

TIPRANKS EXPERT SENTIMENT SIGNAL

January 2018



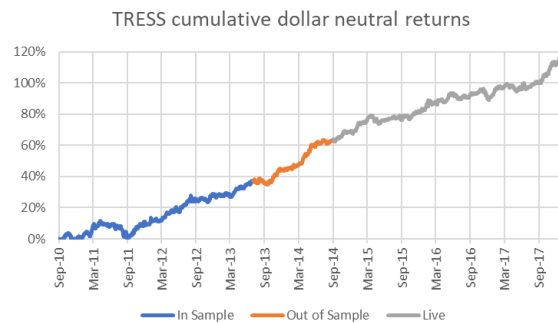
What is TipRanks?

TipRanks is a data driven financial accountability platform which uses advanced machine learning and language processing algorithms (NLP) to measure the performance of digitally published investment advice online, bringing objective measurement to the world of qualitative financial forecasting. TipRanks maintains a unique proprietary database of current and historical analyst and blogger recommendations and their credibility.

What is the Expert Sentiment Signal?

TipRanks developed the TipRanks Expert Sentiment Signal (TRESS) in conjunction with ExtractAlpha, an independent quantitative research firm, to allow institutional investors to profit from the stock-level sentiment of providers of online financial advice. TRESS captures whether top financial bloggers have provided Buy or Sell recommendations, and takes into account the recency of those recommendations and the quality of the source.

Our research shows that liquid U.S. stocks with the most recent Buy recommendations from select bloggers outperform those with the most recent Sell recommendations by 15.7% per annum, with a Sharpe ratio of 1.97, indicating that following expert sentiment as measured by TipRanks is a consistently profitable strategy from a unique source of data.



Returns to dollar neutral portfolio based on TRESS, 9/2010 – 12/2017

| | |
|-------------------|-------|
| Annualized return | 15.7% |
| Sharpe ratio | 1.97 |

A historical data file of TRESS values is available to systematic institutional investors upon request.

Data collection and analysis

TipRanks maintains a database of more than seven years of online financial expertise, incorporating both news articles which mention recommendations from sell side analysts, and blogs which convey the sentiment of independent researchers. The articles are culled from a wide variety of online sources including proactive scanning of websites, RSS feeds, analyst distribution lists, and crowd sourcing of websites visited by users of TipRanks' browser add on.

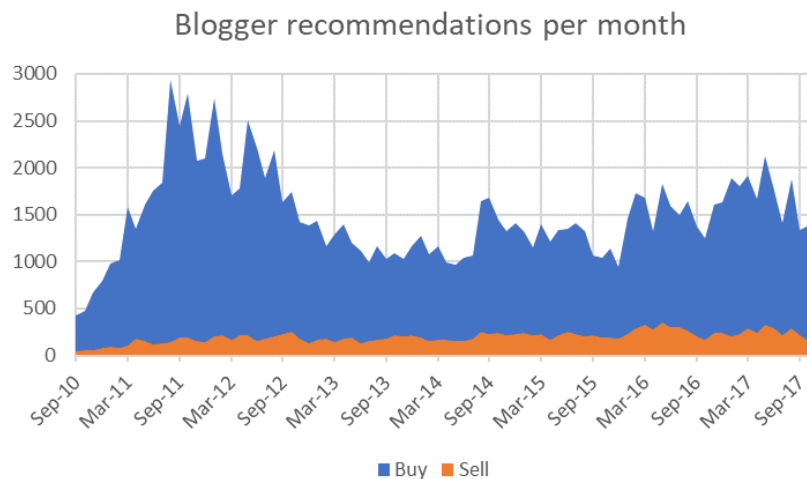
The HTML content of the article is cleaned, and articles are matched to security identifiers. TipRanks then employs proprietary natural language processing (NLP) technology to extract a clear Buy or Sell recommendation from the articles. The NLP is trained based on a feedback mechanism between machine learning algorithms and manual classification.

The methodology has been refined to deal specifically with the many idiosyncrasies of financial forecasts and sentiment. 86% of ratings are determined with what TipRanks determines to be a high confidence level, with a 96% precision rate among high-confidence ratings, as verified by a manual confirmation process which examines a random selection of 10-20% of ratings every day. Low-confidence ratings are always sent through a manual verification process.

