

European Market Landscape

Algorithm and venue usage

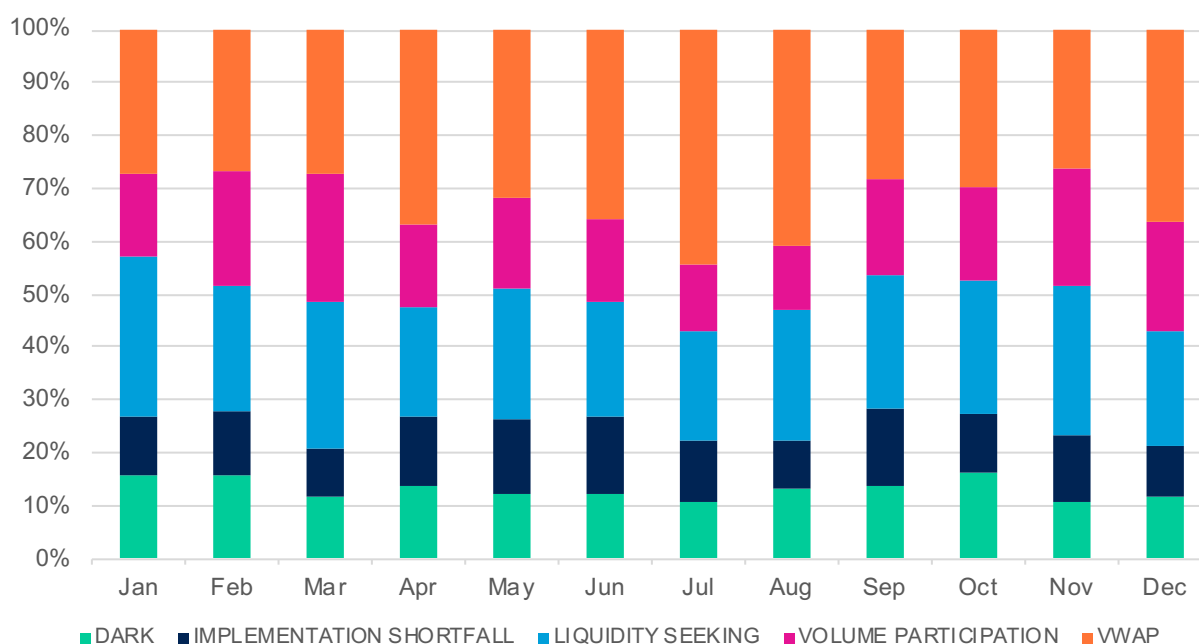
SUMMARY OF FINDINGS

Over the course of 2020, the shift in European equity markets towards scheduled and schedule-based strategies led to higher than necessary trade costs. By selecting the theoretically prudent, low risk approach, it appears traders actually drove their own costs up. The cumulative effect of these marginal cost increases can be significant for overall fund performance.

ALGORITHM USAGE

The last twelve months have seen dramatic shifts in the European equity markets. These changes are particularly seen in the use of algos, the selection of trading venues and the costs incurred. Using data from the *Virtu Analytics* broker-neutral algorithm database, comprising over 30 buy-side contributors and totaling US\$650B in value traded, we have analyzed the evolution of these trends to determine whether the shifts achieved the intended or optimal outcomes.

