Valspresso

Price Sentiment Analysis and Indicators

Technical White Paper

Overview

Valspresso's indicators empower subscribers to design and deploy persistent alpha-generating strategies. Our proprietary technology and patented methods make it easy for quants, analysts, and portfolio managers to integrate our indicators and signals into new or existing trading strategies with the objective of reducing risk and improving returns. Historical values are available from 2004 to present, along with back-tested example strategies that clearly demonstrate the value of Valspresso data: deliver higher alpha and lower beta, consistently.

These indicators are particularly effective for fundamental managers, who need a starting point when analyzing multiple securities. While the indicators are effective for building portfolios on their own, fundamental managers could enhance the systematic signals with their own judgment and experience. Additionally, the Valspresso indicators are cost-effective for pension funds and other asset owners who may be looking to insource their active equity investment function but have limited capacity to hire a team of analysts.

There are three principal steps in developing model portfolios through the indicators. First, we calculate the sentiment scores for each company. Then, a fundamental score assigned based upon a systematic analysis of financial statement data. Finally, the overall scores are combined to give a powerful indicator of future stock price performance. These rankings can then be utilized by portfolio managers as a strong starting point to building effective and efficient portfolios.

This paper reviews the philosophy of Valspresso and its founder, gives a deep description of the indicators, and reviews the evidence of the power of the signals. We further encourage portfolio managers and analysts to evaluate the alpha value of our data feed for themselves via a free subscription to our historical data at FactSet: https://open.factset.com/products/sentiment-and-fundamental-indicators/en-us.

Contents

About Valspresso

The Company

Valspresso, Inc. is a financial technology and investment strategy development firm based in Reston, Virginia. Its two decades of research and innovation culminated in the grant of a U.S. patent and the development and deployment of a suite of rules-based artificial intelligence software applications that automates the entire asset management process — from analysis to portfolio construction to trade execution — with a clear objective: reduce risk and improve returns.

Founder

Reginald Nosegbe, CPA, is the inventor of a theoretical framework that seeks to reduce the risk and improve the return of investing in the stock market. Reginald is an accountant, inventor, systems engineer, entrepreneur, student of economic history, and passionate advocate for investors trying to build and protect their investments. He has years of experience in risk management, regulatory compliance, internal controls, strategic consulting services, and investment management with firms including PricewaterhouseCoopers and Merrill Lynch.

Company History

Valspresso is the culmination of 20 years of research and the confluence of political and economic events.

As a refugee from Liberia's civil war in the early 1990s, Valspresso's founder, Reginald Nosegbe, saw firsthand that whenever there is upheaval, be it military, political, or economic, it is the individual that suffers. He believes that with access to the right information and the right context, we as individuals have enormous power to rise up and solve our own problems.

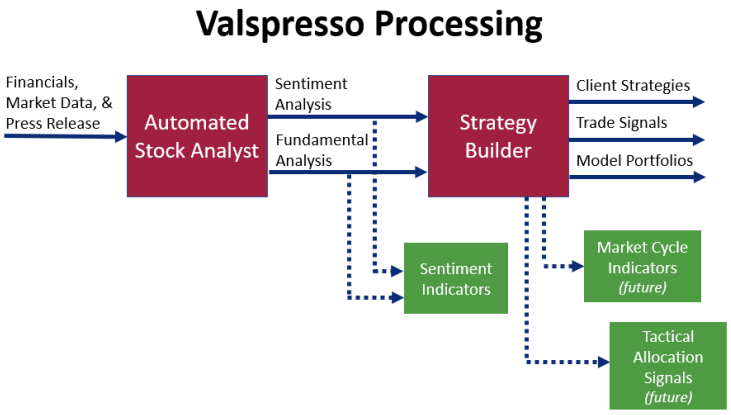
Reginald moved to the United States in the early 1990s and resumed his academic studies at the University of Virginia. While there, he became deeply concerned about extreme market risk and 10 major market failures, including the 1929 market crash. It was more than the failures themselves that concerned him. Rather, it was the impact that those failures had on the lives of so many people – people who worked for years to achieve financial stability and accumulate assets, only to have that security undone, sometimes in a matter of days.

Motivated by this seemingly intractable problem in 1997, he designed an independent study course to create a mathematical model that would objectively quantify market sentiment. His initial findings were presented to a panel of professors and an audience of students. That resulted in an award for the research, analysis, and findings. He went on to get a master's degree in systems engineering from the University of Virginia. In 2007, Reginald filed a patent application for a "Stock Method for Measuring and Assigning Precise Meaning to Market Sentiment". The patent was granted in 2011.

Shortly after the crash of 2008, Reginald recruited a team of technology and financial professionals. Valspresso built an end-to-end suite of applications based on Reginald's theoretical framework. These applications were built on Valspresso's proprietary technology platform that consists of a robust point-in-time historical database, an expert system, diagnostic capabilities, and research tools. On top of that platform, Valspresso has built an automated analyst, a strategy development environment, investment operations modules, model portfolios, and proprietary indicators.

Solution

Valspresso's technology analyzes all publicly traded companies on the U.S. major exchanges every day. This daily automated analysis includes a patented price sentiment analysis as well as deep fundamental analysis. Valspresso's indicators empower subscribers to design and deploy alpha-generating strategies. Our proprietary technology and patented methods make it easy for quants, analysts, and portfolio managers to integrate our indicators and signals into new or existing trading strategies with the objective of reducing risk and improving returns.



Theoretical Framework

Valspresso's approach to investing is based upon our founder's "Free and Competitive Market Equilibrium" hypothesis which is stated as follows:

> "In a free and competitive market, the value that efficient and effective companies produce, shall, in the long run, approximately equal the value that the market (investors) demands."

Basic Assumptions

1. The market is free and competitive
2. Companies are efficient and effective
3. Companies' earnings can be independently verified
4. Companies will continue as a "going concern"
5. Investors expected return can be determined

Essentially, this hypothesis posits that when investors make buy and sell decisions on an open market, they are always trying to discover an equilibrium price for a security based upon expectation of earnings growth or decline and other emerging information. Investors, and the market in general, will sometimes overshoot this equilibrium price and sometimes undershoot, but will always seek equilibrium. Our indicators are built to determine whether a stock's current price

reflects under-reaction or over-reaction to market information, including recent earnings (news), and makes an implicit forecast for stocks that are away from equilibrium. Our results show that this can be an effective way of building an active investment strategy.

Our hypothesis and assumptions enabled us to derive a series of mathematical models that decompose stock price into the portion that is attributable to underlying operations and the portion that is attributable to future expectations of growth, and to classify all companies traded on the major exchanges as to whether the market is pessimistic, optimistic, or irrationally exuberant about their future operating performance (earnings). Price Sentiment Analysis is a key component of Valspresso's solutions.

Price Sentiment Analysis

Most sentiment analyses try to measure how people "feel" by analyzing what they "say," and use that as a proxy for what people will "do" regarding investment decisions. We all know that what people "feel", "say", and "do" are not always aligned. This is especially true in competitive marketplaces.

We believe that the best measure of investors' sentiment is the price they are willing to pay for a stock. Implicit in the price that investors pay for a stock on any given day is a forecast of a company's future operating performance (earnings). Valspresso was granted U.S patent 7,966,241 for this method of measuring price sentiment.

Our primary metrics for price sentiment analysis are Sentiment Index (SI) and Sentiment Quotient (SQ). Our patent describes the following functions used to calculate SI and SQ:

Sentiment Index (Si)

$$S_i = \frac{Ppsxr - Eps}{Eps}$$

Si is undefined when EPS is equal to 0

Sentiment Quotient (Sq)

$$Sq = \int_0^{Si} \frac{1}{(Si+1)^2}\, dsi$$

Change in Sentiment Quotient (SqΔ)

$$Sq\Delta = \int_{Si(TimeA)}^{Si(TimeB)} \frac{1}{(Si+1)^2}\, dsi$$

Together, the above mathematical models play key roles in Valspresso's proprietary classification system and the development of alpha-generating strategies.

The input into Sentiment Index includes stock price (PPS), GAAP earnings per share (EPS), and required rate of return (R). Required rate of return is calculated using Beta (36-month Beta calculated daily), U.S. Treasury bill rate (3 month), and market rate of return (average annual return of S&P 500). By looking at the formula, it is easy to see what would happen to SI should an input increase or decrease. For example, an increase in price would increase SI (assuming all other inputs are constant). This would indicate that the market is more optimistic about future performance. Conversely, if earnings increased, then SI would decrease. Understanding how the interplay of changing input contributes to the market psychology (or sentiment) of price has been a subject of our research for years.

One of the unique attributes of SI and SQ is that their values are on a scale that pivots around the fixed value of 0. Equating SI and SQ to 0 as a fixed frame of reference is the mathematical representation of Free and Competitive Market Equilibrium. This allows the automated analyst to objectively measure the amount of sentiment in companies' stock price and classify them as follows: Companies with SI < 0, but > -1 are classified as Pessimistic (P); Companies with SI > 0 are classified as Optimistic (O); Companies with SI > 4 are classified as Irrationally Exuberant (IE); Companies with SI < -1 are flagged as reporting negative GAAP earnings per share (NE).

SI is used to quantify expected earnings growth. For example, an SI value of 4 means that the company's stock price reflects an expectation that earnings will grow by a factor of 4. An SI value of -0.5 means that the company's stock price reflects an expectation that earnings will decline by a factor of -0.5. The interpretation of SI depends on the sign of EPS and SI. The rules are as follows:

- When SI > 0 then
    - SI represents a factor by which earnings are expected to increase
- When SI = 0 then
    - Earnings are expected to remain constant
- When SI > -1 and SI < 0 then
    - SI represents a factor by which earnings are expected to decrease
- When EPS < 0 then
    - SI </= -1
- When SI </= -1 then
    - -SI represents a factor by which earnings are expected to increase
- When EPS = 0 then
    - SI is undefined
    - 0.01 is used as a proxy for the value of EPS

SQ is used to quantify the portion of a company's stock price that is attributable to future earnings growth. For example, an SQ of 0.8 implies that 80% of the company's stock price is attributable to expectation of future earnings growth and 20% to current fundamentals. The interpretation of SQ depends on the sign of EPS and SQ. The rules are as follows:

- When SQ > 0 then
    - SQ represents the portion of stock price attributable to expectation of future earnings growth
- When SQ < 0 then
    - SQ represents the portion of earnings that is not reflected in the current stock price
- When SI </= -1 then
    - SQ is undefined

Obviously, no one knows the future of a stock price, but Valspresso's sentiment indicators provide a useful and powerful framework to assess investors' optimism or pessimism reflected in a stock price. The uniform applicability and standardized values mean that they can easily be integrated into new or existing trading strategies with the objective of reducing risk and improving returns. Valspresso has used the sentiment framework to deliver sustained alpha and lower beta in both simulated and live portfolios.

Descriptive Statistics

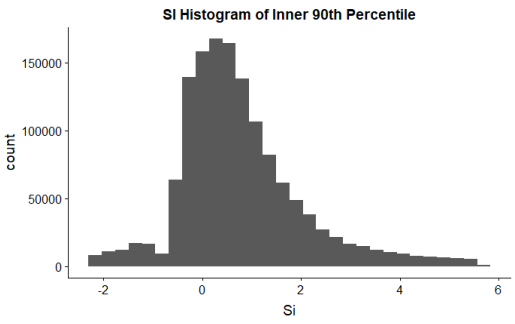
This section includes descriptive statistics for SI and SQ for the components of the S&P 500 from 2004 to 2018.

In some cases, outliers have been removed. Our definition of an outlier is the bottom and top 5%, therefore, the inner 90th percentile of data is included on the charts.

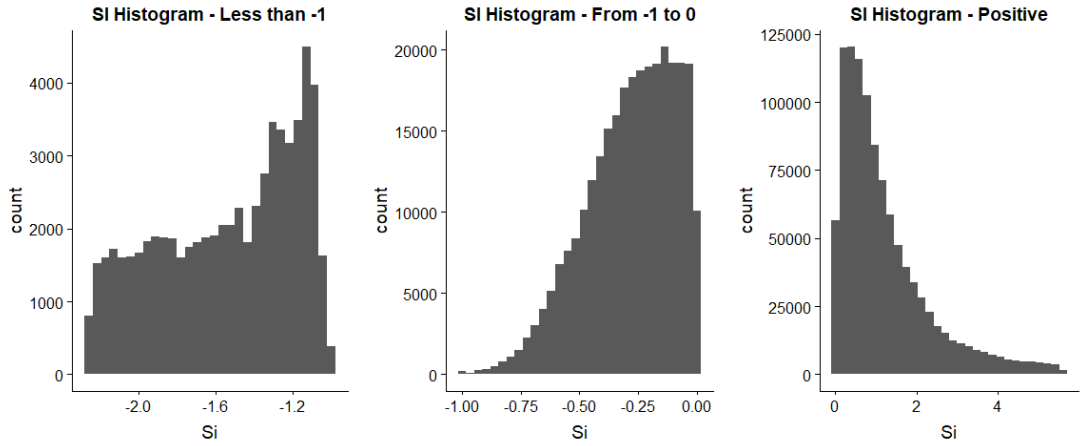
Sentiment Index (SI)

SI is not normally distributed so statistics such as mean and standard deviation are not meaningful. To understand the distribution of this indicator, refer to the charts below.

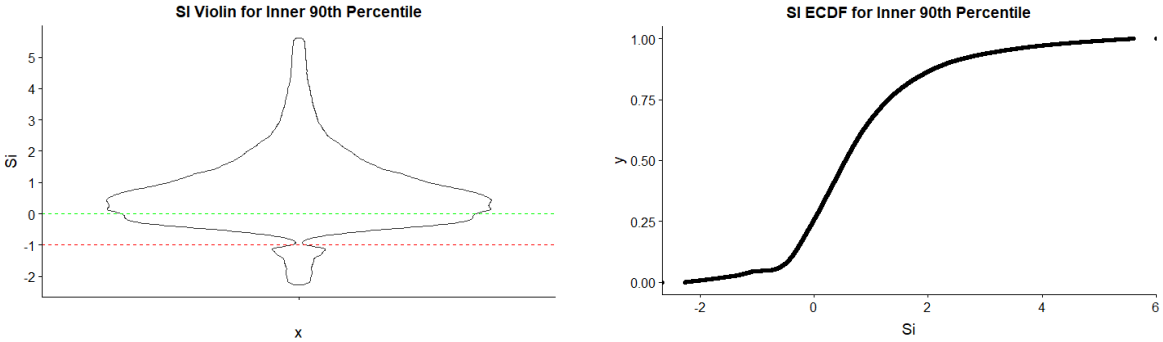
Below is a histogram of SI with outliers removed.



