

Nasdaq Chaikin Power US Small Cap Index

A Multi-Factor Approach to Small Cap

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Multi-factor investing has become very popular in recent years. The term “smart beta” has been coined to categorize a number of these multi-factor indexes along with other interesting new forays into index-based investing. Although hundreds of factors have been identified as potential sources of outperformance, smart beta strategies in general include a combination of the following eight factors: Value, Growth, Momentum, Volatility, Size, Liquidity, Yield, and Quality.

There are a number of reasons for the growth of multi-factor indexes. One of the most appealing advantages of using a multi-factor investing strategy is that it gives an index the ability to capture alpha during different market cycles. For example, value, momentum, and low size factors all tend to do well during pro-cyclical business cycles. On the other hand, quality, low volatility, and yield seeking strategies all do better during defensive business cycles. Using this to our advantage, a multi-factor strategy that incorporates two factors such as momentum and quality would tend to complement each other and have the ability to capture alpha when one factor goes out of favor and the other outperforms. This also helps minimize drawdowns and dampen volatility which leads to improved risk management. There have been a number of studies on multi-factor investing within the financial academia which support this thesis¹.

This white paper will discuss the Nasdaq Chaikin Power US Small Cap Index (NQUSCHK) which adheres to the concept of multi-factor investing. Its dynamic methodology gives it the ability to use different factors in order to diversify the portfolio while still adding significant alpha during different market environments. This research piece will begin by taking a look at some of the specific eligibility requirements and factors which the index follows. Next, we will cover historical components, turnover and industry allocations. We will conclude by reviewing the performance metrics and risk analysis against the index's benchmark, the Nasdaq US 1500 Index (NQUSS1500), during different market environments, such as bull and bear markets.

Index Methodology Summary

ELIGIBILITY REQUIREMENTS

To be eligible for inclusion in the Nasdaq Chaikin Power US Small Cap Index a security must meet the following criteria:

- be a member of the Nasdaq US 1500 Index (NQUSS1500);
- have a 3-month average daily dollar trading volume in excess of \$1M;
- one security per issuer is permitted (if an issue has multiple securities, the security with the highest three-month average daily dollar trading volume will be selected for possible inclusion in the indexes);
- may not have entered into a definitive agreement or other arrangement which would likely result in the security no longer being Index eligible; and
- may not be issued by an issuer currently in bankruptcy proceedings.

Factors

All eligible securities in the Nasdaq US 1500 Index are evaluated using the Chaikin Power Gauge rating, a 20 factor model with Value, Growth, Technical and Sentiment factors. The Chaikin Power Gauge ratings are calculated annually in March for each member of the Universe based on market data through the end of February. To be included in the Index, a security must have a Power Gauge ranking of at least 90 (meaning its rating is better than 90% of the securities in the Universe). Alternatively, a security will be included in the Index if its Chaikin Power Gauge ranking is greater than 70 AND it ranks in the lowest quintile (bottom 20% of the Universe) based on its Price to Sales value. The resulting Index will typically consist of 200 to 350 Index securities. There are no sector constraints placed on the Index.

Each security receives a score for each of the 20 factors in the Chaikin Power Gauge Model. The factors are grouped into 4 groups where the scores are weighted by the group weight. The mapping of the factors to the groups and the weights on each group are as follows:

Value (Financials) (35%)

- **Long Term Debt to Equity Ratio:** Total long - term debt divided by total common equity, latest quarter
- **Price to Book Value Ratio:** Current price divided by book value per share, latest quarter
- **Return on Equity:** Income available to common stockholders as a percentage of total common equity, trailing 12 months
- **Price to Sales Ratio:** Market Cap + long term debt divided by sales, trailing 12 months
- **Free Cash Flow:** Net free cash flow relative to Market Cap, latest quarter

Technical (15%)

