Quant Model White Paper

Stock Ranking Based on Earnings Estimate Revisions

Eugenio A. Pérez, CFA, FRM, Director
Data Science & Quantitative Analysis, TradeStation Technologies

TradeStation®

TradeStation Data Science Mission

TradeStation's Data Science and Quant Analysis (DSQA) team, led by Eugenio Perez, CFA, FRM, leverages the latest technologies and advanced statistical modeling to bring you state-of-the-art market analysis in a simple, practical style.

The TradeStation Technologies Data Sciences White Paper Series is an educational resource of TradeStation Securities. Produced by TradeStation Technologies, these white papers are designed to provide a detailed explanation of a technical or fundamental trading concept or model that can help build your knowledge of market analysis concepts. These concepts and associated TradeStation platform tools are for educational and demonstrational purposes only. These models typically provide a specific market outlook or performance rank for each specific stock in a pre-defined symbol list.

Contents

Objective

This model attempts to identify stocks that may see an increase in price when the consensus among analysts raises expectations for future earnings-per-share (EPS).

Snapshot

Focus	Markets	Time Perspective	Files Included
 Fundamentals	 Equities	 < 3 Trading Days	 TradeStation Workspace
 Earnings-per-Share			 TradeStation Indicator

Summary

When analysts raise their expectations for future EPS, we expect the stock price to rise.

We apply a proprietary calculation to the changes in analysts' consensus EPS estimates to arrive at an average revision number per day per stock. Then we do a percent rank for each day across all stocks in our universe.

Every day, this model calculates an exponentially weighted average of the changes (revisions) in EPS estimates for every stock in our model. The model is currently tracking about 800 of the largest-cap U.S. stocks and the symbols available are listed in RadarScreen® within the TradeStation workspace provided with this paper.

We then do a percent rank each day across all stocks, with 0 representing extreme downward EPS revisions and 100 representing extreme upward revisions. We would expect stocks where analysts are aggressively increasing EPS estimates (with rank values close to 100) to possibly outperform the market in the short term.

These resulting ranks for each stock are displayed in RadarScreen® with the indicator provided with this paper, and enable us to identify symbols that may outperform, market perform, or under-perform over the next day.

Background

Calculation of the Average Growth of EPS Revisions

For any one stock on any date, we pull the historical EPS estimates for the next 12 future quarters (where the actual EPS has not yet been announced). We can express the changes (revisions) in EPS estimates as percent changes, by subtracting the previous EPS estimates for each and then dividing by the latest stock price.

We can now more clearly see the upward and downward revisions and see how large they are compared to the stock price. We combine the EPS estimates percent changes into one exponentially weighted average which is used to rank against the other stocks in the model every day.

Ranking

There will be times when analysts are very aggressive and revising all estimates upward (or, conversely, downward). This is why our final step is to apply a ranking across all stocks in the universe each day. The relatively most positive revisions will get ranks close to 100.

