Final Formulas for Myopically Optimizing MM and Logic

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| **Formulas** | | **Descriptions** |
| PSell | | This is the *a priori* probability a sell order. Uses the assumption that *I* will only sell if *V* < *Pb*, while *U* will sell with a constant prob. |
|  | | The equation for the bid price |
|  | | Prior buy probability |
|  | | Equation for the Ask Price |
|  | | The equations must do be updated as noise is introduced to the system, for the conditions of when *I* will place an order |
|  | | Again, the conditions for *I* are updated for when they will buy, with trading noise |
|  | | Updated sell prior with noise |
|  | | Updated buy prior with noise |
|  | | Bid Price equation with noise |
|  | | Bid Ask equation with noise |
|  | | Example of Updating the probability density given a buy order, although we must account for the proportion of *I & U* |
|  | | If there is no order, we must consider how the true value compares with our spreads, **3 separate conditions here** |
| Variables that we need to assume: | α – proportion of informed traders  η – probability an uniformed trader makes a trade  V0 – the true value of the asset at time 0  Pb – the bid price at time 0  Pa – the ask price at time 0 |  |
| Variables/formulas to calculate: |  |  |

Things to consider:

* This is theoretical, lots of equations based on assumptions
* Costs can be split into three categories:
  + Transaction costs
  + Portfolio risk
  + Cost of asymmetric information
* Have to take on portfolio risk, to control this it is about where the bid and ask price are actually placed, not how big the spread actually is
* This amount can be computed linearly, and just be a number added on too
* How to handle market/limit orders

Pros/cons:

* Quickly restricts the probability mass to a small range, low spreads should increase volume
* This applies after jumps in prices as well
* However, if the jump leaves the window of four standard deviations, the model would struggle to use the density to find a reasonable true value
* Could be fixed with re-establishing a new mean after the fact
* Testing in real life, showed a leptokurtic distribution with fat-tails

Links:

<https://www.financialwisdomforum.org/gummy-stuff/noise.htm>

<https://seekingalpha.com/article/3074086-dont-be-fooled-by-stock-market-noise>