The Best Offense: When Defensive Strategies Win

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In some sports, coaches are fond of the maxim that the best offense is a good defense.[1] The rationale, of course, is that even if a team's offense is having a bad day, good defense can keep the score close.

There's an analogous argument in the investment world, since defensive strategies have often turned out to produce above average returns in the long run. For example, Fama and French famously identified value as a return-generating factor,[2] and more recently, the so-called "low volatility anomaly" has generated considerable interest.[3] If value and low volatility strategies produce long run excess returns, they could be good examples of how investors might win by playing defense—or, as some practitioners are fond of saying, how they might win by not losing.

One way to think about this question is to realize that, in a simple sense, there are two dimensions to investment success.

- The first dimension involves the frequency of success. Other things equal, an investment process that outperforms its benchmark 55% of the time will add more value than a process that outperforms 50% of the time.

- The second dimension is the *magnitude* of success. Other things equal, it's desirable to win, when you win, by more than you lose, when you lose—in other words, it's desirable for the average value added in successful months to exceed (in absolute magnitude) the average value lost in unsuccessful months.

Our goal in this paper is to show that defensive strategies benefit from the interaction of these two dimensions, meaning that **they are more likely to outperform when the benefit of outperformance is relatively high.**

MARKET REGIMES: DIRECTION

Understanding any investment strategy requires us to understand how its success is driven by the market regime in which it operates.[4] Strategies that overweight high beta stocks, e.g., will tend to look good in strong markets and bad in weak markets. Defensive strategies like low volatility or high yield will display the opposite pattern.

[1] Those familiar with the authors' athletic abilities will realize that this is something they read, not something they know from personal experience.

[2] Fama, Eugene F. and Kenneth R. French, "The Cross-Section of Expected Stock Returns," June 1992, *The Journal of Finance*.

[3] See Baker, Malcolm, Brendan Bradley and Jeffrey Wurgler, "Benchmarks as Limits to Arbitrage: Understanding the Low-Volatility Anomaly," January/February 2011, *Financial Analysts Journal,* and Soe, Aye, "The Low-Volatility Effect: A Comprehensive Look," August 2012.

[4] Lazzara, Craig J., "The Limits of History," January 2013.

For example, Exhibit 1 shows how the behavior of the S&P 500 Low Volatility Index[5] has been influenced by the movements in its parent, the S&P 500®.

Exhibit 1: Low Volatility Performance in Different Market Regimes

	# of Months	S&P 500 Low Volatility Index (%)	S&P 500 (%)	S&P 500 Low Volatility Index Minus S&P 500 (%)	Hit Rate (%)
Biggest Negative Months	49	-2.93	-5.83	2.90	88
Smaller Negative Months	50	-0.63	-1.42	0.80	76
Smaller Positive Months	95	1.24	1.39	-0.15	47
Biggest Positive Months	94	3.40	5.10	-1.70	18
Overall	288	0.89	0.81	0.08	50

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, to Dec. 31, 2014. Past performance is no guarantee of future results. Charts and tables are provided for illustrative purposes only and may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Over the 24-year period described by Exhibit 1, the S&P 500 was roughly twice as likely to experience a monthly gain as a monthly decline. The exhibit partitions the data first into up or down months for the S&P 500, and then it splits each of these categories in half. Reading down the rows, we have the largest declines, the smaller declines, the smaller increases, and finally the largest increases.

Exhibit 1 demonstrates that the *relative* return of the S&P 500 Low Volatility Index is importantly, if not decisively, determined by the *absolute* return of the S&P 500. When the S&P 500 is at its most negative, e.g., the S&P 500 Low Volatility Index is likely to outperform (doing so in 88% of the worst months), and by a considerable magnitude (on average 2.90% per month). As the performance of the S&P 500 improves, the relative performance of its low volatility counterpart declines along both dimensions: frequency and magnitude. By the time we come to the most positive months for the S&P 500, the S&P Low Volatility Index is quite likely to underperform (having done so in 82% of the best months) by an average margin of 1.70%.

This pattern is not unique to large-cap U.S. stocks; indeed, it appears across a range of geographies and capitalization ranges.[6] **The relative performance of low volatility indices is a classic example of how the success of a strategy is driven by the market regime in which it operates**.