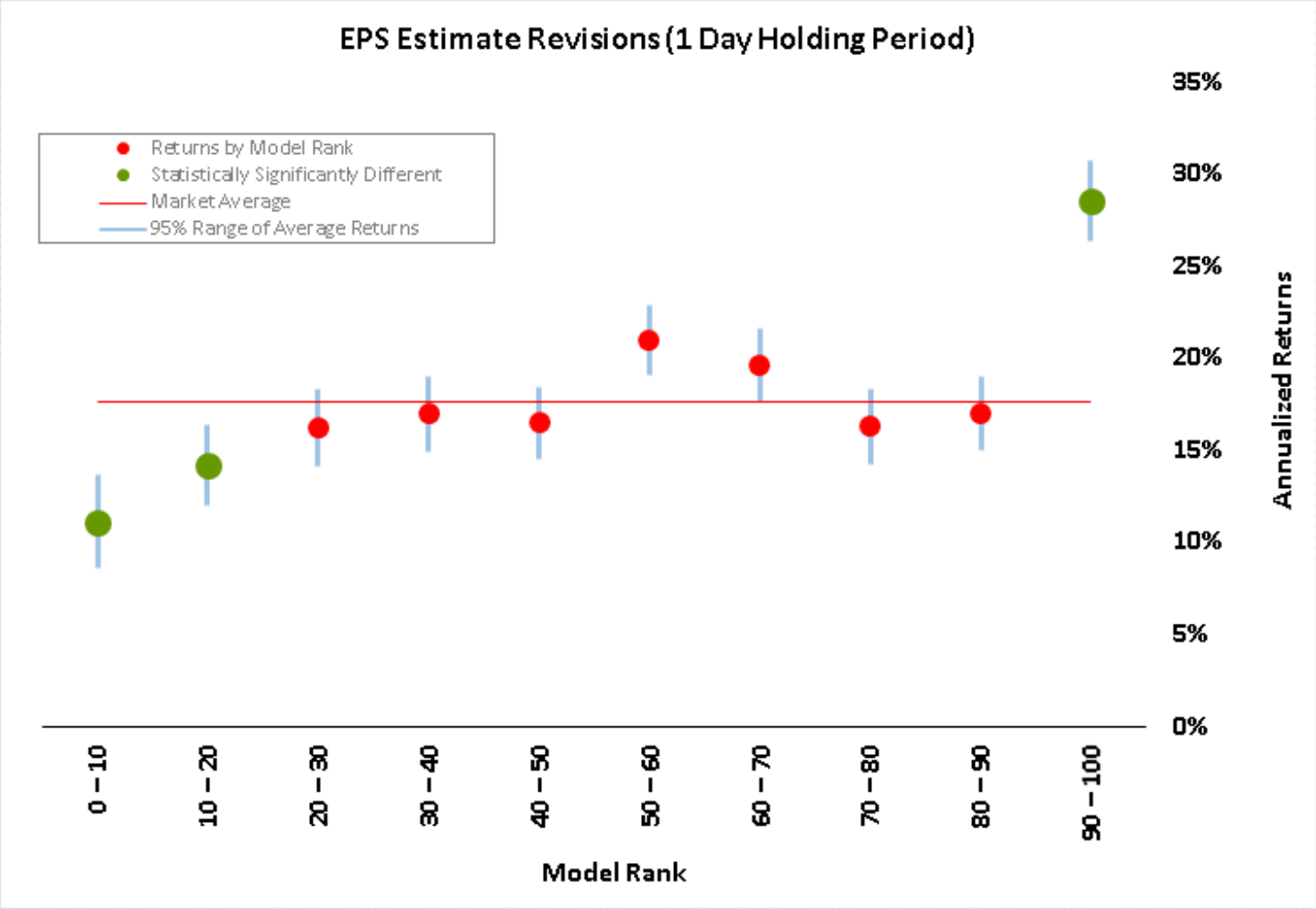
Results

We tested this model assuming a 1-day, 5-day, and 20-day holding period. Returns and statistical significance are better for the 1-day holding period, which tells us that the positive effect on returns for upward revisions of EPS does not last long.

When we assume a 1-day holding period, we mean that you could use the model ranks calculated on Monday night to buy a stock on Tuesday morning and then sell it on Wednesday morning. We averaged these 1-day returns in 10 buckets by the corresponding model rank (from the night before). In **Figure 1** below, we can see that the highest model rank bucket significantly outperforms all of the lower model rank buckets. For ranks 20 through 90, we found no statistically significant difference in returns. We therefore interpret model ranks from 20 to 90 as just "market perform."

The top bucket (model ranks 90 to 100) is better than the rest of the market by about 11% per year, so we will interpret this as "strong outperform." The model ranks from 0 to 10 returned 7.00% less than the market, so we will consider this as "under-perform," and the model ranks from 10 to 20 returned 3.77% less than the market, so we will consider this as "weak under-perform."

