Strategy Example

Making a market on product XYZ.

1. Observe current market state

Note down:
- Best bid/ask (b_t, a_t)
- Midprice $(m_t = (a_t + b_t)/2)$
- Spread $(s_t = a_t - b_t)$

Record relevant microstructure features:
- trade imbalance
- short term volatility
- depth

2. Estimate Relative Values

Use the stat arb model to compare XYZ to a related basket (eg. other stocks in ETF, industry, etc.)

Compute mispricing residual and standardized z-score

$$r_t = P_{\text{XYZ}} - (\alpha + \beta P_{\text{basket}})$$
$$z_t = \frac{r_t - \mu}{\sigma}$$

- Estimate α (baseline difference between prices) and β (hedge ratio) using some regression method on historical data

Interpret:
- $z_t > 0$: product looks overvalued, likely to mean-revert downwards
- $z_t < 0$: product looks undervalued, likely to mean-revert upwards

3. Translate signal into quoting stance

Adjust fair value estimate

$$\hat{p}_t = m_t - k_p \cdot z_t$$

where k_p is a constant that controls how aggresively we act on the signal

Adjust spread:
- Start from observed spread s_t
- Compute bid ask

$$\text{bid} = \hat{p} - \frac{s_t}{2}, \qquad \text{ask} = \hat{p} + \frac{s_t}{2}$$

Skew spread towards signal direction:
- If $z_t > 0$ (overvalued): widen ask, tighten bid (encourages selling inventory)
- If $z_t < 0$ (undervalued): tighten ask, widen bid (accumulates inventory)

4. Post quotes & manage inventory