Figure 1: 2020 Algo Strategies by Month



Source: Virtu Analytics



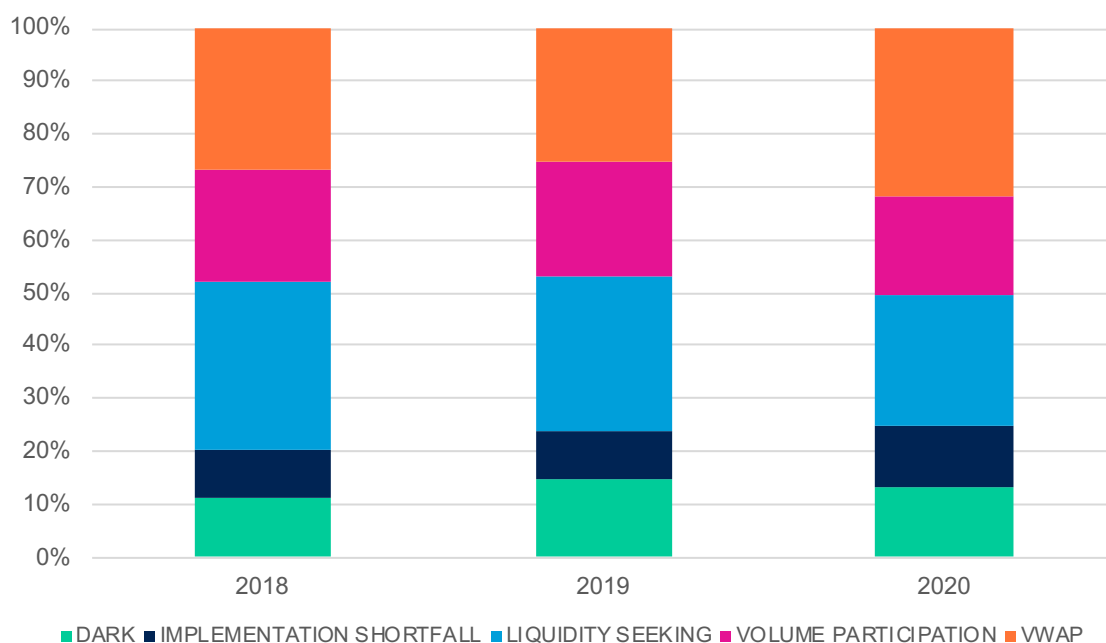
As markets reacted to the global COVID-19 pandemic, higher volumes and volatility were seen and a clear shift emerged in preferences for algo strategies and in venue usage.

— Figure 1

Schedule-oriented strategies (such as volume weight average price, VWAP, and volume participation) became increasingly popular from March through to July 2020, when they made up more than 50% of trading. With volatility levels at recent highs in 1Q and 2Q 2020, the shift to these strategies implies the reluctance of market participants to leverage algo strategies associated with more market impact. Consequently, use of liquidity seeking, implementation shortfall (IS) and dark algo strategies all declined during this period. The trend reversed in the third quarter but in December, schedule-based strategies once again rose sharply.

The increased use of VWAP algo strategies in Europe over the last three years can be seen in the data (Figure 2), with VWAP replacing IS as the most widely used strategy in 2020. The gain in VWAP market share came at the expense of lower usage in dark and liquidity seeking algo strategies. Whereas 2018 and 2019 profiles look quite similar, the change in 2020's algo strategy usage is connected to the extreme market conditions experienced for a considerable portion of the trading year.

