Note on Efficient VWAP Benchmark Trading of Small and Mid-cap Equity Securities

VWAP is a popular benchmark for institutional trade execution. The trading of small and mid- cap equities with this benchmark is more challenging than trading in large-cap securities. This holds true even with same percentage of volume constraint. For the purpose of this note, we classify U.S. equity securities with market capitalization of less than USD $2bn as small-cap and securities with capitalization and between and $5.2bn and $2bn as mid-cap.

Savvy investors are aware that VWAP on its own is not a sufficient benchmark for measuring quality of trade execution. The overall cost of a trade needs to be carefully tracked while using non-independent benchmarks like VWAP, Close and especially PWP. Arrival price, though noisier, is a better benchmark to track the true cost. Noise-mitigation techniques are available to certain trade portfolios. Some investors also take into account post-trade performance to measure quality of trade execution. Please read our earlier note about how seemingly better VWAP and PWP execution can actually have investors incur significantly higher cost.

VWAP and PWP are more prone to manipulation in the small-cap and mid-cap universe. Aggressive trading strategies are especially susceptible. We are indeed able to deliver VWAP + 0.5 bps or better performance in this segment with an aggressive strategy without significant effort. However, that also entails a significant overall price impact. This is primarily because aggressive trades lead volume to follow and move the price, thus you pay a much higher price for buys and vice-versa, while showing a good VWAP/PWP performance. A PWP benchmarked measurement may be even more susceptible as a manipulative, aggressive strategy can essentially determine the end-time, and hence, escape the reversion cost which would be visible in a fixed-time VWAP strategy. Tethys' VWAP/PWP algorithms focus on simultaneously delivering good benchmark performance and reducing total cost.

We list some significant non-proprietary drivers of trade execution cost. Our algorithm design follows a unified framework that models a security on all the drivers. Small-cap and mid-cap optimal execution drivers (their relative weights) can differ significantly from large-caps. The major non-alpha drivers of trade execution cost are:

1. Volume profile forecast and its variance
2. Expected volume rate and its variance
3. Bid-ask spread and its time-based variance
4. Volatility and its time-based variance
5. Liquidity fragmentation especially between dark venues and lit-venues. Additionally, venue signal-risk and adverse selection characteristics
6. Signal risk of displayed, non-displayed and aggressive orders
7. Order types available at various exchanges where the security trades and
8. Participation in any special market segment (in context of the current note, the tick-size pilot and the group the security belongs).

The small-cap and mid-cap universe is non-homogeneous. Tethys uses fundamental and both classical and non-classical statistical techniques to segment the universe. After significant research, we have achieved very good out-of-sample stability in our segmentation models. Models underlying our algorithms are calibrated and the trading tactic weights optimized for each segment.

A majority of the small and mid-cap universe shows high variance in total volume and volume rate (volume per unit time at a given time of the day). This implies volume profiles associated with VWAP algorithms are unstable and daily volumes have lower predictability. This also implies trading tactics have to be much more opportunistic in order to keep the market impact low. Our algorithms allow higher deviation between released volume and the projected profile for the small and mid-caps and are more reactive to liquidity when it appears in the market. Investors should not force completion of trades over a certain time-period. It is common for investors to use a maximum percentage of volume setting or limit price to prevent full completion if volume conditions are sub-par. A percentage of volume constraint is a better choice as limit prices are accompanied by high opportunity costs; in fact, a percentage of volume constraint with dark and block carve- outs will deliver superior results.

Small and mid-caps are generally less liquid and have larger spreads. With these securities, a higher level of mid-point trading and dark pool usage is helpful, but this must be balanced against adverse selection when volatility characteristics are unfavorable. Dark-pool routing is more challenging for these securities. Algorithms must be tuned to generate larger child order sizes if liquidity becomes available.

This will create higher profile deviation, but will result in lower cost — if it is done with careful timing and a good model that optimizes between the VWAP/PWP profile deviation and impact reduction. Superior timing models are required otherwise; the adverse selection can be large.

Signal risk and associated gaming-risk is high, while trading low-liquidity small-cap and mid-cap securities. Algorithms have to use correct order types, venues and timing to minimize their footprint or else they will be gamed. We have spent significant effort researching and optimizing this very important component of our small and mid-cap trading algorithms. In addition, we have also developed a real-time feedback mechanism, which allows us to detect our impact in real time and adjust accordingly if our activity is being detected and influencing the market.

The Tick-size pilot was introduced in late 2016 for U.S. small-cap equities. The participating equities have a higher tick size ($0.05) and significant order handling changes for Group 3 of the Tick pilot. Tethys has leveraged its international experience where variable tick-sizes are common and other market structure features such as absence or minimal presence of hidden orders to optimize its trading for tick-pilot securities. More information about the tick pilot and our initial commentary can be found here.