- **Price Trend:** Ratio of closing price to 200 - day exponential average
- **Price Trend Rate of Change:** 42 - day change in divergence from 200 - day exponential average
- **Chaikin Money Flow:** Chaikin Money Flow persistency of accumulation, 6 months
- **Relative Strength vs. Market:** 6-month price performance relative to S&P500
- **Volume Trend:** Ratio of 30 - day to 90 - day average daily volume

Growth (Earnings) (20%)

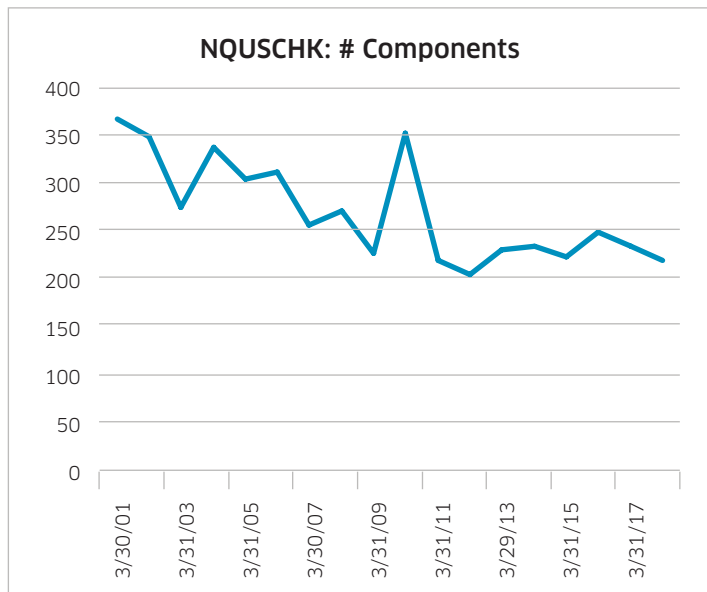
- **Earnings Growth:** Weighted average of 3 - 5 year EPS growth
- **Earnings Surprise:** Weighted average of recent quarterly EPS surprises
- **Earnings Trend:** EPS %change, trailing 12 months
- **Projected Price to Earnings Ratio:** Current price / mean analyst EPS estimate, next fiscal year
- **Earnings Consistency:** EPS consistency, recent and projected fiscal years

Sentiment (Experts) (30%)

- **Earnings Estimate Trend:** 13 - week change, mean analyst EPS estimate , next fiscal year
- **Short Interest:** Short Interest divided by shares outstanding, previous month
- **Insider Activity:** Net shares purchased by company insiders, previous 6 months
- **Analyst Ratings:** 4 - week change, average analyst rating
- **Industry Relative Strength:** 6 - month performance of stock's Industry relative to market

