



University of St.Gallen

Institute for Operations Research
and Computational Finance

SIX Swiss Exchange
Swiss-made. World-class.

European Order Book Quality SLI Securities Feb.'21 - Jan.'22

March 4th, 2022



Contents

- ❖ Motivation
- ❖ Evaluated metrics (EBBO + ARS)
- ❖ Results – EBBO (European Best Bid Offer)
- ❖ Results – ARS (Average Relative Spread)
- ❖ Individual comparison (SSX CLOB) – SLI30
- ❖ Individual comparison (SSX CLOB) – buckets
- ❖ Individual comparison (SSX CLOB+EBBO) – SLI30
- ❖ Contact

Motivation

The measures taken by the Federal Department of Finance FDF to protect the Swiss stock exchange infrastructure, which came into force in July 2019 in response to the withdrawal of the stock exchange equivalence by the European Commission, had at that time prevented the trading of Swiss shares on EU-based stock exchanges.

Since the beginning of February 2021, the mutual recognition of UK and CH stock exchange regulations has opened a new chapter for the trading of Swiss listed securities.

We have taken this revived competitive situation as an opportunity to analyze the quality of the order books of SIX and four UK-based Multilateral Trading Facilities (MTF) for the 30 securities forming the *Swiss Leader Index* (SLI). For this purpose, we used continuous trading granular tick data of lit order books provided by BMLL for the period Feb. 2021 – Jan. 2022.

Management summary

An initial comparison with monthly aggregated metrics for EBBO and ARS for the SLI30 instruments show SIX mostly in a clear lead, especially when SIX's "Swiss EBBO" order book is considered.

A more detailed analysis based on single instruments and trading days through an individual comparison of the metrics between SIX's main CLOB order book and the competing order books at CBOE BXE, CBOE CXE, TRQX and Aquis, reveal a rising competitiveness especially for CBOE CXE and Aquis since mid of 2021. Whereby even the top 10 most liquid instruments are affected by this observation.

However, when SIX's "Swiss EBBO" is also considered within this individual comparison, SIX outperforms its competitors significantly.

Evaluated Metrics

The quality of the single securities' order books is evaluated by means of two measures:

European Best Bid and Offer (EBBO) presence:

For each trading day and security, we compare the average best prices of all venues under consideration (including SIX) and measure the time duration over which a given MTF offers simultaneously the best bid and offer prices across all venues' limit order books. This duration taken relative to the overall continuous trading time defines the EBBO presence proportion, denominated in %.

Aggregation towards the SLI index level and towards the monthly granularity for the EBBO metric is carried out by averaging the (equally weighted) securities.

Average Relative Spread (ARS):

The ARS (denominated in bps) captures the time-weighted average of the relative spread of a single security over each trading day. By measuring the deviation from the idealistic mid-price, this indicator provides an important cost measure to market participants.

Aggregation towards the SLI index level and towards the monthly granularity for the ARS metric is carried out by averaging the securities weighted by the total turnover of the security across all venues.