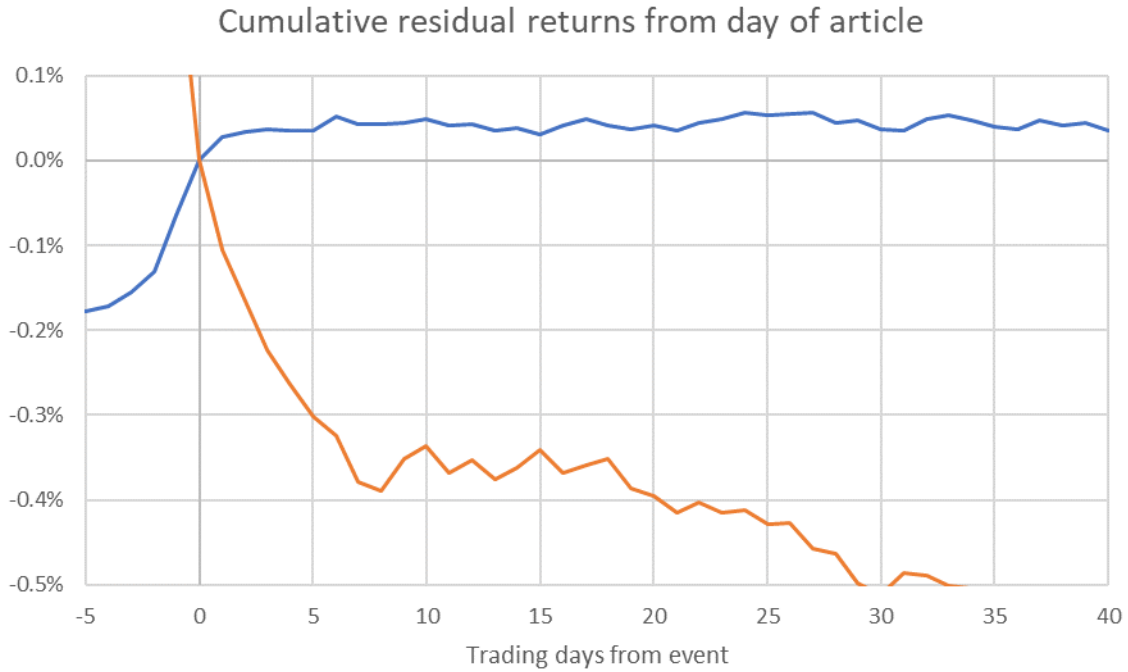
The online articles in the TipRanks database comprise detailed and original research that has not been compiled elsewhere. Currently 65 websites are accessed on an ongoing basis, and the number is growing over time.

Blogger recommendations

TRESS uses only recommendations from financial bloggers, since recommendations from sell side analysts are widely available from other services. Online financial expertise is generally geared towards recommendations to buy rather than to sell stocks, reflecting the audience's long-only bias. As such, only approximately 5% of the recommendations in the TipRanks database are Sell recommendations.



In the chart below, we show the cumulative return following all online experts' Buy and Sell recommendations, as determined by TipRanks. The returns are shown residualized to industries and common risk factors such as size, value, and volatility.



There is clearly a momentum effect among blogger recommendations; the stocks with Buy (Sell) recommendations have experienced recent positive (negative) returns. This effect may relate to bloggers releasing recommendations near news events such as product releases or earnings reports. However, it is clear that there is an additional drift several days after the recommendation, much longer than one typically sees with unexpected earnings. The momentum effect also suggests that a blogger-derived strategy is likely to be additive to a systematic short-term reversal strategy, by identifying large recent stock trends that are less likely to mean-revert.

The event study also shows that Sell recommendations, while more rare, provide even greater alpha than Buy recommendations.

Constructing TRESS

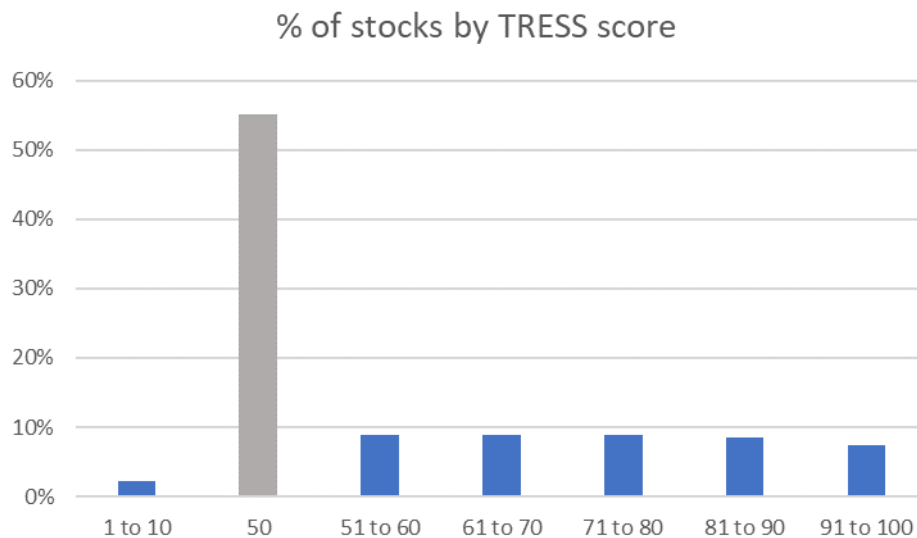
In designing TRESS, TipRanks worked with ExtractAlpha, an independent quantitative research firm with deep expertise in measuring financial analysts and building stock selection models. We utilized rigorous quantitative research techniques, including in and out of sample testing: we retained the period from July 2013 through August 2014 as an out of sample test, and found very comparable – actually better – results relative to our in sample period. TRESS has continued to perform well since going live. We also