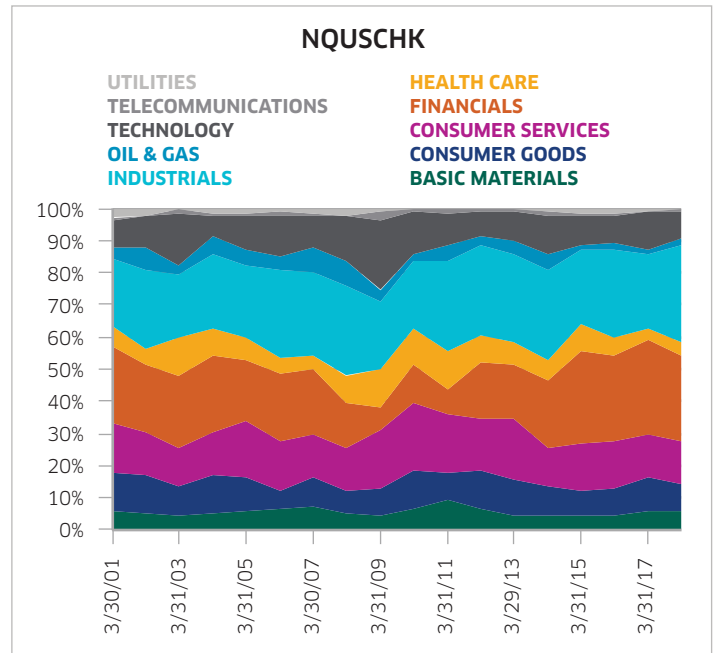
Historical Number of Components

The Index has averaged 270 components per year historically with the most recent rebalance in April 2018 coming in at a slightly lower 219 components. The universe of securities that is reviewed each year is a consistent 1500 and after all of the factor screens that go into the methodology, the index has resulted in about 1/6 of the pool. Annual turnover has been approximately 55% one-way. This means that every year around 45% of the companies stay in the index with the remaining 45% transitioning to new companies. All index components are set to equal weight as of the annual reconstitution date and are allowed to deviate throughout the subsequent 12 months based on market price movements.

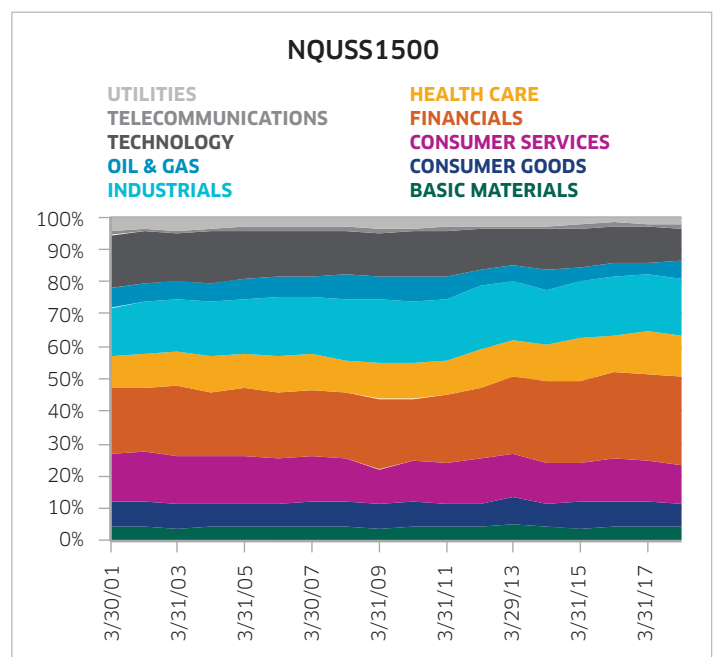


Industry Allocation

As can be seen in the graph below, the Nasdaq Chaikin Power US Small Cap Index has very strong diversification among the ICB industries.



Comparing this to its benchmark, the Nasdaq US Small Cap 1500 Index, NQUSS1500, you can see that the Chaikin Index has some variation, though it still covers the industries in similar proportions historically.