MARKET REGIMES: DISPERSION

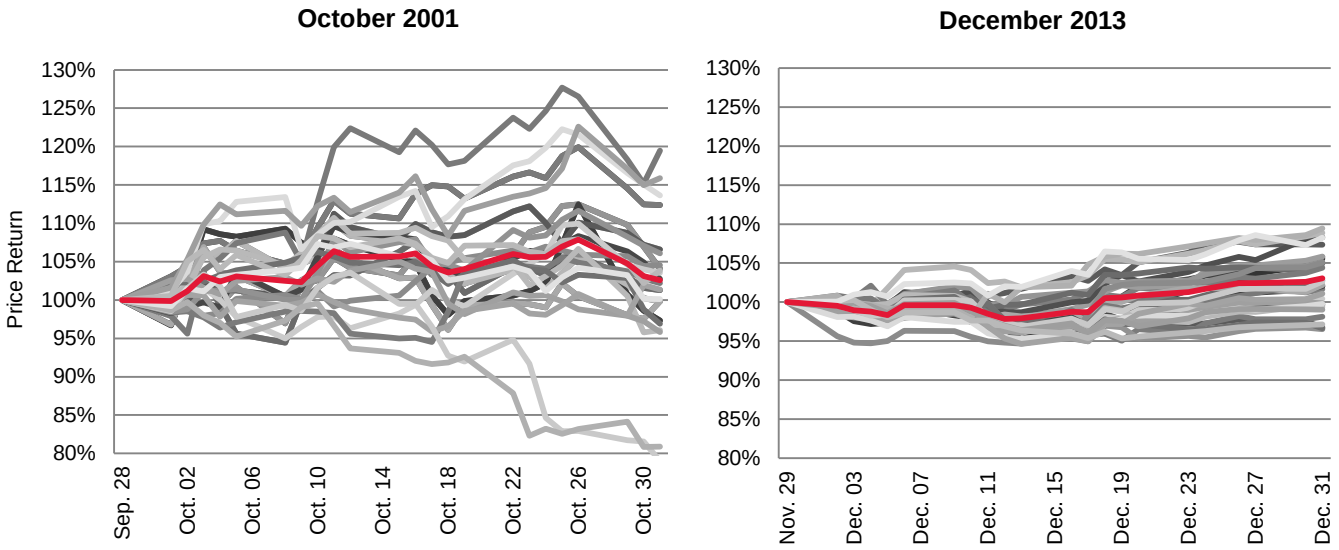
Direction is not the only way to characterize a regime. *Dispersion* gives us another useful metric by which to analyze the nature of the market environment.[7] An index's dispersion measures the spread among the returns of its components in a given period. Exhibit 2 illustrates the difference between high and low dispersion, using the Dow Jones Industrial Average® as an example.

[5] The S&P 500 Low Volatility Index measures the performance of the 100 least-volatile stocks in the S&P 500.

[6] Chan, Fei Mei and Craig J. Lazzara, "Is the Low Volatility Anomaly Universal?" November 2013.

[7] Edwards, Tim and Craig J. Lazzara, "Dispersion: Measuring Market Opportunity," December 2013.

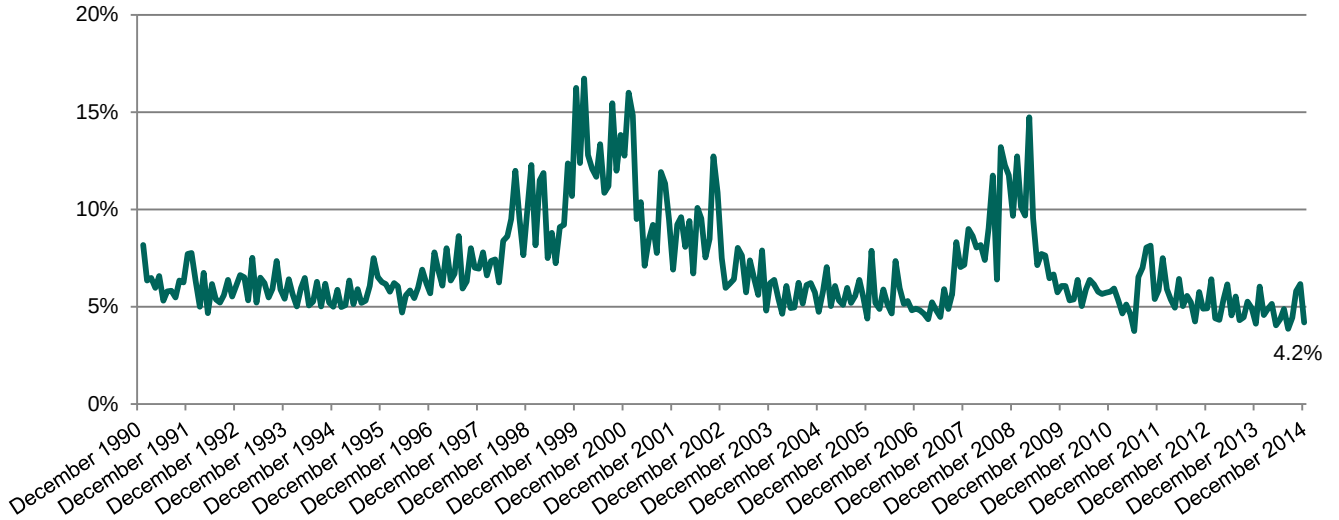
Exhibit 2: Performance of the DJIA and its Components in High and Low Dispersion Months



