Nasdaq Dorsey Wright Technical Attribute White Paper

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Over the years, Nasdaq Dorsey Wright has created many innovative technical indicators based on momentum using Point and Figure charting. One of our most popular indicators in this space is the "Technical Attribute" rating we apply to each stock. The rating ranges from zero (lowest strength) to five (highest strength) with values of three or higher generally regarded as investable.

The purpose of this study was to determine how effective technical attributes are from a portfolio management perspective. If we buy portfolios of high attribute stocks, do we outperform the market? Alternatively, what happens if we buy portfolios of low attribute stocks? What we found is high attribute portfolios have a strong propensity to outperform, with the largest outperformance reserved for the highest ratings (5 attribute stocks), while low attribute portfolios have a marked tendency to underperform under most market conditions.

Why use momentum?

Factor investing has attracted substantial research over the last few years and momentum is often cited as the strongest factor. Factors sparked interest not only because they allow you to potentially outperform market-cap weighted benchmarks, but also because they are not supposed to exist. The efficient market hypothesis predicts that you should not be able to outperform a random basket of securities after adjusting for risk because security prices reflect all publicly available information. As such, factors have often been called "anomalies" in academic papers. Eugene Fama, the University of Chicago professor who created the efficient markets hypothesis, famously considers momentum to be the "premier anomaly."

Many researchers have tried to understand why momentum exists, but there has yet to be a strong consensus as to its cause. Perhaps the best explanation we have heard is that it is a behavioral bias where investors systematically underreact to good news. This under-reaction causes the market to price the news in slowly, leading to a trend of outperformance for the security. This is good news for investors, as behavioral biases tend to be rooted in human nature, making them less likely to change over time. In fact, Geczy and Samonov showed in their 2013 paper, "Two Centuries of Price Return Momentum," that momentum has existed in the US stock market at least as far back as 1801.

The Nasdaq Dorsey Wright Approach

Nasdaq Dorsey Wright's technical attribute ratings are composed of five distinct Point and Figure chart attributes. First, we generate a Point and Figure relative strength chart of the stock vs. the S&P 500 Equal Weight Index. If the chart is on a Point and Figure buy signal (meaning a column of X's has exceeded the previous column of X's), we give the stock one technical attribute. If it is also in a column of X's we give it another. Next, we generate a Point and Figure relative strength chart of the stock vs. an equal weighted index of the stock's sector. Again, a buy signal adds one technical attribute and a column of X's adds an additional attribute. Finally, we analyze the trend of the stock based on the stocks' traditional Point and Figure chart. If it's trading above the trend line it receives another attribute.

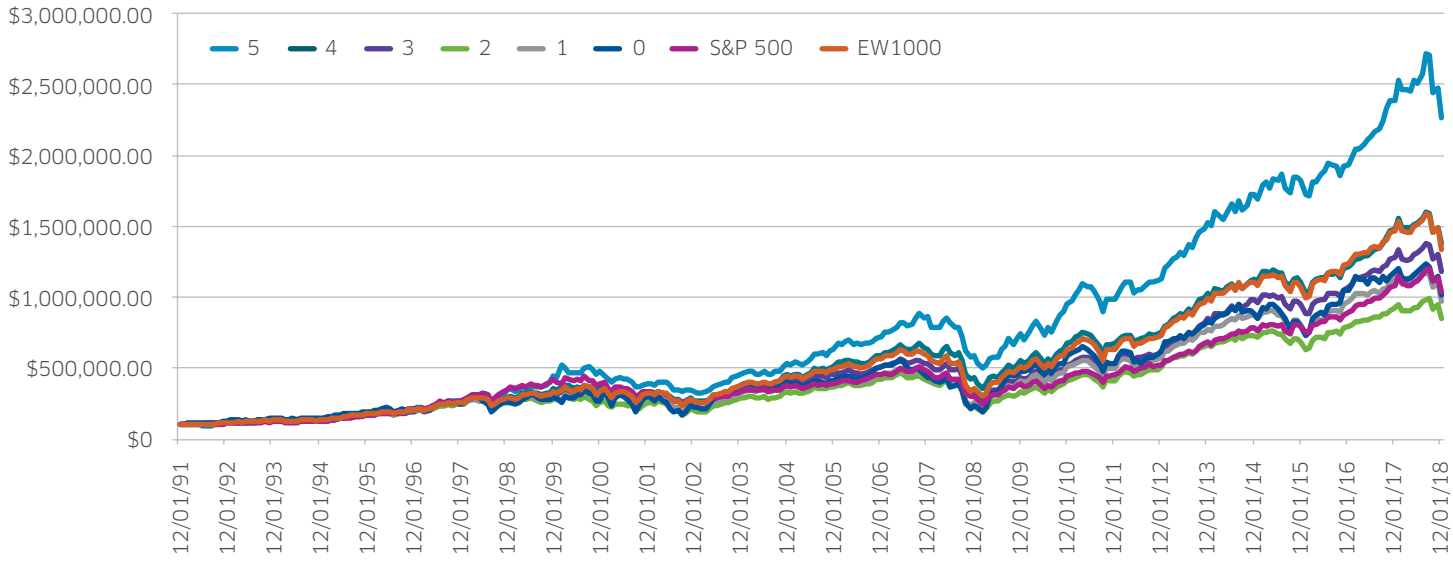
All in all, the rating encompasses four relative attributes (two vs. the market and two vs. the sector) and one absolute attribute (trend). The absolute attribute may seem an odd choice, but momentum is often divided into two categories (relative and absolute). Relative momentum being momentum vs. other securities, and absolute momentum being how it compares to itself along some metric (typically a moving average or some other trend/performance measure). Absolute momentum is typically useful in limiting downside, as a purely relative approach leaves you exposed when everything is moving down at the same time.