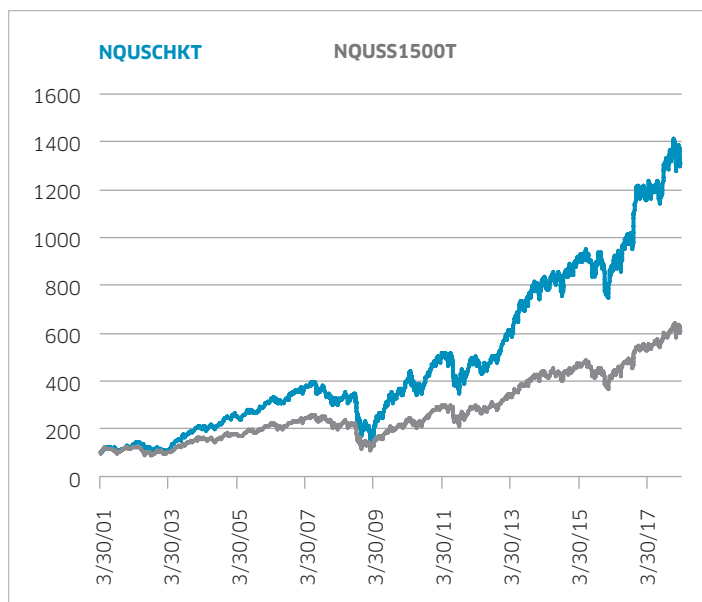
Annual Rebalance

The majority of the factors underlying the Chaikin Power Gauge® are longer term in nature. For example, factors that are included in the Value component, such as Price-to-Book and Free Cash Flow, as well as the Growth component, such as Earnings Consistency and Earnings Surprises, tend to have a longer term focus relative to Technical factors. These Value and Growth factors as well as select Sentiment factors, such as Insider Activity, combined receive a higher weight within Chaikin Power Gauge. Due to this methodology, the Index lends itself better to a longer term mindset. In turn, having the index rebalance on an annual basis is the most ideal frequency as it may allow the selected constituents the appropriate timeframe necessary to reach their true investment potential as indicated by the Chaikin Power Gauge. The annual rebalance also reduces turnover, because excessive turnover could lead to significant trading costs when tracking the index.

Performance

Now that we have a firm understanding of the methodology along with some additional background on the index, we will take a look at some performance numbers as well as general risk metrics for the Nasdaq Chaikin Power US Small Cap Total Return Index (NQUSCHKT) vs. the Nasdaq US 1500 Total Return Index (NQUSS1500T). This will allow us to get a better grasp on the advantages associated with the Nasdaq Chaikin Power US Small Cap Index. Furthermore, the vast time span we will use (3/30/2001 - 3/29/2018) will allow us to capture performance through a number of market cycles.

Standardized Performance/Risk (3/30/2001 - 3/29/2018)



The above chart compares the performance of each index beginning on 3/30/2001. Although both indexes had somewhat similar performance during the first few years of our study, NQUSCHKT began to separate itself during March 2003. Furthermore, one of the important tendencies to point out is the impressive performance NQUSCHKT has displayed since the end of the financial crisis.

In terms of performance statistics, NQUSCHKT gained 1212% on a cumulative basis while NQUSS1500T gained 513%. On an annualized basis, NQUSCHKT posted a 16% return with 25% annualized volatility compared to NQUSS1500T with an 11% return and 23% annualized volatility. The significant outperformance of NQUSCHKT with basically the same level of annualized volatility demonstrates the added benefit of using a multifactor index that is systematic in nature.

	NQUSCHKT	NQUSS1500T
Cumulative	1212%	513%
Annualized	16%	11%
Volatility (Annualized)	25%	23%

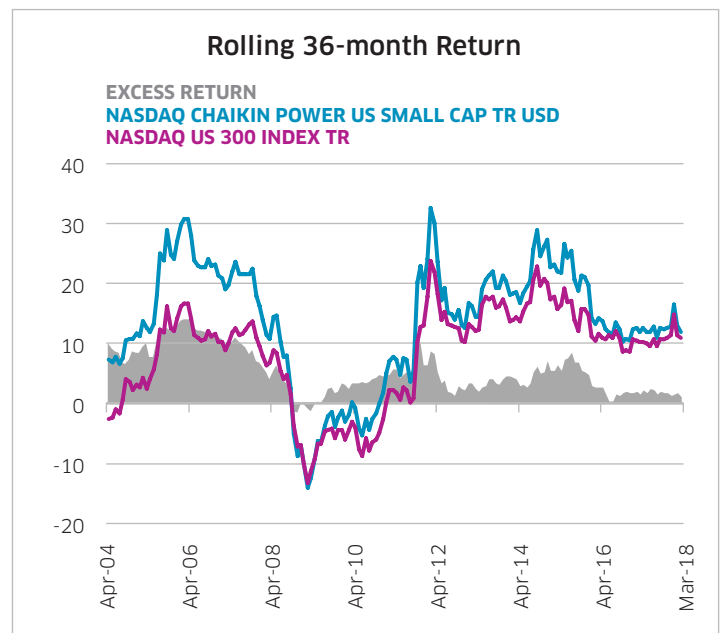
Calendar Year Performance/Risk (12/30/2001 – 12/29/2017)