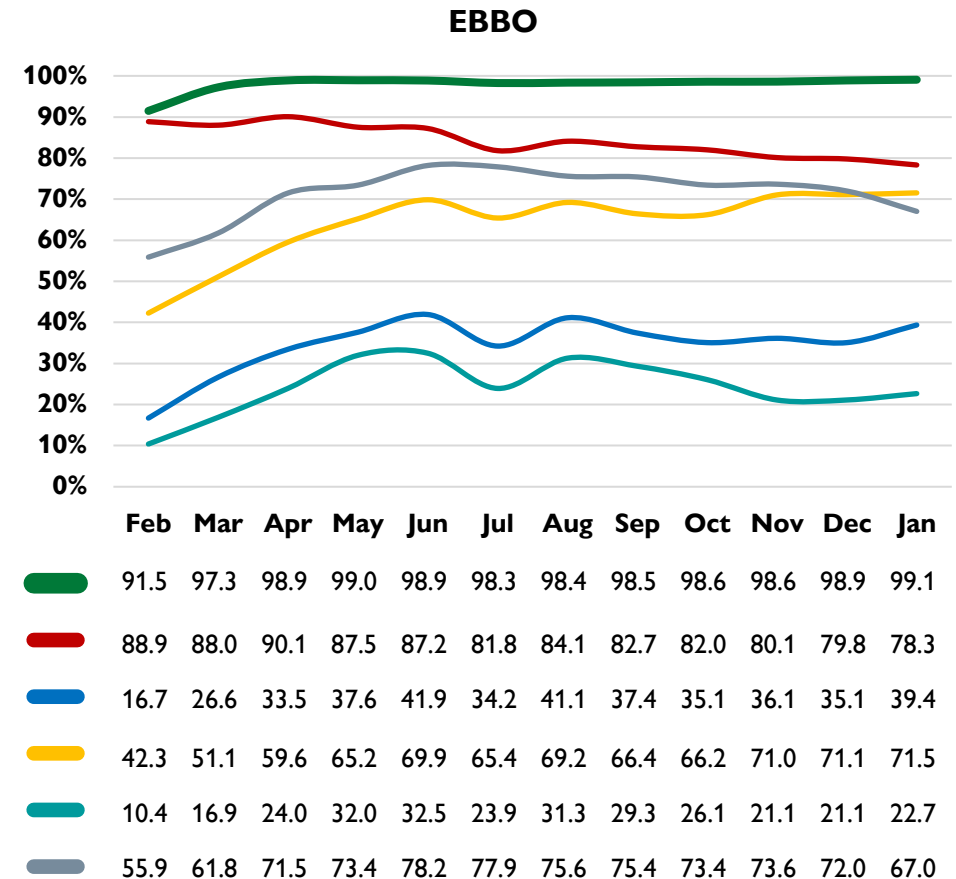
Results – EBBO

The EBBO metric of SIX's Central Limit Order Book (**SSX CLOB**) gradually declines from 90% in early 2021 to 78.3% in January 2022.

A rising trend of EBBO-competitiveness for **Aquis** and **CBO CXE** can be observed over the course of 2021. **CBOE BXE** and **TRQX** are not competitive with respect to this metric.

Merging SIX's CLOB book with its "Swiss EBBO" book (**SSX CLOB+EBBO**) shows noticeably higher EBBO metric results for SIX, yielding close to 99% since April 2021.

This permits the conclusion that the liquidity providers are effectively placing Europe-wide competitive quotes into the "Swiss EBBO". However, not all market participants do have access to this order book.



