders across multiple order books, the evolution of price establishment and transmission can be visualised over time across trading venues. The posting of a new best bid / offer on any one venue ahead of other venues is deemed a price setting. As subsequent orders at the same price level are posted across other venues the newly established price level is transmitted across the market in effect 'mirroring' the original price setting. The evolution of a newly established price level across venues can be analysed overtime to illustrate where and how price formation occurs, the average contribution of each venue to the price formation process, and the impact of price setting and mirroring on market share and liquidity dynamics.

Price Setting Dynamics

Chart 1.0 below provides an illustration of the average price evolution over the first 20 milliseconds (ms) of a newly established price level across venues in Swiss Blue Chip equities for Q2 2025. The Y axis represents the probability that the given venue is at the European Best Bid / Offer (EBBO) overtime following a new price setting at T=0. As such, the average probability that a new EBBO has been set on a given venue can be observed on the left hand side of the chart at time (T=0), with a new best bid / offer price having the highest probability of being set on SIX Swiss Exchange (65.4%), followed by the Aquis book (15.8%), the CBOE CXE book (12.1%), the CBOE BXE book (1.2%) and the Turquoise book (5.6%). It is perhaps somewhat counter-intuitive that the two venues with the highest probabilities of having a new EBBO price set on them (SIX and Aquis) do not pay rebates for passive executions or price setting order executions that occur on them. It is also worth noting that the overall pattern of price setting behaviour is similar across

other European securities universes, with primary exchanges having a circa 4x higher probability of price settings occuring on them compared to the next highest venue.

Chart 1.0 – Probability of EBBO price setting and price mirroring over time in Swiss Blue Chips



Data source: BMLL | Analytics: SIX | Security universe: Swiss Blue Chips (SLI) | Sample period: 01 Apr 2025 - 30 Jun 2025

Price Mirroring Dynamics

Another interesting observation from Chart 1.0 above is how each venue's probability of being at EBBO evolves from initial price setting(at T=0). For most venues, it can be observed that there are defined 'jumps' in the probability that each given venue displays prices that are at the newly set EBBO. As per the above chart for Swiss Blue Chips, the most pronounced 'jumps' occur at approximately 2.8ms and 6.7ms post price setting (at T=0). These timepoints correspond to the one-way geographical latency between Zurich and London via microwave and fibre respectively and indicate the speed at which price mirroring across venues occurs. It is worth nothing that for London based venues there are also 'jumps' that occur between 0 and 1ms post price setting, which are due to price mirroring occuring between London based venues (sometimes located in the same data centre) after a price setting has occurred on a venue based in London. Whilst Chart 1.0 above only illustrates the evolution of the probability any given venue is at EBBO post a new price setting out to 20ms, if extended overtime each venues probability of being at EBBO would tend toward its average share of joining an EBBO price level. The above pattern of price mirroring, especially around 2.8ms post price setting, suggests the role that trading firms that utilise microwave connectivity play in mirroring prices between venues.

Price Setting & Price Mirroring Effect on Market Share Dynamics

Table 1.0 below illustrates the market share of each venue for EBBO price levels, when (a) the venue is price setting, and (b) venue is price mirroring within 20ms after the establishment of a new price level. There are two interesting observations: (i) when any given venue is the price setter its market share is higher than its usual overall market share; (ii) when the primary exchange is a price joiner due to mirroring, its market share is lower than its usual overall market share; and (iii) when MTFs are price joiners due to price mirroring, their market share's are slightly higher than their usual overall market share.

Table 1.0 – Lit continuous trading market share across trading venues in case of EBBO price setting and mirroring

Venue	Lit continuous trading market share		
	Overall	EBBO price setter	EBBO price mirrored within 20ms
SIX Swiss Exchange	65.1%	73.1%	57.6%
Aquis	5.3%	10.0%	6.3%
CBOE BXE	3.4%	24.1%	5.7%
CBOE CXE	23.5%	43.1%	26.2%
Turquoise	2.8%	13.0%	3.8%

Data source: BMLL | Analytics: SIX | Security universe: Swiss Blue Chips (SLI) | Sample period: 01 Apr 2025 – 30 Jun 2025

Price setting & Price Mirroring Effect on Fill Dynamics

Table 2.0 below contextualises a given venue's price setter ratio in relation to its fill likelihood (defined as the probability that there is trading on the given venue at the established price level at any point over the price level lifespan) and the total traded size that occurs on the given venue over the established price level lifespan. When examining this table, three key observations are evident. Firslty, the fill likelihood on any given venue is notably higher when the venue is price setting than when the venue is price mirroring. Secondly, the drop in fill likelihood when a venue is not price setting is most pronounced for MTFs, with the exception of Aquis. Thirdly, whilst for most venues the traded size at an established price level is relatively consistent regardless of whether it is price setting or price mirroring, for the CBOE CXE book it is larger when the venue is price mirroring.