Figure 2: Algo Strategies by Year

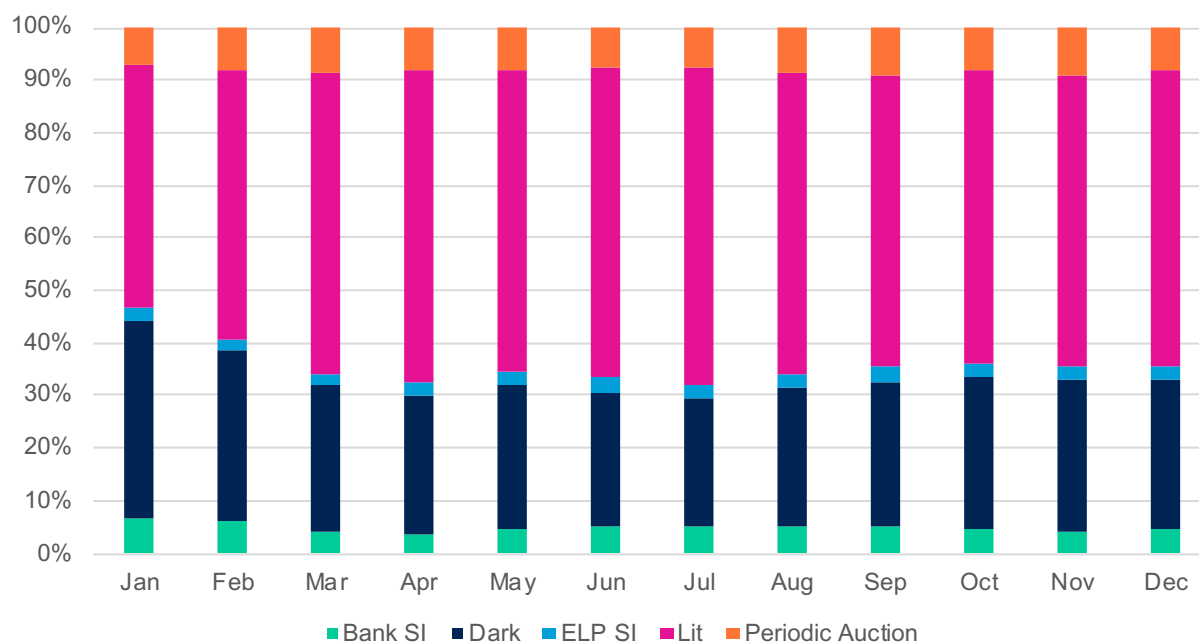


Source: Virtu Analytics



Given the differences in routing logic employed by a given strategy, the shift to schedule-based algo strategies led directly to a shift in venue usage (Figure 3).

Figure 3: 2020 Venue Usage by Month



Source: Virtu Analytics

There was a strong shift from non-displayed (dark) to displayed (lit) venue trading in Q1, coupled with a smaller rise in periodic auction lit trading. Dark venue trading fell sharply between January and July before stabilizing. As we saw in the algo strategy usage by month in 2020 (Figure 1), there was a greater shift to strategies that market participants likely felt would minimize direct implementation shortfall costs (VWAP, volume participation and IS strategies). Most of these strategies source the bulk of liquidity from lit-type venues, lit and periodic auctions.

Over the course of three months, from January to April 2020, lit-type venues increased market share by 14% (from 53% to 67%) for the five main algo strategies analyzed.

