TECHNICALLY SPEAKING

JUNE 2017 ISSUE

IN THIS ISSUE...

CAN WE IMPROVE SECTOR ROTATION?

COREY HOFFSTEIN

Editor's note: This was originally published at "Flirting with Models" on May 22, 2017 and is reprinted here with permission.

Summary
• Momentum-based sector rotation is a popular investment strategy.
• Recent academic studies have shown that alternative implementations of standard momentum – including risk-adjusted momentum, residual momentum, and "frog-in-the-pan" momentum – can significantly improve the risk-adjusted and total return potential of stock-based momentum systems.
• We explore whether these approaches create value for sector rotation systems.

Momentum is a system of investing that buys and sells securities based upon recent returns. Momentum investors buy outperforming securities and avoid – or sell short – underperforming ones.

In the traditional academic implementation of momentum, hundreds of individual securities must be bought and sold. One popular – albeit simplified – implementation of this approach is sector rotation, where investors implement a momentum strategy through industry groups or sectors. In a past commentary[1], we demonstrated that sector rotation was entirely subsumed by the momentum factor (i.e. does not represent its own unique risk factor) and dampens total return potential. We also found, however, that as the number of sectors utilized decreased, so did the risk of momentum crashes. Risk-averse investors, therefore, still may find traditional sector rotation a valuable approach.

Since the momentum factor was identified and published by Jegadeesh and Titman in 1993, several other approaches have been explored and documented. Most prominently have been risk-adjusted momentum, idiosyncratic momentum, and frog-in-the-pan momentum.

In this study, we explore whether these approaches are value-add in a traditional sector rotation approach.

Risk-Adjusted Momentum

Whereas traditional momentum looks at trading 12-1 month returns, risk-adjusted momentum scales this return figure by trailing realized volatility.

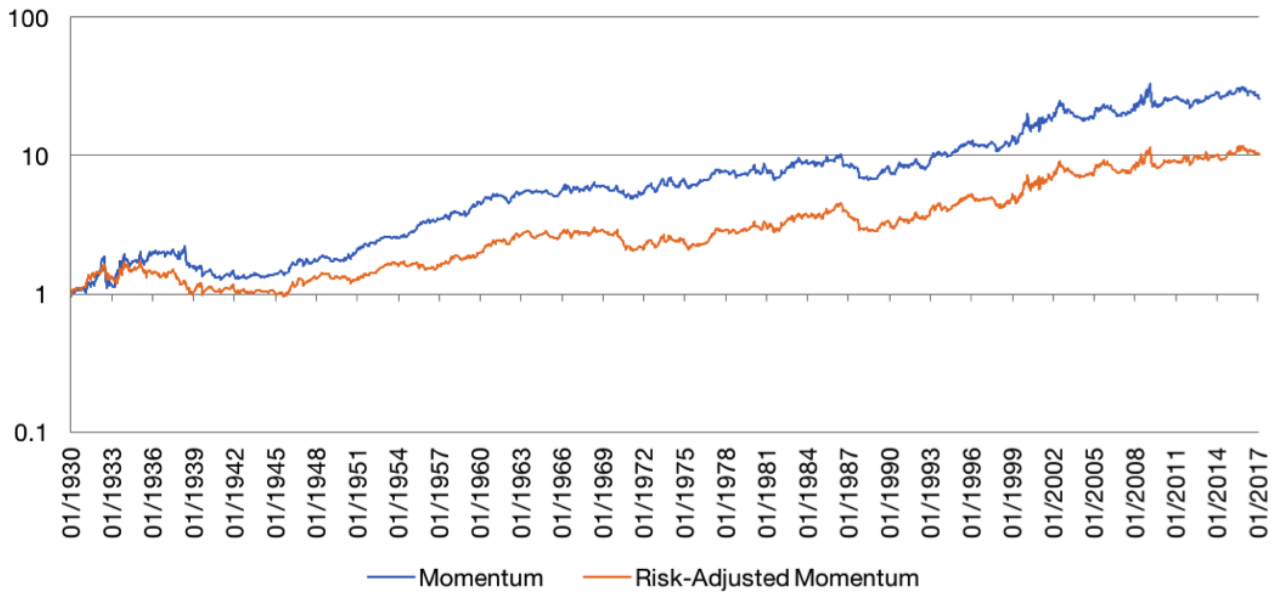
One argument for this approach is that it is secretly a multi-factor approach. Here, we can think of 12-1 returns as our "momentum score" and inverse realized volatility as our "low volatility score." By multiplying them together to create a risk-adjusted momentum score, we are invoking a multi-factor scoring process somewhat similar to the "tilt-tilt" process advocated for by FTSE Russell.

Another potential argument for this approach is that by scaling by volatility, we overweight those sectors whose return has been more continuous in nature and less discrete (e.g. the return is driven by a large jump). The rational inattention theory posits that since time is a scarce resource, investors may selectively ignore information or only obtain news on a limited frequency or with limited accuracy. Chen and Yu (2014) found that portfolios constructed for stocks "more likely to grab attention" based on visual patterns induces investor overreaction.[2] Indeed, momentum continuation could be induced by visually-based psychological biases.

Several studies have demonstrated the benefits of risk-adjusted momentum, including Shaik (2011) [3] and Soe (2016)[4], who find that risk-adjusted momentum creates excess risk-adjusted and total returns in large-cap U.S. equities, small-cap U.S. equities, and global equities.
Similarly, Ahti (2012)[5] finds that beta-adjusted momentum (where the anti-beta and low-volatility anomalies are close cousins) enhances global equity momentum by increasing total return and lowering volatility.

To test risk-adjusted momentum in a sector rotation context, we sort sectors based on their trailing 12-1 month risk-adjusted return. We build an equal-weight portfolio of the top three sectors with the highest scores. Similarly, for our short leg, we build an equal-weight portfolio of the bottom three sectors with the lowest scores. Portfolios are rebalanced monthly (using overlapping portfolios).

Momentum & Risk-Adjusted Momentum Long/Short Portfolios (Log-Scale)

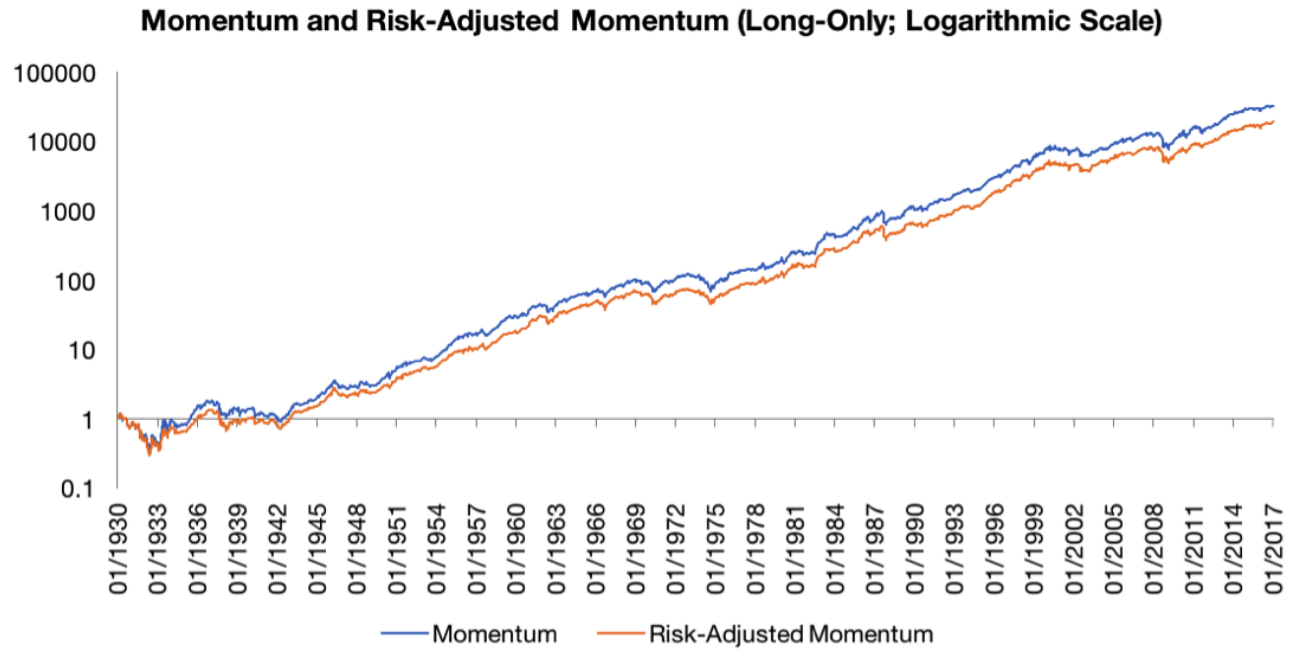


Data from Kenneth French data library. Calculations by Newfound Research. All returns are hypothetical and are gross of all costs.

We can see that risk-adjusted momentum ends up being a drag on our sector rotation approach. And without a commensurate reduction in volatility, we end up with a worse Sharpe ratio.

	Annualized Return	Annualized Volatility	Sharpe Ratio
Momentum	3.90%	12.65%	0.30
Risk-Adjusted Momentum	2.75%	11.30%	0.24

Of course, most investors implementing a sector rotation approach do so in a long-only capacity, so we believe it is important to distinguish between returns originating from the long and short legs of this analysis. Specifically, we can plot the long-only legs to determine whether the short-leg was a drag on performance and we can still harvest some benefit in a long-only model.



Data from Kenneth French data library. Calculations by Newfound Research. All returns are purely hypothetical and are gross of all costs.

Again, we find no evidence that a risk-adjusted momentum approach is advantageous in a long-only sector rotation system.

Residual (Idiosyncratic) Momentum

One argument against the traditional approach to momentum is that the portfolios constructed have time-varying exposures to return factors such as market beta, value, and size.

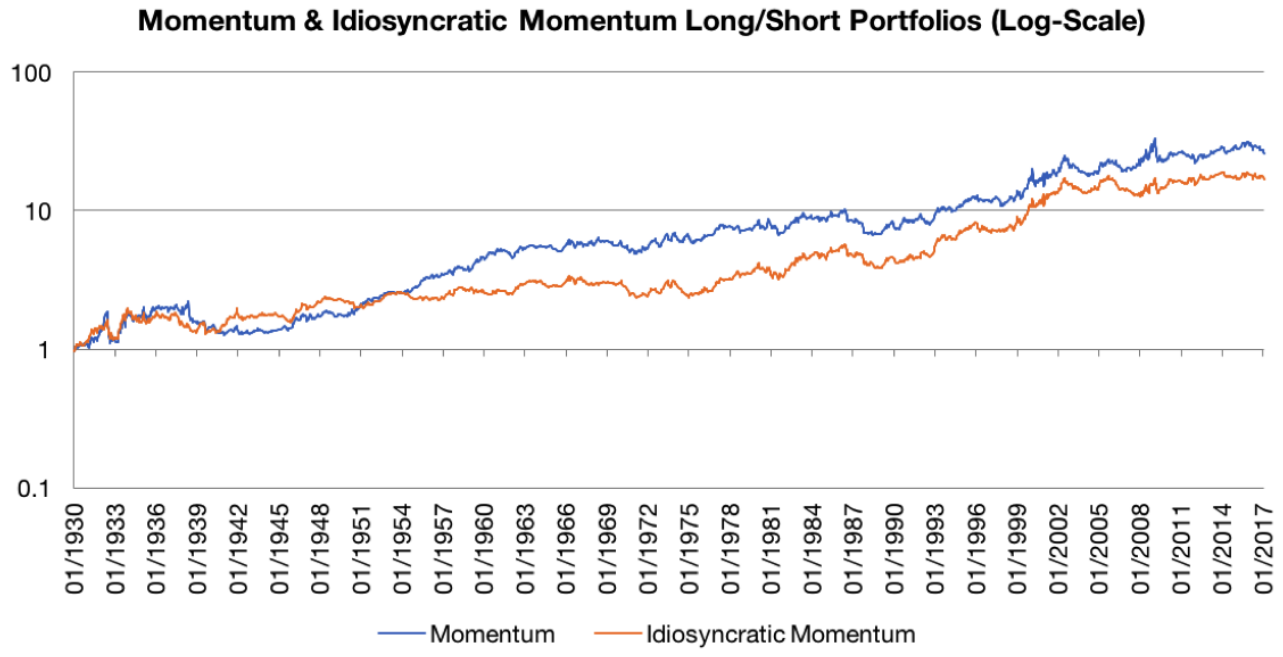
In an effort to control for this effect, residual (or idiosyncratic) momentum first regresses a stock's returns against these common risk factors and extracts only the residual, unexplained return stream. The traditional 12-1 momentum approach is then applied to this idiosyncratic component.

Blitz, Huij, and Martens (2009) found that controlling for market beta, value, and size, risk-adjusted profits of their residual momentum process were about twice as large as those associated with total return momentum, with greater consistency.[6]

By correcting stocks for market returns, Chaves (2012) finds that momentum applied to idiosyncratic returns works better than traditional momentum in a sample of 21 developed countries. Perhaps most importantly, the approach was successful in Japan, where traditional momentum has historically failed.[7]

More recently, Blitz, Hanauer, and Vidojevic (2017) found that residual momentum could not be subsumed by the conventional momentum factor and that traditional arguments of investor over-confidence and overreaction fail to explain the anomaly.[8]

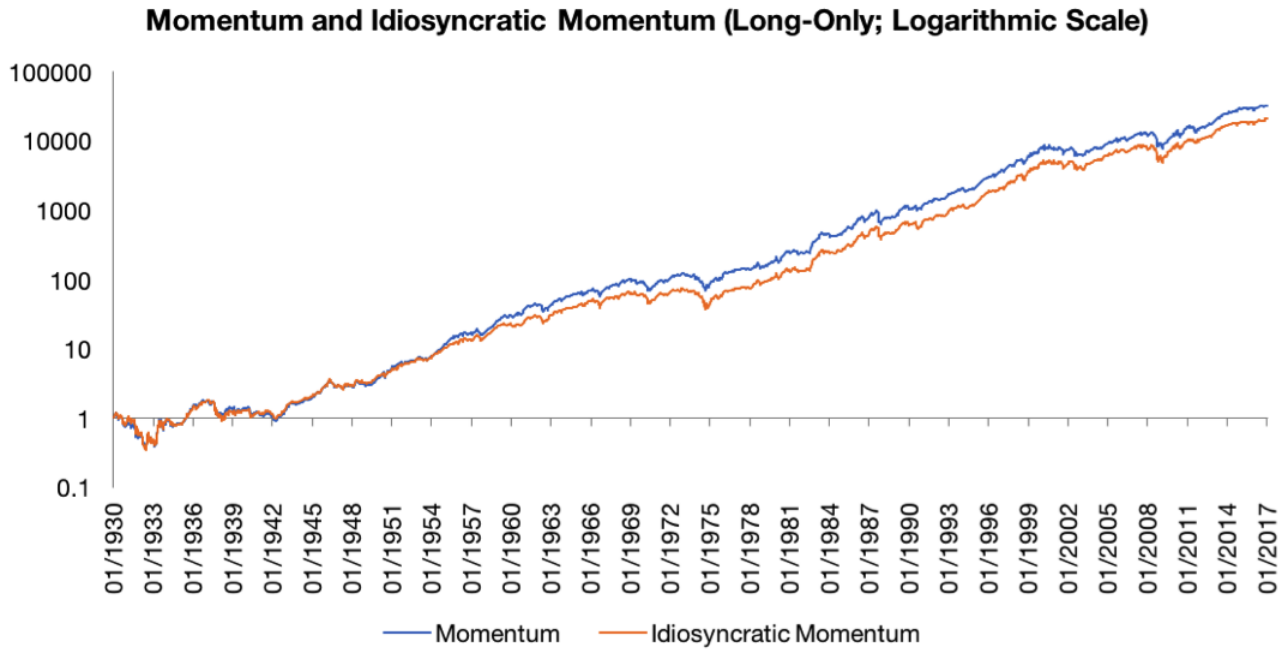
In our sector rotation framework, we can explore this approach by employing the CAPM model, regressing sector returns against the market and extracting the idiosyncratic component. Specifically, we will use rolling three year periods for calculating our residuals. After residuals are calculated for each sector, we run a traditional 12-1 momentum approach.



Data from Kenneth French data library. Calculations by Newfound Research. All returns are purely hypothetical and are gross of all costs.

	Annualized Return	Annualized Volatility	Sharpe Ratio
Momentum	3.90%	12.65%	0.30
Risk-Adjusted Momentum	3.38%	10.79%	0.31

Unlike risk-adjusted momentum, idiosyncratic momentum does improve risk-adjusted returns for the long/short implementation – though just narrowly. Again, however, we find the long-only implementation lacking. In fact, the long-only momentum strategy has a Sharpe ratio of 0.47 while the idiosyncratic approach has a Sharpe ratio of just 0.44.



Data from Kenneth French data library. Calculations by Newfound Research. All returns are purely hypothetical and are gross of all costs.

