

Signal Factor Model

The Estimate Signal is a score (between -100 and +100) given to each instrument during the timeframe leading up to and after its earnings report date. The Signal is composed of two different factor models: Pre-release and Post-release. The Pre-release Signal is for the 10 trading days leading up to the report date, while the Post-release Signal is for the 3 trading days following the report date. The factors in the Pre and Post-earnings Signal are not the same, though they do share some common components:

- **Wall Street Consensus**
 - Mean EPS value of the WS analyst estimates
- **Crowd Consensus**
 - Mean EPS value of the Estimate analyst estimates
- **Select Crowd Consensus**
 - Weighted EPS Mean of Estimate estimates, based on historical analyst accuracy and age of the estimate (More accurate version of the Crowd Consensus)

Signal Models:

The factors that make up the model can vary over the period that the Signal is computed. As events, like new estimates, estimate revisions and changes in the WS consensus happen, they are included as-of the date/time they occur. Furthermore, before the factors are input into the model, they are all normalized.

Pre:

Pre-release Signal is calculated for the 10 days leading up to the report date, and has the following factors:

- **Select-Crowd Surprise**
 - The difference between the **Select Crowd Consensus** and the **WS Consensus** (`select_crowd_consensus - wallstreet_consensus`)
- **Select-Crowd Diff**
 - The difference between the **Select Crowd Consensus** and the **Crowd Consensus** (`select_crowd_consensus - crowd_consensus`)
- **History Surprise**

- The historical surprise rate for the WS mean vs. company's actual reported EPS value
- **Days to Report**
 - This is the number of days before the company reports, it is used to create a ramp-up weight that increases the strength of the signal as it gets closer to the report date

The model has the following form:

```
signal = (0.5 * histori_surprise + 0.4 * select_crowd_surprise +
          0.1 * select_crowd_diff) * days_to_report_weight
```

Post:

The Post-release Signal is calculated for the 3 days following the report date and has the following factors:

- **Estimize Beat**
 - This is the surprise rate between the **Actual EPS** value and the **Select Crowd Consensus** (actual_eps - select_crowd_consensus)
- **Wall Street Beat**
 - This is the surprise rate between the **Actual EPS** value and the **Wall Street Consensus** (actual_eps - wallstreet_consensus)

The model has the following form:

```
if estimize_beat is opposite_in_sign_to(wallstreet_beat):
    signal = 2.0 * estimize_beat
else:
    signal = estimize_beat
```

Normalizing the score:

To normalize the signal score between [-100, 100], we use the cumulative distribution function of a normal distribution to get a value between [-0.5, 0.5] and then multiply by 200:

```
(cdf(value) - 0.5) * 200.0
```