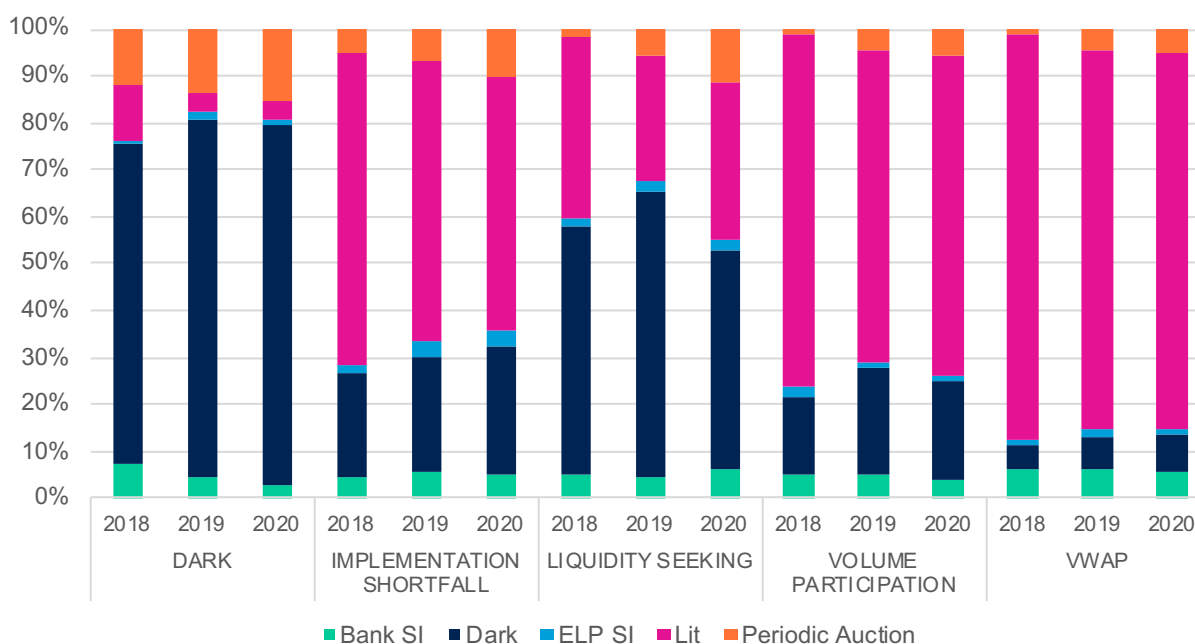
— Figure 3

During the same time frame, the market share of traditional dark venues decreased 11% to the new lows seen at the height of the global pandemic. While still relatively small in terms of market share, systematic internalisers (SIs) experienced growth in 2020 from electronic liquidity providers (ELP), but lost ground in bank SIs. In the extreme volatility experienced during 1Q and 2Q 2020, it seems as though there was a risk tolerance difference between bank SIs and ELP SIs, as ELP SIs appear to have remained active as the pandemic worsened in April and May 2020.



Over the last three years, algo venue usage patterns were relatively consistent (Figure 4). Post-MiFID II implementation, broker crossing networks (BCNs) are no longer viable venue types and we observe that periodic auctions and dark venues have benefited the most in terms of market share growth year over year.

Figure 4: Historical Venue Usage by Algo Strategy



Source: Virtu Analytics

In 2020, liquidity seeking algorithms saw a sharp increase in lit and periodic auction usage. The strategic objective of this type of algo is to source liquidity which is in-line with our earlier observations regarding algo and venue usage in 2020—specifically that VWAP, volume participation and implementation shortfall algos saw increased usage in 2020. We see that these three algo strategies sourced most of their liquidity from lit-type venues, lit and periodic auctions (Figure 4).

Consequently, liquidity seeking algos reacted to the shift of algo/venue usage by utilizing more lit and periodic auction venues than seen previously in 2018 and 2019.

— Figure 4

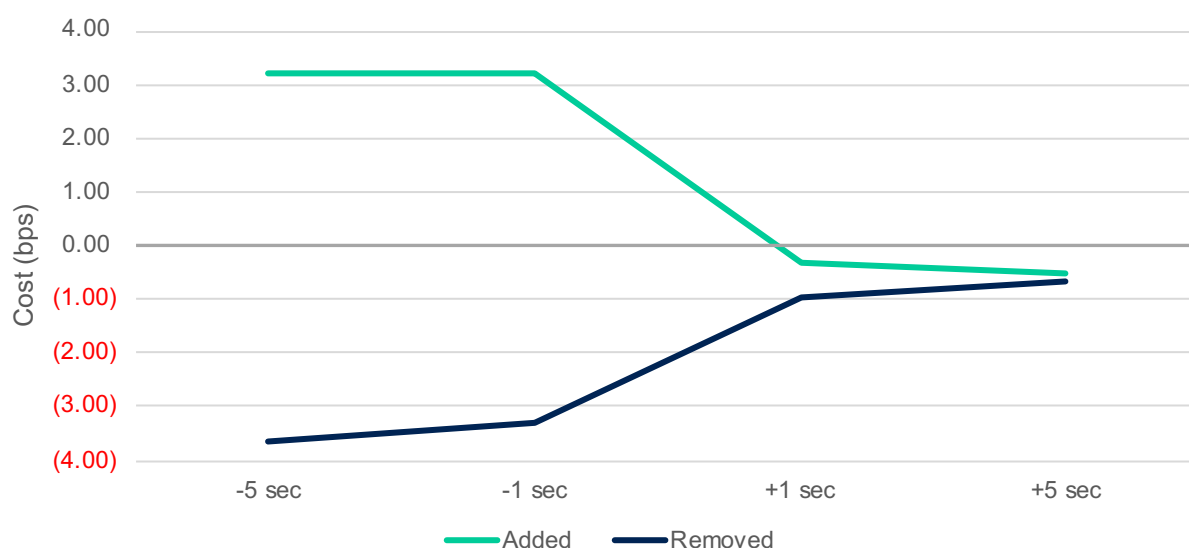


VENUE PERFORMANCE

Given the liquidity shift to more lit-type venues (lit and periodic auctions), it is worth examining the performance in the cost of execution across all venue types. We analyzed the execution price against four short-term (two pre-trade and two post-trade) benchmarks around the execution time. We also took the consolidated European best bid and offer (EBBO) and calculated the mid-quote at one and five seconds before and after the execution.