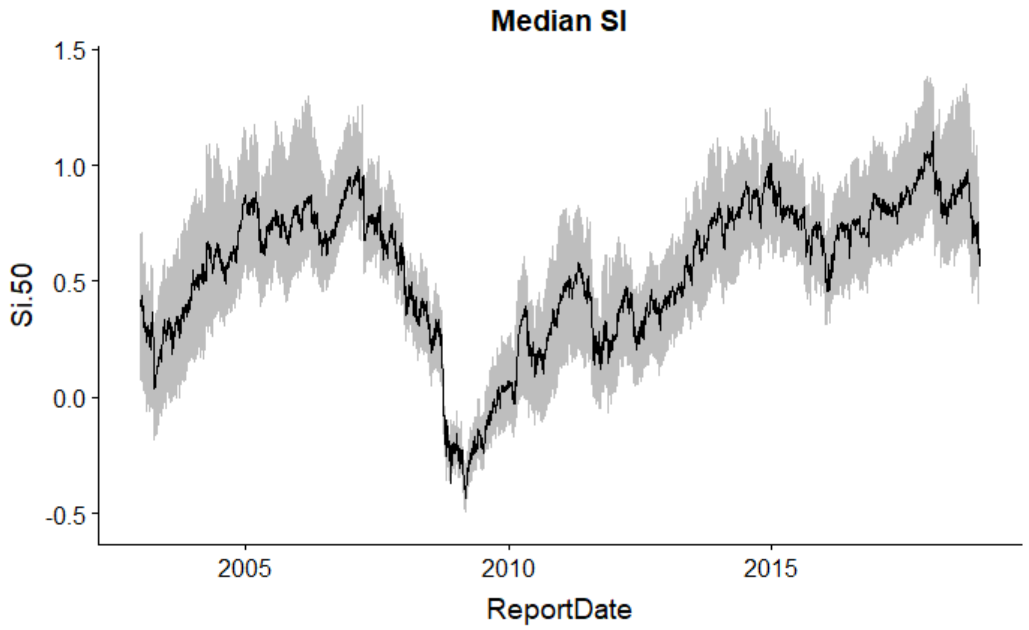
As SI has special cases, the histogram has been divided along those inflection points.



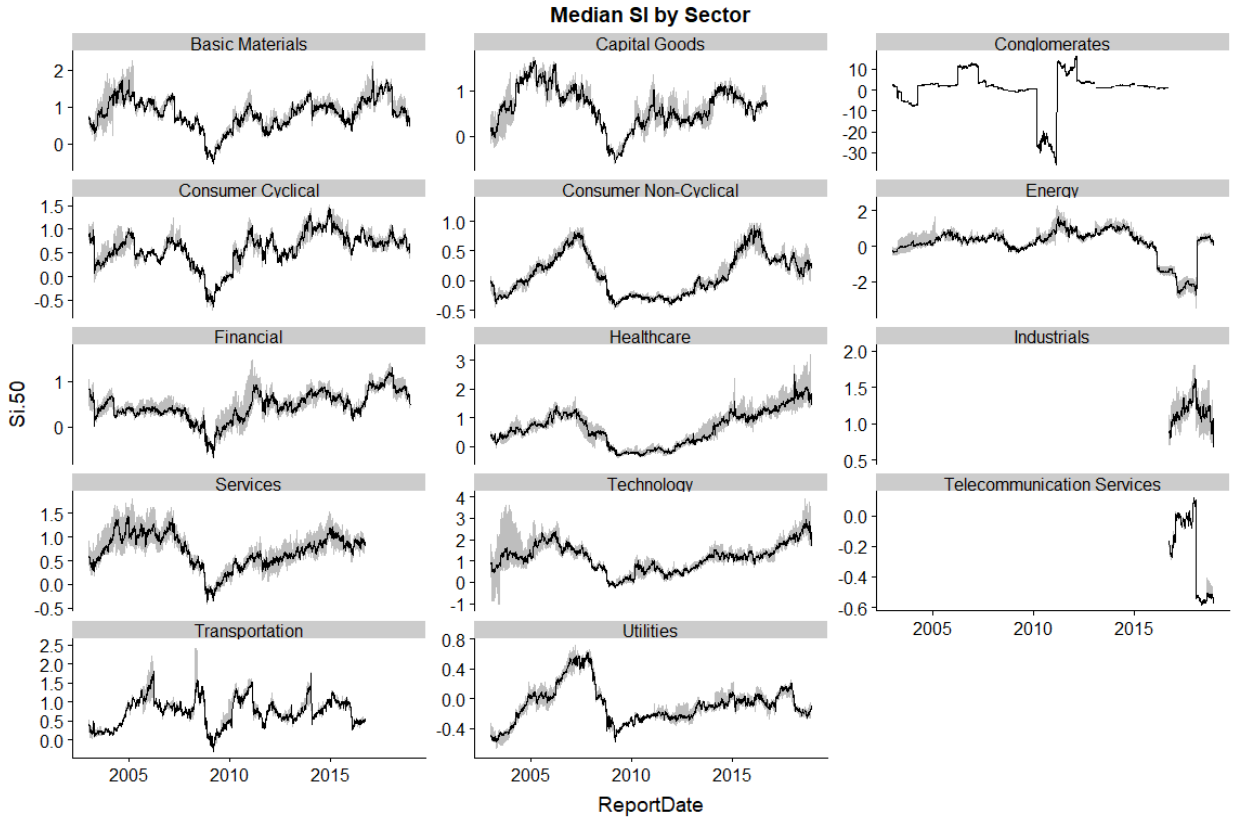
A violin plot of SI is helpful for seeing the distribution behavior. Horizontal lines at 0 and -1 are included to visually indicate the inflection points of the SI function as described above. Outliers have been excluded. To the right, you will find the Empirical Cumulative Distribution Function for SI with outliers excluded.



Below is the SI median over time. The lower part of the grey ribbon is the 40th percentile, while the upper part is the 60th percentile.

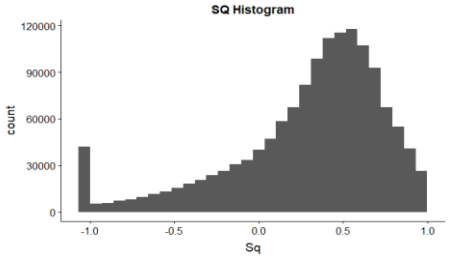

Median SI
1.5
1.0
0.5
0.0
-0.5
Si.50
2005
2010
2015
ReportDate

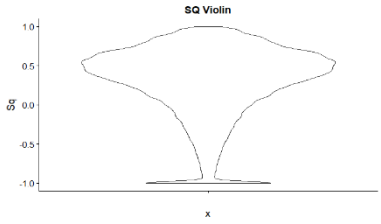
The same data as above has been grouped by sector to see how the various sectors have behaved historically.

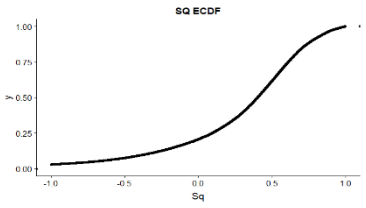


Sentiment Quotient (SQ)

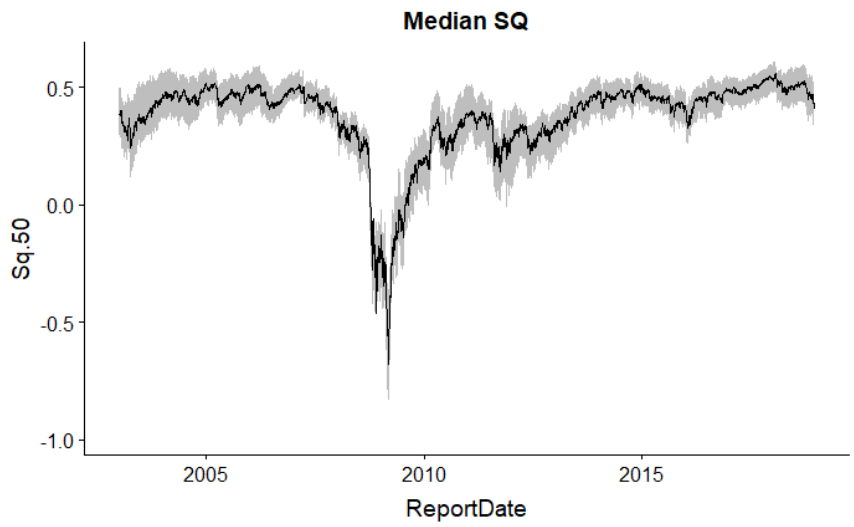
SQ is not normally distributed, so statistics such as mean and standard deviation are not meaningful. To understand the distribution of this indicator, refer to the charts below.







Below is the SQ median over time. The lower part of the grey ribbon is the 40th percentile, while the upper part is the 60th percentile.



Fundamental Analysis

To provide context and veracity for the use of Sentiment, Valspresso's Automated Stock Analyst performs deep financial analysis of publicly traded U.S. companies. This context is important to manage your strategy's risk. Let's say that one of your strategy's holdings is a stock with a high expected earnings growth. If that company's financial quality is poor, it is less likely to achieve or sustain that growth and therefore should be considered riskier. In that case, additional risk mitigation measures would need to be employed to achieve investment objectives.

Our system automatically assesses profitability, solvency, and management by inspecting each public company's financial statements and press releases filed with the Securities and Exchange Commission (SEC) and classifies the quality of companies' financials as High (H), Medium (M), or Low (L).

The concept of "Simplexity" underlies our approach to fundamental analysis. That is, the expert rules that drive our analysis must be: 1) transparent, 2) simple enough for both individual and institutional investors to understand, and 3) rigorous and capable of handling the complexity of automated investment decision making.

Our assessment of the health of companies begins with automated fundamental analysis using Valspresso's proprietary automated analyst. On a daily basis, the software analyzes the financial statements of publicly-traded U.S. companies based upon 3 simple but fundamental questions:

1. Is the company profitable from its core operations?
2. Can the company pay its bills from cash on hand?
3. Is the company structured to reward investors?

Each of the above questions is answered daily by programmatically inspecting each public company's financial statements filed with the Securities and Exchange Commissions (SEC). These include filings such as 10-K, 10-Q, & 8-K. Financial statements tell a complicated and nuanced story, which is often missed when simply looking at the top and bottom lines. Valspresso's Automated Analyst looks deeply at related information on the financial statements to cross-check those high-level values to compose a holistic understanding of the health of the company. The factors of financial health underpin the long-term success of any business. Regardless of the size of companies or the industry sector in which they operate, those health factors are relevant. The automated assessments are applied uniformly to all companies in all sectors and across all market conditions. Valspresso covers all publicly traded U.S. companies and assesses their financial health every day.

Question 1 inspects values such as net income and cash flow. If those values indicate the company is profitable and solvent then question 1 is considered "passed," otherwise it is considered "failed."

Question 2 inspects values such as assets and liabilities. If those values indicate the company has sufficient liquidity then question 2 is considered "passed," otherwise it is considered "failed."

Question 3 inspects values such as equity, net income, cash flow, and assets. If those values indicate sufficient return on equity then question 3 is considered "passed," otherwise it is considered "failed."

Using the pass/fail status to those questions as input on a daily basis, the software classifies each company at various points in time as:

- "Green" or "**High** Quality" (passed all three questions)
- "Yellow" or "**Medium** Quality" (failed one question)
- "Red" or "**Low** Quality" (failed two or more questions)

Assessing the quality and velocity of change in companies' GAAP EPS plays an important role in our classification system's persistent alpha-generation capabilities. The EPS Momentum Classification (EC) field classifies each company at points in time as Fulfillers (F), Sleepers(S) or Neither (X). A company classified as Optimistic withand its EPS growth rate meeting SI projected expectation is classified as Fulfiller. A company classified as Pessimistic with its EPS growth rate exceeding SI projected expectation is classified as Sleeper. A company that is neither Fulfiller nor Sleeper is classified as Neither (X).

Investment Philosophy

We believe that price sentiment analysis paired with deep fundamental analysis is a powerful tool for predicting future relative performance and risk. Each classification behaves differently depending upon market conditions. Behaviors are probabilistic, which means that given a stock's price sentiment, fundamental classification, and market conditions, we can measure the probability of outperforming or underperforming the relevant benchmark. Using those probabilities, portfolio managers can build strategies designed to deliver Alpha with lower Beta.

The goal of any active strategy is to outperform its passive benchmark. From a probabilistic point of view, the goal is to beat the passive benchmark more than 50% of the time. The expectation is that over short periods of time, a successful strategy should outperform only slightly better than 50% of the time, but as the time horizon increases, that probability should increase. This makes sense if we think about this using a gambling analogy. Casinos are profitable because the probabilities of winning a game are slightly in their favor. Let's say that a casino's probability of winning is 51%. This means that they lose money on 49% of the games played. Because many games are played during the course of a day, there is a high probability that at the end of the day the casino will be profitable, which translates into increasingly higher probabilities that they will be profitable for the month, quarter, year, and so on.

Over the short-run, we believe that our classifications have predictive power, given that we know the current market conditions over the past X trading days; i.e. the best classification for any given day depends upon market conditions. A strategy that dynamically moves between classifications depending on market conditions should do well in the short-term and long-term.

If instead of dynamically moving between classifications, one wanted to invest in a single classification, we believe that healthy, growing, pessimistic companies will deliver the best combination of high Alpha and low Beta.

Testable Hypothesis – Short-Term Performance

Depending on market conditions over the past X trading days, we expect stocks in each classification to have a statistically significant probability of outperforming or underperforming the relevant benchmark over the next Y trading days.

In this document, we test this hypothesis using X=30 and Y=30. We will use a few different definitions for "market conditions." Results are shown in the next section. Backtesting – Long-Term Performance and Risk

Over any 3-year rolling period, strategies that hold companies that are classified as growing (EPS increasing) and are fundamentally healthy, but are priced Pessimistically (SI < 0) by the market, tend to outperform the market and other classifications. This classification is abbreviated as HPS. Backtesting results are shown in a later section.

Testing Short-Term Behavioral Characteristics

Using the indicators described earlier, one can create different classifications to be used in building strategy holdings. In this section, we define some simple classifications and show how each classification behaves in terms of risk and performance.

Classifications

Optimistic – Companies with SI > 0 and SI < 4

Pessimistic – Companies with SI > -1 and SI < 0

Irrationally Exuberant – Companies with SI > 4

HOF – Companies with fundamental classification of High (H), sentiment of Optimistic (O), and Fulfiller (F). A Fulfiller is an Optimistic company whose EPS growth rate is meeting SI projected expectation.

HPS – Companies with fundamental classification of High (H), sentiment of Pessimistic (P), and Sleeper (S). A Sleeper is a Pessimistic company whose EPS growth rate is exceeding SI projected expectation.

Behavioral Characteristics

The behavior of each classification is analyzed to understand risk and performance. While backtesting can be a useful tool for understanding risk and performance, it can obfuscate the underlying behavioral characteristics of an indicator or classification. Backtesting reporting primarily relies on performance metrics that generally have significance when applied to return series of at least 36 months. In the next section, we'll cover our backtesting methodology. However, in this section, we apply a more straightforward statistical analysis in order to demonstrate the predictive nature and power of our classifications over the short-term. Once empowered with this information, you can then use it to build your own strategies.

Methodology for Analysis

To understand risk and performance, we need to be able to analyze companies on a per-day basis. Because the stock market fluctuates with a great deal of noise on a daily basis, we cannot use the magnitude of daily returns as a basis for comparison. We need to scale daily returns to relatively stable metrics, regardless of potentially dramatic daily swings.

