
# Predictive Relationship: Weighted Moving Averages

## Contents

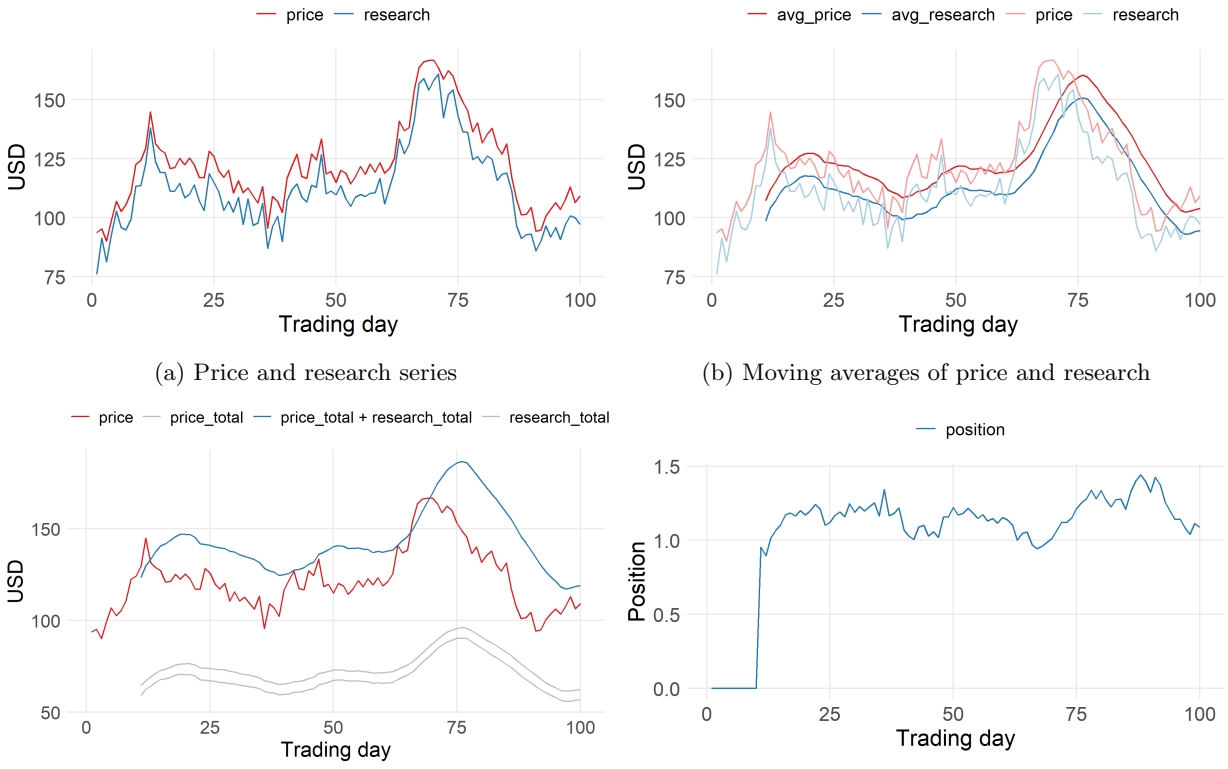
# 1 Trading Strategy Description

This trading rule is a linear combination of two moving averages: the average of the market price and the average of the research values. The four parameters accepted are the length of each average and the coefficients for each average's weighting contribution. The total sum is divided by the current price to calculate a (dimensionless) portfolio allocation to take.

Due to the linear summation this rule is only valid when either i) the research data represents a price target or ii) one of the coefficients (price or research) is zero.

# 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) Moving averages of price and research

(c) Weighted moving averages of price and research

(d) Portfolio allocation

Figure 1: Graphical description of the weighted moving averages algorithm. (1a) The price and research series for a 100 day period. (1b) Moving averages for price and research series with a window size of 10. (1c) The weighted moving averages of price and research are shown in the chart as $price\_total$ and $research\_total$, respectively. They are computed as $price\_total = 0.6 \times avg\_price$ and $research\_total = 0.6 \times avg\_research$. (1d) The prescribed positions derived from $position = (price\_total + research\_total)/price$.

### 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 value of a portfolio is determined by the volume of cash and security value it contains. This rule suggests the percentage of the portfolio that should be invested in the market being traded. When the percentage held is less than the recommended amount, it recommends buying securities. When the recommended allocation is less than the percentage currently held it recommends selling securities. To trade using this strategy you need to adjust each day to the target allocation suggested by rule. A summary of the weighted moving average rule is shown in Figure 1 below.

# 3 Rule Parameters

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

| Parameter Name | Default Value | Description | Symbol |
|---|---|---|---|
| Price average length | 2 | Number of days in the price average. | $L^p$ |
| Research average length | 2 | Number of days in the research average. | $L^r$ |
| Amplitude of price average | 1.0 | Weighting coefficient for the average of price. | $\kappa^p$ |
| Amplitude of research average | 1.0 | Weighting coefficient for the average of research. | $\kappa^r$ |

# 4 Equation

To mathematically describe the WMA trading rule. We can define a function ($\Lambda$) that contain the information of the *Price average length*, *Research average length*, *Amplitude of price average* and the *Amplitude of research average*. These parameters have been described in Section 3.

$$\Lambda(t, L, \kappa, \zeta) = \frac{\kappa}{L} \sum_{n=0}^{L-1} \zeta(t-n) \tag{1}$$

The equation (1) calculate a weighted average of the price accordingly to a generic function $\zeta$. The sum contribution of the equation (1) using the research and price parameters described in Section 3 divided by the actual price series $p(t)$ give us the portfolio allocation at time $t$.

$$z(t) = \frac{\Lambda(t, L^p, \kappa^p, p) + \Lambda(t, L^r, \kappa^r, r)}{p(t)} \tag{2}$$

Here, the new parameter $z_t$ is the portfolio allocation at time $t$, $p = p(t)$ is the value of the price series and $r = r(t)$ is the value of the research series.

# 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`