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Application of Social Media Signals to Enhance Index Performance

Improving Index Performance by Applying Social Media
Tilt Factors

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1. INTRODCUTION

Traditional passive indices such as the S&P 500 use a metric such as float adjusted market cap to calculate the weights of each company in the index. We apply an additional sentiment layer on top of the float market cap to tilt the weight in favor of stocks with a high monthly sentiment score and reduce the weight of stocks with a low monthly sentiment score. The monthly sentiment score is as defined by the factors calculated by [Social Market Analytics](#).



2. INDEX CONSTRUCTION METHODOLOGY

2.1 Eligible Universe

We start with the universe of securities that have been a part of the S&P 500 index. To avoid survivorship bias, we use a monthly snapshot of the index on the first trading day of the month since January 2013.

2.2 Calculation of Normalized Score

The sentiment score is calculated by Social Market Analytics and is a measure of deviations in social media sentiment from a baseline level. The factor is a mix of unusual sentiment activity and volume activity.

The sentiment score, is a z-score calculated as

$$S_Score_{Monthly} = \frac{x - \mu_x}{\sigma_x}$$

Where x is the aggregate of the sentiment score on tweets received for a particular security over the last 50 market days.

μ_x is the mean of x over a 200 day period.

σ_x is the mean of x over a 200 day period.

Similarly, we compute the $SV_Score_{Monthly}$. The x value in this case is number of tweets in the 50 day period.

2.3 Calculation of Composite Factor

The composite factor score that is used for changing the constituent weights is calculated as follows.

$$Score_{Monthly} = 0.5 * S_Score_{Monthly} + 0.5 * SV_Score_{Monthly}$$



3. WEIGHTING METHODOLOGY

The monthly constituents of S&P 500, on the first trading day of the month, are chosen as the starting point. All constituents are given an equal weight, w by assuming the float market cap of 100 for all constituents. This gives the base model to improve.

The improved weights are obtained by applying a tilt based on the $Score_{Monthly}$ value per the following tilt function.

$$f(x) = \begin{cases} \frac{1}{1 - (k * x)}, & x < 0 \\ 1 + (k * x), & x \geq 0 \end{cases}$$

Where $k \geq 0$.

The new market cap becomes $f(x) * 100$. The new weight for stock i becomes,

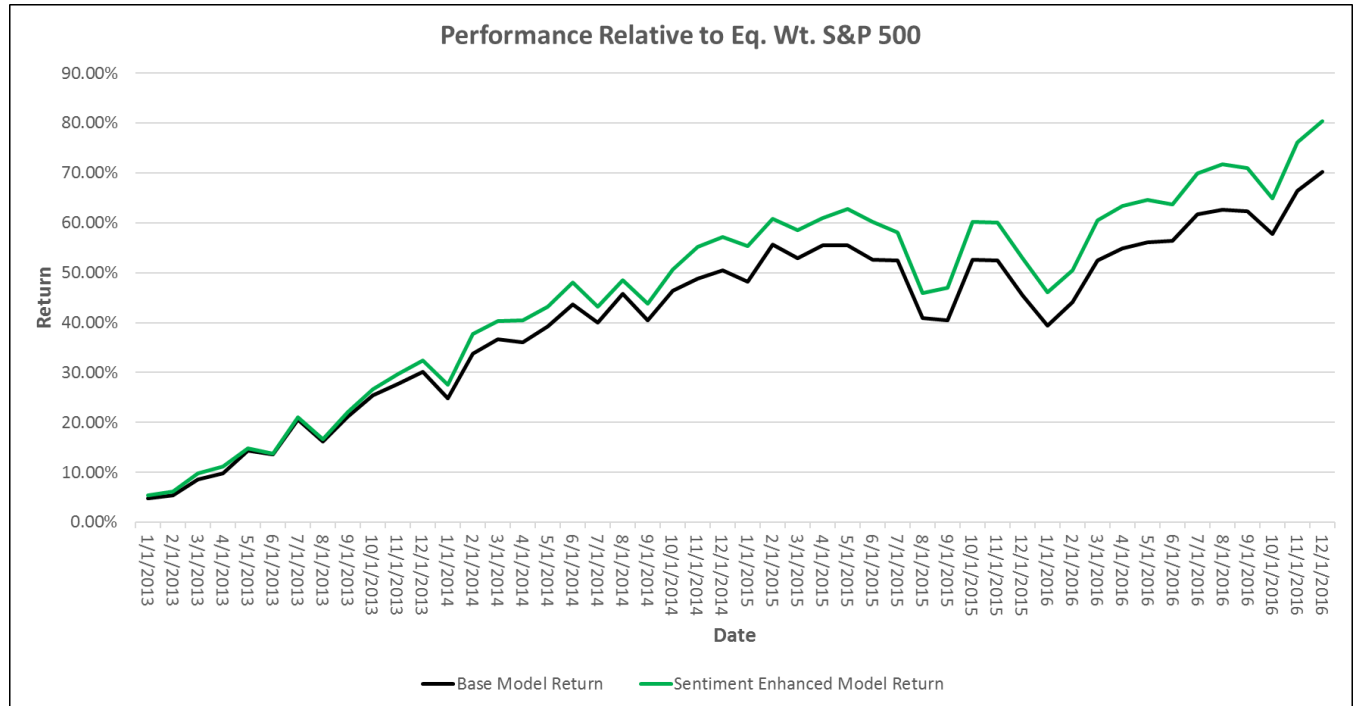
$$w_{new} = \frac{f(x)_i * 100}{\sum_{n=1}^N f(x)_n * 100}$$

The index constituent weights are recalculated monthly.



4. PERFORMANCE

The monthly performance of the index is shown in the chart below. The k value in the function above is chosen to be 100. The maximum weight given to any security is 5.55%.



The performance metrics are tabulated below.

Metric	Base Model	Sentiment Enhanced Model
Annualized Return	14.0%	15.5%
Annualized Volatility	11.7%	12.2%
Annualized Sharpe	1.20	1.28