Predictive Relationship: Logit weighting of research differential

Contents

1 Trading Strategy Description

This rule seeks to always keep a position on, weighted by how attractive the current ratio of the research value to price is. The logit function[1] is used to parse the current differential to a score between -1 and +1. A positive bias is used to shift the neutral point.
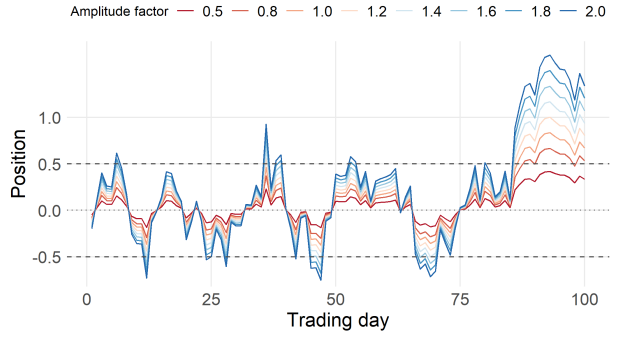
2 How to Trade

In order to trade with the rules InferTrade provides, we calculate allocations for each day. We then allocate that fraction of our total portfolio value (cash and securities) to the market we are trading - to do this we buy or sell securities to reach the target allocation.
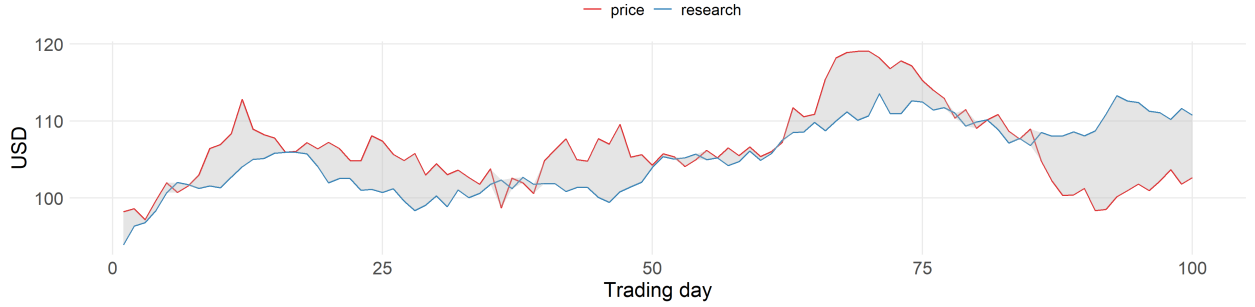
(a) Price and research series
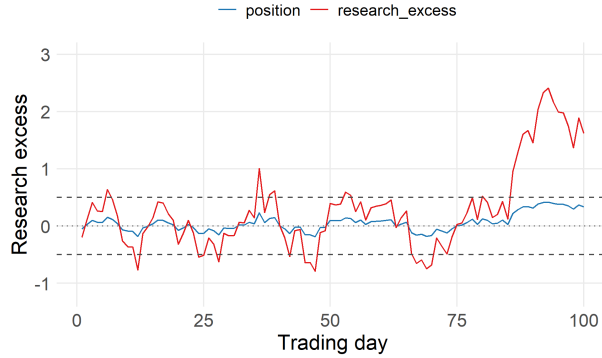
(b) The research excess and position chart

(c) Portfolio allocation

Figure 1: Graphical representation of the logit weighting of research differential algorithm. (1a) The chart of price and research series for a 100 day period. The differential between the price and research is coloured in grey. (1b) Graphical depiction of the research excess. Its formula is given as $research\_excess = ((research + 3)/price - 1.0) \times ratio\_scale\_factor$. (1c) Position spectrum for different amplitude factors, the position is computed using $position = 2 \times (zero\_to\_one(research\_excess) - 0.5) \times amplitude\_factor$.

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[1]https://en.wikipedia.org/wiki/Logistic_function

How Allocation Determines Trade Size

The allocation is the fractional amount of the portfolios value used to determine the size of the trading position. For example, if the allocation for Microsoft (MSFT) shares is 50%, and we have $100, we invest $50 so that the value of held stock is the same as the value of held cash.

Rule Specific Trading Details

The percentage of portfolio recommended for security trading depends on the relative value of the research to price. Figure 1a above highlights the difference in levels between price and research. Larger position is taken when the research moves higher than the price. The suggested position is moderated by the strategy amplitude parameter, as seen in Figure 1c. There is a bias setting which determines in percentage, the threshold growth in the research over the price, required to take position.

3 Rule Parameters

Below is a table summarizing the parameters specific to this trading rule.

Parameter Name	Default Value	Description	Symbol
Strategy amplitude	0.5%	This parameter scales the maximum and minimum size of position that can be taken.	κ
Ratio scale factor	10.0	Varies how fast the position taken varies as the difference between research and price varies.	ψ
Long bias	0.0%	An offset for the neutral % difference between price and research. 0.2 means no position is taken if research series is 20% higher than the price series. Should be zero if the research series is an unbiased predictor of the price series.	Ω
Minimum price	0.01%	A fixed minimum value of price.	P_{min}

4 Equation

Below are the equations which govern how this specific trading rule calculates a trading position.

$$\phi_t = \psi\left(\frac{r_t - \Omega}{max(p_t, P_{min})} - 1\right) \tag{1}$$

$$z_t = \kappa\left(\frac{2}{1 + e^{-\phi}} - 1\right) \tag{2}$$

where p_t is the price at time t, r is the value of the research series and z is the resultant fractional portfolio investment.

Proportional Weighting is a strategy that seeks to capture smaller deviations from fair value between a price series and another time series - a comparable security or price forecast. If the price series tends to mean revert, then proportional weighting will take increasing positions for larger deviations from fair value.

The advantage of some scaling in for medium positions is that the frequency of small bets may be much more than the big bets.

Compare mean reversion with 100% in at 10% cheap, versus 50% in at 5% cheap, 100% in at 10% cheap. Imagine the market is 10% cheap 2 times in five years. You will make 20% from riding the 10% gains twice if eventually reverts.

If market is 5% cheap only twice in five years (i.e. it tends to become 10% cheap if 5% cheap) then scaling in is worse, because you only gain 15% (half of what you invested was at 5% cheap, not 10% cheap). 50% * 5% * 2 + 50% * 10% * 2 = 15%

If however market is 5% cheap 10 times in five years then scaling in performs better as you make 50% * 5% * 10 + 50% * 10% * 2 = 35%.

So scaling in, using strategies like Proportional Weighting, allows you to make money from smaller opportunities, at the expense of less gain for bigger opportunities and a deeper maximum loss (as at the bottom you have lost 5% more on 50% of your holdings).

5 Glossary

- **Bullish:** Positive outlook on the market. Expectation of positive returns.

- **Bearish:** Negative outlook on the market. Expectation of negative returns.

- **Allocation:** The allocation is the fractional amount of the portfolios value used to determine the size of the trading position.

- **Parameter:** Value used by the trading rule in the calculation for trading position

- **Trading Rule:** Strategy to determine when to buy, hold or sell a position.

Further Links

1. InferTrade: `https://www.infertrade.com`

2. Privacy Policy/Legal notice: `https://www.infertrade.com/privacy-policy`

3. InferStat Ltd: `https://www.inferstat.com`