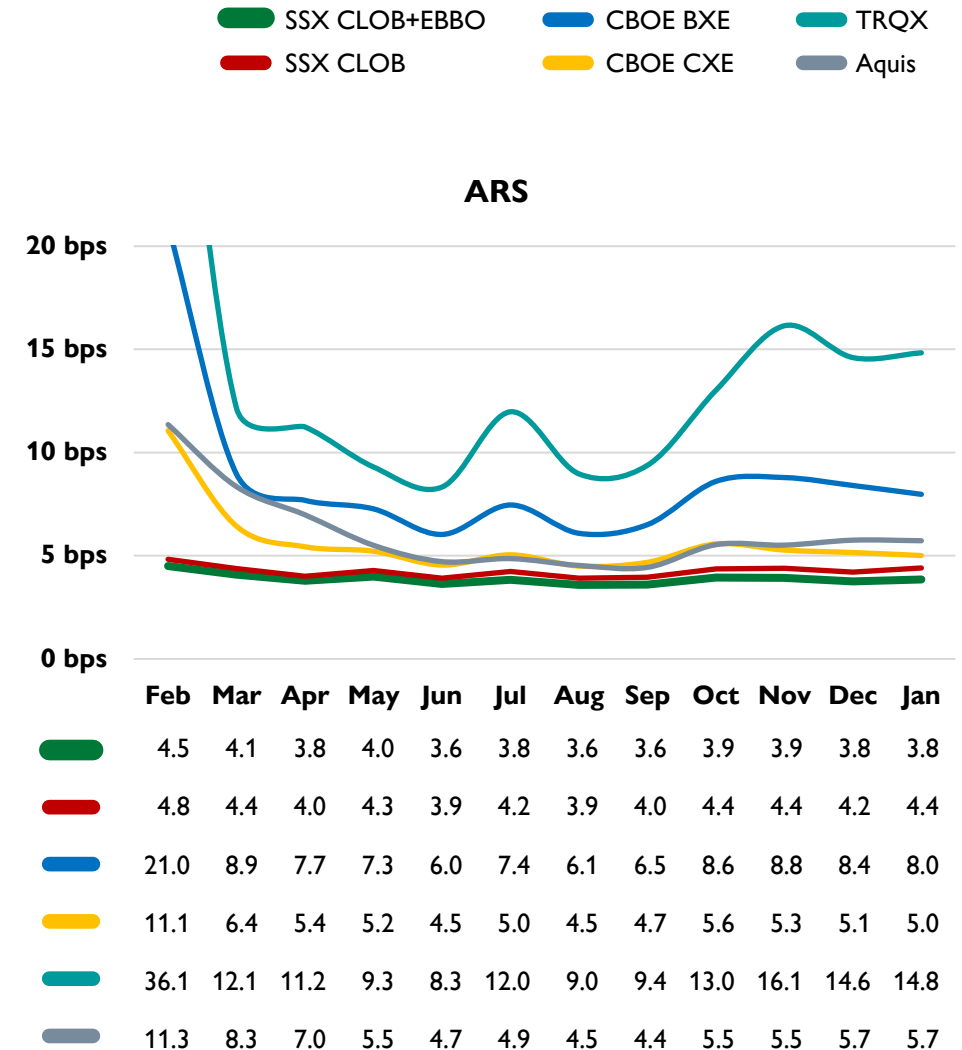
Results – ARS

In general, large and volatile bid-offer spreads are an evident indication for lower order book liquidity.

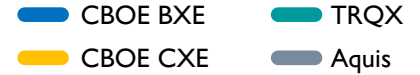
With respect to ARS, both order books **SSX CLOB** and **SSX CLOB+EBBO** remain stable at a level below 5 bps at least for the aggregated ARS metrics. The effect of SIX's EBBO order book is less extensive for the ARS metric than it is for the EBBO metric.

CBOE CXE and **Aquis** follow closely with ARS values between 4.5 and 5.7 bps since May 2021. Competitiveness of these two MTFs had increased continuously until September 2021.

CBOE BXE and **TRQX** show significantly higher ARS metrics accompanied by a higher volatility throughout the whole investigated time period. The outliers in Feb 2021 are induced by a warmup phase during first days of trading the SLI titles after the mutual recognition of UK and CH stock exchange regulations.



Individual comparison (**SSX CLOB**) – SLI30



Individual comparisons are performed by contrasting the resulting metric value for a single instrument on a single trading day and counting how many times a competing venue performed better than **SSX CLOB** order book. All SLI30 instruments have been considered in total and separately in buckets of 10 instruments ranked by total turnover.

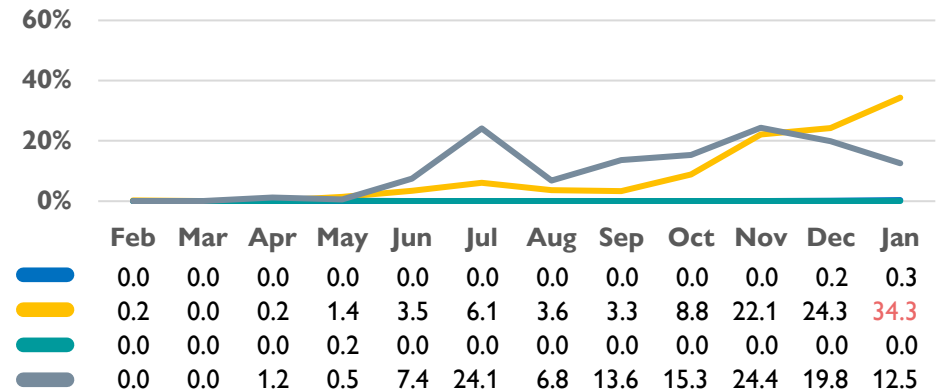
Example for EBBO:

- In January 2022 **CBOE CXE** had a better (higher) EBBO than the **SSX CLOB** order book for a given instrument and trading day in **34.3%** of the cases.

