Predictive Relationship: Difference - Out of Sample Regression for Technical Signals

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1 Trading Strategy Description

Out of Sample Regression is an enhanced version of Signal Regression. This strategy is a regression based approach that is used to forecast change in prices using signal values generated from technical indicators. Using this strategy we split data set in to two sets, in-sample and out-sample. In-sample set is used to learn model parameters while out-sample set is used to evaluate the error. The error results better depicts the performance of regressor in real world scenario and warns investors of any possibility of over-fitting.

2 Relationship Description

In a difference relationship, recent change in the value of the signal directly affects future changes in the price:

$$\Delta p_{t+1} \propto k \left(\frac{S_t}{p_t} - 1 \right) + c \tag{1}$$

where Δp_{t+1} represents the future price change, S_t represents the current value of the signal, p_t represents the current price of market, k is a scalar, and c is a constant.

3 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.

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

Any of the technical indicators supported by InferTrade can be used as signal to forecast price change in asset.

As an example we can consider Money Flow Index (MFI). MFI is a momentum indicator which varies between 0 and 100 and is used to define an overbought and oversold conditions. Usually MFI value above 80 is considered overbought and a sell signal is generated while a value below 20 is considered oversold and a buy signal is generated.

By using this trading strategy we compute the MFI of underlying asset using it's historical High, Low, Close & Volume. Instead of using the MFI value to generate buy/sell signal as explained above, a forecast is made for expected change in price using MFI as a signal governed by Equation 2. β coefficient determines the relationship and impact of Signal S on change in price of asset Δp.

Unlike Signal Regression, Out of Sample regression uses initial 75% of the data set to estimate model parameters remaining 25% data set is used to compute error. Forecast values are then used to generate fractional portfolio investment using formulation mentioned in Equation 3.

4 Rule Parameters

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

Parameter Name	Default Value	Description	Symbol
Regression Period	120	Previous data points used to fit a regression line.	L
Kelly fraction	1.0	Amplitude weighting. 1.0 is maximum growth if regression is exact. < 1.0 scales down positions taken.	F
Volatility	0.01	Volatility used to compute the Kelly recommended optimum.	σ
Split Fraction	0.75	Percentage of data set used to fit model	f

5 Equation

Below is the equations which govern how this specific trading rule calculates a trading position. Equation 1 is the regression equation used to determine β and c. Equation 2 is the subsequent calculation of position sizing.

$$\Delta p_t = \beta \left(\frac{S_{t-1}}{p_{t-1}} - 1 \right) + c + \varepsilon_t \tag{2}$$

$$z_t = F \frac{E[\Delta p_t]}{\sigma^2} = F \frac{S_{t-1} + c}{\sigma^2} \tag{3}$$

with:

Δp_t : is the change in asset price at time t.
$E[\Delta p_t]$: is the expected change in price at time t.
S_{t-1}: is the signal value at time $t-1$.
p_{t-1}: is the price at time $t-1$.
β: is the relationship coefficient between $\left(\frac{S_{t-1}}{p_{t-1}} - 1\right)$ and Δp_t.
c: is a constant bias.
ε_t: is the error term.
F: is the Kelly fraction.
z_t: is the resultant fractional portfolio investment at time t.

6 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`