restricted the concepts we examined to those tied to reasonable hypotheses, and designed the algorithm based on clear, intuitive formulations.

We also restricted the universe to U.S. stocks with market capitalizations in excess of USD \$100mm and a price greater than USD \$4 at any given point in time, thereby ensuring that the results would be actionable by institutional investors. This gave us a universe of approximately 2,000 names at a time. Of these, approximately half will have a recent recommendation at any given point. The universe included companies that are no longer active because they have since delisted, merged, or fallen out of our universe criteria.

The TRESS algorithm identifies recent Buy and Sell recommendations and weights them by the freshness of the recommendation's issuance. We furthermore weight the recommendations by the quality of their source using a proprietary scoring algorithm. Finally, the aggregate weighted sum of the Buy and Sell recommendations is scaled by the amount of blogger coverage on the stock, so that TRESS scores are not dominated by those larger stocks with a higher volume of recommendations.

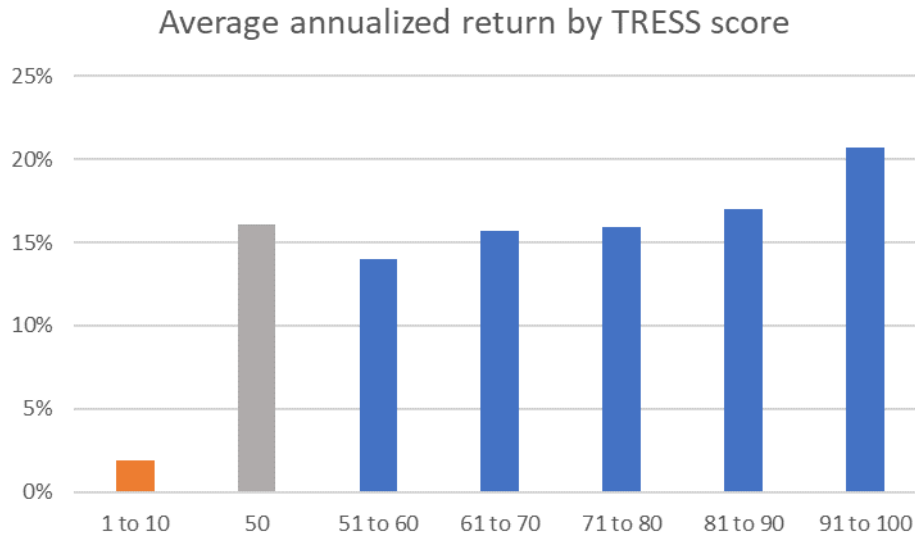
Since the underlying recommendations are biased towards Buy recommendations, and because the useful investment horizon of Sell recommendations tends to be shorter than that of Buys, the distribution of TRESS Scores is also tilted towards Buys. We scale TRESS to be a 1 to 100 score. However, only approximately 2% of stocks in our universe will have a score below 50 at any point in time. Stocks with no recent activity from the bloggers who are included in the algorithm are assigned a score of 50, stocks with negative net sentiment are scored between 1 and 10 depending on the level of sentiment, and stocks with positive net sentiment are scored between 51 and 100 depending on the level of sentiment.



As a result, we cannot construct traditional “decile” portfolios with an equal number of stocks on the long and short side. In the analysis that follows, the short portfolios include all TRESS scores below 50, and the long portfolios use standard deciles, with an equal dollar allocation to the long and the short sides (and therefore a more concentrated short book).