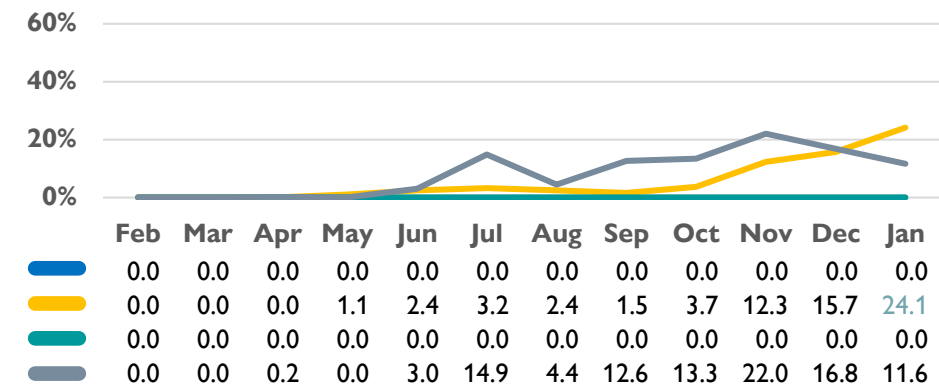
Example for ARS:

- In January 2022 **CBOE CXE** had a better (lower) ARS than the **SSX CLOB** order book for a given instrument and trading day in **24.1%** of the cases.

EBBO comparison (SLI30)



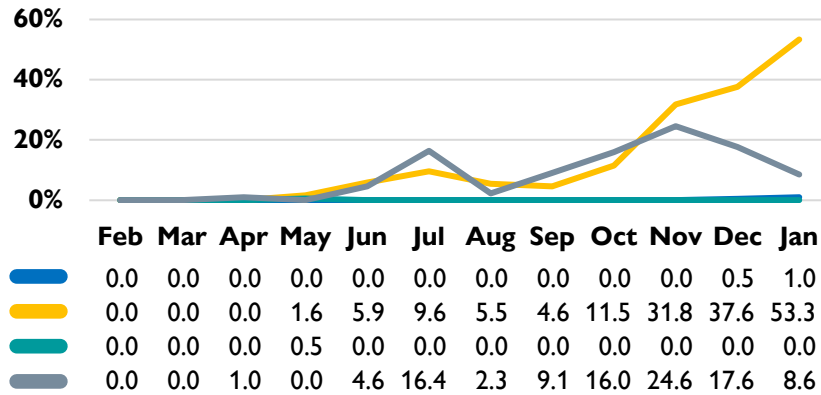
ARS comparison (SLI30)



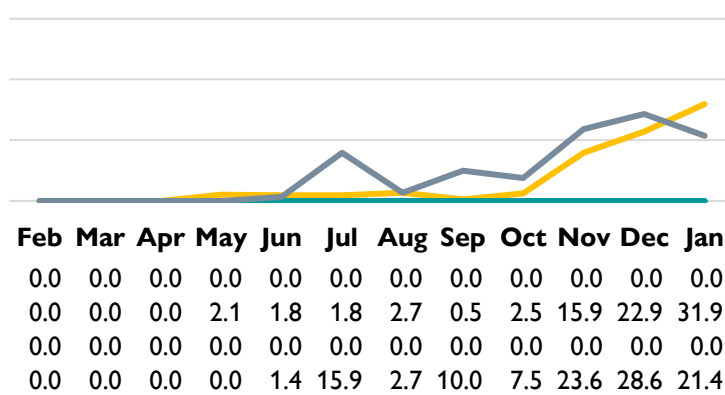
Individual comparison (SSX CLOB) – buckets