We also analyzed the returns using year end dates from 2001 to 2017 (12/31/2001 – 12/29/2017). Later on in this piece we will dive into how each index performed during bull and bear markets, but for now this gives us a decent idea on what years the outperformance or underperformance was present. Both indexes saw the largest year over year gains in 2003 (NQUSCHKT: 69%, NQUSS1500T: 51%), while experiencing the largest losses in 2008 (NQUSCHKT: -34%, NQUSS1500T: -37%). In terms of losses, it's not surprising the largest came in 2008 during the financial crisis. The year which saw NQUSCHKT outperform NQUSS1500T by its largest amount was also in 2003 (69% vs. 51% or 18% relative outperformance). Furthermore, our table below helps confirm what we mentioned above regarding the outperformance of NQUSCHKT starting to pull away in 2003. It also displays the same type of characteristics during the time period after the financial crisis ended in 2009.

	NQUSCHKT	NQUSS1500T
2002	-6%	-17%
2003	69%	51%
2004	30%	21%
2005	13%	8%
2006	26%	19%
2007	-6%	1%
2008	-34%	-37%
2009	60%	43%
2010	32%	31%
2011	-7%	-5%
2012	24%	19%
2013	54%	39%
2014	8%	6%
2015	-1%	-5%
2016	35%	24%
2017	13%	15%

Rolling Performance of NQUSCHK vs NQUSS1500

In the chart below, we look at the rolling 36-month performance, measured monthly, of the Nasdaq Chaikin Power US Small Cap Index vs the Nasdaq US 1500 Index. As one can see, NQUSCHK has consistently outperformed NQUSS1500. In fact, NQUSCHK has done so 97% of the time, since the beginning of the back-test (as of 3/31/18). By viewing NQUSCHK's performance on a rolling basis, it provides a fuller return history and a deeper perspective on the index's returns stacked up at any point in time, not just through the latest month or quarter-end. For example, an index's current trailing three-year return spans just one discrete period. With rolling performance, however, an investor can look back 10 years or longer to see how a particular index has performed in every three-year period throughout its relevant history, encompassing a wider range of market types.



Performance during Bull Markets vs. Bear Markets

Gaining perspective on how each index performed during specific bull and bear markets helps get an idea on the risk management and ability to limit drawdowns during periods of heightened volatility. Below we analyze a number of time periods which are typically considered either a bull or bear market (as well as bear market corrections). In the five bear market time frames we studied, the first period, the financial crisis, (10/10/07 - 3/9/2009) saw the largest declines for both indexes. The returns for each index were fairly close during each bear market, with the difference being as narrow as 1% (11/3/15 - 2/11/16) and as wide as 4% (10/10/2007 - 3/9/2009).

The story is far different when analyzing the bull market time periods. The first bull market period we studied was between 10/9/2002 - 10/9/2007 which saw NQUSCHKT (+280%) outperform NQUSST1500 (+214%) by a fairly wide margin of roughly 66 percentage points. The next time frame was between 3/10/2009 and 4/22/2010 which saw NQUSCHKT gain 187% while NQUSST1500 climbed 125%. Regarding the final three bull market periods, performance during two of them was much closer in comparison. However, the longest time frame out of the three (10/4/2011 - 5/20/15) confirms significant outperformance of NQUSCHKT (+149%) over NQUSST1500 (+111%). The most obvious theme which stands out is the ability of NQUSCHKT to limit losses during bear markets but has the ability to let the winners ride during bull markets.

BEAR MARKETS		NQUSCHKT	NQUSST1500
START DATE	END DATE	RETURN	RETURN
10/10/2007	3/9/2009	-63%	-59%
4/23/2010	7/2/2010	-21%	-18%
4/29/2011	10/3/2011	-33%	-30%
5/21/2015	8/25/2015	-10%	-12%
11/3/2015	2/11/2016	-19%	-20%

BULL MARKETS		NQUSCHKT	NQUSST1500
START DATE	END DATE	RETURN	RETURN
10/9/2002	10/9/2007	280%	214%
3/10/2009	4/22/2010	187%	125%
7/6/2010	4/28/2011	52%	47%
10/4/2011	5/20/2015	149%	111%
2/12/2016	3/29/2018	71%	66%