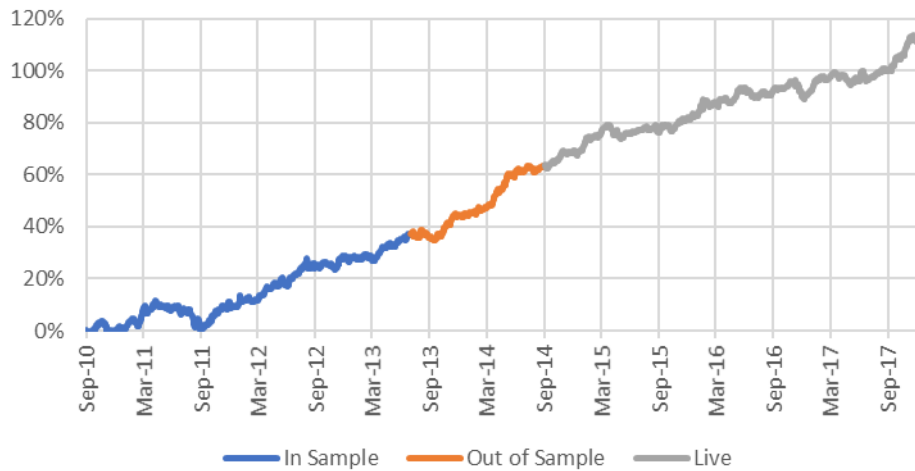
Detailed analysis of results

The following chart shows the average annualized return from September 2010 through December 2017, by groups of TRESS scores. Note that the scores of exactly 50, corresponding to stocks with no recent blogger articles, do not sort neatly in the return distribution. Users may wish to exclude these scores from their analysis.



Below we show the cumulative returns to long/short portfolios using an equally weighted long portfolio consisting of the top 10% (decile) of TRESS scores, hedged by an equally weighted short portfolio consisting of all TRESS scores below 50. We construct portfolios at the market open, using recommendations collected during the previous day at the latest; in later results, we show the effects of waiting until the close to build our portfolios.

TRESS cumulative dollar neutral returns



| | In Sample | Out of Sample | Live | Overall |
|--------|-----------|---------------|--------|---------|
| Return | 13.23% | 22.36% | 15.46% | 15.70% |
| Risk | 8.5% | 7.1% | 7.8% | 8.0% |
| Sharpe | 1.55 | 3.17 | 1.99 | 1.97 |

The results are very consistent year over year on both a return and Sharpe ratio basis.

We also break down our results by capitalization range: Large caps (the top 500 in a given month by market cap), mid caps (the next 500), and small caps (the rest of our universe).

| | Annualized Return | Sharpe | % Positive Days |
|----------------|-------------------|-------------|-----------------|
| Overall | 15.7% | 1.97 | 55% |
| 2011 | 9.9% | 1.07 | 50% |
| 2012 | 18.1% | 2.10 | 55% |
| 2013 | 16.6% | 2.46 | 57% |
| 2014 | 24.5% | 3.51 | 58% |
| 2015 | 13.9% | 2.12 | 57% |
| 2016 | 9.2% | 1.01 | 55% |
| 2017 | 22.5% | 2.83 | 55% |
| Large Cap | 6.3% | 0.77 | 50% |
| Mid Cap | -0.9% | (0.08) | 52% |
| Small Cap | 18.4% | 1.66 | 57% |

As with many market anomalies, we find that the predictability of blogger recommendations is weaker – at least before transaction costs – among larger, more informationally efficient stocks. However, we still show consistently positive results among larger names.

Note that in these cases the short portfolios tend to be comprised of very few stocks, particularly in the beginning of the sample, thus explaining the relatively dramatic drawdowns and lower Sharpe ratios when we restrict to a particular capitalization range.

Latency, turnover, and transaction costs

The average daily turnover of our decile portfolios is approximately 8.7% per day. As such it is natural to wonder about the effect of imposing transaction cost or latency assumptions in our simulations.

We do this in two ways: firstly, by assuming that we enter positions at the close of the day of the signal rather than at the open, and then at the subsequent open, using a full day lag; and separately, by imposing one-way transaction costs of 2bps for large caps, 5bps for mid caps, and 10bs for small caps.

| | Gross Annualized Return | Sharpe | Net Annualized Return | Sharpe |
|-----------|----------------------------|--------|--------------------------|--------|
| Open | 15.7% | 1.97 | 9.2% | 1.15 |
| Close | 12.9% | 1.64 | 6.4% | 0.81 |
| Next Open | 12.4% | 1.60 | 5.9% | 0.76 |

It appears that imposing a lag does have an effect on returns, but reduces the results by less than a quarter. Using a fairly conservative transaction cost assumption has an impact on the results, but TRESS survives these assumptions.

Summary

Recommendations extracted from financial blog posts appear to be a profitable and unique source of alpha, with returns that are robust across time and stocks, including large cap stocks. By converting unstructured articles into structured data and designing a stock selection methodology based on the most profitable recent recommendations, TRESS is able to provide institutional investors with a return stream that was previously unavailable.