Table 2.0 - Decomposed fill likelihood and traded size of EBBO price levels across trading venues

Venue	Price setter ratio	Fill likelihood of price level		Traded size (in CHF) at price level given price level traded	
		Price setter	Mirrored within 20ms	Price setter	Mirrored within 20ms
SIX Swiss Exchange	65.4%	81.8%	71.3%	25'732	26'761
Aquis	15.8%	36.6%	26.8%	7'448	7'458
CBOE BXE	1.2%	80.0%	36.8%	6'917	5'659
CBOE CXE	12.1%	84.9%	60.8%	10'988	13'615
Turquoise	5.6%	53.2%	25.9%	5'462	5'181

Data source: BMLL | Analytics: SIX | Security universe: Swiss Blue Chips (SLI) | Sample period: 01 Apr 2025 – 30 Jun 2025

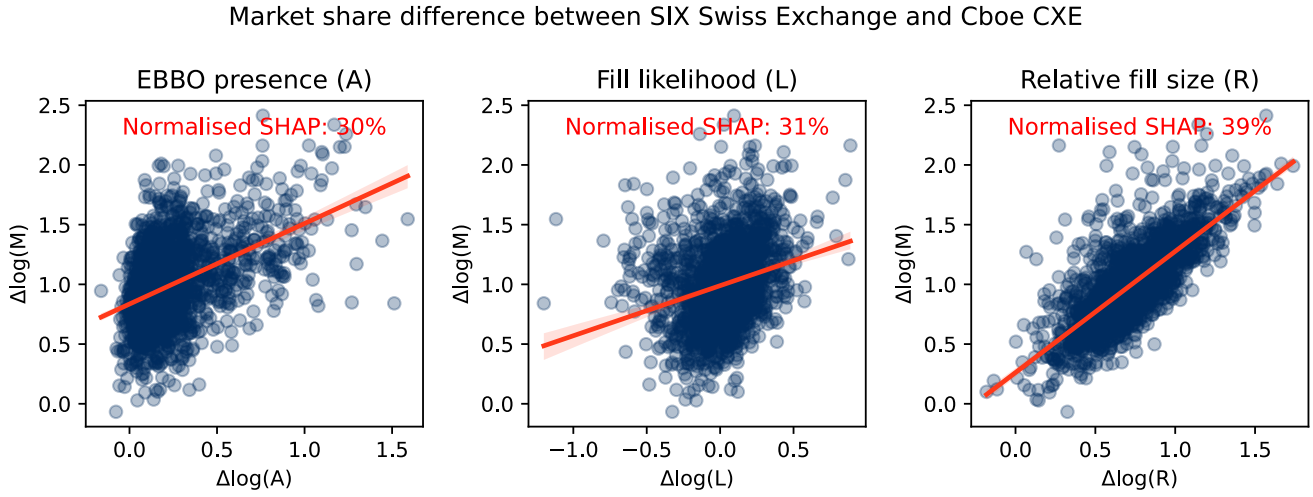
Utilising liquidity factors to decompose market share dynamics across venues

Given the above dynamics between price establishment across venues, fill likelihood and market share, an interesting quandry exists: What drives differences in market share across trading venues? To address this, market share can be decomposed into three fundamental liquidity factors: EBBO presence, fill likelihood at the EBBO price level, and relative fill size at the EBBO price level (plus a residual term).

Chart 2.0 illustrates the pairwise relationship between changes in these key liquidity factors and corresponding changes in market share between two venues, namely SIX Swiss Exchange and CBOE's CXE book. Each scatter plot shows the normalized differences in one of the three components against the difference in overall market share, with fitted regression lines demonstrating the strength and direction of these relationships. Comparing these market share differences reveals that changes in relative fill size contributes the most to explaining market share variation, followed closely by fill likelihood and EBBO presence. The normalised Shapley values (SHAP) values quantify the relative importance of each factor in explaining market share differences.
[1]

Together, this framework provides a clear, model-driven lens for understanding and comparing execution quality between venues, equipping market participants with a powerful tool to contextualize their order-level execution experience within the broader market environment.

Chart 2.0 – Per security market share deviation (from the mean) for Swiss Blue Chips across venues



Data source: BMLL | Analytics: SIX | Security universe: Swiss Blue Chips (SLI) | Sample period: 01 Apr 2025 - 30 Jun 2025

[1] Shapley values provide a principled, model-based method to fairly attribute the contribution of each factor to overall market share variation. This approach enables a concise and consistent comparison of execution dynamics and execution quality across venues at a market-wide level, rather than focusing on individual orders.

Conclusion

Examining the patterns of price setting and price mirroring across venues yields important insights into the price formation process and its influence on liquidity and market share dynamics. There is clear evidence to suggest that the occurrence of price setting activity on venues influence their fill dynamics and market share favourably, and as such where a price is set should be an important consideration for trading participants in both liquidity posting and liquidity taking. It is also clear that prices are mirrored rapidly across venues once a new price has been established. Whilst MTFs seem to benefit from price mirroring activity, typically fill dynamics and market share are weaker in such circumstances. As such, understanding the contributing factors to differences in comparative market share and execution quality between two venues at a market-level is an important additional consideration for trading participants. This can be analysed effectively by employing the Shapley method across the three fundamental liquidity factors (EBBO presence, fill likelihood and relative fill size). This allows trading participants an additional tool against which they can compare their own order-level assessment of execution quality between venues, allowing further optimisation of their liquidity posting and liquidity taking strategies.

Food for thought.

Authors

Simon McQuoid Mason **Phone** +44 788 910 0020 **E-Mail** simon.mcquoid-mason@six-group.com
Fabian Ochsner **Phone** +41 58 399 4212 **E-Mail** fabian.ochsner@six-group.com

Visit our website: www.six-group.com/trading

All editions: www.six-group.com/infosnacks

SIX Swiss Exchange AG
Pfingstweidstrasse 110
P.O. Box
CH-8021 Zurich
T + 41 58 399 5454
F + 41 58 499 5455
info@six-swiss-exchange.com
www.six-swiss-exchange.com