Frog-in-the-Pan Momentum

Da, Gurun, and Warachka (2014) introduced a new concept in momentum: "frog in the pan" (FIP)[9]. The hypothesis behind FIP is that "investors are inattentive to information arriving continuously in small amounts. […] [A] series of frequent gradual changes attracts less attention

than infrequent dramatic changes."

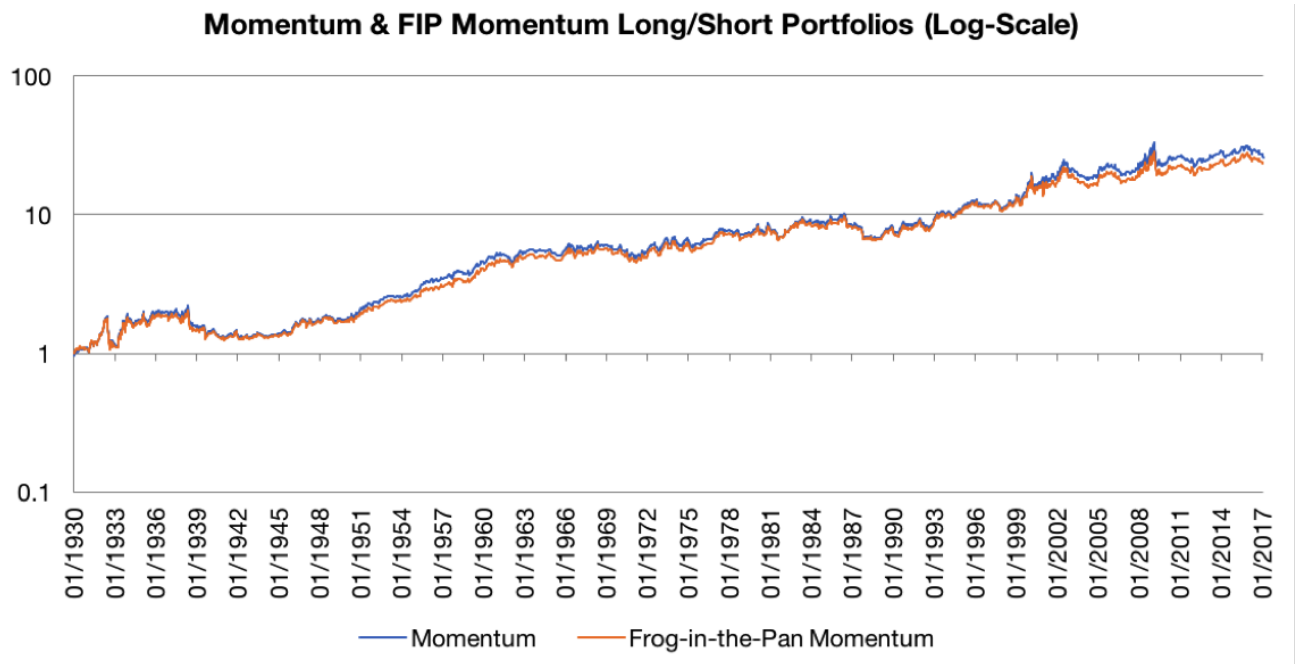
To test this hypothesis, the authors double-sort stock returns, first on trailing 12-1 month total returns and then on an information discreteness (ID) score. This ID score is calculated as the sign of the trailing 12-month return multiplied by the difference between the percentage of negative days and the percentage of positive days. By construction, this figure will range from -1 to +1, with a lower score corresponding to greater return continuity.

The authors find that, consistent with their hypothesis, stocks exhibiting continuous information exhibit stronger momentum returns than those that exhibit information discreteness.

Unfortunately, with only 10 sectors, a double-sort approach is not possible. To incorporate the concept of information discreteness, we create a new score:

$$ID = (\text{sign}(PRET)[\%pos - \%neg] + 1) / 2.$$

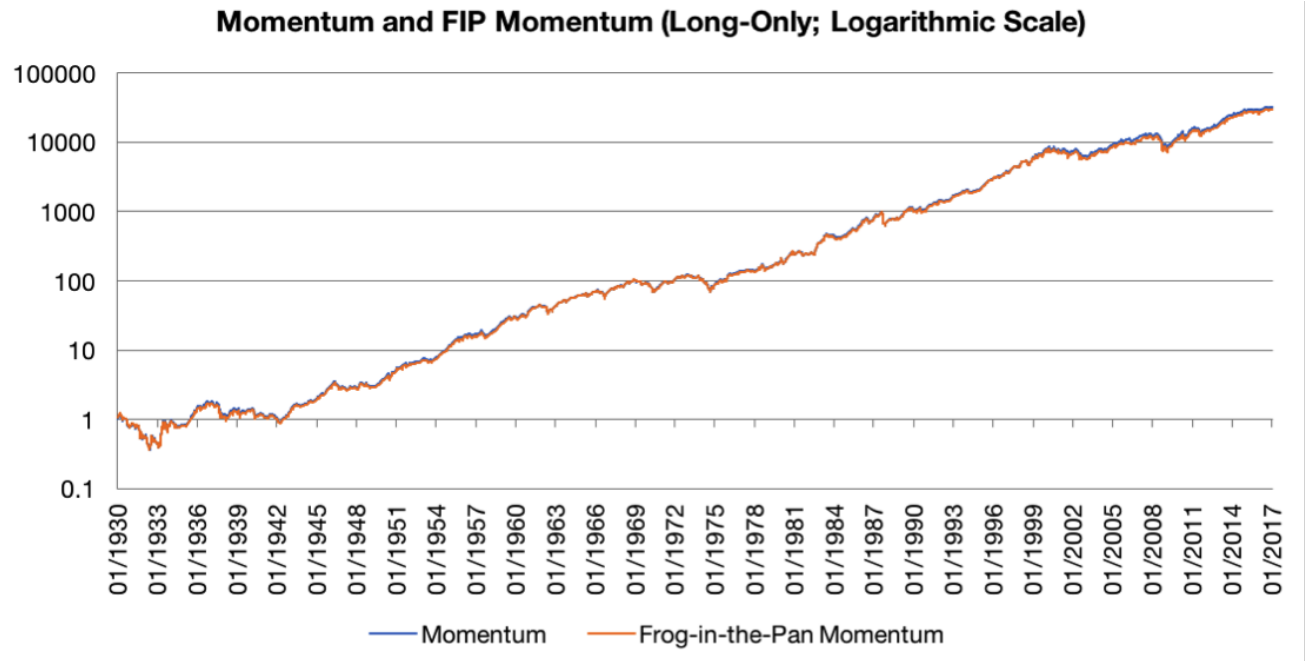
Our information discreteness measure is bound between 0 and 1, with 0 being more discrete returns and 1 being more continuous. We then multiply our traditional momentum score by this ID score, highly continuous returns retain their magnitude while discrete returns are pulled towards zero.



Data from Kenneth French data library. Calculations by Newfound Research. All returns are purely hypothetical and are gross of all costs.

	Annualized Return	Annualized Volatility	Sharpe Ratio
Momentum	3.90%	12.65%	0.30
Risk-Adjusted Momentum	3.69%	12.63%	0.29

Like the approaches before, FIP seems to fall short for sector rotation. We see the same holds true for the long-only side as well.



Data from Kenneth French data library. Calculations by Newfound Research. All returns are purely hypothetical and are gross of all costs.

What's going on here? Why is FIP so close to momentum for sector rotation? Quite simply, it is likely that with only ten sectors, there is not enough differential in the information discreteness score to significantly change the momentum score magnitude and cause relative ranks to shift.

Conclusion

It may seem, at the end of the day, all was for naught. While we did not test every extension of momentum or combinations thereof (e.g. residual momentum using the Fama-French 3-factor model, risk-adjusted idiosyncratic momentum, etc), these initial tests were not promising for creating value-add in a sector rotation system.

To this, we would say two things.

First, we would argue that these adjustments to momentum general try to capture the concept of "consistency" and "smoothness." These tweaks may be relevant when dealing with individual securities that can exhibit a significant amount of jump risk in their returns. However, much of this risk is diluted at the sector level, where we already benefit from a significant amount of diversification. Therefore, the added steps to try to address this risk may not be necessary, and perhaps only harmful to returns.

Second, the mere fact that none of these variations broke sector rotation says something about momentum's robustness. These are not just minor variations either: idiosyncratic momentum, for example, is a significant change in methodology. Nevertheless, evaluated in isolation, it would appear to be a statistically significant anomaly. In other words, regardless of its form, momentum seems to persist.

The nature of research is that you are going to often find yourself at dead ends. We believe, however, learning what doesn't work, and why it doesn't work, is just as, if not more important, than identifying what does.

[1] https://blog.thinknewfound.com/2017/03/sector-rotation-momentum-factor/

[2] Chen, Li-Wen and Yu, Hsin-Yi, Investor Attention, Visual Price Pattern, and Momentum Investing (August 12, 2014). 27th Australasian Finance and Banking Conference 2014 Paper. Available at SSRN: http://ssrn.com/abstract=2292895 or http://dx.doi.org/10.2139/ssrn.2292895

[3] Shaik, Rasool. 2011. "Risk-Adjusted Momentum: A Superior Approach to Momentum Investing." Bridgeway Capital Management.

[4] Soe, Aye. 2016. "Momentum: Does Adjusting By Risk Matter?" S&P Dow Jones Indices.

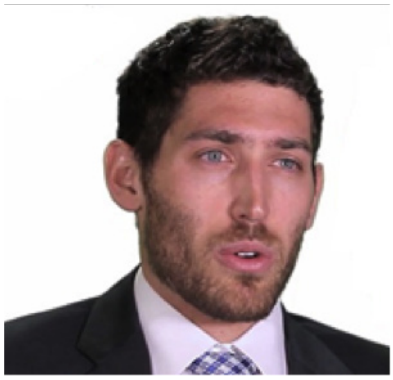
[5] Ahti, Valterri. 2012. "BAMM: MSCI World." Evli Bank.

[6] Blitz, David and Huij, Joop and Martens, Martin, Residual Momentum (August 1, 2009). Available at SSRN: https://ssrn.com/abstract=2319861 or http://dx.doi.org/10.2139/ssrn.2319861

[7] Chaves, Denis. 2012. "Eureka! A Momentum Strategy that Also Works in Japan." Research Affiliates Working Paper (January 9).

[8] Blitz, David and Hanauer, Matthias X. and Vidojevic, Milan, The Idiosyncratic Momentum Anomaly (April 5, 2017). Available at SSRN: https://ssrn.com/abstract=2947044

[9] Da, Zhi and Gurun, Umit G. and Warachka, Mitch, Frog in the Pan: Continuous Information and Momentum (December 21, 2013). Available at SSRN: https://ssrn.com/abstract=2370931 or http://dx.doi.org/10.2139/ssrn.2370931



Corey Hoffstein is co-founder and Chief Investment Officer of Newfound Research. Investing at the intersection of quantitative and behavioral finance, Newfound Research is dedicated to helping clients achieve their long-term goals with research-driven, quantitatively-managed portfolios, while simultaneously acknowledging that the quality of the journey is just as important as the destination. At Newfound, Corey is responsible for portfolio management, investment research, strategy development, and communication of the firm's views to clients. Corey is a frequent speaker on industry panels and contributes to ETF.com, ETF Trends, and Forbes.com's Great Speculations blog. He was named a 2014 ETF All Star by ETF.com. Corey holds a Master of Science in Computational Finance from Carnegie Mellon University and a Bachelor of Science in Computer Science, cum laude, from Cornell University.

GUILLOTINE INVESTING - KEEPING YOUR HEAD WHILE OTHERS ARE LOSING THEIRS

KD ANGLE, Reviewed by MICHAEL CARR, CMT

Editor's note: KD Angle spoke at an MTA Annual Symposium several years ago. In this article, we have a chance to learn about his recent work. He is also the author of the recently released book, Guillotine Investing, which expands on his investment philosophy.In this study, we explore whether these approaches are value-add in a traditional sector rotation approach.

Success in the markets is best measured over the long term. With over thirty years of experience, KD Angle has met any definition of success. His work has focused on researching and developing trading algorithms. Over that time, he has learned a lot about what works and what doesn't work.

In general, when searching for what works, he begins with the premise that nothing works. This forces him to think through every idea to consider the logical underpinnings of every possible trading strategy.

In simple terms, a moving average crossover strategy is a popular trading system. Many system developers simply start with the assumption that a moving average system will be profitable and the only problem to solve is which moving average to use. Beginning with the assumption that nothing works, like KD does, requires thinking through why a moving average should work. The answer might be that the average lags the market action and should highlight the direction of the primary trend, as long as the length of the trend is longer than the moving average. This insight forces the system developer to consider the parameter of the moving average that should be used in testing and reframes the question of how to exit the trade and how much risk the trade carries based on the parameters selected for entering the trade.

After defining the rules for a system that is logically sound, the next step is to run a back test, a trivial task compared to designing and evaluating the test. When evaluating test results, many analysts focus solely on performance metrics. KD goes a step further and reviews statistical tests that show him whether the results are possibly the result of luck. Obviously great results attained through luck are not likely to be repeated in the future and this step helps avoids trading losses.

In testing, there are a few general principles that apply and these principles can be thought of as obvious lessons that, unfortunately, frequently need to be relearned by traders. For example, the

average size of the trade and the worst drawdowns of a strategy are both related to the average holding period of the strategy. With a well-designed short-term strategy, traders should expect to enjoy small wins, on average, and experience brief and relatively small drawdowns. A larger average win requires a longer timeframe and will invariably be associated with larger drawdowns than a short-term strategy.

The average win size, average rate of return and maximum drawdown are statistical measures of a system but they are also emotional aspects of the system. To be successful, the trader must be emotionally suited to the strategy they select. At the most basic level, traders will need either leverage or time to win and different emotional qualities are needed to manage the two.

In his work, the ideas tested are more complex than the simple idea used in this example. But, the process is rigorous because KD believes it's fairly easy to convince yourself of anything and introduce biases into the process. Looking at a moving average again, a system developer may believe a long-term average of 200 days will be profitable in the stock market. Using ten years of data, the results might show relatively poor performance. Since the developer believes the strategy works, the solution to poor performance might be to add more data to the test. In this way, the developer's bias is influencing the process. Profitable test results may eventually be obtained but because the design process was flawed, future trading performance is unlikely to be as profitable as test results showed.

Since the 1980s, KD has tested thousands of ideas and found that relatively few work in the markets. The strategies that work tend to be based solely on the market's price action rather than relying on assumptions about what the market will do. Once he finds an idea that works, in his experience it is best to "go all in" and start trading the strategy. While many developers advise watching the system for a time or paper trading, KD notes that there is no substitute for actual trading. The system reduces the impact of emotions on the trading process but nothing completely eliminates the emotional toll of trading. Only actual trading will allow the developer to determine if the system is tradable.

When trading, KD is able to avoid emotional responses because he knows he has developed his strategy using sound principles and stress tested the idea under a variety of market conditions. He also knows a great deal about what he doesn't know. In advance, he never knows how any individual trade will work even though he knows statistically he is likely to succeed over the long run. His success in shorter timeframes, such as a year, will often result from just a few large trades and he will only know which trades are the biggest winners in hindsight. This means he must employ discipline every day, trading the signals in the markets as they are.

At some level, all of these ideas are simple. In practice, mastering their complexity separates the winners from the losers.

To learn more about KD Angle or Guillotine Investing, please visit www.GuillotineInvesting.com or email KDAngle@GuillotineInvesting.com.

BEHAVIORAL FINANCE BEYOND THE MARKETS:
A REAL-TIME CASE STUDY OF RUSSIA'S MILITARY RESURGENCE

Matt Lampert, Alyssa Hayden and Alan Hall

The Socionomics Institute recently announced that a paper by Matt Lampert, Alyssa Hayden and Alan Hall was accepted for publication in the Journal of Behavioral Finance & Economics. The publication of Behavioral Finance Beyond the Markets: A Real-Time Case Study of Russia's Military Resurgence demonstrates the acceptance of socionomics within the academic community.

Socionomic theory proposes that social mood manifests across the spectrum of social behavior, from the movements of stock market indexes to the leaders we elect to the songs we choose to hear and even to changes in the social propensity toward peace or war. In the paper, the authors present a case study tracking the real-time socionomic analysis of the Russian Trading System Index (RTSI) and Russia's military resurgence from 2007 to 2016. The paper illustrates the utility of the theory for anticipating the character of social actions that express swings in social mood.
The roots of the paper trace back to 2006 when Alan Hall noted an unusual degree of optimism in the Russian market. He believed this was related to a positive social mood in the country and anticipated a reversal in both the tone of the mood and the market.

Hall presented a forecast of the Russian stock market in 2007 noting that an upward wave in the RTSI of nine years' duration appeared to be near the point of termination. He forecast a 62-75% decline in the RTSI, which would carry the index into the area of the preceding fourth wave, a normal retracement level according to the Elliott wave model. The following chart was published in November 2007.