Percentile Rank (Peer Ranking)

We rank all companies in the S&P 500 on a daily basis by their leading (future) 30-trading-day return. This provides us with a basis for peer ranking. Peer ranking is calculated every day. Those ranks are converted to percentiles. The percentile rank becomes our unit of analysis for assessing risk and performance. In theory, the scale is from 0 to 1 with a median of 0.5. In reality, because there are approximately 500 companies in the S&P 500, the range is approximately 0.002 to 1 with an observed median of approximately 0.50129. For simplicity, we refer to the Null Hypothesis

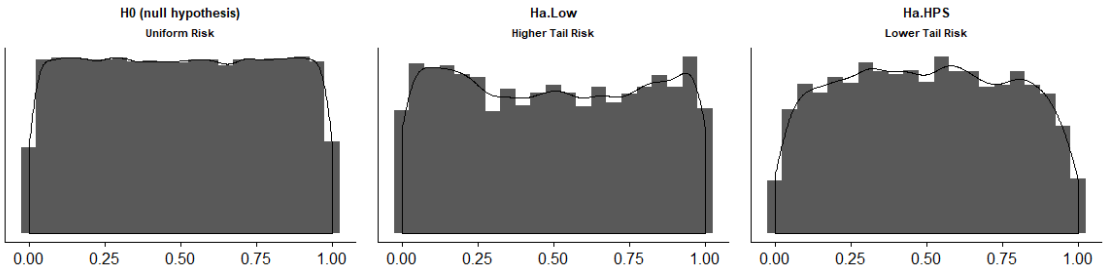
median as 0.5 on reports, but in our analysis code, we always use our observed median of 0.50129 for statistical testing.

Due to the ranking nature of this metric, the distribution will naturally be uniform. Our Null Hypothesis (H_0) is that companies will follow this uniform distribution with a median at 0.5. As we test an Alternative Hypothesis (H_a) we will test for significant deviation from uniform distribution and/or median of 0.5. A significant deviation above 0.5 would indicate that the test group is outperforming its peers (the other components of the S&P 500).

Assessing Risk

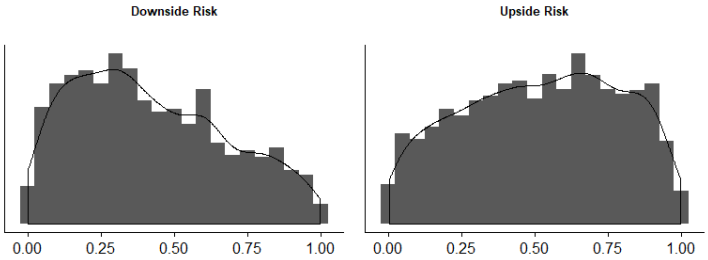
Since the null hypothesis is a uniform distribution, there is an equal probability that a company will be ranked anywhere from 0 to 1. This means there is an equal "risk" that a company will underperform (downside risk) or over-perform (upside risk).

A non-uniform distribution implies a change in the risk profile. The histograms below demonstrate the null hypothesis' uniform distribution as well as Alternative Hypotheses of Low viability and HPS classification. The Low viability histogram is U-shaped with higher density in the tails. Low viability companies therefore have a higher downside and upside risk at the tails of the distribution. We will also call this "tail risk." Low viability companies have higher tail risk. The HPS histogram exhibits an "inverted U" shape which means lower density in the tails. HPS companies have lower tail risk.



To determine if a distribution is uniform, we apply the statistical test known as the Kolmogorov-Smirnov test (ks.test) with p-value < 0.05. A p-value < 0.05 indicates that there is a strong case that the distribution is NOT uniform.

Distributions can also be skewed to one side or the other, which would indicate a higher probability of either downside or upside risk.



Assessing Performance

Company Day

To assess performance of our classifications, we test the median and its statistical significance of deviation from the 0.5. A significant deviation above 0.5 indicates that the test group is outperforming its peers (the other components of the S&P 500). To estimate the median and its significance, we primarily use the Wilcoxon signed-rank test (wilcox.test). A p-value < 0.05 indicates that population median is NOT 0.5. This test is applied to the total sample (of a classification), a sample by year, and a sample by market condition (described below). This metric is used to answer the question, **"If I know today's classification of a company, what is the risk and performance probability distribution for the next 30 trading days?."** This unit of analysis is a **Company Day**, meaning that each data point (observation) is a company on a particular day.

Holding Day

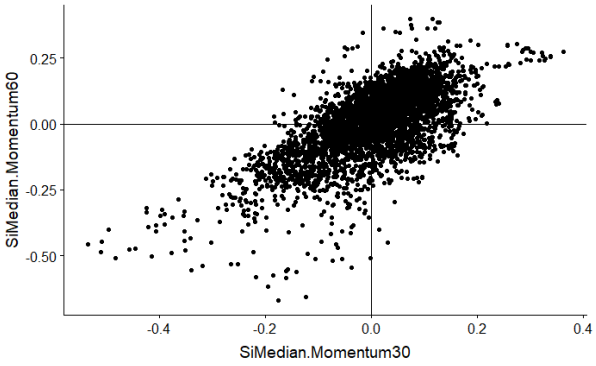
We also measure whether a classification outperformed its peers for a given 30-trading-day period. We aggregate those periods to determine what percent of the time that classification outperformed peers.

Outperformance is measured by calculating the median percent rank of a classification for a given day (first day of 30-trading-day period). If that median percent rank is above a particular threshold majority (e.g. 0.51 or 51%) then we consider that a "beat." We then aggregate the beats to determine the percentage of days where the majority of companies outperformed peers. This metric is used to answer the question, **"If today I were to buy or hold companies in a given classification, what is the probability of that set of holdings outperforming its peers over the next 30 trading days?"** This unit of analysis is a **Holding Day**, meaning that each data point (observation) represents a set of holdings on a particular day. With that unit of analysis, we can report the relative performance of a set of holdings based upon classification.

Market Conditions

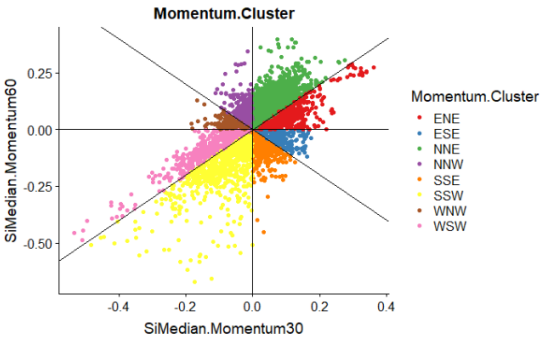
As you will see in the results later in this document, each classification behaves differently across time. This is to be expected, as conditions in the market change over time. If we simply look at behavior by year, we get a glimpse into the behavioral differences, but changes in market conditions do not align nicely with the calendar year. We need a way to label market conditions on a daily basis.

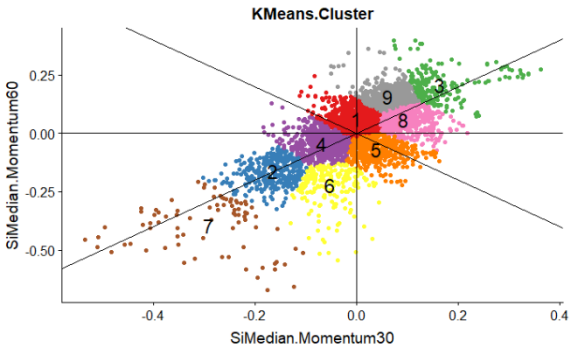
A simple way to classify market conditions is to look at Median SI for the market. A slightly more powerful and predictive method is to measure the momentum of the Median SI for the market (SiMedian.Momentum). In this document, we define market conditions by combining lagging (past) 30-trading-day momentum and lagging 60-trading-day momentum. These are labeled as SiMedian.Momentum30 and SiMedian.Momentum60, respectively. The observed points from 2003 to 2018 are shown below.



These points can be divided into different market conditions. Each subdivision is called a “cluster.” For demonstration purposes, we show two simple methodologies for clustering market conditions.

First, we cluster using compass directions. We subdivided the space into eight different regions, as shown below. Names match those commonly used in compass directions. We call this Momentum.Cluster. The second method is to use the AI machine learning algorithm, k-means clustering to group points based upon their average distance to each other. Nine clusters are created. This method is called Kmeans.Cluster. Both are shown below.





These clustering methods may not be optimal and are not meant to be recommendations, but rather, simple examples to demonstrate possibilities for your own strategies.

Results for “Company Days”

This section provides the statistical tests used to answer the question, **“If I know today’s classification of a company, what is the risk and performance probability distribution for the next 30 trading days?”** The unit of analysis is a **Company Day**, meaning that each data point (observation) is a company on a particular day.

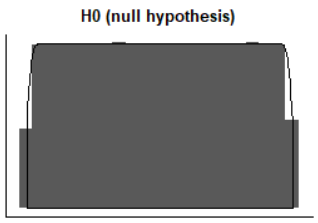
With this unit of analysis, we can test the distribution and median. Because returns are converted to percent ranking, the distribution is uniform and the median is 0.5. Any deviation from uniformity would imply higher or lower tail risk, while deviation from median of 0.5 would imply underperformance or over-performance relative to peers (components of the S&P 500). More details are provided in the prior section.

Null Hypothesis

Here are the results for the Null Hypothesis, to confirm that it is indeed uniform with median of 0.5.

Total

	test	p-values	conclusion	estimate
1	ks.test	0.92884	Distribution is uniform	NA
2	wilcox.test	0.99857	Median is 0.5	0.5012943



By Year

Tests by year also confirm that the Null Hypothesis is consistently uniform with median of 0.5. (Charts not included)

By Market Condition

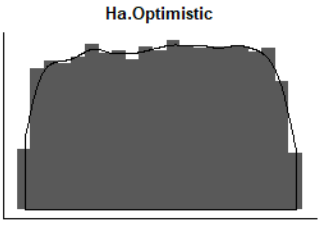
Tests by market conditions also confirm that the Null Hypothesis is consistently uniform with median of 0.5. (Charts not included)

Optimistic

Total

In aggregate, this classification is uniform with median of 0.5. It is possible that under certain market conditions the distribution or median may deviate. See below.

	test	p-values	conclusion	estimate
1	ks.test	0.12624	Distribution is uniform	NA
2	wilcox.test	0.64419	Median is 0.5	0.5026198



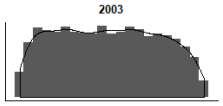
By Year

Tests across years demonstrate occasional deviation from uniformity and occasional deviation from median of 0.5. Results are below. There is not a strong case that this classification, by itself, has much predictive power.

Ha.Optimistic

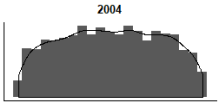
2003

	test	p-values	conclusion	estimate
1	ks.test	0.23457	Distribution is uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.4798167



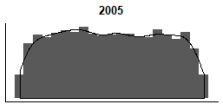
2004

	test	p-values	conclusion	estimate
1	ks.test	0.83393	Distribution is uniform	NA
2	wilcox.test	0.27393	Median is 0.5	0.50566



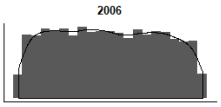
2005

	test	p-values	conclusion	estimate
1	ks.test	0.71489	Distribution is uniform	NA
2	wilcox.test	0.20588	Median is 0.5	0.4960407



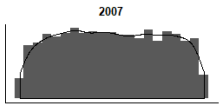
2006

	test	p-values	conclusion	estimate
1	ks.test	0.79248	Distribution is uniform	NA
2	wilcox.test	0.01760	Median is NOT 0.5	0.4915278



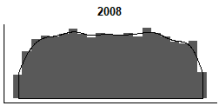
2007

	test	p-values	conclusion	estimate
1	ks.test	0.48447	Distribution is uniform	NA
2	wilcox.test	0.62617	Median is 0.5	0.503211



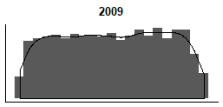
2008

	test	p-values	conclusion	estimate
1	ks.test	0.38283	Distribution is uniform	NA
2	wilcox.test	0.89280	Median is 0.5	0.5017895



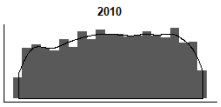
2009

	test	p-values	conclusion	estimate
1	ks.test	0.29414	Distribution is uniform	NA
2	wilcox.test	0.64347	Median is 0.5	0.5032179



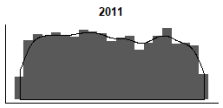
2010

	test	p-values	conclusion	estimate
1	ks.test	0.19788	Distribution is uniform	NA
2	wilcox.test	0.00003	Median is NOT 0.5	0.5184969



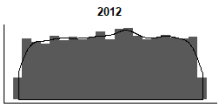
2011

	test	p-values	conclusion	estimate
1	ks.test	0.39254	Distribution is uniform	NA
2	wilcox.test	0.01581	Median is NOT 0.5	0.4914784



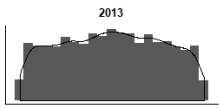
2012

	test	p-values	conclusion	estimate
1	ks.test	0.50097	Distribution is uniform	NA
2	wilcox.test	0.41786	Median is 0.5	0.5045448



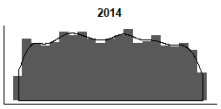
2013

	test	p-values	conclusion	estimate
1	ks.test	0.84982	Distribution is uniform	NA
2	wilcox.test	0.64370	Median is 0.5	0.4993453



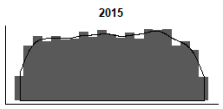
2014

	test	p-values	conclusion	estimate
1	ks.test	0.29290	Distribution is uniform	NA
2	wilcox.test	0.04878	Median is NOT 0.5	0.493318



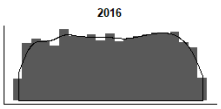
2015

	test	p-values	conclusion	estimate
1	ks.test	0.86738	Distribution is uniform	NA
2	wilcox.test	0.60143	Median is 0.5	0.4992263



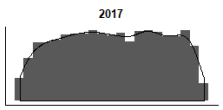
2016

	test	p-values	conclusion	estimate
1	ks.test	0.59632	Distribution is uniform	NA
2	wilcox.test	0.75709	Median is 0.5	0.5025627



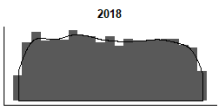
2017

	test	p-values	conclusion	estimate
1	ks.test	0.55169	Distribution is uniform	NA
2	wilcox.test	0.04568	Median is NOT 0.5	0.5095944



2018

	test	p-values	conclusion	estimate
1	ks.test	0.34684	Distribution is uniform	NA
2	wilcox.test	0.04460	Median is NOT 0.5	0.4930651



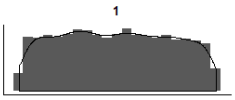
By Market Condition

Tests across market conditions demonstrate occasional deviation from uniformity and occasional deviation from median of 0.5. Results are below. There is not a strong case that Optimistic, by itself, has much predictive power.