Figure 1: EPS Estimate Revisions (1-Day Holding Period)



Here in **Figure 1** we are displaying the averaged 1-day returns in 10 ranking buckets, where each dot represents the average of all 1-day returns annualized for all stocks in the model for all years in the model. For these annualized returns, ranks between 0 and 10 = under-perform for the next day, 10 to 20 = weak under-perform for the next day, 90 to 100 = strong out-perform for the next day, and 20 to 90 = market perform for the next day.

Trading Concepts

We would consider stocks with model ranks of 90 to 100 to outperform the market over the next couple of days. Look for the current rank scores to cross above 90 to identify those stocks that have just become 'strong out-perform' today.

Watch the model ranking scores change from day to day, as the model is more predictive in the shorter term than in the longer term. When stocks have moved out of the most attractive ranks (when they have dipped below 90), the outperformance from upward revisions is probably exhausted.

We should probably ignore the middle ranks (10 to 90) because we cannot be sure they will predict outperformance.

We probably should not just short the bottom ranks (0 to 20) unless we expect to see a longer-term shift in the market to the downside. While we expect the bottom ranks (0 to 10) to under-perform the market, the effect is not strong enough to overcome the longer-term upward trend of stocks. However, going long stocks in the top deciles and short stocks in the bottom decile should work; this strategy can be constructed to be beta neutral (but idiosyncratic risk remains).

Trading this model long only should have about the same market risk as the normal purchases of any single stock or portfolio of stocks.

Understand the model's limitations. The expectations of returns we present here are for all stocks for all years, and the actual return of any one stock still faces the same normal risks of any equity trade. Also, in 2009, 2015, and 2016, the model did not "work" (where the bottom ranks actually outperformed the top ranks). At these times, either analysts were not particularly good at predicting EPS, or markets cared less about EPS than other factors.

Included Files

The 'Stock Ranking EPS Estimate Revisions" indicator is a custom RadarScreen® indicator that displays the daily rank values coming from the "EPS Estimate Revisions" model described in this paper. The model calculates these ranks for about 800 of the largest U.S. stocks. These ranks are calculated every day and are made available to the indicator by automatic download from the Amazon cloud.

The indicator is available free of charge through the TradeStation TradingApp® Store.

Download Indicator

The "Stock Ranking EPS Estimate Revisions" RadarScreen® indicator illustrated in **Figure 2** displays the current day's market outlook based on the current rank score displayed in the "Cur RScore" column. In the current model calculations, 0 to 10 is under-perform, 10 to 20 is weak under-perform, 20 to 90 is market-perform, and 90 to 100 is strong out-perform. You can sort the list of symbols by the "Cur RScore" to rank the symbols by their rank scores.

Figure 2: Stock Ranking RadarScreen Indicator

Symbol	Interval	Last	<>Stock Ranking EPS Estimate Revisions				
			Outlook	Cur RScore	RScore[1]	RScore[2]	Updated
CMS	Daily	43.21	market-perform	12.7	10.3	20.6	02/21/18 03:
CNC	Daily	100.80	strong out-perform	94.1	96.3	96.5	02/21/18 03:
CNP	Daily	27.20	market-perform	48.1	49.0	49.5	02/21/18 03:
COF	Daily	98.28	market-perform	58.5	60.3	60.7	02/21/18 03:
COG	Daily	23.87	market-perform	36.2	35.2	35.1	02/21/18 03:
COL	Daily	138.32	market-perform	34.2	33.9	33.2	02/21/18 03:
COO	Daily	231.27	market-perform	60.9	62.2	63.6	02/21/18 03:
COP	Daily	55.34	strong out-perform	95.9	29.4	29.6	02/21/18 03:
COTY	Daily	21.04	market-perform	10.9	8.9	8.6	02/21/18 03:
CPB	Daily	44.08	weak under-perform	2.3	1.8	8.1	02/21/18 03:
CRM	Daily	113.56	market-perform	70.2	44.[illegible]	44.9	02/21/18 03:
CSCO	Daily	43.39	strong out-perform	93.6	95.6	96.1	02/21/18 03:
CSX	Daily	55.37	market-perform	23.9	22.1	2[illegible]	02/21/18 03:
CTAS	Daily	168.31	market-perform	50.3	51.4	51.9	02/21/18 03:
CTL	Daily	18.36	weak under-perform	0.5	0.3	0.3	02/21/18 03:
CTSH	Daily	81.92	market-perform	76.6	80.7	81.4	02/21/18 03:
CTXS	Daily	92.10	market-perform	59.9	62.0	62.3	02/21/18 03:
CVS	Daily	68.36	market-perform	14.0	82.5	83.7	02/21/18 03:
CVX	Daily	111.02	market-perform	14.7	12.5	11.8	02/21/18 03:
CXO	Daily	149.96	strong out-perform	95.0	53.9	54.4	02/21/18 03:
D	Daily	73.88	market-perform	57.6	59.4	59.8	02/21/18 03:

Note: As time goes on, and the model performance changes, these performance outlooks may also change. You will see an update to the indicator when these changes occur.

The red circled ❶ & ❷ in **Figure 2** highlight a new change in outlook from the previous day. This change is also highlighted by the orange background in the "Cur RScore" column. By comparing today's rank score with the

previous day's rank score – column "RScore[1]" – you can determine if the rank outlook has improved or declined from the previous value.

The column "RScore[2]" is also displayed so you can track the trend of the rank scores for each symbol for the current day and the previous two days' values.

Inputs

The inputs for this indicator allow you to change the background color for the outlook column.

Indicator Inputs

The input parameters for this indicator are the background and foreground color names to be used for each level of the outlook column.

Name	Value
StrongOutPerformColors	"LimeGreen,White"
MarketPerformColors	"Yellow,Black"
WeakUnderPerformColors	"LightSalmon,Black"
UnderPerformColors	"LightCoral,White"
InvalidColors	"Black,White"
RankChangedColors	"Orange,Black"
DefaultColors	"Black,White"

Workspace

The TradeStation workspace included with this indicator shows both a RadarScreen and a chart showing the historical EPS dates and amounts.

How to Use the Indicator

1. If you open the provided workspace, it will already contain the indicator with the column widths set appropriately. If you insert the indicator into a new RadarScreen window, you can adjust the column widths to meet your needs.

2. The symbol list or symbols should be inserted starting in row 1 or 2.

3. Symbols that are not tracked will display NOT TRACKED in the Outlook column.

4. The 'Updated' column displays the date and time the current displayed values were calculated.

5. The hidden 'Version' column displays the specific version of the indicator.

Glossary

ALPHA	In the Capital Asset Pricing Model, we can express the daily returns for a particular stock x as $R_x = \alpha_x + \beta_x R_m + \varepsilon_x$. R_m is the market return (all stocks together represented with an index like the S&P 500) and β_x (Beta) is the sensitivity that each stock has to the market. α_x (Alpha) is the long-term trend in a stock that cannot be explained by market movements (so the long-term outperformance or under-performance of some stocks). ε_x (idiosyncratic risk) is the remaining daily variability in returns for stock x that cannot be explained by market movements or long-term outperformance.
BETA	In the Capital Asset Pricing Model, we can express the daily returns for a particular stock x as $R_x = \alpha_x + \beta_x R_m + \varepsilon_x$. R_m is the market return (all stocks together represented with an index like the S&P 500) and β_x (Beta) is the sensitivity that each stock has to the market. α_x (Alpha) is the long-term trend in a stock that cannot be explained by market movements (so the long-term outperformance or under-performance of some stocks). ε_x (idiosyncratic risk) is the remaining daily variability in returns for stock x that cannot be explained by market movements or long-term outperformance.
BETA NEUTRAL	(See Beta). Market returns are the largest component of individual stock returns, and there are times when traders would prefer not to be exposed to this risk. The beta of a portfolio is simply the weighted average beta of its components, so it is possible to construct a portfolio of long and short stocks (or long stocks and long a "short" ETF) that has a beta of zero. We would call this a "beta neutral" or "beta hedged" portfolio because only the alpha and idiosyncratic risk exposures would remain.
CHAINING	If we have a formula to predict the next value in a time series based on past values, we can keep on going to predict subsequent values based on the previous predictions.
EPS	Earnings-per-share: Net earnings to shareholders divided by the number of common shares outstanding.
EPS ESTIMATES	EPS estimates are considered an important mover of stock prices, so Wall Street companies offer predictions of future EPS estimates for their customers. The average of all of these predictions is the "consensus" estimate. It changes, or is "revised," every day that an analyst changes his prediction.