■ CBOE BXE ■ TRQX
■ CBOE CXE ■ Aquis

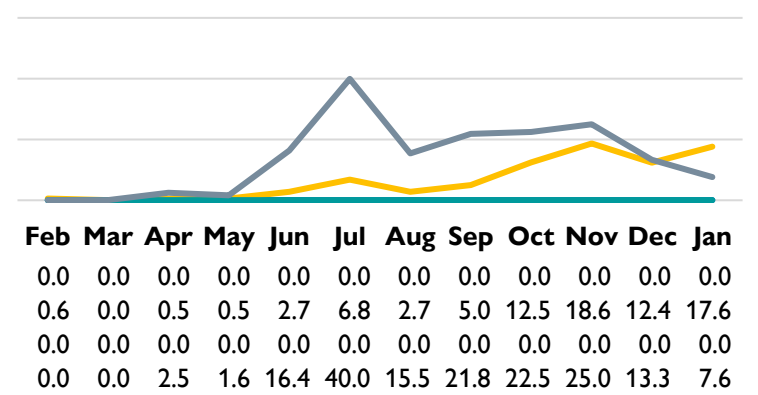
EBBO comparison (Top 1-10)



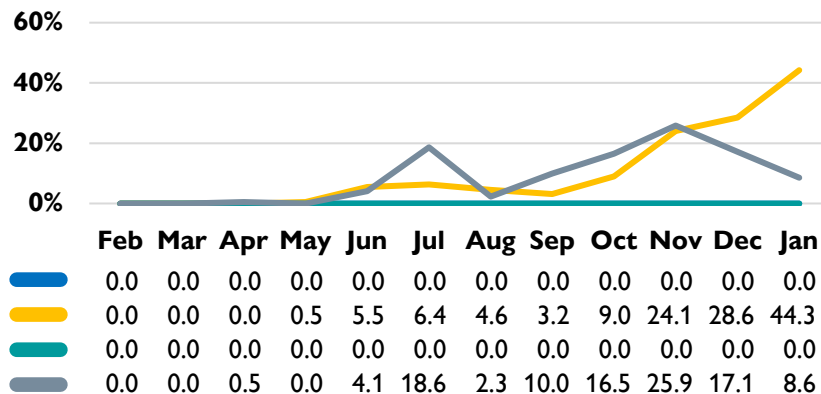
EBBO comparison (Top 11-20)



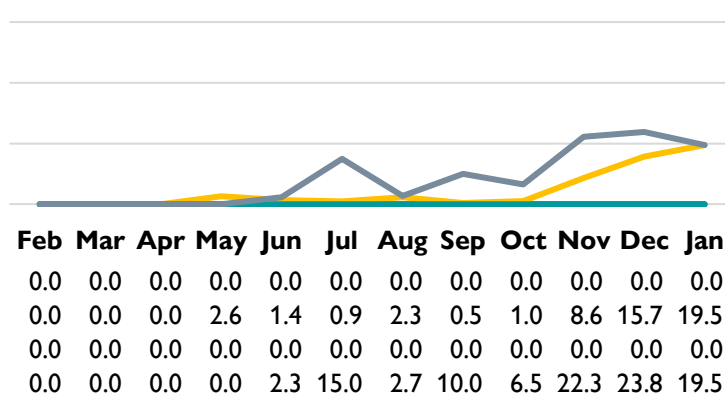
EBBO comparison (Top 21-30)