Applying the socionomic theory, Hall added to his forecast by observing the historical behavior of Russia and the Soviet Union during past global bear markets and identifying patterns in their actions. He found that during negative social mood periods over the previous 150 years, Russia had tended to consolidate political power under an increasingly authoritarian executive, who attempted to expand the country's territory, bolster its military and play the role of outsider on the international stage while exhibiting feelings of opposition to its neighbors and the West that were drawn from an increased sense that the country was encircled and besieged. Based on these historical tendencies, Hall predicted an acceleration in the country's military aggression toward its neighbors and named Kosovo, Azerbaijan, Lithuania, Poland, Syria, Georgia and Ukraine as potential sites of conflict. He also observed that "Russia's opposition to the U.K. and the U.S. would likely increase…." He additionally forecast increased centralization of power under Vladimir Putin and greater state control of the media, politics, economy and society.

The results of his market forecast are shown in the next chart.

On the political front, Hall's forecasts were also accurate. Russia has engaged in conflicts in with its neighbors and tensions are increasing between Russia and global powers as Putin consolidated his power. The next chart illustrates the relationship between the RTSI market action and one of Russia's conflicts with the Ukraine.

This article demonstrates the power of socionomics to move beyond the financial markets while also demonstrating the application of socionomics to the market. Socionomics may be an expansion of behavioral finance that explains the relationship of markets to social mood and political change. In simpler terms:

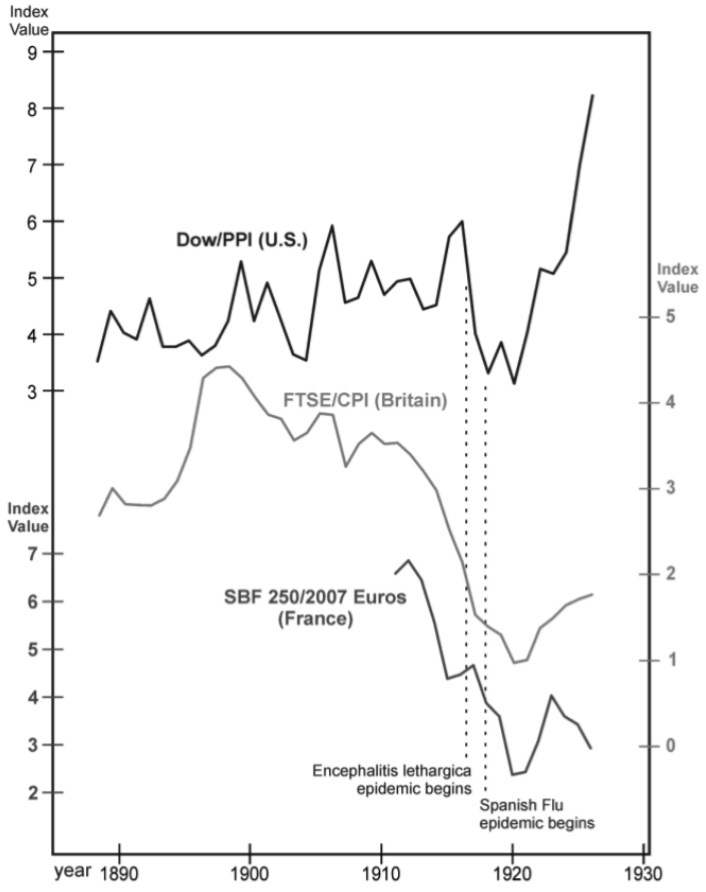
> Markets reflect social mood, as are social expressions of fashion. Technical forecasts ignore society. Social mood affects both the market and expression.

Future research at the Socionomics Institute is considering the relationship of epidemics to social mood. That work builds on a previous working paper, Exploring Socionomic Causality in Social Health and Epidemics, authored by Hall, Haydena, Lamperta and Shikhar Agarwalb, a researcher with Geisinger Medical Center. That paper found:

> Studies have found that changes in benchmark stock market indexes precede corresponding changes in economic performance. Other studies have established a positive association between economic performance and public health. It follows that stock market indexes should be valuable leading indicators of changes in public health. The few studies to have considered this relationship found significant links. We sought to test the historical endurance of the association between stock market performance and public health. First, we investigated temporal, qualitative associations between nine major infectious disease epidemics and severe or extended declines in the benchmark stock market indexes of heavily afflicted countries over a period spanning three centuries. Second, we measured the statistical association between U.S. stock market performance and the Index of Social Health from 1970 to 2011. We built a two-predictor linear model to account for each year's Index of Social Health value using the annual percentage change in the inflation-adjusted Dow Jones Industrial Average (Dow/PPI) and the previous year's value of the Index of Social Health. We found a positive and leading relationship between severe or extended declines in stock market indexes and the onset of major

epidemics of the 19th, 20th and 21st centuries, including epidemics of cholera, encephalitis lethargica, Spanish Flu, Hong Kong Flu, HIV/AIDS, SARS, H1N1, Ebola and Zika. We also found a positive association between U.S. stock market performance and the Index of Social Health from 1970 to 2011. We explored the socionomic explanation for these associations, specifically that natural fluctuations in social mood regulate changes in both stock price trends and public health trends.

The paper includes a number of charts, including the one below that shows the "positive and leading relationship between severe or extended declines in stock market indexes and the onset of major epidemics." In this chart, the timing of the encephalitis lethargica epidemic and the Spanish flu epidemic are shown with the inflation-adjusted Dow Jones Industrial Average, the inflation-adjusted FTSE All-Share Index and the inflation-adjusted SBF 250 Index Notice how the epidemics begin after extended market declines.



This paper builds on recent work that shows changes in stock market indexes precede changes in the economy, and since changes in the economy precede changes in public health, it follows that changes in stock market indexes would be especially valuable leading indicators for changes in public health. Among the work in that area are papers showing declining stock index prices, rising stock market volatility and stock market crashes are associated with subsequent increases in negative public health outcomes. Specific outcomes include increased cigarette smoking, binge drinking and fatal alcohol-related car accidents, greater incidences of stroke, poor well-being, increased heart attacks, increased coronary heart disease deaths, poor mental health and increased hospital admissions for psychological conditions and firearm-related injuries. The consensus among these researchers is that there is a positive association between stock market performance and subsequent public health-related metrics

Socionomics could explain that association as its applications spread beyond the financial markets.

BONDS OR STOCKS?
INVESTORS ARE BUYING BOTH

CHAD SHOOP, CMT

***Editor's note:** This was originally published at BanyanHill.com and is reprinted here with permission.*

Over the past few months, stocks have roared to a number of new highs and investors are eager to participate in the rally. It's this type of risk-on environment where you typically see investors sell bonds to move even more cash into stocks. But we are seeing investors buy bonds, pushing those prices higher as well. This is contradictory to what we take for granted — that there is an inverse relationship between the stock market and bond prices. While many are calling for concern over this, based on the data, this isn't something to be alarmed about.

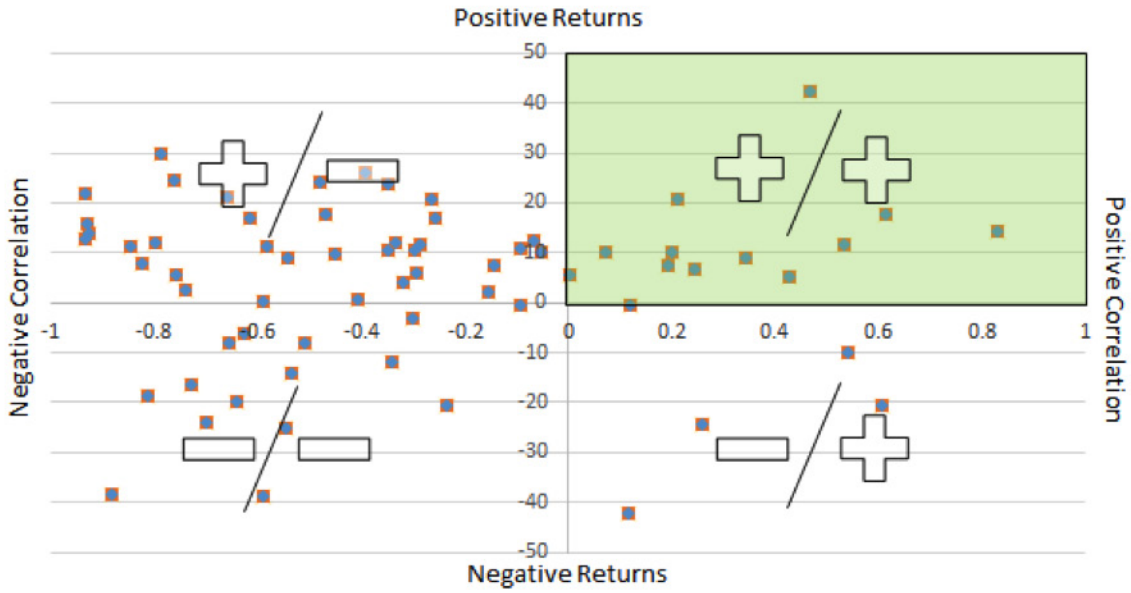
The Cash Flow

First, let's discuss why this is such a given concept — that as stocks go higher, bonds typically head lower. The rationale is that bonds are the safe place to park your cash. So when uncertainty is on the rise, and you are worried about economic growth, you dump your cash into bonds to preserve capital and earn a small amount of yield. This pushes the yields on bonds down and prices higher.

This cash doesn't come out of thin air, either. It is usually coming out of stocks, as investors are selling stocks and moving into bonds. And investors reverse that action when the market is strong, selling bonds to buy stocks — which pushes bond prices lower and their yields higher. There are a few instances where it's logical to see the positive correlation like we have now — such as low interest rates, low inflation and skepticism about stocks. For moments, both bonds and stocks can move in the same direction. But eventually one or the other will be right. Either bonds will be the best asset to hold, or everyone will move back into stocks

The Data Says

The data test was simple. I ran the correlation between the stock market and bonds over three-month periods going back to 2000. Then I tracked the performance over the following 12 months, and here's what I discovered: It's actually a positive sign for the markets. Take a look at the green shaded box in the chart below:



The green box represents the three-month periods since 2000 that both correlation and returns were in positive territory. Below that shows you the periods where the correlation was positive but the return was negative. As you can clearly see, more times than not the returns were up nicely after we see a positive correlation between stocks and bonds. Also, note that on the left side of the chart, those are all the periods where there was a negative correlation — clearly more often than the positive correlation we are experiencing today. That's why it's important to analyze the data.

Don't Get Spooked

By following some of the headlines today, you wouldn't know what action to take — and new headlines and data come out every day. But based on these results, had you exited the market every time there was a positive correlation between stocks and bonds, you would have missed out on some solid 10% to 40% rallies in the stock market. That's why even though a positive correlation doesn't happen often, and it may spook investors when it does, it's actually a sign for robust stock market returns in the coming 12 months.

Based on my data, in only four out of the past 17 times when there was a positive correlation between stocks and bonds did the market have negative returns over the following 12 months. So, owning stocks, not bonds, over the next 12 months puts the odds in your favor to grow your account.

Chad Shoop, CMT, joined Banyan Hill in 2012 and edits two newsletters. Pure Income uses technical analysis to identify income opportunities. Automatic Profits Alert is designed to take advantage of seasonal patterns in the markets. In addition to the CMT designation, Chad's credentials include two bachelor's degrees from the University of North Carolina at Greensboro, one in finance and one in economics.

THINK INCOME AND GROWTH DON'T EXIST IN THIS MARKET? THINK AGAIN

CAMBRIA INVESTMENTS

Editor's note: this article demonstrates a different perspective on income and was originally published as a white paper at the Cambria Investments web site. In the paper, the authors illustrate the different considerations involved in the investment selection process.

Are you having the following argument with yourself?

"I need an investment that's going to provide me not only income, but growth too. Unfortunately, investors have been piling into dividend funds for years now in their search for yield. I'm worried that this has left me few reasonably-valued opportunities. If I invest in a potentially overvalued dividend fund today and this 8-year bull market finally runs out of steam tomorrow, then I'm risking serious losses. On the other hand, keeping my money on the sidelines is returning me zero. Is there an answer?"

As I'm about to show you, yes, I believe there is an answer – and a good one. Income and growth are still possible, even in this market, though admittedly, harder to find.

How We Got Into This Predicament

We all know how we got here: the Fed's zero interest rate policy (ZIRP), and now the various negative interest rate policies (NIRP) around the globe, the ostensible end of a 30+ year bull market in bonds, one of the lengthiest bull markets in stocks in U.S. history… All of this has funneled billions of dollars into any investment even resembling an income play. Desperate, yield-hungry investors have picked over the markets, stretching valuations and depressing yields.

The result is that if you're looking for income and growth at reasonable values, you're finding yourself in a challenging market. So what can you do?

I humbly request you consider the Cambria Shareholder Yield ETF, (NYSE: SYLD).

For those unfamiliar, we've engineered SYLD to help investors get exposure to quality value stocks that are returning the most cash to shareholders via dividends and buybacks. This makes SYLD similar to some popular dividend ETFs, though the differences are profound enough to set SYLD apart, as you'll see momentarily. But given that I'm referencing a Cambria fund, I'd rather not try to sway anyone based on my own opinion. Instead, let's go straight to the numbers so that you can decide for yourself.

The Search for Income

Below we show the SEC 30-day dividend yields for SYLD, Vanguard Dividend Appreciation ETF (VIG), iShares Select Dividend ETF (DVY), Vanguard High Dividend Yield ETF (VYM), iShares Core High Dividend ETF (HDV), SPDR S&P Dividend ETF, SPDR S&P Dividend ETF (SDY), and the PowerShares Buyback Achievers ETF (PKW). We've placed them in descending order, with the values as of 12/31/16.

We chose five of these ETFs as they're the largest dividend funds as measured by assets under management according to ETFdb.com (as of the end of 2016). We included the sixth ETF (PowerShares Buyback Achievers – PKW) as its strategy includes a focus on share buybacks.
(For more information on these ETFs, please see the appendix.)

iShares Core High Dividend (HDV)	3.45%
Vanguard HIgh Dividend Yield	3.06%
iShares Select Dividend (DVY)	3.04%
SPDR S&P Dividend (SDY)	2.67%
Vanguard Dividend Appreciation	2.19%
Cambria Shareholder Yield (SYLD)	1.73%
PowerShares Buyback Achievers	1.20%

Past performance does not guarantee future results.

Although SYLD offers a healthy dividend at 1.73%, it's obviously near the bottom of this group. But remember, we've engineered SYLD to reflect total cash distributions to investors from dividends and buybacks. When management rewards investors with buybacks, we wouldn't see that value-transfer reflected in the dividend yield. Therefore, we shouldn't expect SYLD to be leading this category.

Further illustrating this point, note the ETF in last place with a dividend yield of 1.20% – the PowerShares Buyback Achievers ETF (PKW). As previously mentioned, like SYLD, PKW strategy targets companies repurchasing shares, not just dividend payers. According to its fact sheet, PKW targets U.S. securities that have effected a net reduction in shares, via buybacks, of 5% or more over the trailing twelve months.

This is a helpful illustration of the contrast between a "dividend yield" and a "combined dividend and buyback yield."

Look again to PKW's dividend return. If you're an investor focusing exclusively on dividend yield, you'd think that PKW is returning just 1.20% cash to investors. But when we include the 5%-or-more buyback return that's a part of PKW's methodology, we realize that the actual, total cash distribution to investors is more like 6.20%.

With this perspective, we suddenly have a far more complete way of evaluating our investments.

Why Buybacks Should Be Considered

A pure income investor might look at the above and say, "Explain it away however you want, but I don't care about buybacks. After all, it seems like overconfident CEOs are always buying back stock at all sorts of prices, regardless of valuations. Plus, they throw lucrative stock options to management, so trying to include buybacks isn't worth it to me. I see far better dividend yields up there than what SYLD is offering, so I'm choosing one of them."

It's a logical response, but let's challenge it.

Why, perhaps, should you be willing to pay more attention to buybacks?

Without getting into too much detail, corporate share buybacks can be an effective way for managers to return prof- its to shareholders – similar to dividends – yet without triggering the taxable event that occurs with dividends. This means shareholders are receiving value, but it's subtler – generally camouflaged in the asset's market price, rather than the obvious dividend payment that appears in your brokerage account one day. But that doesn't mean the value isn't there, it's just in a different form. And at the end of the day, wouldn't you prefer the highest total return possible, regardless of the source of that return?

If you're still not convinced on the value of buybacks, consider famed investor, Warren Buffett's opinion. From his 1984 letter to Berkshire Hathaway shareholders:

> **"When companies with outstanding businesses and comfortable financial positions find their shares selling far below intrinsic value in the marketplace, no alternative action can benefit shareholders as surely as repurchases."**

The key phrase for buybacks here is "intrinsic value." If you are an overconfident CEO buying back overvalued shares, then you're destroying value. In such a case, the earlier objection to including buybacks is valid. Buybacks would in- deed be a detriment to total return.