Figure 5 displays the performance cost for adding liquidity (crossing the spread) and removing liquidity (taking the spread) on lit venues, both primary and multi-lateral trading facilities (MTFs).

Figure 5: Venue Cost for Lit Venues—Adding and Removing Liquidity



Source: Virtu Analytics

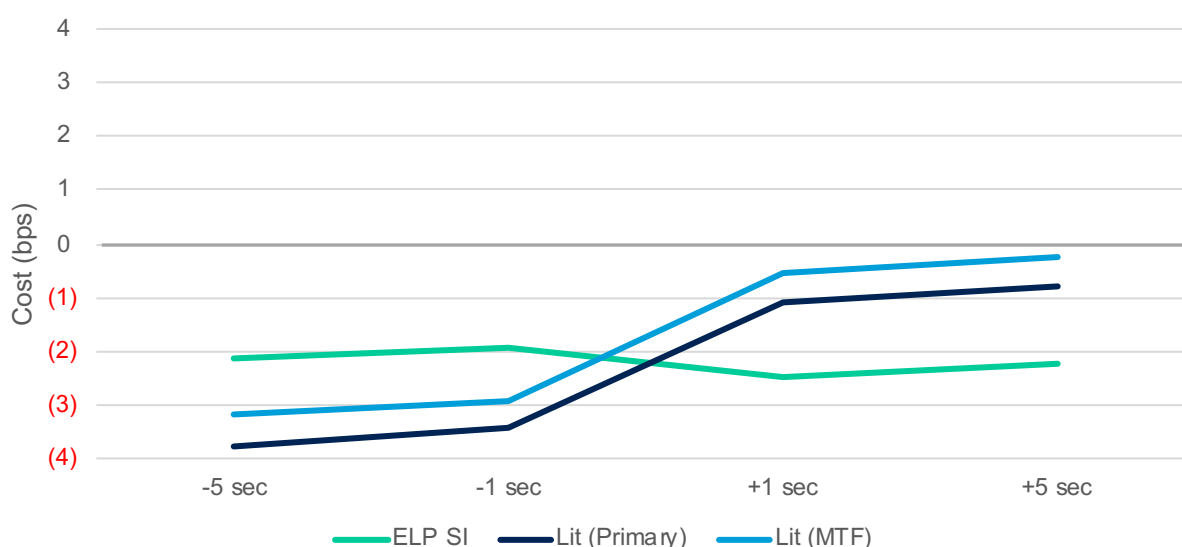
When adding liquidity, we observe approximately 3 bps of positive cost versus the mid-quote, indicating price improvement when trading passively. Post execution, this price improvement disappears as the new mid-quote moves to price levels equal to the execution price (lower for buyers and higher for sellers).

When removing liquidity (taking the spread) on lit venues, we see similar pre- and post-trade patterns develop—but with inverse price movement. Aggressive executions incur a pre-trade performance cost of -3.5 bps, indicating the cost due to paying half the spread. In the two seconds around the execution, an adverse price movement of 3 bps is observed. A new mid-quote is pegged at approximately the execution price implying that aggressive executions further impact the price.



While still relatively small in terms of venue market share, ELP SIs offer market participants an alternative execution channel when removing liquidity from the lit market. We take a deeper dive by isolating the primary venues from the MTFs within the lit-type venues and compare these to the ELP SIs (Figure 6). Primary and MTF lit venues share a very similar pre- and post-execution price profile, indicating very little difference in impact between these two venue types.

Figure 6: Venue Cost—Lit (Removing Liquidity) vs ELP SI



Source: Virtu Analytics

ELP SIs do, however, have a different performance profile compared to traditional aggressive executions on lit venues—offering lower pre-trade cost (and price improvement opportunity) when compared to lit venues for aggressive trading.