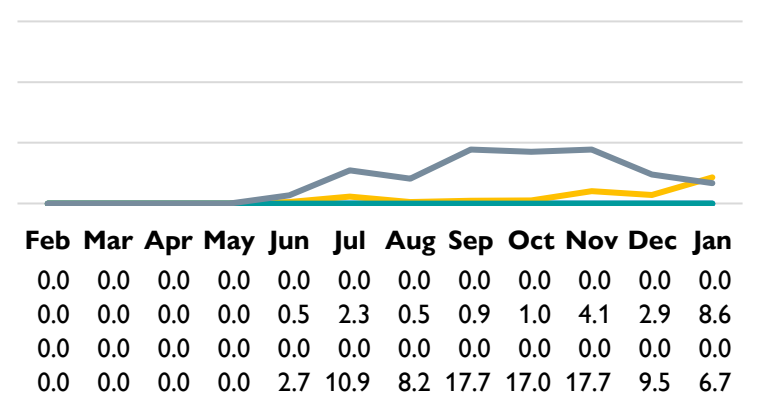
ARS comparison (Top 1-10)



ARS comparison (Top 11-20)



ARS comparison (Top 21-30)



Individual comparison (SSX CLOB+EBBO) – SLI30

■ CBOE BXE ■ TRQX
■ CBOE CXE ■ Aquis

Results for individual comparisons between SIX's merged order book **SSX CLOB+EBBO** show a completely different picture. For both metrics, the comparisons consistently reveal noticeably lower proportions of the cases where the competing MTF is better than **SSX CLOB+EBBO**.

Note the different scaling on the y-axis!

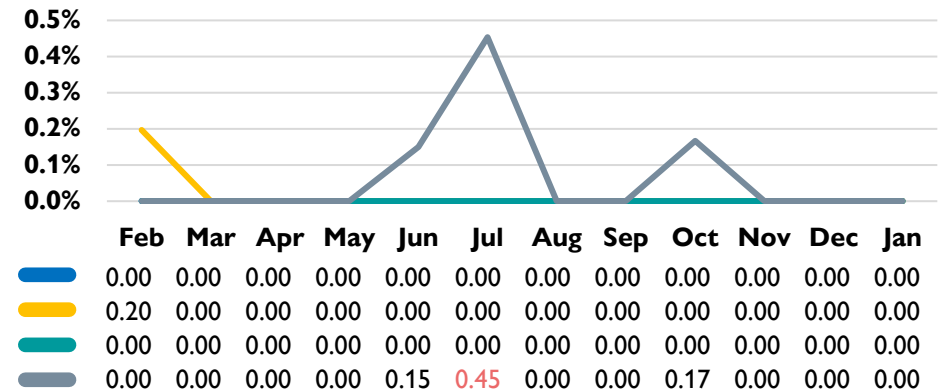
Example for EBBO:

- In July 2021 **Aquis** had a better (higher) EBBO than the **SSX CLOB+EBBO** order book for a given instrument and trading day in **0.45%** of the cases.

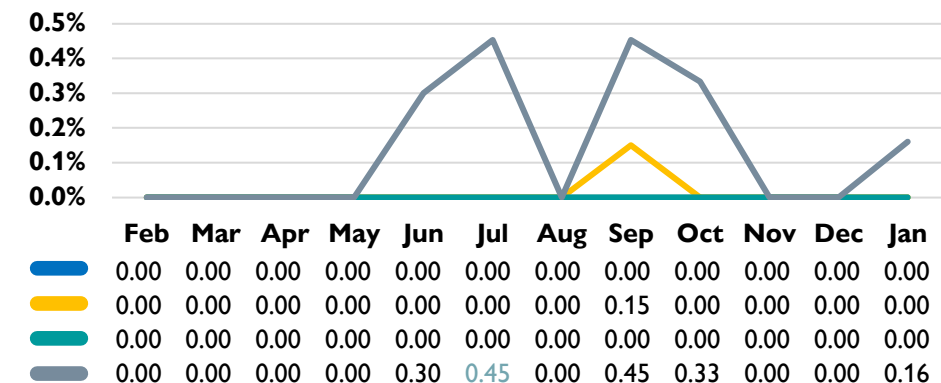
Example for ARS:

- In July 2021 **Aquis** had a better (lower) ARS than the **SSX CLOB+EBBO** order book for a given instrument and trading day in **0.45%** of the cases.

EBBO comparison (SLI30)



ARS comparison (SLI30)



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Accreditations