Attribute Description	# of Attributes
Relative strength chart vs. the market on a buy signal?	1
Relative strength chart vs. the market in a column of X's?	1
Relative strength chart vs. the sector on a buy signal?	1
Relative strength chart vs. the sector in a column of X's?	1
Point and Figure chart in a positive trend?	1
TOTAL	5

Study

To determine how technical attributes work in a portfolio management context we first calculated technical attributes for the top 1000 market cap stocks every year from 1992-2018. We chose the top 1000 market cap stocks, as they're highly liquid and thus more practical for the average financial advisor to buy. Next, we constructed six different equal weight portfolios (one for each possible attribute rating).The five attribute portfolio, for example, would own every stock with a five attribute rating in the top 1000 universe, while the 4 attribute portfolio would own every stock with a 4 attribute rating in the top 1000 universe, etc. Finally, we reconstituted and rebalanced these portfolios at the end of every month to account for changes in the technical attribute ratings over time. The graph below shows the cumulative performance of these portfolios along with the performance of the S&P 500 Index and an equal weighted index we calculated comprised of all members of the universe (EW1000).

GROWTH OF $100,000 FOR TECHNICAL ATTRIBUTE PORTFOLIOS



The performance information above is based on the back-tested performance of non-investable indexes. Investors cannot invest directly in an index. Indexes have no fees. Please see the disclosure slide for important information regarding back testing. The relative strength strategy is not a guarantee. There may be times where all investments are unfavorable and depreciate in value. Past performance not indicative of future results. Potential for profits accompanied by possibility of loss.

The results demonstrate that buying a portfolio of stocks with all five technical attributes in their favor outperform the market by a large margin (12.24%/year vs. 9.06%/year respectively). The portfolios that buy four attribute and three attribute stocks also outperformed the benchmarks but by much less. In fact, a 202 bps performance gap exists between the five attribute and four attribute portfolios. A sizable gap also exists between the three attribute and two attribute portfolio. Interestingly, the two attribute portfolio is the worst of the group with the 0 attribute portfolio performing roughly in line with the market. Looking at the data though, much of the low attribute portfolios' performance comes from large rallies off long term market bottoms in 2003 and 2009. Without those two years, the 0 portfolio's CAGR drops from 8.95% to 4.52%.