Performance Statistics (3/30/2001 - 3/29/2018)

The below table displays a number of ratios that are often looked at in terms of risk management for a portfolio. Just to point a few of the more well know metrics. The Sharpe Ratio for NQUSCHKT (0.67) was higher than NQUSS1500T (0.48). The max drawdown stats, which both occurred during the financial crisis, were -64% and -60%. The information ratio, typically described as a ratio of portfolio returns above a given benchmark to the volatility of excess returns (otherwise known as Tracking Error) measures an index or portfolio managers ability to generate excess returns. The consistent outperformance of NQUSHCHKT over NQUSS1500T puts the IR for the index at 0.95. The excess return² of NQUSHCKT over NQUSS1500T is 50%. Lastly, the up capture/down capture ratios for NQUSCHKT are 1.06 and 1.02, respectively.

	NQUSCHKT	NQUSS1500T
Sharpe Ratio	0.66	0.48
Max Drawdown	-64.47%	-59.61%
Information Ratio	0.95	N/A
Alpha	45.19%	N/A
Up Capture Ratio	1.06	1
Down Capture Ratio	1.02	1

A few other statistics to look at which provide additional value add are Beta and Correlation. Beta is typically thought of as a measure of systematic risk. In other words, it's thought to represent a portfolio's tendency to respond to swings in the market (or vs. a given benchmark). A beta of 1 is representative of moving in sync with the market. A beta of greater than one typically indicates a security or portfolio's price is perceived as more volatile than the market, while the opposite holds true for a beta of less than one. The beta of NQUSCHKT vs NQUSS1500T is 1.04, while the correlation between the two stands at 0.98

Hit Rate: Monthly (3/30/2001 - 3/29/2018)

We used monthly returns through our time period studied in order to gather information to form a "hit rate", or the % (on a monthly basis) one index outperformed the other. NQUSCHKT won the battle by winning 56.9% of the time vs. NQUSS1500T only 43.1%.

Hit Rate: % of Stocks with Positive Returns in NQUSCHK vs NQUSS1500

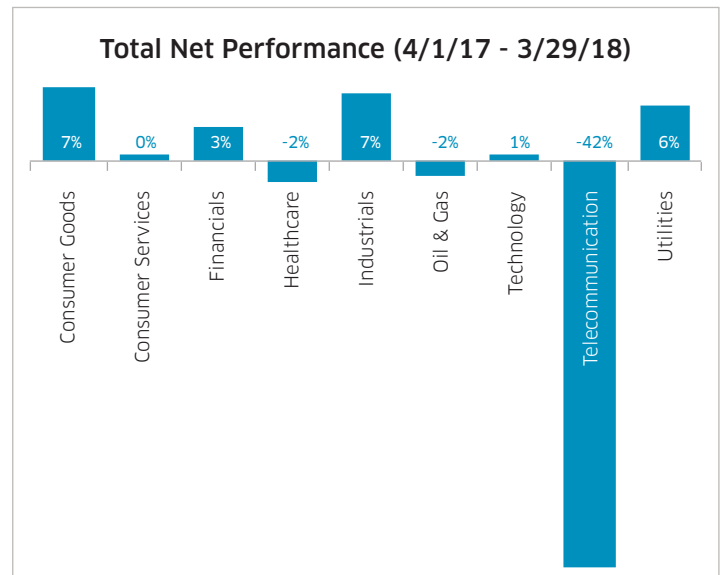
The below table tells us the % of stocks in each index that netted a positive return for the respective time periods back to the beginning of the back-test in 2001. NQUSCHK had its highest percentage (95%) of stocks in positive territory in the 3/31/03 - 3/31/04 year; NQUSS1500T also had its highest percentage of stocks in positive territory during this time window (92%). The lowest percentage for both indexes occurred during the financial crisis, not surprisingly, between 3/31/08 - 3/31/09 (NQUSCHKT at 8%; NQUSS1500T at 10%). The table below denotes that over the past 17 years, NQUSCHKT had a higher % of stocks performing in positive territory than NQUSS1500T 76% of the time (13 years). In the four years where NQUSCHKT did not have a higher %, two of the four NQUSCHKT had the same % of stocks performing in positive territory and the other two had less. In the last six years, NQUSCHKT had higher % of stocks performing in positive territory other than the most recent period.