But when a wise CEO buys back shares at great valuations that are below intrinsic value, to paraphrase Buffett's quote, "no alternative action benefits shareholders as much."

Combining Dividend Yield with Buyback Yield

Now, just so you're not misunderstanding, this isn't an issue of choosing buybacks instead of dividends. It's not a competition.

We like dividends too; we just think an investor can do better by combining good dividend yields with good buyback yields, rather than by focusing on dividend yield alone. Think of these two returns as a broader, complementary "share- holder yield."

We're confident this shareholder yield is a superior indicator of an investment's long-term potential. But we're not the only ones.

For instance, J.P Morgan writes, "Across the range of definitions, we find the single best measure of Value is arguably Shareholder Yield, which combines the effects of Dividends, Buy-Backs & Net Issuance…" (J.P Morgan, Value Everywhere, August 23, 2016.) Then there was the Societe Generale study reporting that, historically, a shareholder yield strategy had beaten the market in 17 of the previous 20 years, whereas a dividend yield strategy had beaten the market in only 9 of those years. (Societe Generale, Global Quantitative Research, October 9, 2014.) You'll find similar takeaways in various reports from other large financial institutions.

With all this in mind, let's look again at this same group of ETFs, this time on a total return basis instead of just dividend yield.

A Comparison of Total Returns

Below we compare the cumulative returns of SYLD with the same group of ETFs. The beginning date is 5/13/2013, which is the day on which we introduced SYLD to the market. Returns stop at 12/31/16, and are based on net asset value. The ETFs are ordered from highest to lowest return.

iShares Select Dividend (DVY)	52.4%
Cambria Shareholder Yield (SYLD)	50.2%
Vanguard High Dividend Yield (VYM)	49.2%
SPDR S&P Dividend (SDY)	49.1%
iShares Core High Dividend (HDV)	46.9%
Cambria Shareholder Yield (SYLD)	37.2%
Vanguard Dividend Appreciation (VIG)	35.6%

Source: Bloomberg. SYLD 1-year performance as of 12/31/16 at NAV: 15.3%. SYLD since-inception performance as of 12/31/16 at NAV: 50.2%. SYLD 1-year performance at market price (price return): 12.6%. SYLD since-inception performance at market price (price return): 30.1%. The performance data quoted represents past performance. Past performance does not guarantee future results. The investment return and principal value of an investment will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost and current performance may be lower or higher than the performance quoted.

Note that SYLD's total return of 50.2% is second highest in the entire group. Therefore, had you focused exclusively on dividend yield, you might have chosen, say, VIG or HDV with a higher yield – yet that would have meant your overall return would have been significantly lower.

But back to the counter-argument: "Your point is valid, but I still see that DVY has a higher total return than SYLD, and a higher dividend yield too. So why shouldn't I invest in it right now instead?" Great question – and there's an equally great answer.

Looking at These Investments Through a "Value" Prism

One of the basic tenets of investing is that, all else being equal, the less you pay for an investment, the better your future returns should be. By that logic, the better the value at which we can purchase quality assets, the better positioned we should be for increased returns going forward.

Recall for a moment our earlier discussion of Warren Buffett and buybacks. Buffet believes buybacks are wonderful when they're effected at discounted valuations. He didn't say "all buybacks are great, all the time," because they're not. If a CEO overpays for his shares, it's an unwise use of money, same as if you or I overpay for, say, a new car or a dishwasher.

The point is, valuation matters. With investing, the price which you pay for an asset has a significant influence on the return (or lack thereof) that you'll get.

With that in mind, let's return to our group of ETFs.

The chart below includes numerous common valuation metrics: the ratios of price-to-earnings, price-to-book, price-to- sales, and price-to-cash flow. We've re-included the dividend yield for perspective, highlighting the highest dividend yield (from HDV) as well as SYLD's total numbers.

S&P 500		VIG	DVY	VYN	SDY	HDV	PKW	SYLD
P/E	19.37	20.09	19.42	18.78	21.57	20.80	17.36	14.92
P/B	2.71	4.00	2.30	2.54	2.92	3.12	2.33	1.71
P/S	1.89	1.64	1.60	1.76	1.69	2.08	1.13	0.92
P/CF	10.48	13.87	8.74	10.07	11.47	11.52	8.67	5.59
Div Yield*	2.28%	2.19%	3.04%	3.06%	2.67%	3.45%	1.20%	1.73%

Forward-looking based on historical data, as of 12/30/16. Source: Morningstar. Style and Market Cap Breakdown and Value and Growth Measures are calculated only using the long position holdings of the portfolio.

*ETF div yields are SEC 30 day yield as of 12/30/16. Source: individual fund companies.

SYLD trades at the lowest valuation of all ETFs in every single category. In many cases, the aggregate holdings in SYLD are significantly cheaper than those of the competing dividend funds.
And for any skeptics remaining, wondering about the extent to which valuation really matters, I'll point you to a report from O'Shaughnessy Capital Management. The group conducted research on the subject and concluded the following:

> **"While (dividend) yield is attractive in general, one of the most important lessons we've learned in the large cap market is that it becomes unattractive when expensive… … if a company has a high yield but is also cheap, then it has outperformed the market by 3.29%, on average. But when a stock has a high yield and is trading at expensive multiples of earnings, sales, EBITDA, and free cash flow, it's lost to the market by an average of 2.06% a year."**
>
> (O'Shaughnessy Asset Management, The Myth of the Most Efficient Market, 2013.)

As we stand here today looking forward, SYLD offers the lowest valuation out of all of these ETFs. We'll let you draw your own conclusion as to what this might mean for future returns.

Yes, this is a challenging market for income investors, but it doesn't have to be an impossible market. Income, growth, and good values are still out there. If you haven't looked at SYLD in a while, maybe it's time.

Appendix

This paper was compiled to provide a framework to analyze the characteristics of Cambria's ETF, Shareholder Yield (NYSE: SYLD) relative to funds that seek to offer investors exposure to U.S. based companies with a focus on dividends, and/or U.S. based companies with a focus on share buybacks, when such Funds are available. The valuation data—at the time this report was written—reflects the fundamental data of Price/Earnings ratios, Price/Book ratios, Price/Sales ratios, Price/Cash Flow ratios, and dividend yield so that investors can compare the ETFs across the same metrics. All information is provided strictly for educational and illustrative purposes only.

No representation is being made that any investment will achieve performance that is similar to the returns shown above. The information provided should not be considered investment advice.
Below is more information on each of the referenced funds in this paper.

VIG (all info below from ETFDB 12/5/16)		
OBJECTIVE	This ETF is linked to the Dividend Achievers Select Index, which offers exposure to dividend paying large-cap companies that exhibit value characteristics within the U.S. equity market.	
Cost, Expenses, Sales Charges, Expense Ratio	0.10%	
Liquidity	AUM: $22,222.1 M	Shares: 262.2 M
	1 Month Avg. Volume: 1,022,232	3 Month Avg. Volume: 812,008
Safety	There are risks associated with investing in VIG, including possible loss of principal.	
Guarantees or Insurance	There are no guarantees or insurance when investing in VIG.	
Fluctuation of Principal or Return	Because of its narrow focus, VIG may be more volatile than broadly diversified funds, and generally result in greater price fluctuations than the overall market.	
Tax Features	Before investing in VIG, investors should consult their own CPA or tax attorney to determine whether the investment is right for them.	

DVY (all info below from ETFDB 12/5/16)		
OBJECTIVE	This ETF is one of several options available to investors looking to focus equity exposure on dividend-paying stocks; the underlying index screens the equity universe by factors such as dividend per share growth rate, dividend payout percentage rate, and dividend yield.	
Cost, Expenses, Sales Charges, Expense Ratio	0.40%	
Liquidity	AUM: $16,420.1 M	Shares: 188.7 M
	1 Month Avg. Volume: 1,432,273	3 Month Avg. Volume: 1,106,905
Safety	There are risks associated with investing in DVY, including possible loss of principal.	
Guarantees or Insurance	There are no guarantees or insurance when investing in DVY.	
Fluctuation of Principal or Return	Because of its narrow focus, DVY may be more volatile than broadly diversified funds, and generally result in greater price fluctuations than the overall market.	
Tax Features	Before investing in DVY, investors should consult their own CPA or tax attorney to determine whether the investment is right for them.	

DVY (all info below from ETFDB 12/5/16)		
OBJECTIVE	This ETF is linked to the FTSE High Dividend Yield Index, which offers exposure to dividend paying large-cap companies that exhibit value characteristics within the U.S. equity market.	
Cost, Expenses, Sales Charges, Expense Ratio	0.10%	
Liquidity	AUM: $16,392.8 M	Shares: 221.0 M
	1 Month Avg. Volume: 1,106,900	3 Month Avg. Volume: 898,667
Safety	There are risks associated with investing in VYM, including possible loss of principal.	
Guarantees or Insurance	There are no guarantees or insurance when investing in VYM.	
Fluctuation of Principal or Return	Because of its narrow focus, VYM may be more volatile than broadly diversified funds, and generally result in greater price fluctuations than the overall market.	
Tax Features	Before investing in VYM, investors should consult their own CPA or tax attorney to determine whether the investment is right for them.	

SDY (all info below from ETFDB 12/5/16)		
OBJECTIVE	This ETF is linked to the S&P High Yield Dividend Aristocrats Index, which offers exposure to dividend paying large-cap companies that exhibit value characteristics within the U.S. equity market.	
Cost, Expenses, Sales Charges, Expense Ratio	0.35%	
Liquidity	AUM: $14,994.5 M	Shares: 176.1 M
	1 Month Avg. Volume: 1,043,082	3 Month Avg. Volume: 898,867
Safety	There are risks associated with investing in SDY, including possible loss of principal.	
Guarantees or Insurance	There are no guarantees or insurance when investing in SDY.	
Fluctuation of Principal or Return	Because of its narrow focus, SDY may be more volatile than broadly diversified funds, and generally result in greater price fluctuations than the overall market.	
Tax Features	Before investing in SDY, investors should consult their own CPA or tax attorney to determine whether the investment is right for them.	

SDY (all info below from ETFDB 12/5/16)		
OBJECTIVE	This ETF is linked to the S&P High Yield Dividend Aristocrats Index, which offers exposure to dividend paying large-cap companies that exhibit value characteristics within the U.S. equity market.	
Cost, Expenses, Sales Charges, Expense Ratio	0.35%	
Liquidity	AUM: $14,994.5 M	Shares: 176.1 M
	1 Month Avg. Volume: 1,043,082	3 Month Avg. Volume: 898,867
Safety	There are risks associated with investing in SDY, including possible loss of principal.	
Guarantees or Insurance	There are no guarantees or insurance when investing in SDY.	
Fluctuation of Principal or Return	Because of its narrow focus, SDY may be more volatile than broadly diversified funds, and generally result in greater price fluctuations than the overall market.	
Tax Features	Before investing in SDY, investors should consult their own CPA or tax attorney to determine whether the investment is right for them.	

HDV (all info below from ETFDB 12/5/16)		
OBJECTIVE	This ETF from iShares tracks the Morningstar Dividend Yield Focus Index, which gives investors exposure to dividend paying large-cap companies that exhibit value characteristics within the U.S. equity market.	
Cost, Expenses, Sales Charges, Expense Ratio	0.08%	
Liquidity	AUM: $6,189.1 M	Shares: 77.2 M
	1 Month Avg. Volume: 707,086	3 Month Avg. Volume: 510,682
Safety	There are risks associated with investing in HDV, including possible loss of principal.	
Guarantees or Insurance	There are no guarantees or insurance when investing in HDV.	
Fluctuation of Principal or Return	Because of its narrow focus, HDV may be more volatile than broadly diversified funds, and generally result in greater price fluctuations than the overall market.	
Tax Features	Before investing in HDV, investors should consult their own CPA or tax attorney to determine whether the investment is right for them.	

PKW (all info below from ETFDB 12/9/16)		
OBJECTIVE	This ETF focuses in on companies that have bought back large numbers of shares in the past year. In order to be included, a company must have repurchased at least 5% of its outstanding shares in the past twelve months.	
Cost, Expenses, Sales Charges, Expense Ratio	0.68%	
Liquidity	AUM: $1,400.0 M	Shares: 27.1 M
	1 Month Avg. Volume: 106,805	3 Month Avg. Volume: 102,848
Safety	There are risks associated with investing in PKW, including possible loss of principal.	
Guarantees or Insurance	There are no guarantees or insurance when investing in PKW.	
Fluctuation of Principal or Return	Because of its narrow focus, PKW may be more volatile than broadly diversified funds, and generally result in greater price fluctuations than the overall market.	
Tax Features	Before investing in PKW, investors should consult their own CPA or tax attorney to determine whether the investment is right for them.	

SYLD (all info below from ETFDB 12/5/16)		
Cost, Expenses, Sales Charges, Expense Ratio	0.59%	
Liquidity	AUM: $129.1 M	Shares: 4.0 M
	1 Month Avg. Volume: 8,882	3 Month Avg. Volume: 510,682
Risks	There are risks associated with investing in SYLD, including possible loss of principal. There is no guarantee that the Fund will achieve its investment goal. High yielding stocks are often speculative, high risk investments. The underlying holdings of the fund may be leveraged, which will expose the holdings to higher volatility and may accelerate the impact of any losses. These companies can be paying out more than they can support and may reduce their dividends or stop paying dividends at any time, which could have a material adverse effect on the stock price of these companies and the Fund's performance. International investing may involve risk of capital loss from unfavorable fluctuations in currency values, from differences in generally accepted accounting principles, or from economic or political instability in other nations. Emerging markets involve heightened risks related to the same factors as well as increased volatility and lower trading volume. Investments in smaller companies typically exhibit higher volatility. Narrowly focused funds typically exhibit higher volatility. The Fund is actively managed using proprietary investment strategies and processes. There can be no guarantee that these strategies and processes will produce the intended results and no guarantee that the Fund will achieve its investment objective. This could result in the Fund's underperformance compared to other funds with similar investment objectives. There is no guarantee dividends will be paid. Diversification may not protect against market loss.	

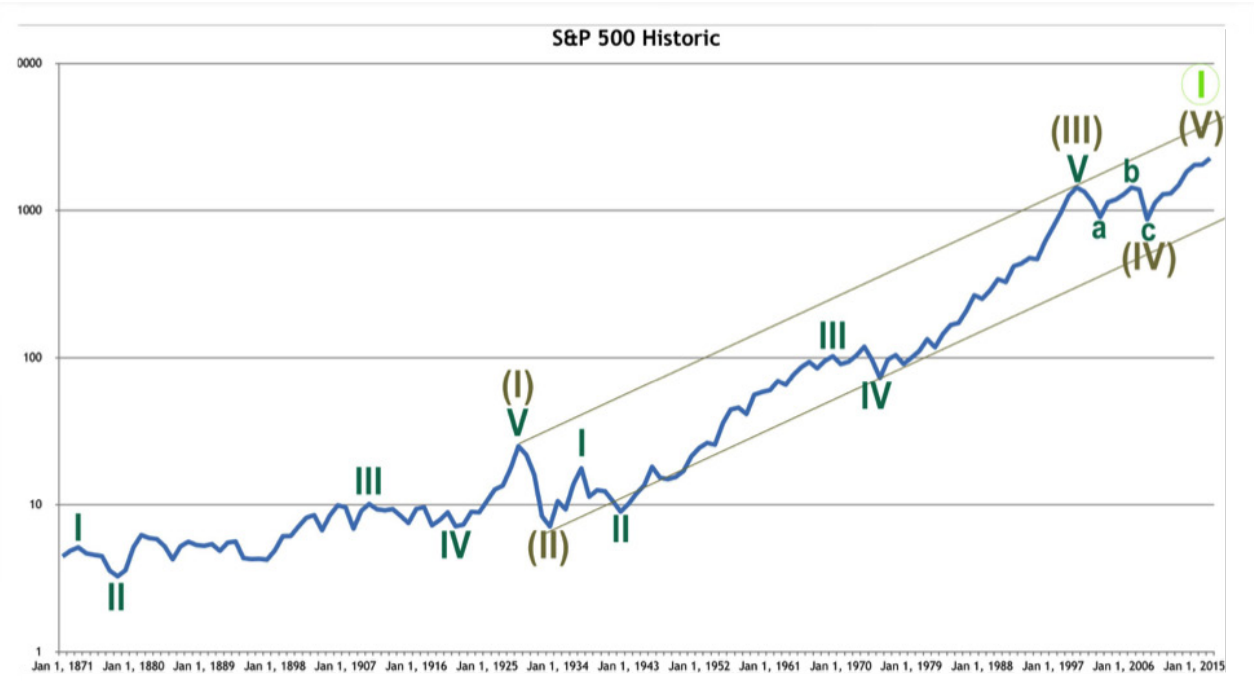
Guarantees or Insurance	There are no guarantees or insurance when investing in SYLD.
Fluctuation of Principal or Return	Because of its narrow focus, SYLD may be more volatile than broadly diversified funds, and generally result in greater price fluctuations than the overall market.
Tax Features	Before investing in SYLD, investors should consult their own CPA or tax attorney to determine whether the investment is right for them.