Year	5	4	3	2	1	0	S&P 500	EW1000
1992	8.43	11.69	10.00	17.13	15.60	26.24	7.62	14.89
1993	18.50	15.18	14.68	12.10	13.85	12.70	10.08	14.60
1994	-1.98	-3.15	-1.55	-0.65	-1.69	1.23	1.32	-1.35
1995	36.09	38.04	30.72	31.69	33.81	29.07	37.58	33.24
1996	24.00	18.06	18.10	14.28	20.11	14.41	22.96	18.49
1997	27.31	32.30	30.03	26.09	22.99	16.04	33.36	26.49
1998	25.81	7.53	14.36	7.25	3.62	3.99	28.58	11.46
1999	30.28	22.81	12.59	4.05	8.35	14.20	21.04	14.67
2000	8.38	6.48	2.25	-9.26	0.75	-8.84	-9.10	0.09
2001	-19.23	-16.52	-6.71	1.11	5.92	11.40	-11.89	-2.02
2002	-14.47	-14.93	-14.43	-22.60	-25.50	-25.10	-22.10	-17.95
2003	35.79	37.50	34.95	45.55	41.83	67.09	28.68	41.59
2004	17.85	23.10	19.71	16.31	16.95	12.32	10.88	18.40
2005	18.25	11.63	6.91	9.30	1.71	-0.63	4.91	9.03
2006	13.75	15.88	11.63	14.66	16.77	21.69	15.79	15.56
2007	21.42	8.40	5.83	-1.81	-1.77	-15.26	5.49	4.00
2008	-32.51	-32.35	-37.68	-43.82	-42.61	-44.65	-37.00	-39.61
2009	26.37	27.65	29.40	44.80	60.55	101.04	26.46	43.80
2010	27.87	22.57	20.71	23.64	24.00	23.48	15.06	23.73
2011	4.09	-0.57	0.77	0.71	-1.42	-8.93	2.11	0.04
2012	14.41	11.80	15.73	22.04	15.66	16.44	16.00	16.41
2013	35.56	37.18	39.77	31.52	35.01	32.82	32.39	35.66
2014	12.48	10.14	15.98	10.41	11.98	6.90	13.69	11.49
2015	6.04	-1.95	-3.17	-6.77	-7.69	-10.40	1.38	-3.59
2016	6.35	9.47	12.52	16.32	20.73	31.87	11.96	15.58
2017	23.40	21.73	20.12	16.17	15.93	12.62	21.83	19.02
2018	-5.37	-6.23	-8.29	-7.68	-13.51	-14.11	-4.38	-8.73
Cumulative Return	2163.55	1286.60	1080.90	753.17	872.12	913.37	939.18	1242.41
CAGR	12.24	10.22	9.57	8.26	8.78	8.95	9.06	10.09
Max Drawdown	-48.71	-51.66	-56.26	-63.76	-64.08	-71.78	-55.25	-58.73
Standard Deviation	15.01	14.38	14.82	16.99	17.99	24.42	13.99	16.16
Sharpe Ratio	0.65	0.54	0.48	0.34	0.35	0.27	0.47	0.47
Avg Num Holdings	175.00	158.00	210.00	185.00	152.00	118.00	500.00	1000.00
3 Year Outperformance - SPX	74.74	55.36	57.09	47.06	50.87	44.64	0.00	59.86
3 Year Outperformance - EW1000	79.59	49.48	36.68	19.72	23.53	36.68	40.14	0.00