Estimation Error	Every calculated statistic will have an estimation error associated with it. For example, if we want to know the average weight of men who sport mustaches, and pick 10 men to measure as representative of the universe of mustachioed men, the answer will be different depending on which 10 we pick. The answer will also depend on which scales we use, who is doing the measuring, etc. We need to know the estimation error before we can reach conclusions about our calculated statistic (see t-Tests).
Historical Volatility	Our proprietary model to estimate the volatility (standard deviation of returns) of a stock over the next month based on its recent history of returns.
Idiosyncratic Risk	In the Capital Asset Pricing Model, we can express the daily returns for a particular stock x as $R_x = \alpha_x + \beta_x R_m + \varepsilon_x$. R_m is the market return (all stocks together represented with an index like the S&P 500) and β_x (Beta) is the sensitivity that each stock has to the market. α_x (Alpha) is the long-term trend in a stock that cannot be explained by market movements (so the long-term outperformance or under-performance of some stocks). ε_x (idiosyncratic risk) is the remaining daily variability in returns for stock x that cannot be explained by market movements or long-term outperformance.
Market	Generally, refers to all stocks put together (see Beta).
Normalization	Generally, normalization refers the manipulation of data to align its distribution to the normal (Gaussian) distribution because the latter's properties are well understood and form the basis of many statistical analysis. The most common steps are to subtract the mean and then divide by the standard deviation.
Present Value	The discounted value of future cash flows. For example, if interest rates are 10%, the present value of $100 received next year is $90.91 (because $90.91, if put in a bank for a year at 10%, will grow to exactly $100).
Survivorship Bias	The bias resulting from a test that does not account for companies that have gone bankrupt or are otherwise not in the data. For example, estimating the risk of a traffic accident by looking at the driving histories of 100 50-year-olds may underestimate the risk somewhat because it ignores people who died before the age of 50 (some perhaps in car crashes).

T-TESTS	A statistical analysis to test a hypothesis to a certain level of confidence. The independent two-sample t-test is used to determine whether there is a difference between two separate groups. For example, are men who sport mustaches on average heavier than men who don't? To test the hypothesis, we would need the average weight of a group of mustachioed men, the average weight of a group of clean-shaven men, and the estimation errors of both averages. To reach a conclusion, we need to see that the differences in the averages is large compared to estimation errors (otherwise the apparent difference could just be the result of randomness in sampling).
ZERO COUPON	A type of bond that does not pay interest at all until maturity (when the interest is paid out with the face value). Present values are most conveniently calculated using a zero-coupon yield curve. (See Present Value)

Disclosures

All support, education and training services and materials on the TradeStation Securities website are for informational purposes only. No type of trading or investment advice is being made, given or in any manner provided by TradeStation Securities or its affiliates.

TradeStation Securities does not provide or suggest trading models or strategies. We offer you analysis and educational tools to help you design your own strategies and trading ideas, and determine how they could have performed in the past. While we believe this is very valuable information, we caution you that simulated past performance of a trading idea or strategy is no guarantee of its future performance or success.

We also do not recommend or solicit the purchase or sale of any particular securities or derivative products. Any symbols referenced are used only for the purposes of the demonstration, as an example and not a recommendation.

TradeStation Group, Inc. Affiliates: All proprietary technology in TradeStation is owned by TradeStation Technologies, Inc. Equities, equities options, and commodity futures products and services are offered by TradeStation Securities, Inc. (Member NYSE, FINRA, CME and SIPC). TradeStation Securities, Inc.'s SIPC coverage is available only for equities and equities options accounts.