Ha.Optimistic by KMeans.Cluster

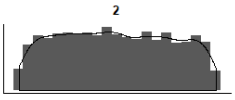
	test	p-values	conclusion	estimate
1	ks.test	0.07776	Distribution is uniform	NA
2	wilcox.test	0.08590	Median is 0.5	0.4943133

1



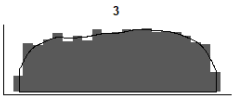
	test	p-values	conclusion	estimate
1	ks.test	0.09014	Distribution is uniform	NA
2	wilcox.test	0.08992	Median is 0.5	0.4943933

2



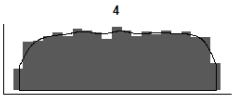
	test	p-values	conclusion	estimate
1	ks.test	0.01176	Distribution is NOT uniform	NA
2	wilcox.test	0.04500	Median is NOT 0.5	0.5094242

3



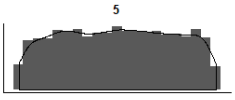
	test	p-values	conclusion	estimate
1	ks.test	0.2240	Distribution is uniform	NA
2	wilcox.test	0.1491	Median is 0.5	0.5071968

4



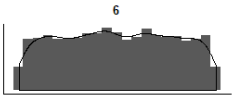
	test	p-values	conclusion	estimate
1	ks.test	0.62237	Distribution is uniform	NA
2	wilcox.test	0.63526	Median is 0.5	0.5032181

5



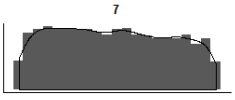
	test	p-values	conclusion	estimate
1	ks.test	0.53974	Distribution is uniform	NA
2	wilcox.test	0.83396	Median is 0.5	0.5004356

6



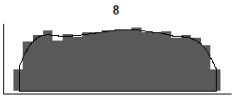
	test	p-values	conclusion	estimate
1	ks.test	0.00031	Distribution is NOT uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.481734

7



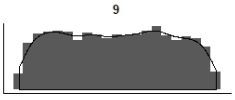
	test	p-values	conclusion	estimate
1	ks.test	0.07607	Distribution is uniform	NA
2	wilcox.test	0.43682	Median is 0.5	0.4981326

8



	test	p-values	conclusion	estimate
1	ks.test	0.14109	Distribution is uniform	NA
2	wilcox.test	0.12809	Median is 0.5	0.4950967

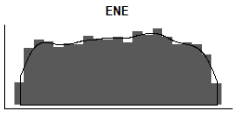
9



Ha.Optimistic by Momentum.Cluster

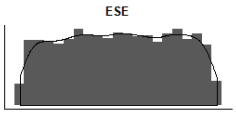
	test	p-values	conclusion	estimate
1	ks.test	0.14331	Distribution is uniform	NA
2	wilcox.test	0.78265	Median is 0.5	0.5001773

ENE



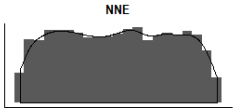
	test	p-values	conclusion	estimate
1	ks.test	0.43885	Distribution is uniform	NA
2	wilcox.test	0.38813	Median is 0.5	0.5048459

ESE



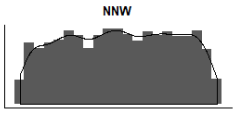
	test	p-values	conclusion	estimate
1	ks.test	0.10924	Distribution is uniform	NA
2	wilcox.test	0.10060	Median is 0.5	0.4946174

NNE



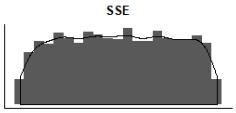
	test	p-values	conclusion	estimate
1	ks.test	0.10238	Distribution is uniform	NA
2	wilcox.test	0.13636	Median is 0.5	0.5073808

NNW



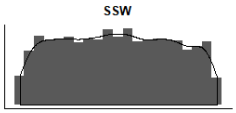
	test	p-values	conclusion	estimate
1	ks.test	0.22364	Distribution is uniform	NA
2	wilcox.test	0.35931	Median is 0.5	0.5050189

SSE



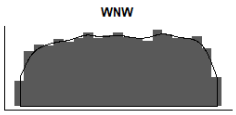
	test	p-values	conclusion	estimate
1	ks.test	0.16424	Distribution is uniform	NA
2	wilcox.test	0.22960	Median is 0.5	0.4963922

SSW



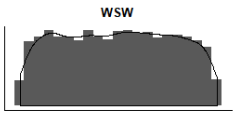
	test	p-values	conclusion	estimate
1	ks.test	0.05597	Distribution is uniform	NA
2	wilcox.test	0.07416	Median is 0.5	0.508605

WNW



	test	p-values	conclusion	estimate
1	ks.test	0.10584	Distribution is uniform	NA
2	wilcox.test	0.34327	Median is 0.5	0.4974572

WSW

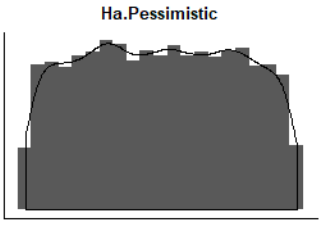


Pessimistic

Total

In aggregate, this classification is uniform with median of 0.5. It is possible that under certain market conditions the distribution or median may deviate. See below.

	test	p-values	conclusion	estimate
1	ks.test	0.10728	Distribution is uniform	NA
2	wilcox.test	0.27909	Median is 0.5	0.4981599



By Year

Tests across years demonstrate some deviation from uniformity and median of 0.5. Results are below. This implies that under those market conditions, there is some predictive power.

Ha.Pessimistic

2003

	test	p-values	conclusion	estimate
1	ks.test	0.29656	Distribution is uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.4696611

2004

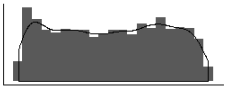
	test	p-values	conclusion	estimate
1	ks.test	0.00866	Distribution is NOT uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.540029

2005

	test	p-values	conclusion	estimate
1	ks.test	0.00114	Distribution is NOT uniform	NA
2	wilcox.test	0.00050	Median is NOT 0.5	0.4875394

2006

	test	p-values	conclusion	estimate
1	ks.test	0.27702	Distribution is uniform	NA
2	wilcox.test	0.00041	Median is NOT 0.5	0.4866932



2007

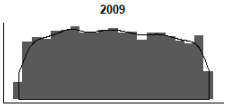
	test	p-values	conclusion	estimate
1	ks.test	0.00213	Distribution is NOT uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.4570673

2008

	test	p-values	conclusion	estimate
1	ks.test	0.38874	Distribution is uniform	NA
2	wilcox.test	0.60250	Median is 0.5	0.5033988

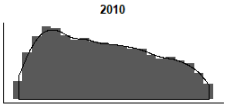
2009

	test	p-values	conclusion	estimate
1	ks.test	0.24756	Distribution is uniform	NA
2	wilcox.test	0.80754	Median is 0.5	0.5002925



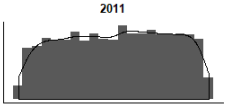
2010

	test	p-values	conclusion	estimate
1	ks.test	0	Distribution is NOT uniform	NA
2	wilcox.test	0	Median is NOT 0.5	0.4438165



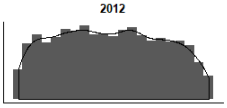
2011

	test	p-values	conclusion	estimate
1	ks.test	0.30377	Distribution is uniform	NA
2	wilcox.test	0.00033	Median is NOT 0.5	0.5158861



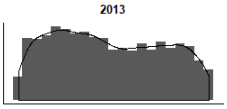
2012

	test	p-values	conclusion	estimate
1	ks.test	0.00213	Distribution is NOT uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.4816585



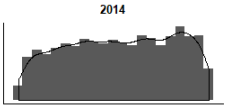
2013

	test	p-values	conclusion	estimate
1	ks.test	0.0145	Distribution is NOT uniform	NA
2	wilcox.test	0.0000	Median is NOT 0.5	0.474771



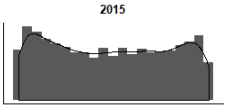
2014

	test	p-values	conclusion	estimate
1	ks.test	8e-05	Distribution is NOT uniform	NA
2	wilcox.test	0e+00	Median is NOT 0.5	0.5347255



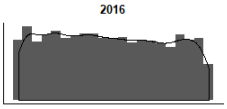
2015

	test	p-values	conclusion	estimate
1	ks.test	0.83394	Distribution is uniform	NA
2	wilcox.test	0.00004	Median is NOT 0.5	0.4846377



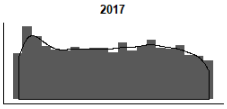
2016

	test	p-values	conclusion	estimate
1	ks.test	0.78446	Distribution is uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.4800272



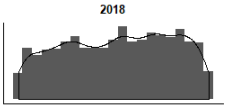
2017

	test	p-values	conclusion	estimate
1	ks.test	0.46947	Distribution is uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.4804021



2018

	test	p-values	conclusion	estimate
1	ks.test	0.54617	Distribution is uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.5224859



By Market Condition

Tests across market conditions demonstrate some deviation from uniformity and median of 0.5. Results are below. This implies that under those market conditions, there is some predictive power.

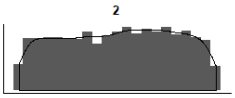
Ha.Pessimistic by KMeans.Cluster

	test	p-values	conclusion	estimate
1	ks.test	0.05074	Distribution is uniform	NA
2	wilcox.test	0.01170	Median is NOT 0.5	0.4909303

1

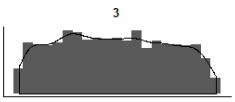
	test	p-values	conclusion	estimate
1	ks.test	0.01275	Distribution is NOT uniform	NA
2	wilcox.test	0.11556	Median is 0.5	0.5078119

2



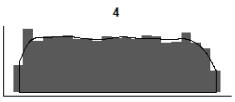
	test	p-values	conclusion	estimate
1	ks.test	3e-04	Distribution is NOT uniform	NA
2	wilcox.test	0e+00	Median is NOT 0.5	0.4807929

3



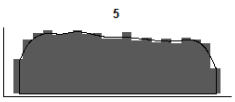
	test	p-values	conclusion	estimate
1	ks.test	0.07772	Distribution is uniform	NA
2	wilcox.test	0.00094	Median is NOT 0.5	0.4876588

4



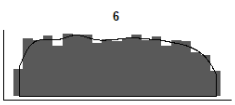
	test	p-values	conclusion	estimate
1	ks.test	0.02838	Distribution is NOT uniform	NA
2	wilcox.test	0.00003	Median is NOT 0.5	0.4840577

5



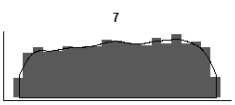
	test	p-values	conclusion	estimate
1	ks.test	0.00447	Distribution is NOT uniform	NA
2	wilcox.test	0.00006	Median is NOT 0.5	0.4847353

6



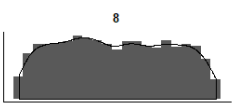
	test	p-values	conclusion	estimate
1	ks.test	0.00167	Distribution is NOT uniform	NA
2	wilcox.test	0.00038	Median is NOT 0.5	0.5158545

7



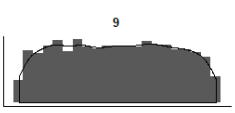
	test	p-values	conclusion	estimate
1	ks.test	0.00756	Distribution is NOT uniform	NA
2	wilcox.test	0.01592	Median is NOT 0.5	0.4914742

8



	test	p-values	conclusion	estimate
1	ks.test	0.18274	Distribution is uniform	NA
2	wilcox.test	0.29917	Median is 0.5	0.4970509

9



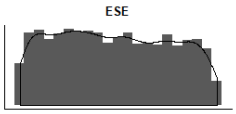
Ha.Pessimistic by Momentum.Cluster

	test	p-values	conclusion	estimate
1	ks.test	2e-05	Distribution is NOT uniform	NA
2	wilcox.test	0e+00	Median is NOT 0.5	0.4803264

ENE

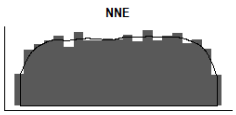
	test	p-values	conclusion	estimate
1	ks.test	0.00208	Distribution is NOT uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.4773709

ESE



	test	p-values	conclusion	estimate
1	ks.test	0.52639	Distribution is uniform	NA
2	wilcox.test	0.54351	Median is 0.5	0.5037857

NNE

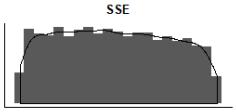


	test	p-values	conclusion	estimate
1	ks.test	0.17061	Distribution is uniform	NA
2	wilcox.test	0.64611	Median is 0.5	0.5031739

NNW

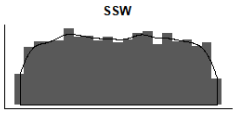
	test	p-values	conclusion	estimate
1	ks.test	0.04562	Distribution is NOT uniform	NA
2	wilcox.test	0.00001	Median is NOT 0.5	0.4825747

SSE



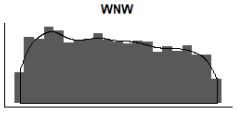
	test	p-values	conclusion	estimate
1	ks.test	0.25209	Distribution is uniform	NA
2	wilcox.test	0.30077	Median is 0.5	0.4970446

SSW



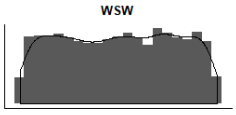
	test	p-values	conclusion	estimate
1	ks.test	0	Distribution is NOT uniform	NA
2	wilcox.test	0	Median is NOT 0.5	0.471134

WNW



	test	p-values	conclusion	estimate
1	ks.test	0.55598	Distribution is uniform	NA
2	wilcox.test	0.94814	Median is 0.5	0.501021

WSW

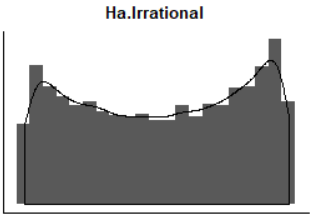


Irrationally Exuberant

Total

In aggregate, this classification demonstrates significant deviation from uniformity and median of 0.5. Results are below. The shape of the histogram implies higher tail risk.

	test	p-values	conclusion	estimate
1	ks.test	0	Distribution is NOT uniform	NA
2	wilcox.test	0	Median is NOT 0.5	0.5167312



By Year

Tests across years demonstrate significant deviation from uniformity and median of 0.5. Results are below. This implies that under those market conditions, there is some predictive power.