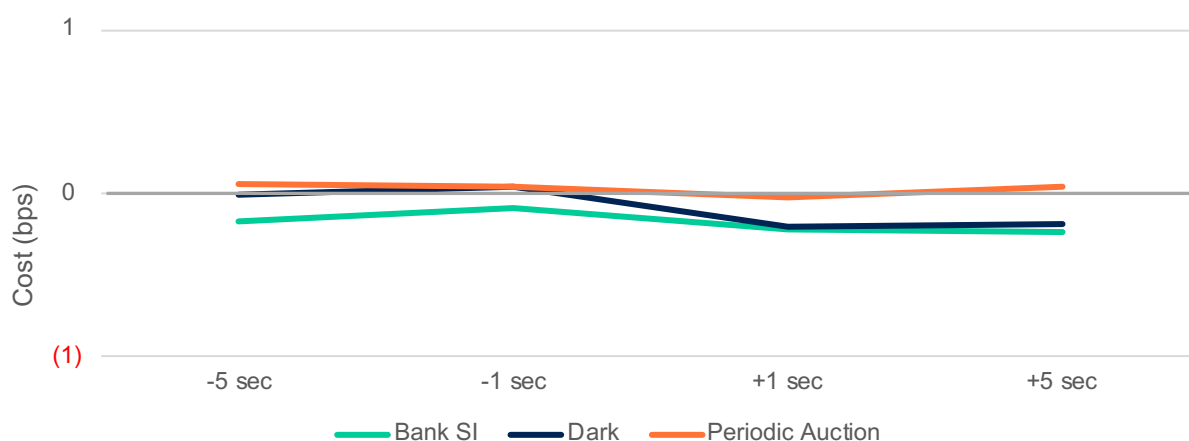
— Figure 6

We do not observe any significant movement in post-trade cost for ELP SIs. The relatively flat cost profile implies less price movement caused by information leakage when compared to removing liquidity from lit venues.



Observing the other venue types, we see considerably less pre- and post-trade performance cost across bank SIs, dark, and periodic auctions compared to lit venues (Figure 7). Periodic auctions, the venue type with the most prominent growth over the last three years, have effectively no performance cost when looking at both pre- and post-trade indicators. Executions within periodic auctions occur at the mid-price and do not signal the market while incurring any post-trade performance cost. Trading on dark venues also occurs at the mid-price and sees very little pre-trade cost. Approximately 0.25 bps of post-trade reversion is seen in dark venues five seconds after the fill. Bank SIs do have a slight pre-trade performance cost of -0.10 bps with execution prices underperforming the mid-quote, one second before execution. After the execution, not much price reversion or cost is observed compared to the pre-trade figures.

Figure 7: Venue Cost, Pre-and Post-Execution



Source: Virtu Analytics

CONCLUSIONS

Since the 2018 implementation of MiFID II, several noticeable trends have emerged regarding European venue taxonomy:

- Lit venues continue to maintain their substantial market share—as intended by the regulators.
- In 2018 and 2019, we begin to observe the re-distribution of pre-MiFID II BCN volume.
- Periodic auction market share has grown year over year while SIs (both bank and ELP) have not experienced a similar growth trajectory.
- In 2020, we observe a large shift to schedule-based algorithms as market participants presumably became more risk averse in terms of market impact following heightened volatility and haphazard volumes in the early days of the COVID-19 pandemic.
- In 2020 lit-type venues, lit and periodic auctions saw an increase in market share in contrast to 2019 and 2018.

- The implementation of various algo strategies will leave different market footprints per the aggressiveness of its trade schedule. We observe that the venue selection of specific algorithms can be as impactful as the strategy itself.
 - With more liquidity executed on lit-type venues, strategies like VWAP, volume participation and IS were employed more widely to counteract 2020 pandemic-related volatility.
 - Lit venues (both primary and MTFs) incur the largest post-trade price impact though are still the main source of liquidity.
 - Dark, periodic auctions, bank SI and ELP SI venue types, while offering different forms of liquidity to the market, leave substantially lesser footprints in terms of price impact.

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