# Research Meeting – September 29, 2020

**Objective: Establish the research team’s current status.**

## Slippage

* Objective: Discuss the current state of the project.
  + There are several experimental models that have been released over the last few days.
  + The drift component is now available from Andrew.
  + We should have a pre-trade model with drift available tomorrow.
  + Matthew is currently testing the sensitivity of each variable.
* Harry’s view is that all of the models currently being evaluated are suboptimal.
* The unconstrained parameters produce very strange results.
  + For instance, a negative minimum component.
* These unusual results seem to be a function of there being too much noise in the data.
* How do the new models compare to where we were two months ago (i.e. what is in production)?
* It is difficult to compare as the older models are USD-weighted and the current ones are unit-weighted.
* We now hold the spread in units constant.
* The performance is cut in half from the July version.
* Harry’s view is that the current model is probably better, or at least a better reflection of reality.
* We may need to add one or two new variables to the model.
* It is unusual that similar markets (i.e. European stock indices) have very different slopes or exponents.
* The execution time is often 50-75% of the total snapshot regardless of the size of the order.
  + This is by design for some algorithms.
  + The Almgren-Chriss model does not take into effect the participation rate.
  + This can have an extreme effect on small orders.
  + LiquidFIFO and SlowLearner both have this flaw.
* Some markets where we have a low participation rate (i.e. ES) probably do not need to factor in the size effect.
* If our average participation rate is less than 1%, we should just do the order and assume our size effect is negligible.
* Some markets seem to have very low slippage, for instance, suggesting that we can trade 700 units of IDRUSD before moving the market 1 V.
* Thoas suggests slowing done trading in the low volatility markets.
* In pro-rata markets we see less slippage with large orders.
* There is still the potential to leverage our HFT infrastructure for these purposes.
* Thomas proposed that we add an additional term.
  + This could mean using StdDev to capture the drift.
  + There is a higher signal-to-noise ratio in StdDev.
* Is there a way to test this easily?
* How can we get this on the MdlGrid?
  + There are two options:
    - The first is that we port this to Python
    - The second is that we move straight to MdlGrid and run it as a separate process
  + Harry would prefer that we move this to MdlGrid as quickly as possible.
* Phillip has added quartile regression to the MdlGrid.
* Should we re-examine a piece-wise model.
  + We originally had a piece-wise model (MS/ML).
  + A piece-wise model could be better than the current model.
  + It would be interesting to see the fit and R
  + We could have separate control of the slope for small and large orders.
  + We may want to split the training data for small and large orders as well.
* We want to trade “reality”
  + In principle, it shouldn’t matter if the performance is better or worse.
  + How does the new syste compare to what we currently trade?
  + We currently underestimate slippage but not systematically.
    - A few large events skew the results.
* Do we prefer to get many small orders correct, recognizing that we may have occasional trades that are way off, or do we want to overestimate most trades in order to have a buffer to mitigate larger issues?
* Increasing the slippage cost will move the allocations to later periods, where we have weaker forecasts. This is one of the effects of slippage on performance.
* We should try to execute faster in the equity markers.
* Large stock indices should be sped up.
  + We want to try to complete the order in the first 5 minutes.
* Can we change the evaluation function?
  + Use the objective function that takes into account both signal and error.
  + This is similar to Sergii’s bet-proportional-to-edge formula.
  + We could also use a loss function that avoids outliers.
* We could give a higher weight when the edge is high.
  + Fitting a model on a market we don’t trade much doesn’t help much either.
  + Isn’t this implicit in weighting by order size?
  + Using the absolute value of the edge should help us to avoid bias
* How do we evaluate new models as “good”?
  + We need to use the same method on both new models and the current production models in order to determine if these new models are better than what we currently trade.
  + Phillip’s results are comarpable to the results of R2.
  + The current production model used USD-weights.
  + The new models (v19 onward) use unit-based weights.
  + It is too early to settle on an evaluation metric, but it is worth seeing all of the candidate metrics.
  + We should let Peter know so that we can evaluate the SnapStats/tick-based model as well.
    - This covers all markets except for FX
    - Can Peter present a scatter plot for comparison?
    - We currently use historical orders and calculate cumulative slippage over time. V2 was in qSlippag.
    - Peter should produce a file like SlpOrd.
  + We are also seeing a singularity in some markets at order size 0