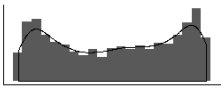
Ha.Irrational

2003

	test	p-values	conclusion	estimate
1	ks.test	0.01893	Distribution is NOT uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.5483013

2004

	test	p-values	conclusion	estimate
1	ks.test	0.04719	Distribution is NOT uniform	NA
2	wilcox.test	0.00597	Median is NOT 0.5	0.5146988



2005

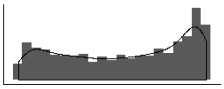
	test	p-values	conclusion	estimate
1	ks.test	0	Distribution is NOT uniform	NA
2	wilcox.test	0	Median is NOT 0.5	0.5497298

2006

	test	p-values	conclusion	estimate
1	ks.test	0.01050	Distribution is NOT uniform	NA
2	wilcox.test	0.30339	Median is 0.5	0.4960116

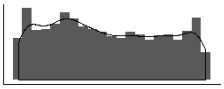
2007

	test	p-values	conclusion	estimate
1	ks.test	0	Distribution is NOT uniform	NA
2	wilcox.test	0	Median is NOT 0.5	0.5648913



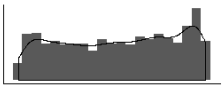
2008

	test	p-values	conclusion	estimate
1	ks.test	0	Distribution is NOT uniform	NA
2	wilcox.test	0	Median is NOT 0.5	0.4717513



2009

	test	p-values	conclusion	estimate
1	ks.test	2e-05	Distribution is NOT uniform	NA
2	wilcox.test	0e+00	Median is NOT 0.5	0.5364479



2010

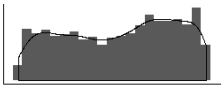
	test	p-values	conclusion	estimate
1	ks.test	6e-05	Distribution is NOT uniform	NA
2	wilcox.test	0e+00	Median is NOT 0.5	0.5428638

2011

	test	p-values	conclusion	estimate
1	ks.test	0.04771	Distribution is NOT uniform	NA
2	wilcox.test	0.42353	Median is 0.5	0.4973323

2012

	test	p-values	conclusion	estimate
1	ks.test	0	Distribution is NOT uniform	NA
2	wilcox.test	0	Median is NOT 0.5	0.5401568



2013

	test	p-values	conclusion	estimate
1	ks.test	0.03930	Distribution is NOT uniform	NA
2	wilcox.test	0.27948	Median is 0.5	0.4958858

2014

	test	p-values	conclusion	estimate
1	ks.test	0.05597	Distribution is uniform	NA
2	wilcox.test	0.47235	Median is 0.5	0.4978269

2015

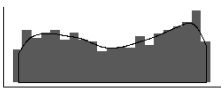
	test	p-values	conclusion	estimate
1	ks.test	0.06231	Distribution is uniform	NA
2	wilcox.test	0.30252	Median is 0.5	0.5062327

2016

	test	p-values	conclusion	estimate
1	ks.test	0.06610	Distribution is uniform	NA
2	wilcox.test	0.35928	Median is 0.5	0.5060978

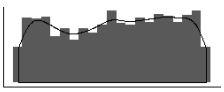
2017

	test	p-values	conclusion	estimate
1	ks.test	0.02812	Distribution is NOT uniform	NA
2	wilcox.test	0.00028	Median is NOT 0.5	0.5206695



2018

	test	p-values	conclusion	estimate
1	ks.test	0.01919	Distribution is NOT uniform	NA
2	wilcox.test	0.01536	Median is NOT 0.5	0.5142934



By Market Condition

Tests across market conditions demonstrate significant deviation from uniformity and median of 0.5. Results are below. This implies that under those market conditions, there is some predictive power.

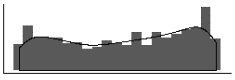
Ha.Irrational by KMeans.Cluster

	test	p-values	conclusion	estimate
1	ks.test	0.00165	Distribution is NOT uniform	NA
2	wilcox.test	0.07869	Median is 0.5	0.5174925

1

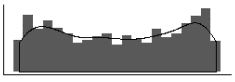
	test	p-values	conclusion	estimate
1	ks.test	0.00000	Distribution is NOT uniform	NA
2	wilcox.test	0.00124	Median is NOT 0.5	0.5317884

2



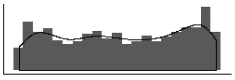
	test	p-values	conclusion	estimate
1	ks.test	0.00086	Distribution is NOT uniform	NA
2	wilcox.test	0.53638	Median is 0.5	0.5068193

3



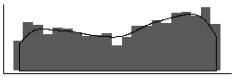
	test	p-values	conclusion	estimate
1	ks.test	0.00016	Distribution is NOT uniform	NA
2	wilcox.test	0.01285	Median is NOT 0.5	0.5238364

4



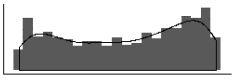
	test	p-values	conclusion	estimate
1	ks.test	0e+00	Distribution is NOT uniform	NA
2	wilcox.test	8e-05	Median is NOT 0.5	0.5390794

5



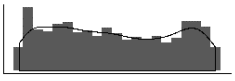
	test	p-values	conclusion	estimate
1	ks.test	0e+00	Distribution is NOT uniform	NA
2	wilcox.test	8e-05	Median is NOT 0.5	0.5383706

6



	test	p-values	conclusion	estimate
1	ks.test	0.08681	Distribution is uniform	NA
2	wilcox.test	0.05081	Median is 0.5	0.4834427

7

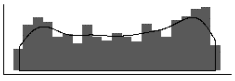


	test	p-values	conclusion	estimate
1	ks.test	0.00002	Distribution is NOT uniform	NA
2	wilcox.test	0.00054	Median is NOT 0.5	0.5344523

8

	test	p-values	conclusion	estimate
1	ks.test	0.00016	Distribution is NOT uniform	NA
2	wilcox.test	0.01391	Median is NOT 0.5	0.5235225

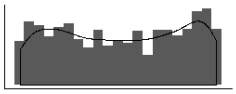
9



Ha.Irrational by Momentum.Cluster

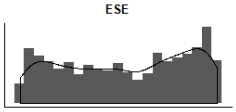
	test	p-values	conclusion	estimate
1	ks.test	0.00033	Distribution is NOT uniform	NA
2	wilcox.test	0.14609	Median is 0.5	0.5144405

ENE



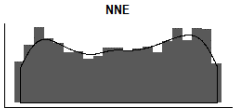
	test	p-values	conclusion	estimate
1	ks.test	0.00001	Distribution is NOT uniform	NA
2	wilcox.test	0.00023	Median is NOT 0.5	0.5351452

ESE



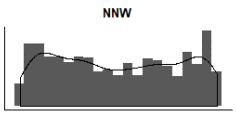
	test	p-values	conclusion	estimate
1	ks.test	0.05898	Distribution is uniform	NA
2	wilcox.test	0.27313	Median is 0.5	0.5113573

NNE



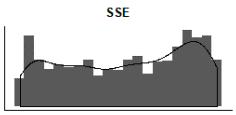
	test	p-values	conclusion	estimate
1	ks.test	0.01364	Distribution is NOT uniform	NA
2	wilcox.test	0.87410	Median is 0.5	0.4999108

NNW



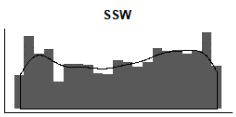
	test	p-values	conclusion	estimate
1	ks.test	0.00000	Distribution is NOT uniform	NA
2	wilcox.test	0.00017	Median is NOT 0.5	0.5372734

SSE



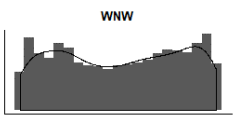
	test	p-values	conclusion	estimate
1	ks.test	0.00063	Distribution is NOT uniform	NA
2	wilcox.test	0.03486	Median is NOT 0.5	0.5206999

SSW



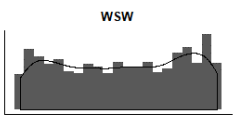
	test	p-values	conclusion	estimate
1	ks.test	0.00688	Distribution is NOT uniform	NA
2	wilcox.test	0.31647	Median is 0.5	0.5102699

WNW



	test	p-values	conclusion	estimate
1	ks.test	0.00065	Distribution is NOT uniform	NA
2	wilcox.test	0.08739	Median is 0.5	0.5168144

WSW



HOF

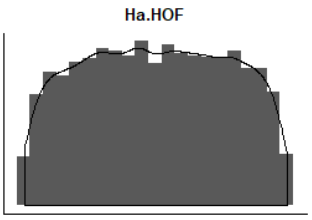
Total

In aggregate, this classification demonstrates some deviation from uniformity, but no deviation from median of 0.5. Results are below. The shape of the histogram implies lower tail risk.

Assessment

Short-Term Risk	Lower risk than benchmark
Short-Term Performance	Same as benchmark

	test	p-values	conclusion	estimate
1	ks.test	0.00028	Distribution is NOT uniform	NA
2	wilcox.test	0.69625	Median is 0.5	0.5024007



By Year

Tests across years demonstrate some deviation from uniformity and median of 0.5. Results are below. This implies that under those market conditions, there is some predictive power.

Assessment

Short-Term Risk	Sometimes lower risk than benchmark
Short-Term Performance	Sometimes different from benchmark

Ha.HOF

2003

	test	p-values	conclusion	estimate
1	ks.test	0.10606	Distribution is uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.4730816

2004

	test	p-values	conclusion	estimate
1	ks.test	0.47775	Distribution is uniform	NA
2	wilcox.test	0.61569	Median is 0.5	0.5026928

2005

	test	p-values	conclusion	estimate
1	ks.test	0.22857	Distribution is uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.48447

2006

	test	p-values	conclusion	estimate
1	ks.test	0.90780	Distribution is uniform	NA
2	wilcox.test	0.00002	Median is NOT 0.5	0.488721

2007

	test	p-values	conclusion	estimate
1	ks.test	0.11925	Distribution is uniform	NA
2	wilcox.test	0.19818	Median is 0.5	0.5049435

2008

	test	p-values	conclusion	estimate
1	ks.test	0.00572	Distribution is NOT uniform	NA
2	wilcox.test	0.01744	Median is NOT 0.5	0.5079783

2009

	test	p-values	conclusion	estimate
1	ks.test	9e-05	Distribution is NOT uniform	NA
2	wilcox.test	0e+00	Median is NOT 0.5	0.4847169

2010

	test	p-values	conclusion	estimate
1	ks.test	0.25859	Distribution is uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.5322909

2011

	test	p-values	conclusion	estimate
1	ks.test	0.05715	Distribution is uniform	NA
2	wilcox.test	0.69181	Median is 0.5	0.5001596

2012

	test	p-values	conclusion	estimate
1	ks.test	0.28338	Distribution is uniform	NA
2	wilcox.test	0.00603	Median is NOT 0.5	0.5091751

2013

	test	p-values	conclusion	estimate
1	ks.test	0.59499	Distribution is uniform	NA
2	wilcox.test	0.83426	Median is 0.5	0.5017974

2014

	test	p-values	conclusion	estimate
1	ks.test	0.06142	Distribution is uniform	NA
2	wilcox.test	0.00059	Median is NOT 0.5	0.4914209

2015

	test	p-values	conclusion	estimate
1	ks.test	0.98752	Distribution is uniform	NA
2	wilcox.test	0.73778	Median is 0.5	0.5024119

2016

	test	p-values	conclusion	estimate
1	ks.test	0.10432	Distribution is uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.4821549

2017

	test	p-values	conclusion	estimate
1	ks.test	0.08692	Distribution is uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.5256635

2018

	test	p-values	conclusion	estimate
1	ks.test	0.79849	Distribution is uniform	NA
2	wilcox.test	0.75933	Median is 0.5	0.5004617

By Market Condition

Tests across market conditions demonstrate some deviation from uniformity and median of 0.5. Results are below. This implies that under those market conditions, there is some predictive power.

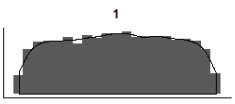
Assessment

Short-Term Risk	Sometimes lower risk than benchmark
Short-Term Performance	Sometimes different from benchmark

Ha.HOF by KMeans.Cluster

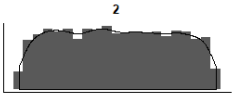
1

	test	p-values	conclusion	estimate
1	ks.test	0.01366	Distribution is NOT uniform	NA
2	wilcox.test	0.43393	Median is 0.5	0.5039737



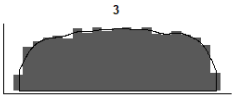
2

	test	p-values	conclusion	estimate
1	ks.test	0.05928	Distribution is uniform	NA
2	wilcox.test	0.36838	Median is 0.5	0.4981918



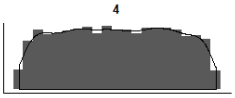
3

	test	p-values	conclusion	estimate
1	ks.test	0.01758	Distribution is NOT uniform	NA
2	wilcox.test	0.12282	Median is 0.5	0.5065408



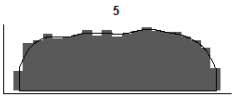
4

	test	p-values	conclusion	estimate
1	ks.test	0.09449	Distribution is uniform	NA
2	wilcox.test	0.52730	Median is 0.5	0.4991344



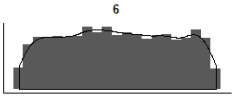
5

	test	p-values	conclusion	estimate
1	ks.test	0.01879	Distribution is NOT uniform	NA
2	wilcox.test	0.55767	Median is 0.5	0.5032901



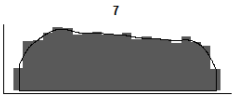
6

	test	p-values	conclusion	estimate
1	ks.test	0.41968	Distribution is uniform	NA
2	wilcox.test	0.63093	Median is 0.5	0.5029474



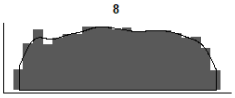
7

	test	p-values	conclusion	estimate
1	ks.test	0.00239	Distribution is NOT uniform	NA
2	wilcox.test	0.00001	Median is NOT 0.5	0.4856745



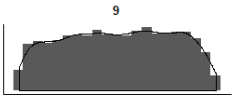
8

	test	p-values	conclusion	estimate
1	ks.test	0.00941	Distribution is NOT uniform	NA
2	wilcox.test	0.58071	Median is 0.5	0.4994142



9

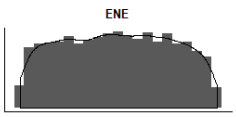
	test	p-values	conclusion	estimate
1	ks.test	0.00429	Distribution is NOT uniform	NA
2	wilcox.test	0.62972	Median is 0.5	0.5029397



Ha.HOF by Momentum.Cluster

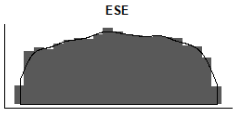
ENE

	test	p-values	conclusion	estimate
1	ks.test	0.00204	Distribution is NOT uniform	NA
2	wilcox.test	0.07552	Median is 0.5	0.495221



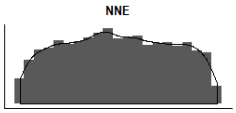
ESE

	test	p-values	conclusion	estimate
1	ks.test	0.00743	Distribution is NOT uniform	NA
2	wilcox.test	0.99685	Median is 0.5	0.5012835



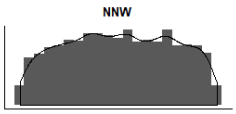
NNE

	test	p-values	conclusion	estimate
1	ks.test	0.00924	Distribution is NOT uniform	NA
2	wilcox.test	0.42122	Median is 0.5	0.4985406



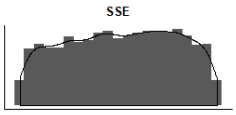
NNW

	test	p-values	conclusion	estimate
1	ks.test	0.00324	Distribution is NOT uniform	NA
2	wilcox.test	0.14581	Median is 0.5	0.5062728



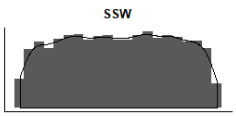
SSE

	test	p-values	conclusion	estimate
1	ks.test	0.00037	Distribution is NOT uniform	NA
2	wilcox.test	0.00099	Median is NOT 0.5	0.5126825



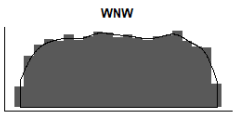
SSW

	test	p-values	conclusion	estimate
1	ks.test	0.15216	Distribution is uniform	NA
2	wilcox.test	0.86080	Median is 0.5	0.5018965



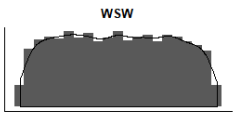
WNW

	test	p-values	conclusion	estimate
1	ks.test	0.01417	Distribution is NOT uniform	NA
2	wilcox.test	0.32081	Median is 0.5	0.5046851



WSW

	test	p-values	conclusion	estimate
1	ks.test	0.06981	Distribution is uniform	NA
2	wilcox.test	0.12804	Median is 0.5	0.4960818



HPS

This means of measuring risk and performance demonstrates that HPS is lower risk (lower tail risk), but it does not demonstrate consistent outperformance in “Total” (regardless of time period). The “By Year” section does demonstrate both lower risk and, in some cases, the ability to predict performance. Later in this document, the backtesting methodology does demonstrate more clearly the long-term predictive power.