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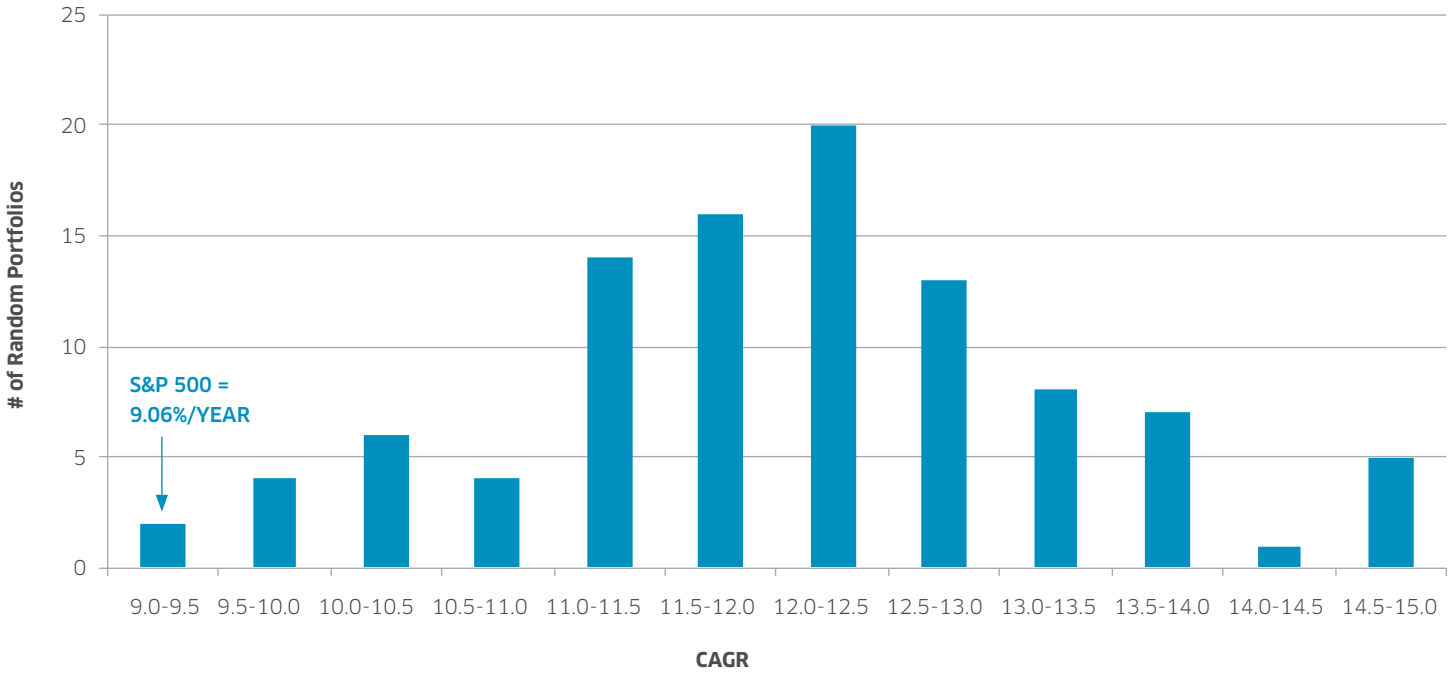
From a risk perspective, max drawdowns, standard deviations, and Sharpe ratios also improve as you move from the low attribute portfolios to the high attribute portfolios. In fact, even though the five attribute portfolio outperforms the S&P 500 by 318 basis points per year, it does so with only 102 basis points of additional risk, as measured by its standard deviation. In turn, this allows it to have a 40% higher Sharpe ratio.

Yearly returns were also very positively skewed. The worst relative yearly performance to the market was -7.34% in 2001; while the best relative yearly performance to the market was +17.48% in 2000. The five technical attribute portfolio also outperformed 75% of the time on a rolling three year basis, making it more likely that a client could actually hold the portfolio without suffering many long periods of underperformance.

That may all be true, but a client cannot hold every five attribute stock in his/her portfolio. To do so, they would have to hold, on average, around 175 stocks. How do we know this works for a more manageable portfolio of 30 stocks? In order to test this, we created a portfolio by buying 30 5-attribute stocks at random every month over the test period (1992 – 2018). We then ran that simulation 100 times to see how often it outperformed.

The chart below shows the number of random portfolios at each CAGR level (grouped into 0.5% increments). As expected, the majority of the portfolios exhibited returns in or around the average of the "Buy All 5's" portfolio (12.24%). What's interesting though is that every random portfolio beat the market. 94% of them even managed to beat it by at least 100 bps/year. This means that not only is a 5 attribute portfolio likely to outperform over time, it's also robust in that you don't have to be particularly lucky in your stock selection to achieve the outperformance.

 # OF RANDOM 5 ATTRIBUTE PORTFOLIOS PER CAGR LEVEL



Conclusion

The results of this study demonstrate that buying portfolios of high attribute stocks is a sound method of portfolio construction, while buying portfolios of low attribute stocks has consistently underperformed.

Not only did we find better performance from buying strong attribute stocks, but portfolios comprised of stocks with strong attribute ratings also exhibited lower volatility than the lower attribute portfolios.

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The relative strength strategy is not a guarantee. There may be times where all investments and strategies are unfavorable and depreciate in value. Relative strength is a measure of price momentum based on historical price activity. Relative strength is not predictive and there is no assurance that forecasts based on relative strength can be relied upon.

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