Editor's note: *for more information, please visit CambriaInvestments.com or email info@cambriainvestments.com.*

ELLIOT WAVE GRAND SUPER CYCLE ANALYSIS OF THE S&P 500 CASH INDEX - SUPPORTED BY CLASSIC TECHNICAL ANALYSIS

LARA IRIARTE, CMT

This Elliott wave analysis is offered as a long-term view of the wave structure of the S&P 500.



Historic Chart - Back to 1871

This analysis makes two base assumptions:

1. That the S&P 500 price is a good reflection of current social mood and Elliott waves.

* That the upwards wave to the market peak of 1929 can be counted as a complete five wave impulse. (Data used for this analysis goes back to 1871 only. Data prior to the inception of the S&P 500 index is an amalgamation of the US stock market back to that date.)

Because this data does not show the start of *Super Cycle wave* (I), no reasonable analysis of Fibonacci ratios can be made of cycle degree waves within it.

Within *Super Cycle wave* (I),), there looks to be perfect alternation between a zigzag for cycle wave II and a combination for cycle wave IV.

Super Cycle wave (II), unfolded around the same time as the Great Depression occurred, with the market low in 1933 ending the correction.

There are no adequate Fibonacci ratios between *cycle waves I, III and V* within *Super Cycle wave* (III),. There is perfect alternation between the very deep zigzag of cycle wave II, which was a 0.82 correction of *cycle wave* I, and the very shallow flat or combination of cycle wave IV, which was a 0.26 correction of *cycle wave III.*

On a log scale, almost all price movement since the market high of 1929 onwards fits well within a channel drawn using Elliott's technique. The exception is the depth of cycle wave II, which falls slightly below the channel, but this is fairly typical price behaviour for early and deep second wave corrections.

Super Cycle wave (I), was extended. *Super Cycle wave* (III), was a very long extension. *Super Cycle wave* (V), therefore may not be extended, so that the rule regarding extension is met: only one or two actionary waves within an impulse may be extended, not all three. The implication of this is very important: *Super Cycle wave* (V) should be expected to be more brief in time than *Super Cycle wave* (I) and (III) and may be expected to be over when it is a complete five wave impulse.

This analysis now turns to the structure of *Super Cycle wave* (IV) and (V).

Quarterly Chart

Super Cycle wave (IV) fits well as an expanded flat correction for the S&P 500 data.

Within *Super Cycle wave (IV),* the upwards wave labelled *cycle* wave b is a 1.06 length of *cycle wave* a. This is slightly longer than the minimum requirement for *cycle* wave b within an expanded flat correction. *Cycle wave* c is shorter than the common length of 1.618 to *cycle wave* a but does end below the end of *cycle wave* a, avoiding a truncation, and exhibits no Fibonacci ratio to *cycle wave* a.

Both *cycle wave* a and b subdivide as zigzags (within flats both waves must subdivide as threes) and *cycle wave* c will fit neatly as a five wave impulse.

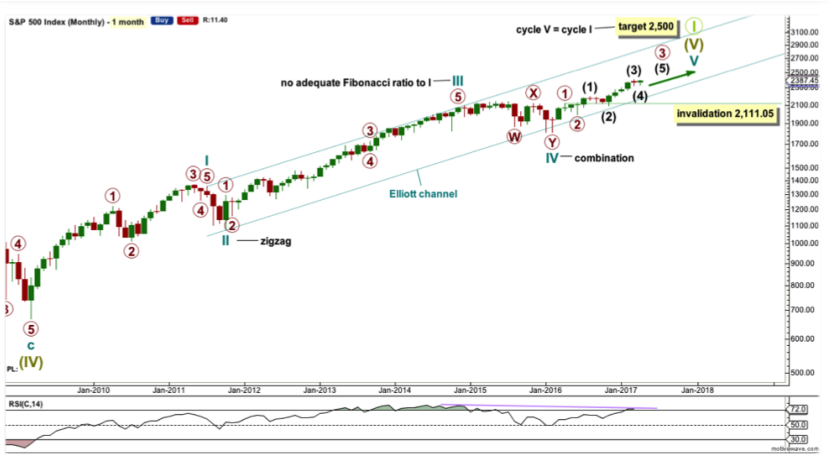
There is no adequate Fibonacci ratio between primary waves A and C within *cycle wave* a. Within *cycle wave* b, primary wave C is 20.54 points short of equality in length with *primary wave* A. This difference is less than 10% of the length of *primary wave* C, so it is judged to be close enough to say that these waves exhibit a Fibonacci ratio of equality.

There is no adequate Fibonacci ratio between *primary wave* 1 and 3 within *cycle wave* c. *Primary wave* 5 is just 9.95 points longer than 0.382 the length of *primary wave* 1.

The conclusion at this stage is that *Super Cycle wave (IV)* must be over. An alternate Elliott wave count cannot be made by decreasing the degree of labelling within *Super Cycle wave* (IV) all down one degree and seeing this flat correction as only cycle wave a of a continuing and larger flat, nor as a first structure within a continuing double combination. While there is no rule stating a limit for B waves within flats (nor for X waves within combinations, which are analogous to them), there is a convention within Elliott wave that states when the possible B wave reaches twice the length of the possible A wave the idea of a flat correction (or combination) should be discarded based upon a very low probability. In this case, that price point was passed on March 1, 2017, when price moved above 2,393.23.

The monthly chart below focusses on the structure of *Super Cycle wave (V).*

Monthly Chart



There is no adequate Fibonacci ratio between *cycle waves I and III* within *Super Cycle wave (V)*. This means it is more likely that *cycle wave V* would exhibit a Fibonacci ratio to either of *cycle waves I* or III. The most common ratio for a fifth wave is equality in length with the first wave, and this would be achieved almost exactly at the round number pivot of 2,500 meaning this target has a reasonable probability.

Cycle wave I of *Super Cycle wave (V)* ends with a slight truncation on July 7, 2011. The structure of this wave fits perfectly on the daily chart as an impulse and has a close Fibonacci ratio between two of the three actionary waves within it.

Cycle wave II fits perfectly as a relatively shallow zigzag, correcting to 0.41 the depth of *cycle wave I. Cycle wave II* lasted 62 days. *Cycle wave IV* is a shallower 0.27 double combination, lasting 269 days. This is six days short of 4.236 the duration of *cycle wave II.* There is good proportion and perfect alternation between these two corrective waves.

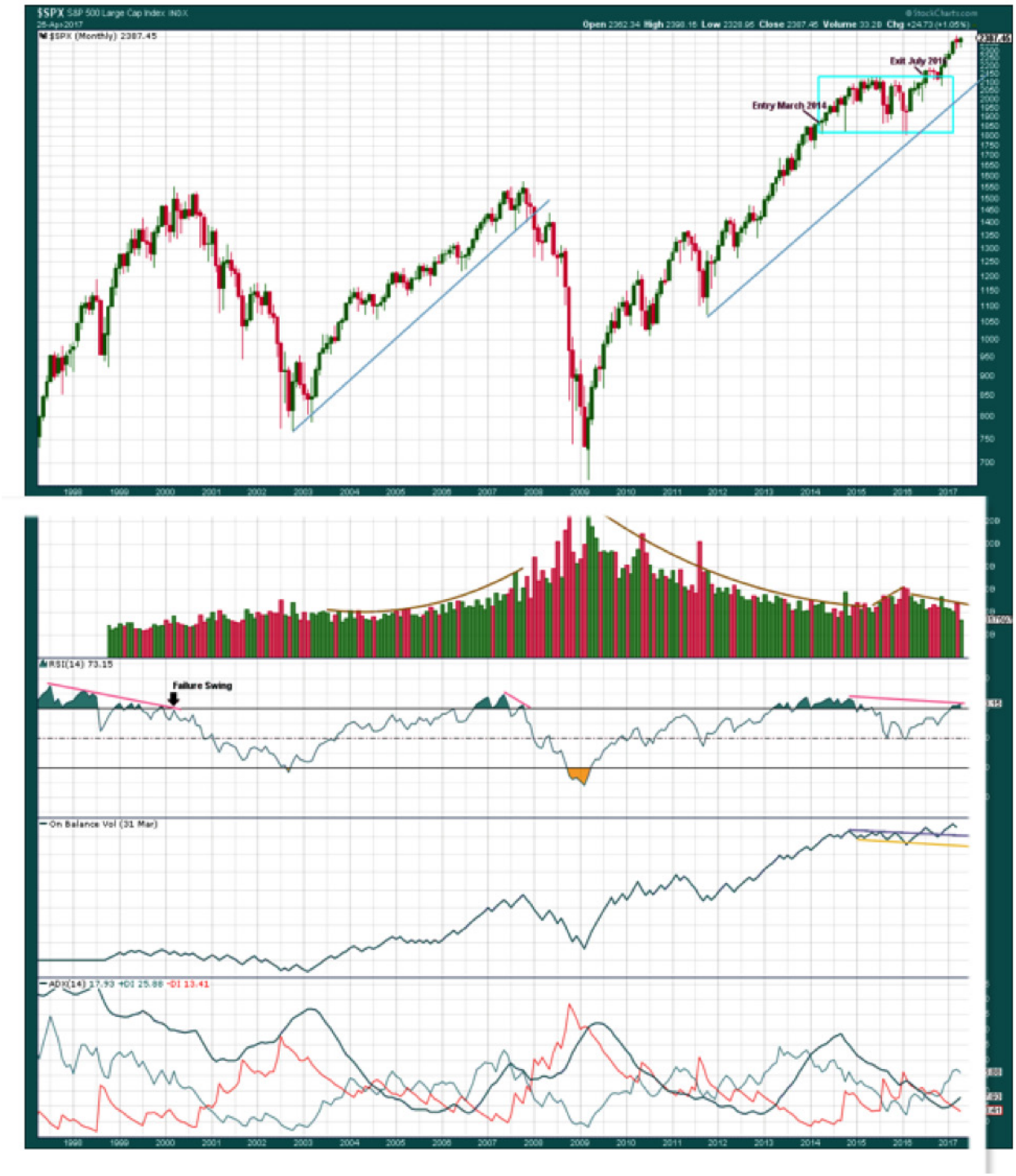
Weekly Chart

This analysis now focuses on the structure of a possible final fifth wave at two large degrees, to end a long-term wave lasting multi generations.

Within the final wave of cycle wave V, primary waves 1 and 2 are complete and primary wave 3 looks incomplete. Primary wave 3 may only subdivide as an impulse, and within that impulse the intermediate wave (4) correction may not move into intermediate wave (1) price territory below 2,193.81.

Within the impulse of primary wave 3, intermediate wave (3) is just 9.86 points short of 1.618 the length of intermediate wave (1).

Classic Technical Analysis - Monthly Chart



Up to the market high of March 2000 RSI had exhibited multiple divergence for many months, and on March 2000 exhibited a failure swing. The subsequent bear market to the low in October 2002

was characterized by some increase in volume and extreme ADX above both directional lines, then the bear ended quickly after RSI reached oversold at the monthly chart level.
The next bull market to the high of October 2007 was characterized by a steady increase in volume. The rise in price had support from volume and this overall looks like a normal healthy bull market. Then prior to the end of the bull market ADX began to decline and at the end RSI exhibited strong and single divergence with price.

The bear market from October 2007 to March 2009 was also supported by increasing volume. Only right at the end did ADX reach extreme. The final month saw a Piercing pattern candlestick with the second candlestick having a very bullish long lower wick. At this point, RSI was deeply oversold and the low of the March 2009 candlestick saw single month bullish divergence between the new low for price and a higher low for RSI.

The following and current bull market has been characterized by declining volume as well as RSI, at this stage, exhibiting single and long-term divergence with price. These two situations support an Elliott wave count that sees the current wave as a fifth wave. Fifth waves should exhibit weakness compared to their prior third waves, and at their ends they should exhibit increasing weakness. Going back to July 1997, RSI does exhibit very clear long-term divergence with price.

On Balance Volume is currently bullish and ADX is not extreme. ADX indicates an upwards trend in place; there is room still for price to rise further.

Using the rectangle pattern and a measured rule, a target for upwards movement after the breakout from the pattern would be about 2,455. This fits reasonably well with the Elliott wave target.

Conditions which may develop at the end of cycle wave V:

2. Divergence with the AD line lasting a minimum of 4 months (currently there is no divergence).

3. A further decline in volume.

4. Further divergence with RSI, and possibly a failure swing.

5. A bearish signal from On Balance Volume.

6. Extreme ADX or declining ADX.

Wave Notation Reference

Wave Notation

(I) Grand Supercycle	generations *(lime green)*
(II) Supercycle	multi decade (about 40-70 years) *(olive)*
III Cycle	one to several years *(teal green)*
(4) Primary	a few months to a couple of years *(maroon)*
(5) Intermediate	weeks to months *(black)*
A Minor	weeks *(blue)*
(b) Minute	days *(pink)*
(c) Minuette	hours *(green)*
i Subminuette	minutes *(orange)*
(2) Micro	minutes *(purple)*
(3) Submicro	minutes (very few) *(light blue)*
4 Miniscule	seconds to minutes *(red)*

Lara Iriarte, CMT holds a BSc in Science from Auckland University. A science degree has taught her to view data objectively and think logically. She provides daily Elliott wave and technical analysis of the S&P500 cash and Gold spot markets to her members at ElliottWaveStockMarket.com and ElliottWaveGold.com. On these websites Lara has built a small community of experienced professionals who share their knowledge and experience trading these markets.

THE 'GRAND OLD PARTY' AND THE U.S. DOLLAR

HOWARD FRIEND, CMT

The storming of the White House by Donald Trump last November created not just the usual ripples on a change in U.S. leadership but many shockwaves both at home and abroad as the world holds its breath waiting for the 'New Normal' to emerge.

For those trying to get a handle on what to expect over the next four or more years the early months of the Presidency have been a little perplexing to say the least. Differences have emerged between Mr. Trump's isolationist pre-election rhetoric and some of his actions in the Oval Office, particularly in the field of foreign policy which has seen unilateral action in Syria, strong assurances given to NATO and the ramping up of stakes with North Korea.

Despite all the confusion and contradictions witnessed so far it is worth pointing out that while in what used to be called 'the free world' the leader of the elected political party holds a very large amount of sway over government policy, he or she will still need a groundswell of support to retain power. This involves consensus-building and compromise with the various power brokers within the ruling party which inevitably leads to some dilution of the power of the president relative to the party.

Assuming the 'party over president' theme holds true in this case and that the core values of the Republican party are to dominate the major policy decisions going forward I thought it would be a worthwhile exercise to review the historical performance of the U.S. dollar during various Republican administrations to see whether there were any common themes which could affect the value of the currency. Here's what I discovered.

Since Nixon's landslide victory and inauguration in 1969 there have been eight U.S. presidents prior to the current incumbent. I list them here along with the accompanying percentage change in the dollar as measured by the U.S. dollar exchange rate verses the Euro since inception in 1999 and its constituent parts prior to inception.

U.S. Presidents (1969 to 2017)

- Richard Nixon (January 1969 to August 1974): Percentage change in U.S. dollar: -16.23%
- Gerald Ford (August 1974 to January 1977): Percentage change in U.S. dollar: +2.23%
- Jimmy Carter (January 1977 to January 1981): Percentage change in U.S. dollar: -10.28%
- Ronald Reagan (January 1981 to January 1989): Percentage change in U.S. dollar: +9.79%
- George H.W. Bush (January 1989 to January 1993): Percentage change in U.S. dollar: -8.68%
- Bill Clinton (January 1993 to January 2001): Percentage change in U.S. dollar: +30.80%
- George W. Bush (January 2001 to January 2009): Percentage change in U.S. dollar: -29.13%
- Barack Obama (January 2009 to January 2017) : Percentage change in U.S. dollar: +24.72%

Here is a chart courtesy of FXtop.com which highlights the trend in the currencies of the Eurozone against the U.S. dollar from the late-1960s to date.

Source: FXtop.com

The chart shows a slight upward bias in the trend (downward bias for the USD) since 1985 when the G5's Plaza Agreement halted the steep rise in the value of the dollar seen during the early Reagan years. While the bias has on balance been for a lower dollar over the whole period it is worth noting that there have been a number of significant price swings of large duration which provided opportunities for the global macro investor. Note that the decline (U.S. dollar advance) which has been in effect since 2008 has held above the trendline coming in from the 1985 and 2000 lows – a positive sign for the market technicians among us.

Putting these price swings into the context of who was in the White House at the time a very interesting fact stands out. **The dollar has tended to fall when a Republican has been the**

incumbent with three out of the five Republican presidents presiding over a decline in the currency while only one of the three Democratic presidents (Carter) at the wheel while the dollar fell.