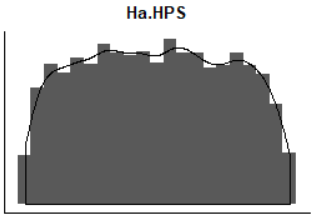
Total

In aggregate, this classification demonstrates some deviation from uniformity, but no deviation from median of 0.5. Results are below. The shape of the histogram implies lower tail risk.

Assessment

Short-Term Risk	Lower risk than benchmark
Short-Term Performance	Same as benchmark

	test	p-values	conclusion	estimate
1	ks.test	0.00059	Distribution is NOT uniform	NA
2	wilcox.test	0.07420	Median is 0.5	0.4961775



By Year

Tests across years demonstrate significant deviation from uniformity and median of 0.5. Results are below. This implies that under those market conditions, there is some predictive power.

Assessment

Short-Term Risk	Sometimes lower risk than benchmark
Short-Term Performance	Sometimes different from benchmark

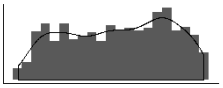
Ha.HPS

2003

	test	p-values	conclusion	estimate
1	ks.test	0.45120	Distribution is uniform	NA
2	wilcox.test	0.90828	Median is 0.5	0.5000074

2004

	test	p-values	conclusion	estimate
1	ks.test	0.00254	Distribution is NOT uniform	NA
2	wilcox.test	0.00007	Median is NOT 0.5	0.5372247

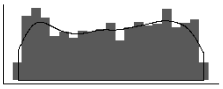


2005

	test	p-values	conclusion	estimate
1	ks.test	0.00302	Distribution is NOT uniform	NA
2	wilcox.test	0.30363	Median is 0.5	0.5105283

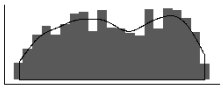
2006

	test	p-values	conclusion	estimate
1	ks.test	0.11609	Distribution is uniform	NA
2	wilcox.test	0.97132	Median is 0.5	0.5013714



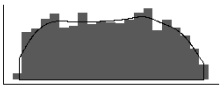
2007

	test	p-values	conclusion	estimate
1	ks.test	0.04934	Distribution is NOT uniform	NA
2	wilcox.test	0.02769	Median is NOT 0.5	0.5214964



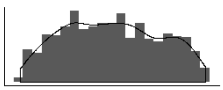
2008

	test	p-values	conclusion	estimate
1	ks.test	0.05510	Distribution is uniform	NA
2	wilcox.test	0.34397	Median is 0.5	0.4929555



2009

	test	p-values	conclusion	estimate
1	ks.test	0.00639	Distribution is NOT uniform	NA
2	wilcox.test	0.83443	Median is 0.5	0.4994175

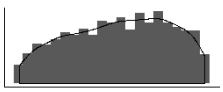


2010

	test	p-values	conclusion	estimate
1	ks.test	0	Distribution is NOT uniform	NA
2	wilcox.test	0	Median is NOT 0.5	0.4209631

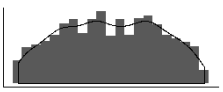
2011

	test	p-values	conclusion	estimate
1	ks.test	0.00034	Distribution is NOT uniform	NA
2	wilcox.test	0.00001	Median is NOT 0.5	0.5424786



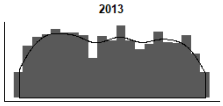
2012

	test	p-values	conclusion	estimate
1	ks.test	0.03129	Distribution is NOT uniform	NA
2	wilcox.test	0.73745	Median is 0.5	0.498256



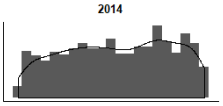
2013

	test	p-values	conclusion	estimate
1	ks.test	0.21862	Distribution is uniform	NA
2	wilcox.test	0.22437	Median is 0.5	0.4900767



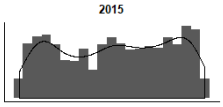
2014

	test	p-values	conclusion	estimate
1	ks.test	0.05520	Distribution is uniform	NA
2	wilcox.test	0.00023	Median is NOT 0.5	0.535739



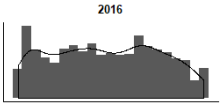
2015

	test	p-values	conclusion	estimate
1	ks.test	0.14080	Distribution is uniform	NA
2	wilcox.test	0.10134	Median is 0.5	0.5160113



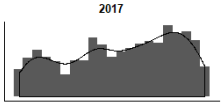
2016

	test	p-values	conclusion	estimate
1	ks.test	0.01120	Distribution is NOT uniform	NA
2	wilcox.test	0.00309	Median is NOT 0.5	0.4728066



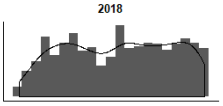
2017

	test	p-values	conclusion	estimate
1	ks.test	0.00201	Distribution is NOT uniform	NA
2	wilcox.test	0.00000	Median is NOT 0.5	0.5531595



2018

	test	p-values	conclusion	estimate
1	ks.test	0.03418	Distribution is NOT uniform	NA
2	wilcox.test	0.00002	Median is NOT 0.5	0.5413412



By Market Condition

Tests across market conditions demonstrate significant deviation from uniformity and median of 0.5. Results are below. This implies that under those market conditions, there is some predictive power.

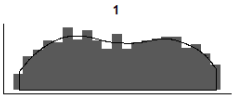
Assessment

Short-Term Risk	Sometimes lower risk than benchmark
Short-Term Performance	Sometimes different from benchmark

Ha.HPS by KMeans.Cluster

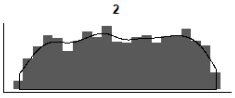
1

	test	p-values	conclusion	estimate
1	ks.test	0.25278	Distribution is uniform	NA
2	wilcox.test	0.78751	Median is 0.5	0.5037366



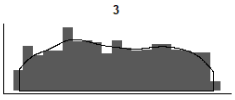
2

	test	p-values	conclusion	estimate
1	ks.test	0.01635	Distribution is NOT uniform	NA
2	wilcox.test	0.06273	Median is 0.5	0.5180383



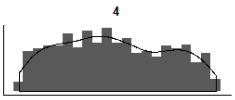
3

	test	p-values	conclusion	estimate
1	ks.test	0.30437	Distribution is uniform	NA
2	wilcox.test	0.05830	Median is 0.5	0.4842491



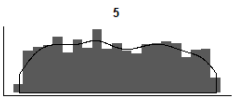
4

	test	p-values	conclusion	estimate
1	ks.test	0.01582	Distribution is NOT uniform	NA
2	wilcox.test	0.02971	Median is NOT 0.5	0.4817731



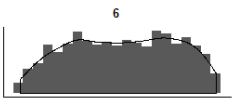
5

	test	p-values	conclusion	estimate
1	ks.test	0.54900	Distribution is uniform	NA
2	wilcox.test	0.49863	Median is 0.5	0.495117



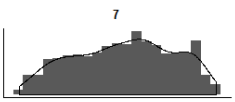
6

	test	p-values	conclusion	estimate
1	ks.test	0.00044	Distribution is NOT uniform	NA
2	wilcox.test	0.00313	Median is NOT 0.5	0.5274931



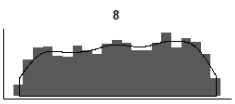
7

	test	p-values	conclusion	estimate
1	ks.test	2e-05	Distribution is NOT uniform	NA
2	wilcox.test	3e-05	Median is NOT 0.5	0.5369511



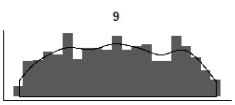
8

	test	p-values	conclusion	estimate
1	ks.test	0.05287	Distribution is uniform	NA
2	wilcox.test	0.01874	Median is NOT 0.5	0.5225722



9

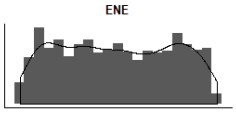
	test	p-values	conclusion	estimate
1	ks.test	0.07012	Distribution is uniform	NA
2	wilcox.test	0.97865	Median is 0.5	0.5011117



Ha.HPS by Momentum.Cluster

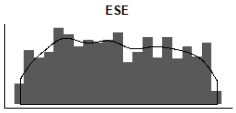
ENE

	test	p-values	conclusion	estimate
1	ks.test	0.71326	Distribution is uniform	NA
2	wilcox.test	0.28677	Median is 0.5	0.4918699



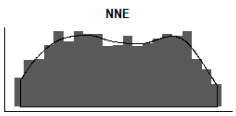
ESE

	test	p-values	conclusion	estimate
1	ks.test	0.24986	Distribution is uniform	NA
2	wilcox.test	0.17890	Median is 0.5	0.4891114



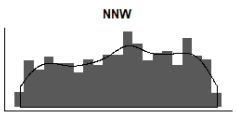
NNE

	test	p-values	conclusion	estimate
1	ks.test	0.09153	Distribution is uniform	NA
2	wilcox.test	0.59697	Median is 0.5	0.496494



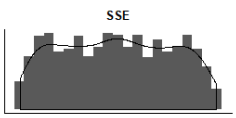
NNW

	test	p-values	conclusion	estimate
1	ks.test	0.00433	Distribution is NOT uniform	NA
2	wilcox.test	0.01317	Median is NOT 0.5	0.5242153



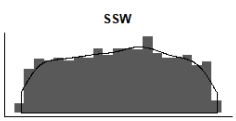
SSE

	test	p-values	conclusion	estimate
1	ks.test	0.25038	Distribution is uniform	NA
2	wilcox.test	0.19544	Median is 0.5	0.4896194



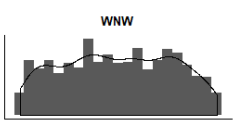
SSW

	test	p-values	conclusion	estimate
1	ks.test	0.16112	Distribution is uniform	NA
2	wilcox.test	0.44912	Median is 0.5	0.5079295



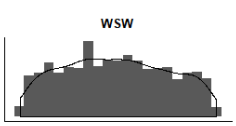
WNW

	test	p-values	conclusion	estimate
1	ks.test	0.08605	Distribution is uniform	NA
2	wilcox.test	0.50526	Median is 0.5	0.4951026



WSW

	test	p-values	conclusion	estimate
1	ks.test	0.03458	Distribution is NOT uniform	NA
2	wilcox.test	0.16660	Median is 0.5	0.4889822

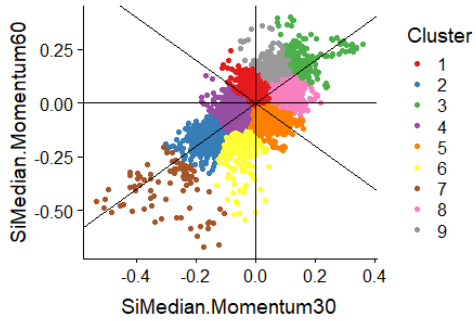


Results for “Holding Days”

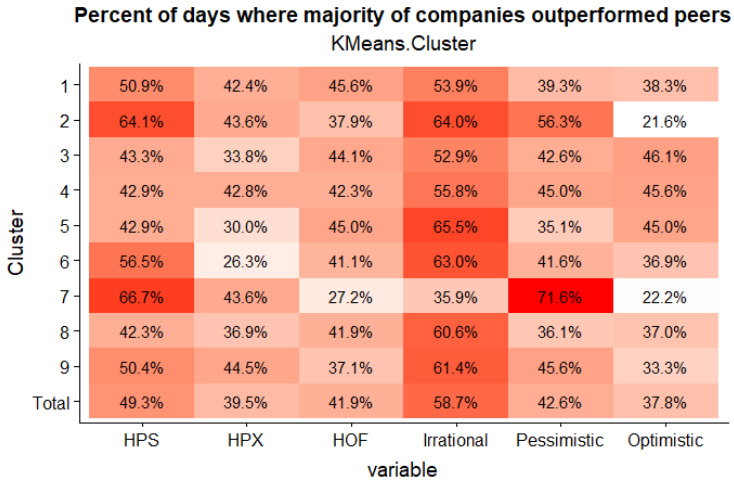
In this section there are tests to measure whether a classification outperformed its peers for a given 30-trading-day period. We aggregate those periods to determine what percentage of the time that classification outperformed peers.

Outperformance is measured by calculating the median percent rank for a classification for a given day (first day of 30-trading-day period). If that median percent rank is above a particular threshold majority (e.g. 0.51 or 51%) then we consider that a “beat.” We then aggregate the beats to determine the percentage of days where the majority of companies outperformed peers. This metric is used to answer the question, “If today I were to buy or hold companies in a given classification, what is the probability of that set of holdings outperforming its peers over the next 30-trading-days?” This unit of analysis is a **Holding Day**, meaning that each data point (observation) represents a set of holdings on a particular day. With that unit of analysis, we can report the relative performance of a set of holdings based upon their classification.

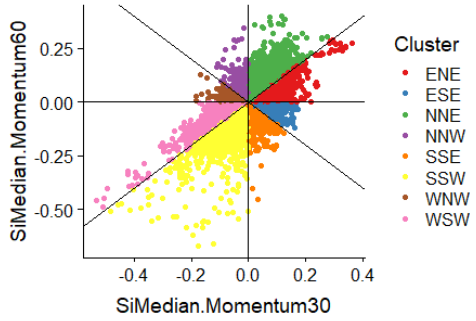
KMeans.Cluster



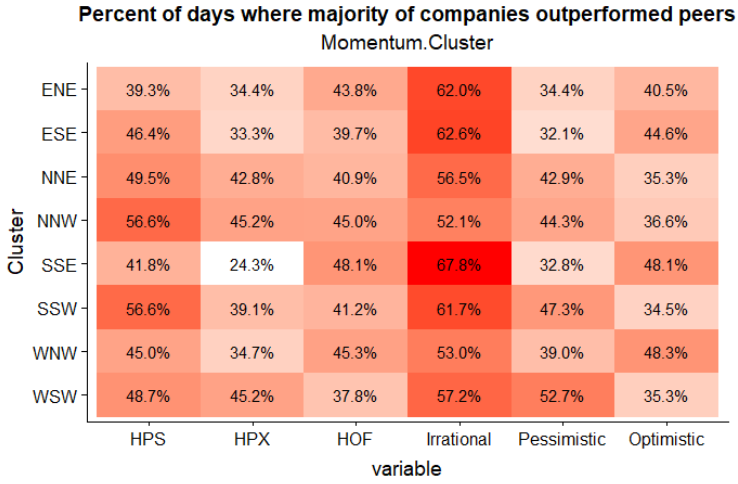
Cluster	TotalDays	Freq
1	903	22.8%
2	343	8.7%
3	204	5.2%
4	596	15.1%
5	467	11.8%
6	214	5.4%
7	81	2.0%
8	570	14.4%
9	579	14.6%



Momentum.Cluster



Cluster	TotalDays	Freq
ENE	491	12.4%
ESE	184	4.6%
NNE	1310	33.1%
NNW	309	7.8%
SSE	287	7.3%
SSW	714	18.0%
WNW	172	4.3%
WSW	490	12.4%



Using Behaviors to Build Strategies

The analysis of behavioral characteristics described in the previous section demonstrates the predictive power for certain classifications under various market conditions. While some of the statistically significant deviations from the median of 0.5 may seem small in absolute terms, those small differences add up quickly over time when implemented as a strategy. The methodology removes magnitude of underperformance or over-performance in terms of return and therefore does not reflect the magnitude of a potential strategy's performance. The methodology only analyzes peer ranking on the basis of leading (future) 30-trading-day returns, which does not tell us much about long-term buy and hold strategies, nor does it tell us much about strategies that adapt to ever-changing market conditions and company classifications. For example, a strategy may buy (or hold) 100 companies based upon particular classification, but the next day, only 95 of those holdings still match that classification. It is not assumed that strategies built on Valspresso classifications would buy a classification and blindly hold those companies for 30-trading-days. Rather, it is presumed that a strategy would make periodic adjustments to holding based upon daily classification changes. Ideally, those adjustments would be on a daily basis in order to take advantage of the latest company and market information.