	NQUSCHKT	NQUSS1500T
3/31/01 - 3/31/02	77%	66%
3/31/02 - 3/31/03	22%	19%
3/31/03 - 3/31/04	95%	92%
3/31/04 - 3/31/05	70%	51%
3/31/05 - 3/31/06	70%	68%
3/31/06 - 3/31/07	56%	50%
3/31/07 - 3/31/08	22%	22%
3/31/08 - 3/31/09	8%	10%
3/31/09 - 3/31/10	88%	86%
3/31/10 - 3/31/11	69%	69%
3/31/11 - 3/31/12	37%	40%
3/31/12 - 3/31/13	71%	63%
3/31/13 - 3/31/14	79%	73%
3/31/14 - 3/31/15	63%	54%
3/31/15 - 3/31/16	37%	33%
3/31/16 - 3/31/17	80%	75%
3/31/17- 3/31/18	59%	54%

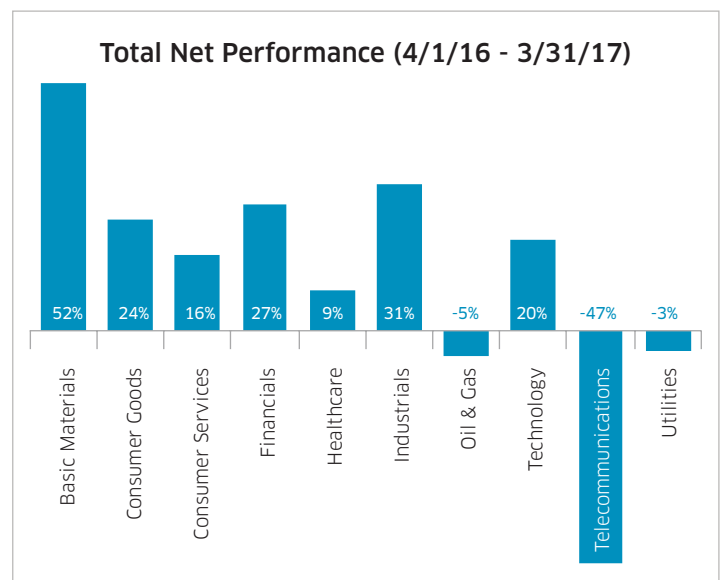
Performance Attribution by Industry

To conclude our performance analysis, we will take a look at which ICB Industries within the NQUSCHKT Index have helped drive performance on a yearly time frame over the past three years before each respective re-balance period.

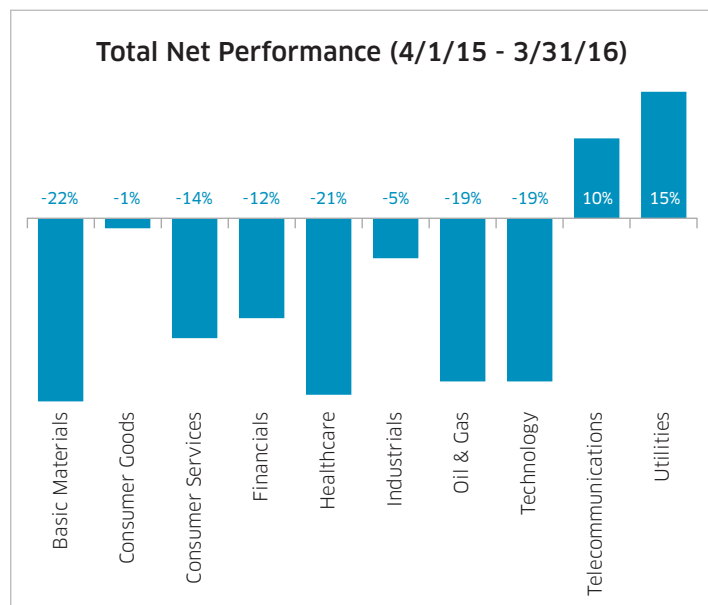
Below is a brief snapshot of the total net performance for each industry from 4/1/17 - 3/29/18. Industrials and Consumer goods were the top performers, notching gains of 7%.