Taking a closer look at the numbers and counting the full terms of the ruling parties sheds some more light on what could be an inherent 'bias' towards the currency dependent on which party has been elected. I list the administration by party and changes in the value of the dollar below:

U.S. dollar: percentage changes by political party (1969 to 2017)

REPUBLICAN: Nixon and Ford (January 1969 to January 1977)
Percentage change in U.S. dollar: -14.37%
DEMOCRAT: Carter (January 1977 to January 1981)
Percentage change in U.S. dollar: -10.28%
REPUBLICAN: Reagan and Bush (January 1981 to January 1993)
Percentage change in U.S. dollar: +0.26%
DEMOCRAT: Clinton (January 1993 to January 2001)
Percentage change in U.S. dollar: +30.80%
REPUBLICAN: G.W. Bush (January 2001 to January 2009)
Percentage change in U.S. dollar: -29.13%
DEMOCRAT: Obama (January 2009 to January 2017)
Percentage change in U.S. dollar: +24.72%

The 1970s were not a good time to be holding U.S. dollars under administrations of any stripe. The decline which followed Nixon's departure from the stability of the Bretton Woods Agreement saw a net loss for the combined Republican term at 14.37% which was extended under Carter before Reagan and monetarism saved the day, halting the inflationary spiral which had dogged monetary policy during the 1970s. Apart from the fact that Nixon abandoned the stability of a 'pegged' exchange rate in favor of a floating (or sinking) currency, no major party political biases were apparent until the latter half of the 1980s.

Things started to become clearer during Reagan's second term and into Bush senior's sole term as the dollar saw a complete reversal in its post-Plaza Accord advance by the time the Republican triple-term had ended in 1993. Some might say that the next president, Mr. Clinton, may have benefitted from a 'peace dividend' as an extended period of global stability unfolded following the end of the Cold War which may have contributed to the first sustained period of strength under a Democratic President. The U.S. unit ended his scandal-hit second term some 30% higher than where he found it eight years prior.

The Clinton Presidency gave way to a less sanguine era in which George W. Bush gifted the world with a post-9/11 "with us or against us" consensus which saw the controversial involvement in Iraq and the 2008 financial crisis. Looking through the rear view mirror it may come as no big surprise

that the dollar ended nearly 30% lower at the end of his tenure but could it have been a case of returning to type under another long period of Republican control?

The third successive 20% plus move in the U.S. unit occurred under Mr. Obama who had to adopt many of the foreign policy stances of his predecessor whilst fighting the fires of the financial crisis. While government finances continued to deteriorate the fact that confidence slowly ebbed back into the financial system after the meltdown along with a broad disengagement from far away wars and combined with woes in the Eurozone may have helped to put a floor under the greenback.

Despite all of the major events on the world stage which have occurred since the end of the 1960s, which conventional wisdom would argue for a stronger or weaker US dollar the facts are as follows:

REPUBLICAN presidential terms have seen an average DECLINE in the US dollar of 14.41%
DEMOCRATIC presidential terms have seen an average RISE in the US dollar of 15.07%

A good case for a bearish turn in trend?

Regardless of whether one believes that movements in the value of the U.S. dollar or the Euro for that matter are dependent on external shock events (Rumsfeld's "unknown unknowns") or indeed the policy decisions of those in power who are guided by their own collective political persuasions, it is worth noting that financial markets often appear to have a 'life of their own.

As with most things in life there are often long-term trends and cycles at work which have a strong pull on prices over time which can create logic defying price movements. Of note in this case is the fact the six price swings I have highlighted have shared similar characteristics in terms of extent, particularly in terms of duration. This begs the question: Where could we be in the current cycle? Here are the average price swings from 1969 to 2016 along with details of each price swing:

Average percentage change: 67.24%
Average duration: 94.83 months (7.9 years)
August 1969 to October 1978: Duration: 110 months, percentage change: -36.08%
October 1978 to February 1985: Duration: 76 months, percentage change: +130.15%
February 1985 to September 1992: Duration: 92 months, percentage change: -57.39%
September 1992 to October 2000: Duration: 97 months, percentage change: +77.14%
October 2000 to July 2008: Duration: 93 months, percentage change: -48.39%
July 2008 to December 2016: Duration: 101 months, percentage change: +54.28%

As at the time of writing (25th April 2017) the Euro/US dollar exchange rate is trading around the 1.0900 level having found support in the 1.0300-1.0500 region following the 2014/2015 slide which completed the larger decline (U.S. dollar advance) from the 2008 peak. This begs the question:

Could the last major up cycle for the U.S. dollar have run its course? A comparison with the extent and duration numbers seems to point in that direction as the last U.S. dollar uptrend had been in effect for 101 months (versus 94.83 months) at the December 2016 U.S. dollar peak while the extent number of +54.28% fell a little short of the 67.24% average price movement but was well within the historical range.

Conclusion

While the political, economic and cyclical drivers which ultimately produce the large trends in asset prices can often be at odds with each other at least two of these dynamics have in my view created a 'perfect storm' for the U.S. dollar. Republican governments have tended to coincide - either by accident or by design - with a falling currency while the U.S. dollar has actually been rising (EUR/USD falling) for longer than its historical average term which suggests a very high risk of seeing a much lower U.S. dollar over the next few years.

While the Eurozone will undoubtedly have its own problems to contend with not least keeping the bloc together post-Brexit my guess is that whatever may be in store for the U.S. over the Trump presidency could be (or more importantly, perceived to be) relatively worse than the issues facing Europe. For those who are in the business of forecasting currency rates this is the salient point as one currency is measured in terms of another as there are two sides to the equation.
Whatever the drivers of the impending under performance of the US dollar may turn out to be the paradox is that a weaker currency will ultimately provide a boon to Trump's "America first" agenda as the so called "currency manipulators" will finally be brought to book courtesy of yet another competitive devaluation in the almighty U.S. dollar. Watch this space……

Howard Friend, CMT, is a Swiss-based multi-asset class trader with a specialization in the development and trading of systematic chart-based methodologies ('HF Systems'). Howard is Chief Investment Officer, Easy Neu Alpha Partners SA. He has developed his own trading methodology, 'Break and Retrace,' which aims to capitalize on 'market traps' where the vast majority of participants have become wrong-footed due to a technical or news-driven movement thus creating the conditions for a significant pick up in price momentum. He is a member of Swiss self-regulatory organization ARIF. He can be reached at howardmarcfriend@gmail.com.

BFF STOCKS: BACH, FIBONACCI, FRACTALS, AND US EQUITIES

ANALYSIS OF MODEL TRADING STRATEGY UTILIZING MAP QUANTITATIVE EQUITY RESEARCH DATA

JASON BODNER, LUCAS DOWNEY, RAN ZHAO AND VICKY ZHOU

SUMMARY

This paper explores an in-depth analysis of enhancing a model trading strategy utilizing MAP quantitative equity research data. Three studies were conducted and the dataset representing the weekly pool of securities for portfolio construction spanned over 3.5 years.

This paper poses the following primary question:

> *Can we use quantitative analysis to enhance the desirable risk-adjusted return of the Compass 20/10 model trading strategy?*

STUDY ONE: MODEL PORTFOLIO - WEEKLY COMPASS 20/10

The first study addressed the following question:

> *Is there enough statistical significance using MAP quantitative equity research data to create the Compass 20/10 model trading strategy to achieve desirable risk-adjusted return?*

HYPOTHESIS: A model portfolio constructed with the aim of buying stocks with the highest Compass Scores, and shorting stocks with the lowest Compass Scores each week will generate desirable risk-adjusted return over time with statistical significance.

RESULTS: The model strategy tested assumes portfolio construction based on the weekly COMPASS 20/10 reports. On a model portfolio of $1 million, it assumes dollar neutral execution of 20 initiated longs and 10 initiated shorts executing Market-On-Close orders on the date each basket was generated, with associated closing prices. Assumptions for trade impact slippage, commissions, and borrow rates for shorts were assumed which are detailed later in this report. The

report also details our quantitative analysis based on the COMPASS 300 database, from which we analyzed 55,278 data points beginning 1/2/2013. The categories of interest are the Compass Score, Technical Score, and Fundamental Score.

Our findings show that the annualized Sharpe Ratio of our target stocks is **1.96** for the time period between 01/02/2013 and 06/14/2016. The maximum Sharpe Ratio of **2.02** appears on the 5th trading day after the baskets are initiated. According to the regression results which are based on the optimal holding period of 5 trading days, we found that the Compass Score is **positively significant** for 5-day holding periods, indicating that stocks with higher Compass Scores suggest a higher return after 5 trading days. We further dissected the Compass Score into a Technical Score and a Fundamental Score in order to exclude the fundamental changes that influenced our stocks returns. The results still showed the fundamental score to be **positively significant** for 5-day holding periods.

STUDY TWO: COMPASS 20/10 TRADING STRATEGY BASED ON COMPASS SCORES – DEFINING OPTIMAL THRESHOLDS

The second study posed the questions:

> Can we define optimal thresholds for upper and lower extremes of the Compass Score with statistical significance?
>
> Can we define optimal holding periods for the model strategy with statistical significance?

HYPOTHESIS: Both an upper boundary and lower boundary of Compass Score exists at which point the Compass Score might exhibit an inverse signal.

RESULTS: Using the same portion of the COMPASS 300 dataset, we performed a refined 2.5% interval return distribution analysis on Compass and Technical Scores. The thresholds gravitated towards 0.175 and 0.9 for Compass Scores, and 0.225 for the downside portion of Technical Scores. There appears to be no statistically significant upside threshold for Technical Score. The returns displayed in the charts of this study correspond to the 5-day optimal holding period's returns. The annualized average returns for stocks where Compass Scores are larger than 0.9 is -41.83%, while the annualized average returns for stocks whose Compass Scores are smaller than 0.175 is +84.67%. This observation indicates that extreme positive and negative score tail results may actually exhibit an inverted signal.

STUDY THREE: COMPASS 20/10 TRADING STRATEGY BASED ON COMPASS SCORES WITH OPTIMAL THRESHOLDS

The third study posed the questions:

> *Do applying boundaries of upper thresholds for stocks with high Compass Scores and a lower boundary for stocks with low Compass Scores (eliminating extreme stocks and replacing with the next available Compass 300 stocks) enhance risk-adjusted return with statistical significance?*

If so, can we combine this with an optimal holding period to achieve further enhanced risk-adjusted return?

HYPOTHESIS: Eliminating stocks with scores above and below a defined threshold residing on the Compass 20/10 report, coupled with a defined optimal hold time will enhance the risk-adjusted return of the Compass 20/10 model trading strategy.

RESULTS: Employing a 100% rollover strategy for new baskets constructed from the same compass 300 dataset of more than 55,000 stocks, we excluded stocks with compass scores above 90 or below 17.5 As defined by the upper and lower thresholds from the results of study two. The investment horizon for this test strategy also lasts 3.5 Years, from january 2nd, 2013 to june 14th, 2016. We found that the 3.5 -Year net return of our rotating basket investment strategy yields 91.18%, Compared to 77.59% For the unfiltered compass 20/10 with no thresholds employed. Compared with the original compass 20/10 100% rollover strategy, we found the average weekly return on baskets increased from 0.36% To 0.40% (+4Bps), and the standard deviation increased from 1.43% To 1.45% (+2Bps); the annualized sharpe ratio increased from 1.79 To 1.96 (+0.17), And we compounded our principle and return every week. The 5-day holding period average sharpe ratio is 2.02 For our strategy employing thresholds, compared to the old average 5-day holding period sharpe ratio 1.71 Without thresholds.

Whether or not you listen to classical music, J.S. Bach's impact on music in general is undisputable. He is generally hailed as the greatest composer of all time, composing well over 1,000 known works. He was prolific in family as well, fathering 20 children. Surprising to many, when he died in 1750, most of his music died with him and it wasn't until 1829 when a 19 year old19-year-old Felix Mendelsohn revived Bach's works and ignited a new foundnew-found passion for his music. Some may know that Bach aimed to make each composition perfect as an offering to God. With this fact, his music is replete with mathematical symmetry and hidden numerical meaning. In the mystical numerology known as Gematria, B equals 2, A equals 1, C equals 3 and H equals 8: the sum is 14. Both 14 and its mirror 41 (achieved by adding the numerical J and S to the prior result) were Bach's favorites. These two numbers, as well as many others, are hidden in the notes and musical structure of Bach's compositions. For example, there are 14 Canons in the Goldberg Variations and 14 Contrapuncti in the Art of Fugue. Symmetry is found heavily in the Goldberg Variations as his contrapuntal (two independent melodic lines) phrases would deviate and explore dizzying heights until they invariably would resolve, releasing the musical tension he created.

The fact is, numbers, data, and quantitative relationships can be found in nearly everything in nature. One need only look toward the Golden Ratio found in hurricanes, tree branches, or even the structure of galaxies. The Fibonacci sequence is found countless places in nature, from the arrangement of petals on a flower to the scales of a pineapple. Similarly, fractals can be found in Romanesco Broccoli, the chambered shell of a Nautilus, pinecones, ice crystals, tree branches, and the list goes on and on.

If numerical patterns exist everywhere in nature and even in musical creations of man, the question can logically be redirected toward the financial markets:

Can we use quantitative analysis of fundamental and technical stock data to reveal statistically significant patterns in order to generate a strategy with desirable risk-adjusted return?

This was a founding question that served as a basis to begin MAP in the first place. To expound further on this question, we performed a series of studies based on MAP equity research historical data and the Compass 20/10 report. In this paper, we explore the analysis of MAP equity data to reveal patterns in the US equity market arranged into a model portfolio strategy. This model strategy describes a set of possible outcomes that exhibit desirable risk-adjusted return. We refer to this strategy as the COMPASS 20/10 strategy.

INTRODUCING THE COMPASS SCORING METHODOLOGY

Compass Score is a numeric ranking that we assign to a company (equity) based on our proprietary technical and fundamental filters. We begin our analytic process by defining a universe of US stocks that we deem to be tradable by institutions. We filter for stocks that meet our minimum criteria including amongst others: liquidity, market capitalization, average volume, and whether options are available. This universe is defined daily and yields an average of roughly 1400 US equities. The stocks that pass the filters collectively function as an index of institutionally tradable stocks that we refer to as the **MAP 1400.**

At this point, 110 individual historical data points are retrieved for each stock. A truncated list of example data points are shown in the table below.

STOCK DATA EXAMPLES:

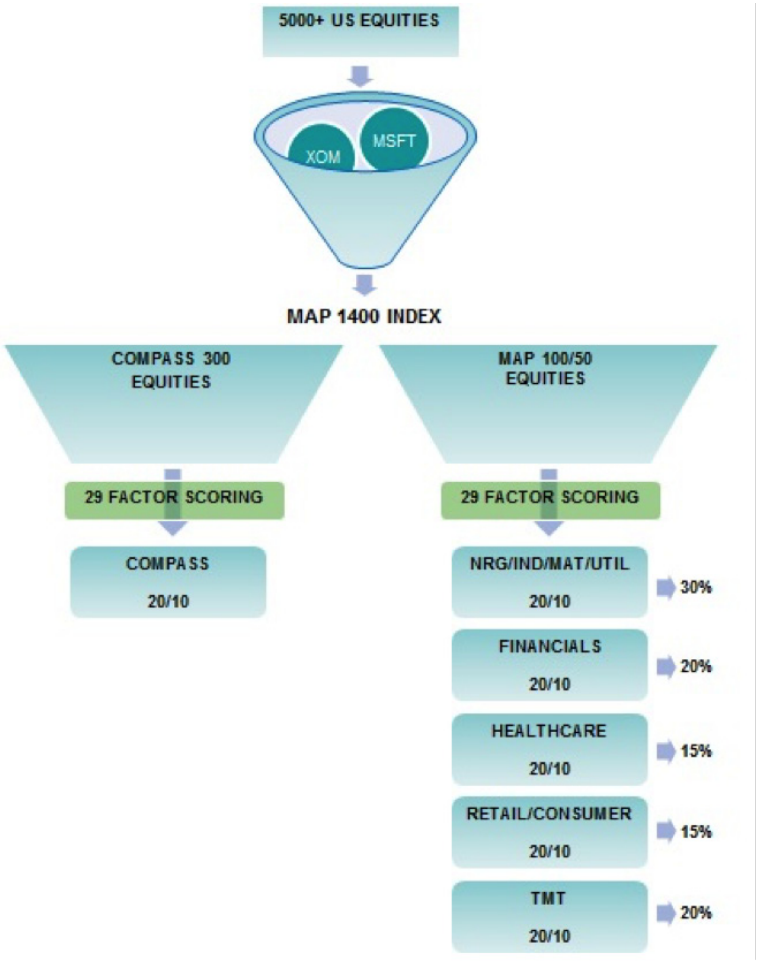
TECHNICAL	FUNDAMENTAL
Price highs and lows within a specified time period	Revenue and Earnings Growth - Single and Multi Year
52 week highs and lows	Analyst Revisions
Average Daily Volume within a specified time period	P/E ratio
Historical Volatility for a specified time period	Debt Levels
Several Moving Averages	Cash Flow
Relative Performance to Sector	Enterprise Value

We then employ a factor scoring methodology on the MAP 1400 utilizing 29 factors, each with various combinations of subsets of the 110 data points. Each factor component is part of an aggregate score. Aggregate scores approaching 100 are more bullish; approaching 0 are more bearish. The scores are further divided into technical and fundamental components. The technical score is our factor scoring methodology dealing with market mechanics: trading volumes, buying/selling pressure, price ranges, and volatility to name a few factors. The fundamental score is our factor scoring methodology dealing with the fundamental health of a company: revenues, earnings, debt, and revisions to name a few. The composite Compass Score is roughly 58% market mechanics (technical) and 42% fundamentals.