In this section, an example strategy is defined and backtested for a single classification, "HPS."

Performance of Example Strategy

The classifications described earlier are extremely powerful tools for building alpha-generating strategies. Let's choose a simple, straightforward, and intuitive set of classifications for demonstration and educational purposes.

Suppose we define a strategy that only uses the Valspresso classifications.

Criteria

Only hold a stock where all the following are true:

1. Fundamental health is High (H)
2. Sentiment implies market pricing is Pessimistic (P)
3. EPS Momentum Classification is Sleeper (S)

If the company no longer adheres to the above classification, sell it.

Explanation

Let's explore the reasons behind each of the holding criteria above.

Criteria 1. The strategy is only holding companies with High fundamental health. We would do this to reduce risk. High health companies are less likely to fail. High health companies are in a better financial situation to support sustained growth. This seems reasonable and intuitive.

Criteria 2. The strategy is only holding companies when the market is pricing it Pessimistically (P). A pessimistic sentiment usually implies that the market expects negative to no growth from the company. This criterion is intuitive if your goal is to try to buy stocks that are "underpriced."

Criteria 3. The strategy is only holding companies when it is a Sleeper (S). A Sleeper is a company that is priced pessimistically, however, its EPS growth rate is exceeding that pessimistic expectation.

So, in summary, the strategy holds stocks that are fundamentally healthy, and its earnings are outperforming the pessimistic pricing of the stock market. Using common Wall Street vernacular, we are holding "underpriced" or "mis-priced" stocks. As long as it is "underpriced," we hold it. When it is no longer "underpriced" (or fundamentally healthy), we sell it.

Backtesting

By applying only those rules to the components of the S&P 500 from 2004 to 2018, backtested results demonstrate the power of Valspresso's sentiment classifications.

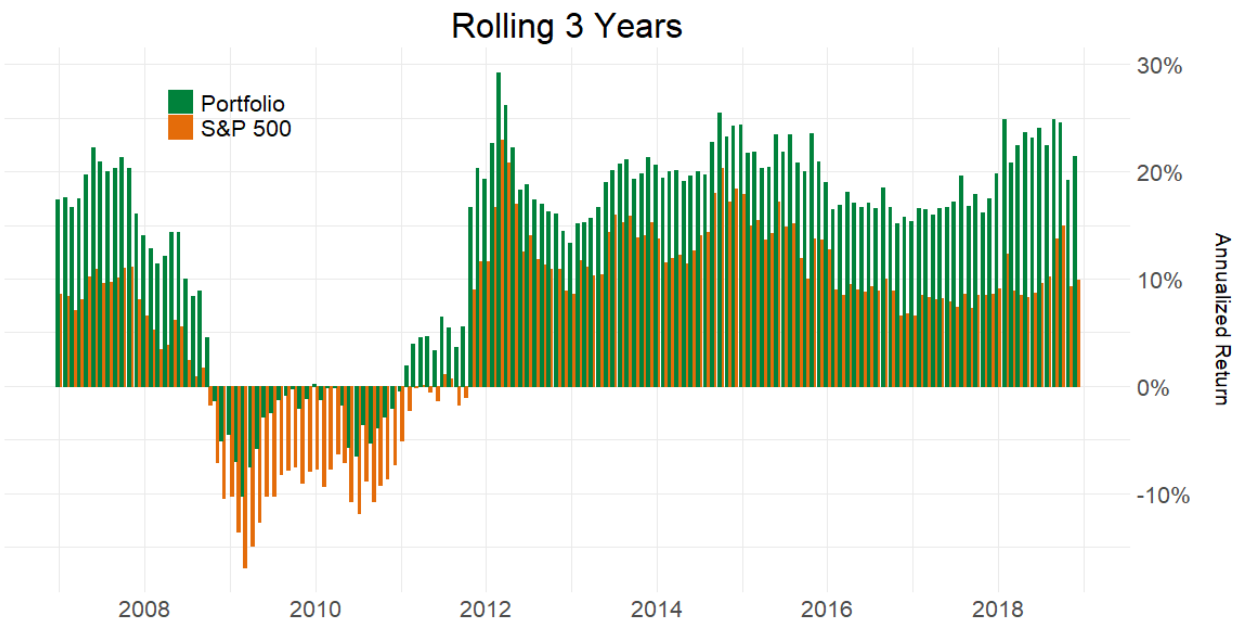
Methodology

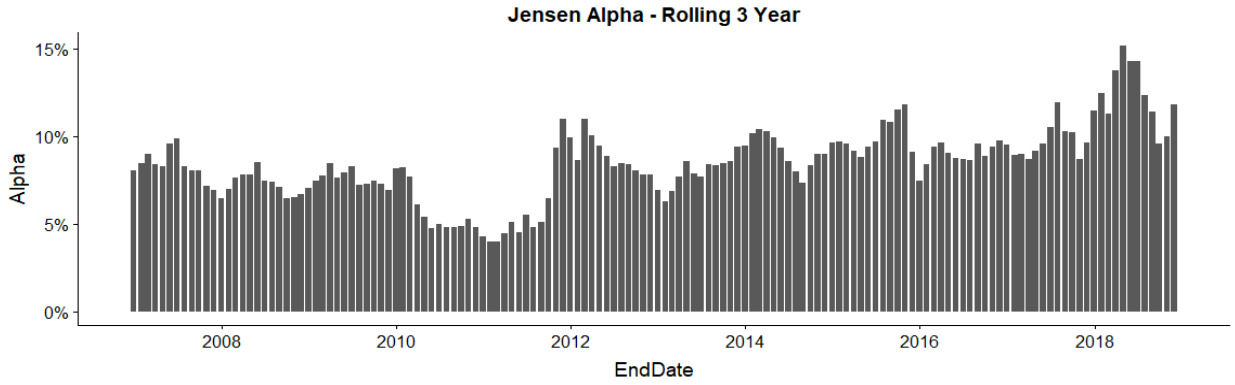
To demonstrate the contribution of Valspresso's classifications, we created a simplified backtesting system. This system was intentionally kept very simple to more easily test and compare the performance against publicly-available benchmarks without concern for confounding factors in the backtesting methodology.

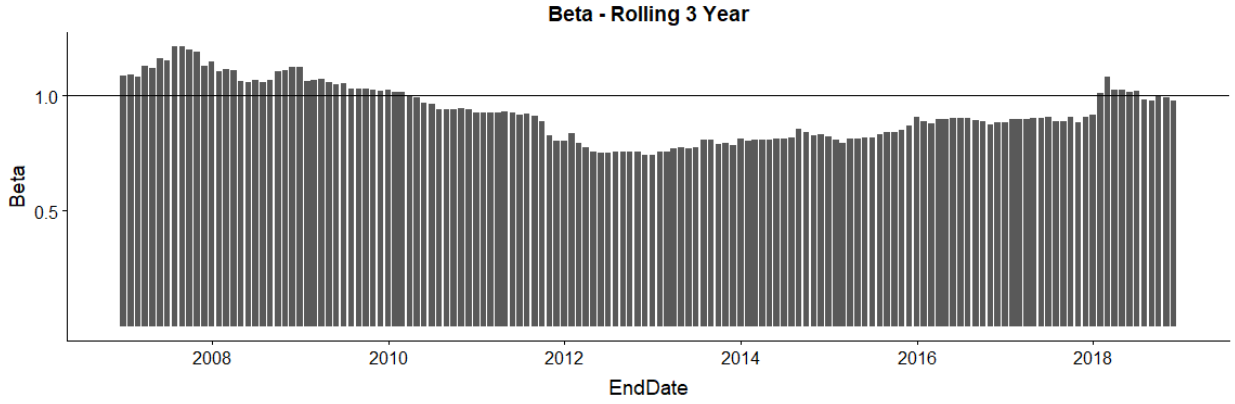
Data consists of Valspresso's Sentiment data for S&P 500 companies from 2004 to 2018 and daily closing prices for each component of the S&P 500. All companies matching the holding rule (described above) on a given day will be held in the simulated portfolio. Holdings are equal-weighted. Portfolio is 100% stock. No money is simulated. (i.e. no account value, no trading costs, no management fees, etc.) Based upon those daily holdings, the backtesting system simply uses daily returns and percent allocations to calculate daily weighted returns for the portfolio. Those daily returns are then used to build all performance reports. The primary performance measure is 3-year rolling Alpha.

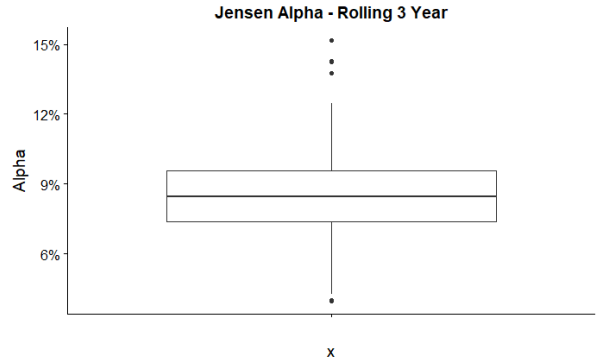
Performance vs. S&P 500

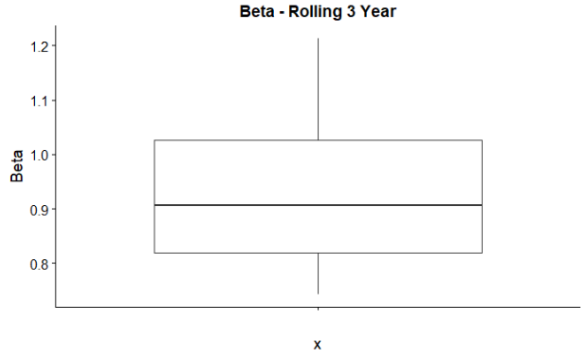
Since the backtested holdings are components of the S&P 500, let's review the performance using the S&P 500 price index as a benchmark. The signals for the HPS strategy for rolling 3-year periods from 2004 to 2018 delivered an average an **annualized Alpha of 8% with a range of 4% to 15%.** This result is delivered with an average beta less than 1 and information ratio greater than 1.











The signals for our HPS strategy are available for subscribers to independently reproduce the results and perform their own analyses.

Performance vs. RSP

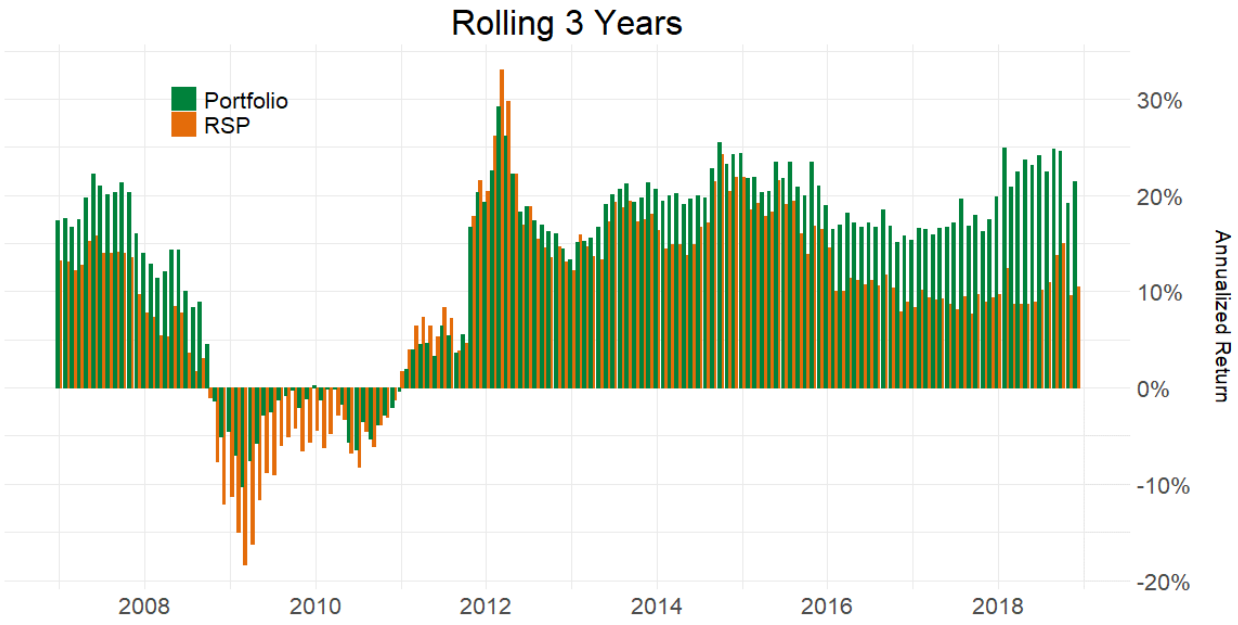
Our backtesting is equal-weighted and has closer correlation to the S&P 500 equal-weighted index than the S&P 500 cap-weighted index. From 2004 to 2018, equal weighting of S&P 500 yields an additional Alpha of approximately 2% over the S&P 500 market cap-weighted index. This means that about 2% of our HPS 8% Alpha generated relative to the S&P 500 cap-weighted index could be attributed to equal weighting. We verified this by having our backtesting system

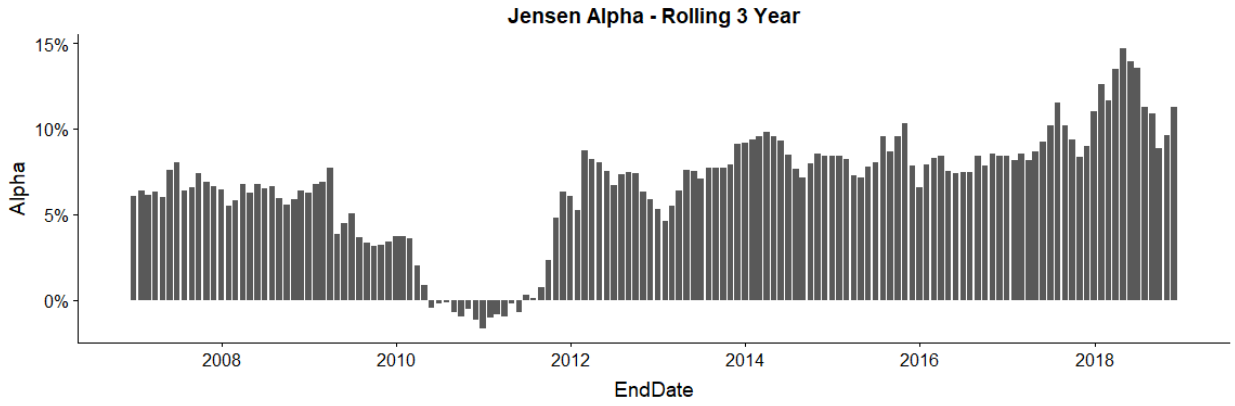
invest in all 500 companies in the S&P 500, which is essentially the Null Hypothesis. For the Null Hypothesis, we observed an Alpha of 1.99%. One might choose to simply subtract 2% from the Alpha values above, but a more valid comparison would be to choose an S&P 500 index that is equal-weighted.