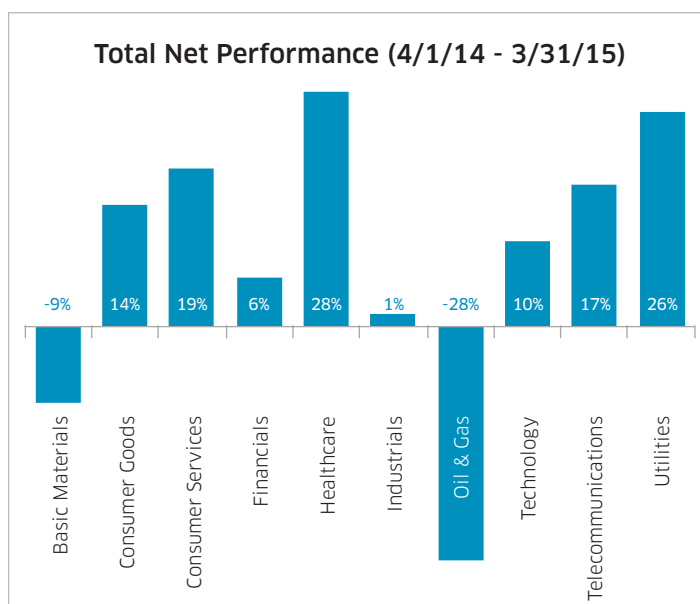
The next chart shows total net performance for each industry from 4/1/16 - 3/31/17. Basic materials led the way with a gain of 52%, while Telecommunications lagged with a decline of (-47%). Other strong performers were Industrials (+31%) and Financials (+27%). Both Utilities and Oil & Gas saw small declines of 3% and 5%, respectively.



The next period we will analyze to help build a similar attribution report will be 4/1/15 - 3/31/16. Additional detail on the performance figures over the year can be found below. We can see the outperformance by both Telecommunications (+10%) and Utilities (+15%). Basic Materials (-22%) and Healthcare (-21%) were the industries that displayed the steepest losses.



The final period to conclude our attribution analysis is 4/1/14 - 3/31/15. One final look at overall performance during the last time period being studied confirms the outperformance of Healthcare (+28%) and Utilities (+26%). It also confirms the underperformance of the Oil & Gas Industry (-28%). The only other industry with negative performance was Basic Materials (-9%).



Conclusion

Multi-factor investing has become more en vogue over the last couple of years. The Nasdaq US Chaikin Small Cap Index is an index that launched just over four years ago on April 1, 2014, and is a reflection of how taking a multi-factor model and applying it to a sector of the market (US Small Cap) has reaped impressive rewards over time. The index rebalances annually, has a strong minimum liquidity requirement in place and it has greatly outperformed its benchmark with similar volatility and industry allocations. Possibly the most interesting aspect of how the index has fared historically has been in how the index has performed relatively inline during bear markets, but greatly outperformed during bull markets, making the strategy a good fit as a core holding in one's portfolio.

For more information on the index please go to:

<https://indexes.nasdaqomx.com/Index/Overview/NQUSCHK>

<https://www.chaikinanalytics.com/nasdaq-chaikin-stock-indices/>

FOOTNOTES

1 https://www.researchaffiliates.com/en_us/publications/articles/594-a-smoother-path-to-outperformance-with-multifactor-smart-beta-investing.html

2 Excess return is defined as (the annualized return of the portfolio minus the annualized return of the benchmark) / (the annualized return of the benchmark)

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