An additional Technical filter is applied searching for potentially unusual institutional activity. We identify this activity by studying violations of relationships between price, volume and volatility. When a stock violates the upper thresholds on our filter it receives a PBO designation indicating

potential unusual institutional accumulation. When a stock violates the lower thresholds on our filter it receives a PBD designation indicating potential unusual institutional distribution. PBO connotes Potential Breakout (Bullish Signal) while PBD connotes Potential Breakdown (Bearish Signal). Each day finds roughly 100 stocks resulting in PBO or PBDs in aggregate. For the purpose ofFor the model portfolios published each week which are used in this study, we aggregated 5 days' worth of returns and removed duplicate stocks (roughly 40%). This gave us an average weekly universe of 300 stocks exhibiting unusual institutional activity. We refer to this weekly pool as the **COMPASS 300.**

The MAP Equity Filtering and Scoring Process



From this pool of 300 average weekly stocks, we select the 20 highest scores, and 10 lowest scores to assemble a weekly basket of stocks. The study examines a weekly strategy of initiating longs for the top 20 stocks, and shorts for the bottom 10 stocks. The long bias is based on several factors including historic long bias of the equity market and the observation that suggested shorts exhibit a higher beta component than suggested longs, thus partially neutralizing the long bias. These baskets are referred to as Compass 20/10 baskets.

Example of Compass 20/10 basket generated 6/21/16

COMPASS

COMPASS Top 20 and bottom 10 Stocks for the week prior.

Prepared by Macro Analytics for Professionals on 6/21/16 based on closing prices for the previous day.

TICKER	NAME	SECTOR	INDUSTRY GROUP	INDUSTRY SUBGROUP	PRIOR CLOSE	COMPASS SC	TECHNICAL	FUNDAMENTAL
MNST	Monster Beverage Corporation	Consumer Staples	Food Beverage & Tobacco	Soft Drinks	156.17	84.5	85%	83%
EGHT	8x8, Inc.	Telecommunication Service:	Telecommunication Services	Alternative Carriers	13.76	82.8	94%	67%
AM	Antero Midstream Partners LP	Energy	Energy	Oil & Gas Storage & Transport	25.91	82.8	79%	88%
SJM	J. M. Smucker Company	Consumer Staples	Food Beverage & Tobacco	Packaged Foods & Meats	145.16	81.0	91%	67%
ALB	Albemarle Corporation	Materials	Materials	Specialty Chemicals	83.01	81.0	94%	63%
RGLD	Royal Gold, Inc.	Materials	Materials	Gold	67.51	81.0	94%	63%
PLAY	Dave & Buster's Entertainment, Inc.	Consumer Discretionary	Consumer Services	Restaurants	47.58	81.0	85%	75%
CYBR	CyberArk Software Ltd.	Information Technology	Software & Services	Systems Software	48.32	79.3	71%	92%
GRUB	GrubHub, Inc.	Information Technology	Software & Services	Internet Software & Services	30.59	79.3	74%	88%
SYK	Stryker Corporation	Health Care	Health Care Equipment & Services	Health Care Equipment	116.09	79.3	79%	79%
FNV	Franco-Nevada Corporation	Materials	Materials	Gold	70.6	79.3	91%	63%
WEC	WEC Energy Group Inc	Utilities	Utilities	Multi-Utilities	62.94	79.3	94%	58%
COR	CoreSite Realty Corporation	Financials	Real Estate	Specialized REITs	84.61	77.6	88%	63%
FNSR	Finisar Corporation	Information Technology	Technology Hardware & Equipment	Communications Equipment	18.83	77.6	82%	71%
DOC	Physicians Realty Trust	Financials	Real Estate	Health Care REITs	20.33	77.6	88%	63%
Z	Zillow Group, Inc. Class C	Information Technology	Software & Services	Internet Software & Services	34.76	75.9	82%	67%
GLPI	Gaming and Leisure Properties, Inc.	Financials	Real Estate	Specialized REITs	34.58	75.9	82%	67%
LOCK	LifeLock, Inc.	Consumer Discretionary	Consumer Services	Specialized Consumer Servic	15.59	75.9	82%	67%
TRMB	Trimble Navigation Limited	Information Technology	Technology Hardware & Equipment	Electronic Manufacturing Ser	26.7	75.9	85%	63%
RICE	Rice Energy Inc.	Energy	Energy	Oil & Gas Exploration & Prod	22.48	75.9	91%	54%
DB	Deutsche Bank AG	Financials	Diversified Financials	Diversified Capital Markets	16.3	31.0	29%	33%
SNY	Sanofi Sponsored ADR	Health Care	Pharmaceuticals Biotechnology & Life Sciences	Pharmaceuticals	39.1	31.0	15%	54%
SPWR	SunPower Corporation	Information Technology	Semiconductors & Semiconductor Equipment	Semiconductors	15.07	29.3	15%	50%
JD	JD.com, Inc. Sponsored ADR Class A	Consumer Discretionary	Retailing	Internet Retail	21.06	29.3	18%	46%
RARE	Ultragenyx Pharmaceutical, Inc.	Health Care	Pharmaceuticals Biotechnology & Life Sciences	Biotechnology	54.5	29.3	26%	33%
ERJ	Embraer S.A. Sponsored ADR	Industrials	Capital Goods	Aerospace & Defense	21.06	29.3	21%	42%
VNET	21Vianet Group, Inc. Sponsored ADR Clas	Information Technology	Software & Services	Internet Software & Services	11.39	24.1	15%	38%
HMHC	Houghton Mifflin Harcourt Company	Consumer Discretionary	Consumer Services	Education Services	16	24.1	18%	33%
INSM	Insmed Incorporated	Health Care	Pharmaceuticals Biotechnology & Life Sciences	Biotechnology	9.645	20.7	18%	25%
CS	Credit Suisse Group AG Sponsored ADR	Financials	Diversified Financials	Diversified Capital Markets	12.84	20.7	15%	29%

STUDY ONE: MODEL TRADING STRATEGY BASED ON COMPASS SCORES STRATEGY GUIDELINES

The model strategy tested, assumes execution of 20 initiated longs and 10 initiated shorts executing Market-On-Close orders on the date each basket was generated. It assumes closing prices were achieved on the date the baskets were released with an assumption for trade impact slippage of 0.75%. Commissions were accounted for on a 0.0025 per share trade transaction cost. Borrow rates for shorts were assumed to be 1.25%.

We used the following additional assumptions:

- Portfolio size of $1,000,000
- Longs were selected as the top 20 scoring stocks from the compass 300
- Shorts were selected as the bottom 10 scoring stocks from the compass 300
- Each stock included in our basket is equally dollar weighted ($33,333 exposure on each stock) at week 1 then compounded forward
- Using the average stock price of $30, each position was hypothetically 1,111 shares
- 20% Of our basket's stocks repeated from prior week's basket (based on historic observation)
- Transaction fees calculated as .0025*30*1111*52=$4,332.90
- Annual transaction fee in percentage is 0.433%

STATISTICAL DESCRIPTION OF OUR DATA

In this report, we present the results of our quantitative analysis based on the COMPASS 300 database, from which we analyzed 55,278 data points beginning 1/2/2013. The categories of interest in our data include the Compass Score, Technical Score, and Fundamental Score.

METHODOLOGY

Sharpe Ratio Calculations for each holding period were based on the following formula:

$$\text{Sharpe Ratio} = \frac{E[R_{cumulative}]}{\sqrt{Var(R_{cumulative})}}$$

We performed a simple linear regression to test the significance of each variable.

RESULTS

Our initial findings show that the annualized Sharpe Ratio of our target stocks is **1.96** for the time period between 01/02/2013 and 06/14/2016. The maximum Sharpe Ratio is **2.02**, which appears on the 5th trading day after we initiate our baskets. According to the regression results which are based on the optimal holding period of 5 trading days, we find that the Compass Score is positively significant for 5-day holding periods, which indicates that stocks with higher Compass Scores suggest a higher return after 5 trading days. From a more detailed point of view, we decomposed the Compass Score into a Technical Score and a Fundamental Score so that we could exclude the fundamental changes that influenced our stocks' returns. The results still show the fundamental score to be positively significant for 5-day holding periods.

STUDY TWO: COMPASS 20/10 TRADING STRATEGY BASED ON COMPASS SCORES-DEFINING OPTIMAL THRESHOLDS
REVISITING THE COMPASS SCORE

As discussed earlier, the Compass Score is a numeric ranking that we assign to a company (equity) based on our proprietary technical and fundamental filters. PBO means Potential Breakout (Bullish Signal), PBD means Potential Breakdown (Bearish Signal). The Compass Score is based on 29 technical and fundamental factors. PBO is based on additional parameters of potential buying and PBD is based on unusual potential selling. We perform our research based on the following assumptions:

1. All of the regressions use the cumulative return on day 5 without annualizing.
2. We use the equal dollar weighted method when calculating the return of the stock basket.
3. When we run the regression of returns and Compass Scores, we treat the stocks homogeneously.

STATISTICAL DESCRIPTION OF OUR DATA

In this report we present our quantitative results based on the COMPASS 300 database, from which we analyzed 55,278 data points. The categories of our data include MAP Compass Score, Technical Score, Fundamental Score, and cumulated returns of our target individual stocks over different periods and the S&P 500 returns accordingly.

	Min	1st Quarter	Median	3rd Quarter	Max
Compass Score	18.52	46.30	60.34	70.37	89.66
Technical Score	0.030	0.710	0.8282	1.0000	1.0000
Fundamental Score	0.0000	0.4900	0.5800	0.6700	1.0000
Stock Return on day 5	-0.5400	-0.0200	0.0000	0.0300	0.7700
S&P 500 Return	-0.1100	0.0000	0.0000	0.0100	0.0500
# of PBO	23,024				
# of PBD	32,254				
Time Period	01/02/2013-06/14/2016				
Total # of Data Points	55,278				

EXHIBIT 1: STATISTICAL DESCRIPTION

DEFINING UPPER AND LOWER SCORE THRESHOLDS

Using the same COMPASS 300 data points, we performed a refined 2.5% interval return distribution analysis on Compass and Technical Scores. The thresholds gravitated towards 0.175 and 0.9 for Compass Scores, and 0.225 for the downside portion of Technical Scores. There appears to be no statistically significant upside threshold for Technical Score. The returns displayed in the charts correspond to the 5-day optimal holding period's returns. The annualized average returns for stocks where Compass Scores are greater than 0.9 is -41.83%, while the annualized average returns for stocks whose Compass Scores are less than 0.175 is +84.67%. This observation indicates that extreme positive and negative score tail results may actually exhibit an inverted signal.

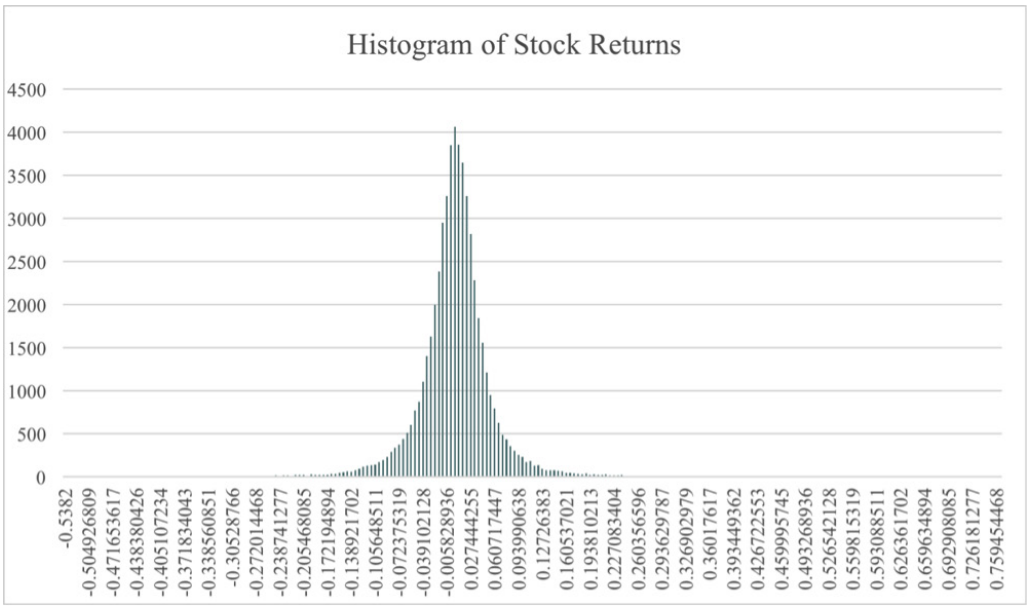


EXHIBIT 2: DISTRIBUTION OF STOCK RETURNS

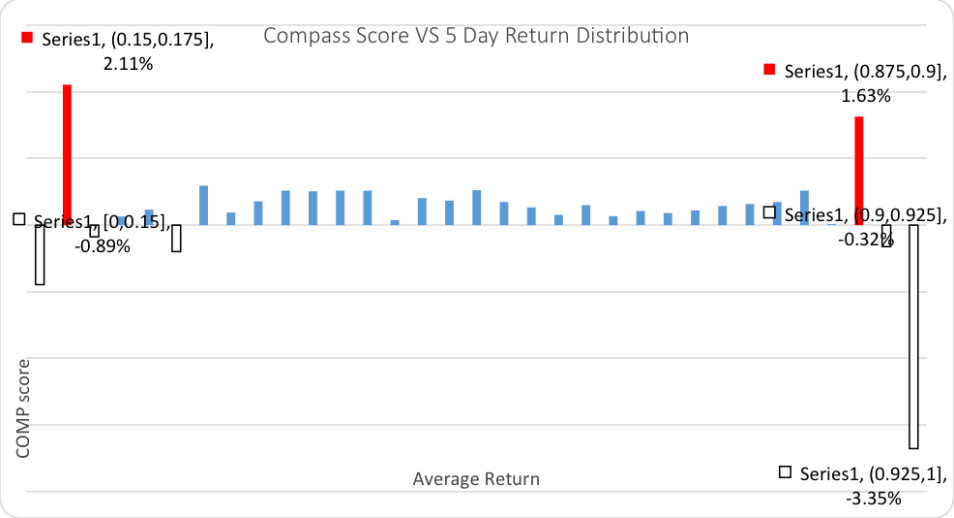
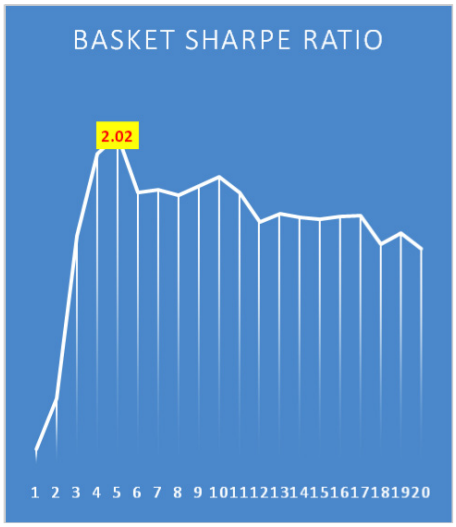


EXHIBIT 3: COMPASS SCORE VS RETURN ON DAY 5

OPTIMAL HOLDING PERIOD

This study considered holding periods from 1 day out to 20 days as 20 separate portfolios. We treated baskets for different weeks homogenously. For simplicity and comparison, we used the S&P 500 Index as our benchmark and utilized the Sharpe Ratio to represent the risk-adjusted return for each portfolio.

As seen in the graph below, we find that the optimal holding period is still the 5th trading day with a maximum Sharpe Ratio of 2.02 (We initiate longs and shorts at the closing prices on the report dates. The 1st holding day is defined as the next trading day, e.g. Jan. 2nd, 2013 initiation held until Jan. 23rd, 2013). The average basket Sharpe Ratio is 1.96 compared to the S&P 500's 0.69. The optimal holding period of S&P 500 is the 16th trading day with the max Sharpe Ratio equal to 0.95.