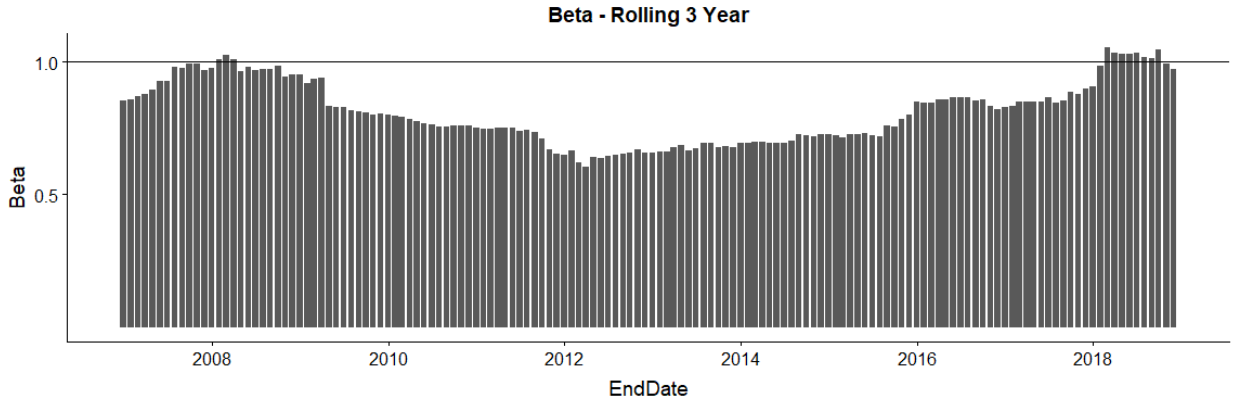
To evaluate the performance of our backtesting while controlling for equal weighting, we have selected the ETF with ticker RSP. Unfortunately, there are no publicly-available indices for equal-weighted S&P 500 that go back to 2004. RSP is the closest match for our purposes.

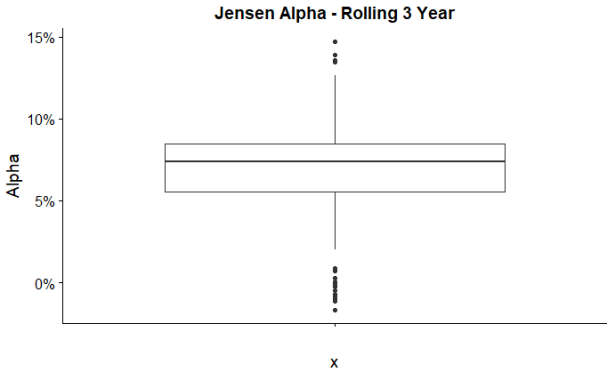
Remember from the previous section that we observed a 1.99% difference for the Null Hypothesis. When compared to RSP, the difference for the Null Hypothesis is -0.06%, which is much closer to zero than the 1.99% we observed against the S&P 500 cap-weighted index. While this is not a perfect benchmark for comparison, it is the best available to us for controlling our backtesting methodology. The R-Squared for the Null Hypothesis is also better; 0.9938 when compared against RSP, vs 0.9478 when compared against the S&P 500 price index.

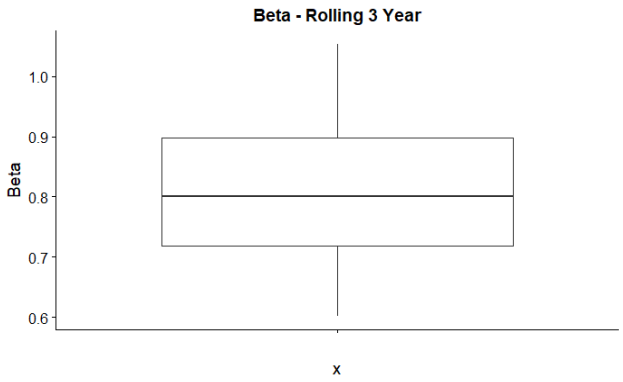
The signals for the HPS strategy, for rolling 3-year periods from 2004 to 2018, delivered an average **annualized Alpha of 6.7% with a range of -1.7% to 14.7%.** This result is delivered with an average beta less than 1 and an information ratio of 0.74.











Other Use Cases

The above use case is by no means the only possible use for Valspresso's indicators. Valspresso has created several of its own successful strategies for its clients. While we can't go into the details of those strategies, we can give a few ideas to help you get started on one of your own strategies.

Buy when HPS, but hold in HPS, HOF

You could create a strategy that only buys stocks when they are in the HPS classification, but as long as it is in the HPS or HOF classification, continue to hold it. If it leaves those classifications, then sell it. The advantage to this strategy is that you are buying stocks when they are "underpriced," but as long as they are healthy, you continue to hold them as their price increases and they enter the optimistic range. If a stock becomes irrationally exuberant, it will no longer be classified as HOF.

Identify mis-pricing using your own SI, SQ thresholds

We have proposed thresholds for SI and SQ, but with some experimentation for the types of stocks you typically hold, you could develop your own thresholds and definitions for "underpriced" or "overpriced."

Short "overpriced" stocks (SI > 4)

Those stocks with SI > 4 are considered irrationally exuberant. These are possible candidates for a shorting strategy to benefit from the "overpricing" of the market.

Dynamically move between classifications

Based upon market conditions, select holdings based on the classifications that are predicted to do best during those market conditions.

Data Processing

Sources of Data

- SEC filings (10-K, 10-Q, 8-K) from Edgar Online
- Pricing data from Edgar Online
- 3-month treasury bill rates from the Federal Reserve

Coverage

Valspresso covers all publicly-traded U.S. companies. Fundamental classification requires at least 3 years of financial statements.

Frequency

Automated analysis is performed daily for all companies. Financials filed with SEC go through a manual quality review process by our SEC data provider, therefore, there can sometimes be a delay between the time a company files with the SEC and it shows up in our database. The data provider prioritizes based upon market cap and other investor relevance factors. For this reason, filings for large market companies usually appear the next day, but small-cap companies can

sometimes take a few days. When developing a strategy and/or backtesting a strategy, this latency should be taken into account.

Point-in-Time Data

Our database, derived indicators, and backtesting system use point-in-time data. All data is aligned to ensure that the indicator calculation and backtesting system only consider data that was available on that particular trading day.

Dictionary

Price Date

The date for which the given security was traded on the stock market. The price date only includes days for which the stock market was open. Not all stocks are traded every day and not all markets share the same holidays.

Holding Date

The date that a given security is held in a portfolio. This portfolio might be a backtested simulation or a live portfolio. Valspresso defines different types of dates and enforces their application through its software to ensure there is no look-ahead bias, such as holding a security based on pricing information that is not yet available.

Price per Share (PPS)

The price of a security traded on the stock market. PPS represents a generic definition of stock price and is used as theoretical price used in formulas throughout this document. When those formulas are calculated, a specific price (e.g. prior day's closing price) is used.

Number of Outstanding Shares

The number of outstanding shares of stock used when PPS is reported when trading on a stock market. A company issues a number of shares to be traded on the stock market. Those number of shares can change over time because of splits, buybacks, and other corporate actions. This value is the implied denominator when reporting things such as PPS or EPS. The precise way that this implied denominator affects values such as PPS and EPS is a complex subject and outside the scope of this document.

Closing Price

The PPS of a stock reported by a stock exchange at the end of the trading day. The closing price is not adjusted for stock splits or other corporate actions. The closing price is the most commonly used PPS used to calculate indicators such as Sentiment Index.

Adjusted Closing Price

The Closing Price historical adjusted for stock splits and other corporate actions. Each time there is a new split, a stock's historical adjusted closing prices are recalculated. Adjusted closing price is not used to calculate sentiment index or its derivatives. Adjusted closing price is only used for assessing predictive capabilities of our indicators by calculating lagging or leading returns.

Ticker

A unique set of characters that represent a security traded on a stock exchange. Tickers can be 1 to 5 characters. Tickers are unique for any given day. In the event a security is delisted by an exchange, its ticker can be issued for a completely different security in the future. Therefore, a ticker can be assigned to different securities over time.

CompanyId

An integer that represents a company. This number will not change even if the ticker changes.

Sentiment Index (SI)

SI is used to project expected earnings growth. For example, an SI value of 4 means that the company's stock price reflects an expectation that earnings should grow by a factor of 4.

Sentiment Quotient (SQ)

SQ is used to quantify the portion of a company's stock price that is attributable to future earnings growth. For example, an SQ of 0.8 implies that 80% of the company's stock price is attributable to expectation of future earnings growth and 20% to current fundamentals.

Fundamentals Classification (FC)

Possible Values: H,M,L,X

Valspresso's Automated Stock Analyst performs deep financial analysis of publicly-traded U.S. companies. This context is important to manage your strategy's risk. Let's say that one of your strategy's holdings is a stock with a high expected earnings growth. If that company's financial quality is poor, it is less likely to achieve or sustain that growth and therefore should be considered riskier. In that case, additional risk mitigation measures would need to be employed to achieve investment objectives.

Our system automatically assesses profitability, solvency, and management by inspecting each public company's financial statements and press releases filed with the Securities and Exchange Commission (SEC) and classifies the quality of companies' financials as High (H), Medium (M), or Low (L). If the system is unable to make a determination, the financials are classified as Unknown (X).

Sentiment Classification (SC)

Possible Values: O,P,X

One of the unique attributes of Sentiment Index (SI) is that its value is on a scale that pivots around the fixed value of 0. This allows the automated analyst to objectively measure the amount of sentiment in a company's stock price and classify each company as Pessimistic (P) or Optimistic (O). Companies with SI < 0 are classified as Pessimistic (P); Companies with SI and SQ > 0 are classified as Optimistic (O). If the system is unable to make a determination, the company is classified as Unknown (X).

EPS Momentum Classification (EC)

Possible Values: F,S,X

The EPS Momentum Classification (EC) field classifies each company at points in time as Fulfillers (F), Sleepers(S) or Neither (X). A company classified as Optimistic and its EPS growth rate is meeting SI projected expectation is classified as Fulfiller (F). A company classified as Pessimistic and its EPS growth rate is exceeding SI projected expectation is classified as Sleeper (S). A company that is neither Fulfiller nor Sleeper is classified as Neither (X).

Official Annual EPS

The Earnings Per Share (EPS) from a company's latest official (10-K) annual filing.

Official Quarterly EPS

The Earnings Per Share (EPS) from a company's latest official (10-Q) quarterly filing.

Preliminary Annual EPS

The Earnings Per Share (EPS) from a company's latest official (10-K) annual filing or latest preliminary annual (8-K) financial filing. In those calculations where "preliminary" values are allowed, the latest annual value is used regardless of whether it's official or preliminary.

Preliminary Quarterly EPS

The Earnings Per Share (EPS) from a company's latest official (10-Q) quarterly filing or latest preliminary quarterly (8-K) financial filing. In those calculations where "preliminary" values are allowed, the latest quarterly value is used regardless of whether it's official or preliminary.

Beta

36-month beta calculated on a daily basis. The benchmark used to calculate Beta is S&P 500 price return. Beta is calculated over the prior 36 months relative to the current price date being calculated. Therefore, beta changes daily for each stock.

Market Rate of Return

Market rate of return is calculated using the S&P 500 price return.

Risk-Free Premium

Three Month U.S. Treasury Bill Rate

Required Rate of Return

Required rate of return is calculated using beta, risk-free premium, and market rate of return.

GAAP

Generally accepted accounting principles (GAAP) refer to a common set of accepted accounting principles, standards, and procedures that companies and their accountants must follow when they prepare and present their financial statements. The Financial Accounting Standards Board (FASB) has the authority to establish and interpret GAAP in the United States.

Going Concern

Under generally accepted accounting principles (GAAP), the continuation of a reporting entity as a going concern is presumed as the basis for preparing financial statements unless and until the entity's liquidation becomes imminent. Preparation of financial statements under this presumption is referred to as the "going concern" basis of accounting.

Sentiment Indicators Data Feed

Product Overview

Valspresso's unique quantitative metrics are a result of 20 years of theoretical research that were further refined over 10 years of practical application. Valspresso's technology analyzes all publicly-traded companies on the U.S. major exchanges every day. This daily automated analysis includes a patented price sentiment analysis as well as deep fundamental analysis. Subscribers (quants and investment management teams) to Valspresso data feeds use them to develop their own alpha-generating trading strategies. The data feeds provided have been used internally for years at Valspresso to build trading strategies for its clients.

File Structure

Format

The data feed is delivered as a comma-delimited file (CSV). Each column is separated by a comma. Each field's value is enclosed in double-quotes if it is a string (character). Each row represents a single ticker for a single trading day. The first (header) row contains the names of the columns and each column name is enclosed in double-quotes.

Example from January 2, 2004:

```
"VersionId","Date","Ticker","CompanyId","SI","SQ","FC","SC","EC"
1,2004-01-02,"A",543,-2.3068,,"M","O","X"
1,2004-01-02,"AA",44,24.6598,0.961,"H","O","X"
1,2004-01-02,"AAPL",146,0.9417,0.485,"M","O","X"
1,2004-01-02,"ABC",588,-0.8843,,"H","P","S"
1,2004-01-02,"ABT",301,-0.2718,,"H","P","X"
1,2004-01-02,"ACV",456,-0.6408,,"H","P","S"
```

Values which are NULL, N/A, or unavailable will be represented as blank (i.e. open double quote immediately followed by closing double quote with nothing in between).

Columns

Column Name	**Type**	**Format**	**Definition** (see dictionary)
VersionId	Integer		Identifies the version of the classifications to allow incremental improvements without breaking historical backtesting.
Date	Date	yyyy-MM-dd	See Price Date
Ticker	String	1 to 5 characters	See Ticker
CompanyId	String	integer	See CompanyId
SI	Decimal	4 decimal places	See Sentiment Index
SQ	Decimal	4 decimal places	See Sentiment Quotient
FC	String	1 character	See Fundamentals Classification
SC	String	1 character	See Sentiment Classification
EC	String	1 character	See EPS Momentum Classification

Coverage and Frequency

Valspresso covers all publicly-traded U.S. companies. Automated analysis is performed daily. Data feeds are delivered before the opening bell of U.S. markets (9:30 am ET).

Valspresso, Inc.
11921 Freedom Drive, Suite 550
Reston, VA 20190
rnosegbe@valspresso.com
(703) 675-7722