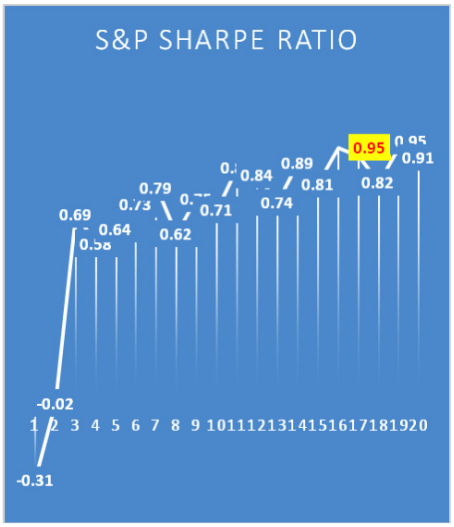


EXHIBIT 4: BASKET SHARPE RATIO & EXHIBIT 5: S&P SHARPE RATIO

REGRESSION RESULTS

Using the compass 20/10 data subset from the compass 300 for the same time period, we conducted regressions of the 5 day5-day cumulative stock returns on the s&p 500 index cumulative returns, compass, technical and fundamental scores. The results show that within the universe of data, the compass, technical and fundamental scores are all positively significant for 5-day holding periods. One interesting observation found that the parameter of the compass score is 0.0059897, Which means if the compass score increases by 1 unit, the annualized return of our basket would significantly increase by **+30.19%**. Similarlysimilarly, if the technical score increases by 1 unit, the annualized return of our basket would increase less, but still by **+7.14%**.

These positive results give us statistical confidence that the compass score could be used to generate extra returns after considering the market trend (s&p 500). We could construct a weekly strategy trading the compass 20/10 baskets and generate alpha on a desirable risk adjusted basis.

EXHIBIT 6: 5D RETURN ~ COMPASS + S&P (ADJUSTED R^2 = 0.2093)

	Coefficients	Standard Error	t Stat	P-value	Significance
(Intercept)	-0.0035779	0.0007795	-4.59	4.44E-06	***
MAP$ADJ.COMPASS	0.0059897	0.001294	4.629	3.69E-06	***
S.P.500.cum.ret.on.day.5	1.231091	0.0101815	120.914	2.00E-16	***

EXHIBIT 7: 5D RETURN ~ S&P + TECH + FUND (ADJUSTED R^2 = 0.2093)

	Coefficients	Standard Error	t Stat	P-value	Significance
(Intercept)	-0.0048024	0.0010476	-4.584	4.57E-06	***
MAP$TECHNICAL	0.0014162	0.0006875	2.06	0.0394	*
MAP$FUNDAMENTAL	0.0062502	0.001448	4.316	1.59E-05	***
S.P.500.cum.ret.on.day.5	1.2279407	0.0101612	120.846	2.00E-16	***

In the next section, we construct a 100% rollover strategy to apply our compass 20/10 strategy into real world application.

STUDY THREE: COMPASS 20/10 TRADING STRATEGY SCORE WITH OPTIMAL THRESHOLDS NEW BASKET CONSTRUCTION METHODOLOGY

For this portion of the study, we employ a 100% rollover strategy for new baskets constructed from the same compass 300 dataset of more than 55,000 stocks. We excluded stocks whose compass scores are above 90 or below 17.5 As defined by the upper and lower thresholds above. The investment horizon for this test strategy also lasts 3.5 Years, from january 2nd, 2013 to june

14th, 2016. Displayed in the graph below, we find that the 3.5- Year net return of our rotating basket investment strategy yields 91.18% Compared to 77.59% For the unfiltered compass 20/10 (no thresholds employed), significantly outperforming our benchmark s&p 500 return of 41.91% For the same time period. Compared with the original compass 20/10 100% rollover strategy, we see the average weekly return on baskets increases from 0.36% To 0.40% (+4Bps), and the standard deviation increases from 1.43% To 1.45% (+2Bps). The annualized sharpe ratio increases from 1.79 To 1.96 (+0.17). We compounded our principle and return every week until june 14th, 2016 at 4:00pm.

As a side note, the new 5-day holding period average sharpe ratio is 2.02 For our strategy employing thresholds, compared to the old average 5-day holding period sharpe ratio 1.71 Without thresholds.

EXHIBIT 8: RETURN DESCRIPTION

We used the following assumptions:

100% Rollover	New Basket	S&P
Mean	**0.40%**	**0.21%**
Stdev	**1.45%**	**1.77%**
Sharpe	**0.28**	**0.12**
Annualized Sharpe	**1.96**	**0.84**
Total Net Return	**91.18%**	**41.91%**
Maximum Drawdown	**14.35%** Peak on 7/28/2015 Trough on 9/29/2015	**17.62%**
Transaction cost	**Stock Trade Fee**	**Borrow rate**
Assuming there are 20% Repeated Stocks every week	**$.0025 per share**	**1.25%**
Execution slippage	**0.75%**	

- Portfolio size of $1,000,000
- Each stock included in our basket is equally dollar weighted ($33,333 exposure on each stock) at week 1 then compounded forward
- Using the average stock price of $30, each position is hypothetically 1,111 shares
- 20% Of our basket's stocks repeat from prior week's basket.
- Transaction fees calculated as .0025*30*1111*52=$4,332.90
- Annual transaction fee in percentage is 0.433%

DATA & METHODOLOGY

1. Cumulative basket returns and s&p 500 returns calculated on aug. 17Th, 2016.
2. Construct new compass 20/10 baskets
   - Based on the compass 300 dataset, we constructed new compass 20/10 baskets, excluding stocks where compass scores are above 90 or below 17.5. The investment horizon lasts 3.5 Years, from jan. 2Nd, 2013 to jun. 14Th, 2016.
3. Eliminate events on company m&a activities:
   - Replace companies having m&a targets during the report period with new tickers of the next highest scores.
4. Basket returns for 100% rollover strategy calculated as:
   - Invest $1 on jan. 2Nd, 2013 at 4:00 pm in our newest basket; roll over each investment in the new basket every week, at the closing prices on the report dates. Compound our principle and return every week until june 14th, 2016 at 4:00 pm.
5. Passive investment in s&p 500:
   - Invest $1 on jan. 2Nd, 2013 at 4:00 pm in s&p 500, hold our position for 3.5 Years and close our position on jun. 14Th, 2016 at 4:00 pm.

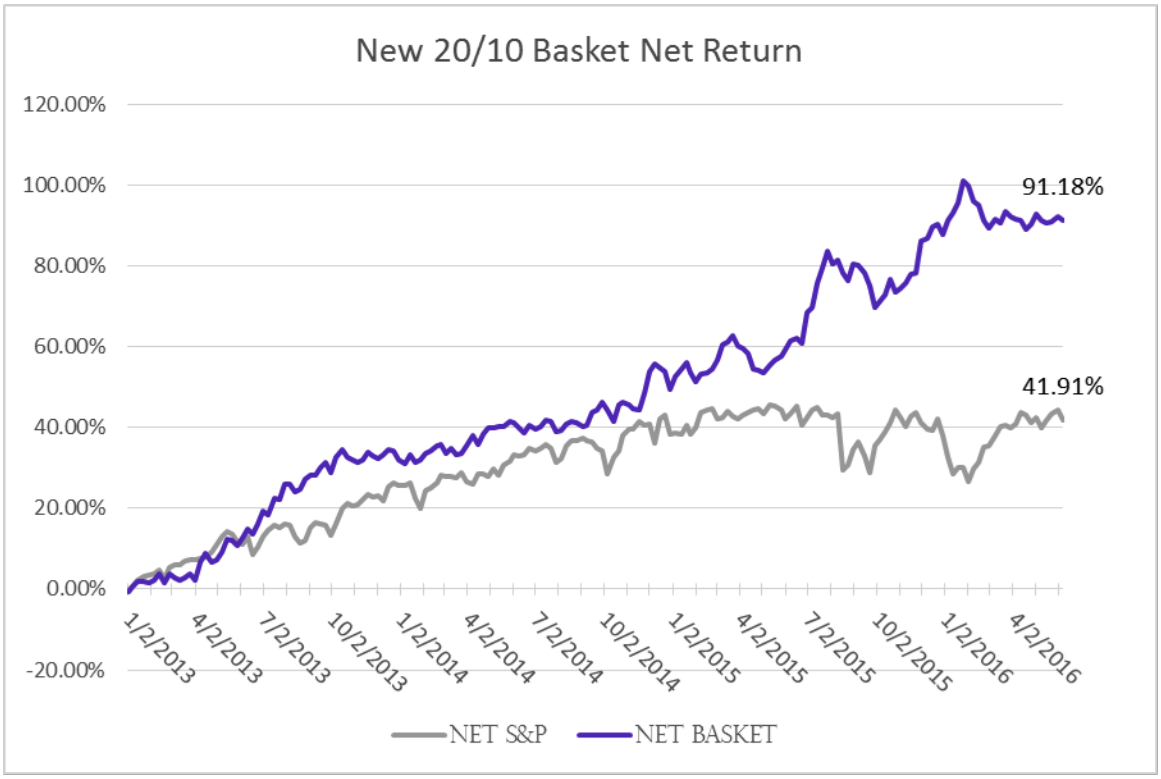


Exhibit 9: new 20/10 basket net return

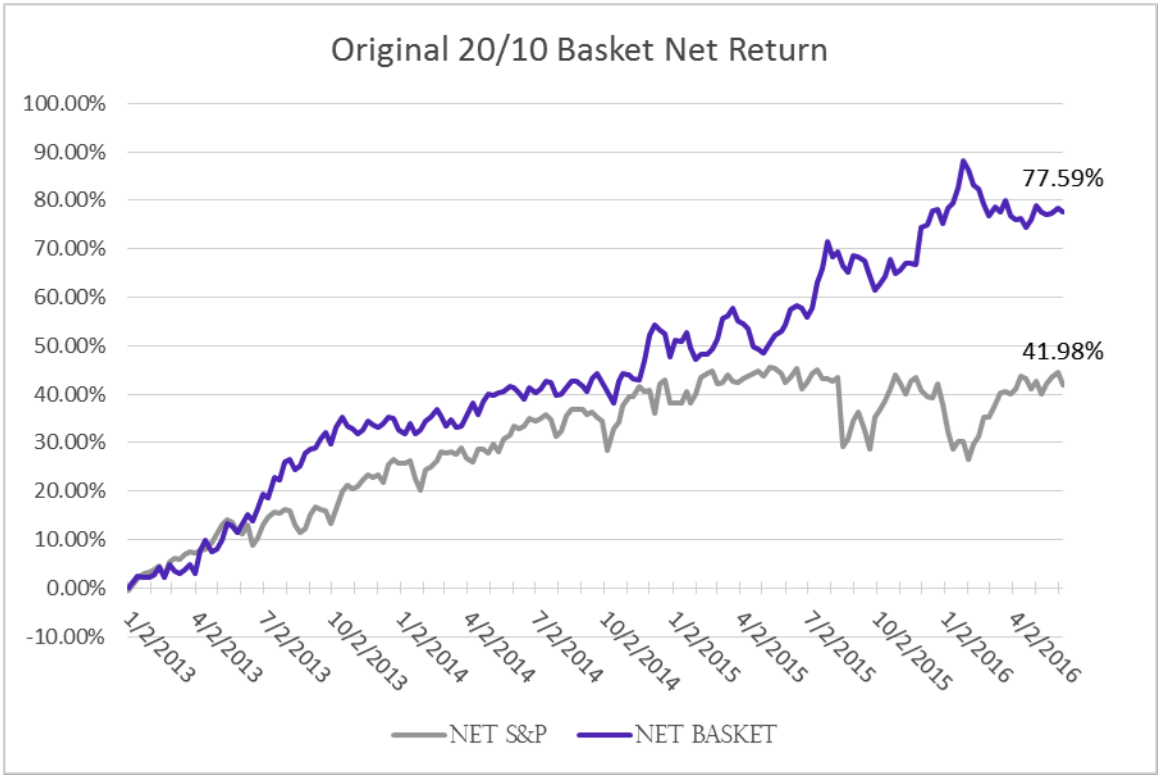


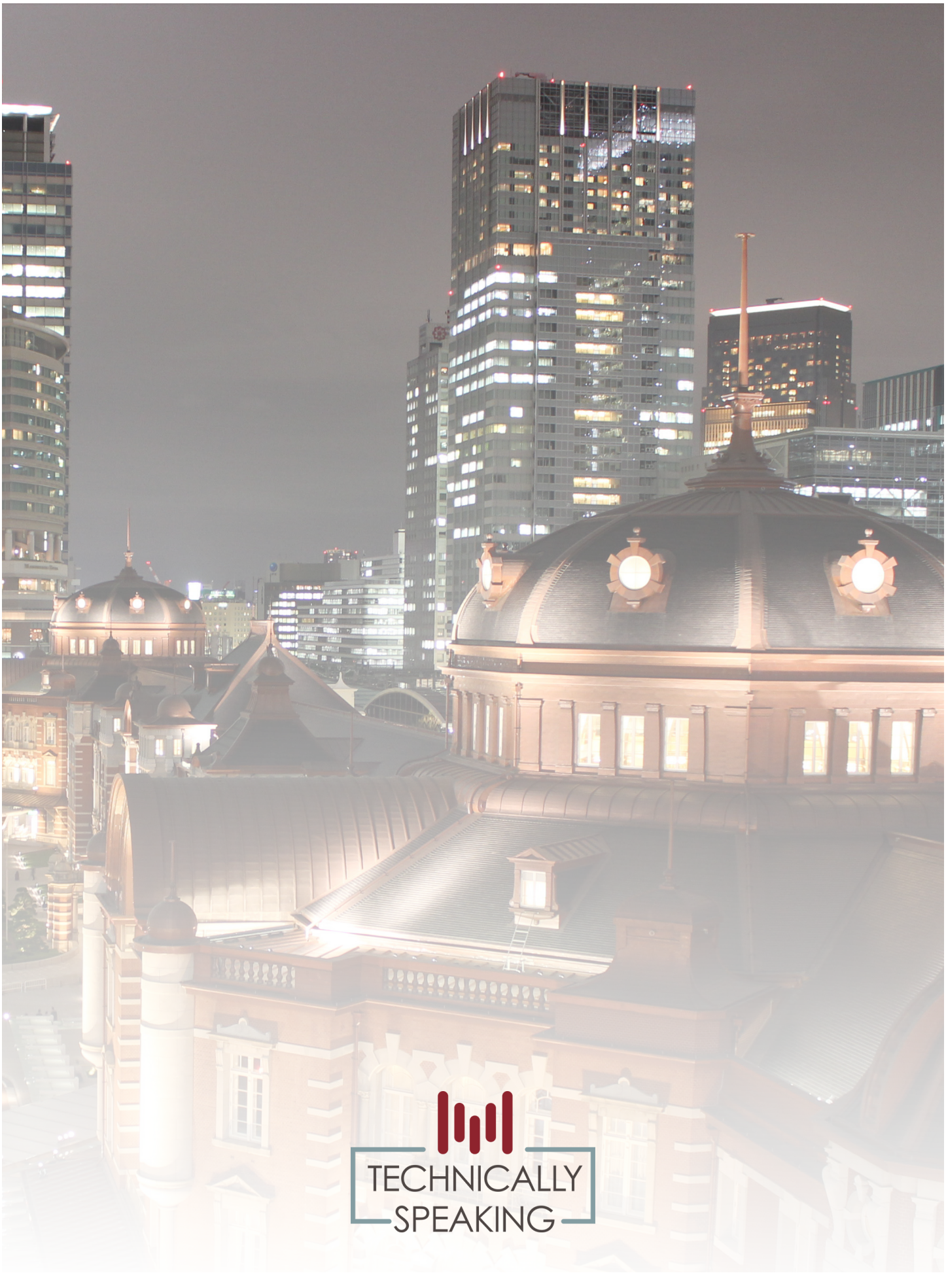
EXHIBIT 10: ORIGINAL 20/10 BASKET NET RETURN

CONCLUSION

In conclusion, we tested for the efficacy of using our compass score as a trade indicator using a dataset spanning 3.5 Year's. We found statistical significance in the effectiveness of the compass score. Constructing weekly baskets of 20 longs and 10 shorts, we found 5 days to be our optimal holding period. The shorter-term period for this strategy exhibits characteristics that reduce positonposition risk and generate considerable risk-adjusted return. We sought to enhance this strategy by defining upper and lower thresholds for the compass scores and optimal holding periods. Future studies may focus on different methodologies for basket construction utilizing an oscillating strategy of numbers of longs and shorts dictated by the overall market performance. We may also examine reliability of scores on a sector or industry group level. More analysis may also be performed on the intrinsic value of the pbo/pbd designation indicating unusual institutional activity.

Numerical patterns and symmetry exist all over nature, art, music, and virtually everywhere you look. When we apply a quantitative method to analyzing technical and fundamental data of stocks, patterns can emerge over larger data sets. These patterns can potentially be exploited by creating strategies to identify opportunities for alpha. Bach coded numerical puzzles in his music that computers are now analyzing. We at map seek to find hidden relationships and patterns in the equity markets. With these studies of a model trading strategy, we can illustrate that they do exist and that there are statistically significant ways to identify them, quantify them, and potentially profit from them.

The authors are part of macro analytics for professionals (map), an independent research firm. Map starts with the intricate study of relationships between price, volume, and volatility to extract measurable information not readily visible to an "on the surface" analysis. The firm seeks to identify unusual institutional activity. Rather than looking at fund flows, map seeks to measure unusual potential accumulation/distribution at the single stock level. To learn more, please visit their web site.


TECHNICALLY
SPEAKING