Source: S&P Dow Jones Indices LLC. Data from October 2001 and December 2013. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results. Gray lines represent Dow Jones Industrial Average components, and the red line represents the Dow Jones Industrial Average itself.

Exhibit 3 shows the past 24 years of dispersion for the S&P 500.[8] Conceptually, dispersion measures the statistical spread among the returns of the securities in an index. Economically, dispersion provides a gauge of opportunity. When dispersion is relatively wide, the opportunities to profit from stock selection are relatively large; when dispersion is narrow, the opportunities diminish. This is not a function of manager skill; the problem is that **in a low dispersion environment, the value of skill goes down**.[9]

Exhibit 3: S&P 500 Dispersion



Source: S&P Dow Jones Indices LLC. Data from January 1991 through December 2014. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results.

[8] Computing dispersion requires specifying both *periodicity* and *granularity*. For example, Exhibit 3 computes dispersion at the stock level on a monthly basis. For different purposes, one could compute dispersion at the sector or industry level, or at a periodicity other than a month. Once periodicity and granularity are given, dispersion is, computationally, the weighted standard deviation of returns. See Edwards and Lazzara, op. cit.

[9] The low level of dispersion in 2014 helps explain why so many active managers were unable to outperform their benchmarks. See, e.g., "Third Quarter Results: Expect Disappointment," October 7, 2014.

What's true of active managers is also true, *mutatis mutandis*, of factor or strategic beta indices. When dispersion is low, as was the case for the S&P 500 during the past three years, we would expect a factor index to perform relatively closely in line with its parent; when dispersion is wide, such as during the inflation and puncturing of the technology bubble, we would expect the performance gap to widen.

Exhibit 4: Dispersion and Mean Absolute Deviation in Different Dispersion Environments

Index	Least Disperse (%)	2nd Least (%)	3rd Least (%)	Most Disperse (%)	Ratio of Most/Least
S&P 500 Low Volatility Index	1.07	1.30	1.63	3.82	3.6
S&P 500 High Beta Index	1.66	2.12	3.27	6.29	3.8
S&P 500 Equal Weight Index	0.52	0.74	1.04	2.02	3.9
S&P 500 Dividend Aristocrats®	0.70	0.98	1.33	3.20	4.5
S&P 500 Growth	0.40	0.56	0.75	1.70	4.3
S&P 500 Value	0.94	1.53	1.67	3.80	4.1
S&P 500 Pure Growth	0.42	0.57	0.78	1.76	4.2
S&P 500 Pure Value	1.19	1.73	2.23	4.41	3.7

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, to Dec. 31, 2014. Past performance is no guarantee of future results. Charts and tables are provided for illustrative purposes and may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

These expectations are borne out in data from 1991 to 2014. Exhibit 4 analyzes a number of factor indices, all progeny of the S&P 500. We computed the mean absolute monthly deviation of each index, relative to the S&P 500, and sorted the months into quartiles depending on that month's S&P 500 dispersion.[10] Without exception, the mean absolute deviation increases monotonically as dispersion increases. In the most-disperse quartile, the typical mean absolute deviation is roughly four times larger than in the least-disperse quartile. As we have pointed out previously, dispersion doesn't predict differential returns, **but differential returns are a consequence of index dispersion**.[11]

MARKET REGIMES: DIRECTION AND DISPERSION

What happens when we combine dispersion *and* direction? From 1991 to 2014, monthly dispersion for the S&P 500 averaged 7.01%. If we measure each month's average dispersion and sort by the contemporaneous return of the S&P 500 (as in Exhibit 1), we get the results shown in Exhibits 5 and 6. Notably, **the months in which the S&P 500 performed the worst were the months in which the market's dispersion was highest**. The results are not monotonic; in fact, the average disperion in the months when the S&P 500 performed best was the second highest. But Exhibit 6 shows us that the biggest deviations from average dispersion occur when the S&P 500 performs worst; the second-largest deviations occur for the smaller positive months. In contrast, in the smaller negative months and the biggest positive months, dispersion is much closer to its average level.

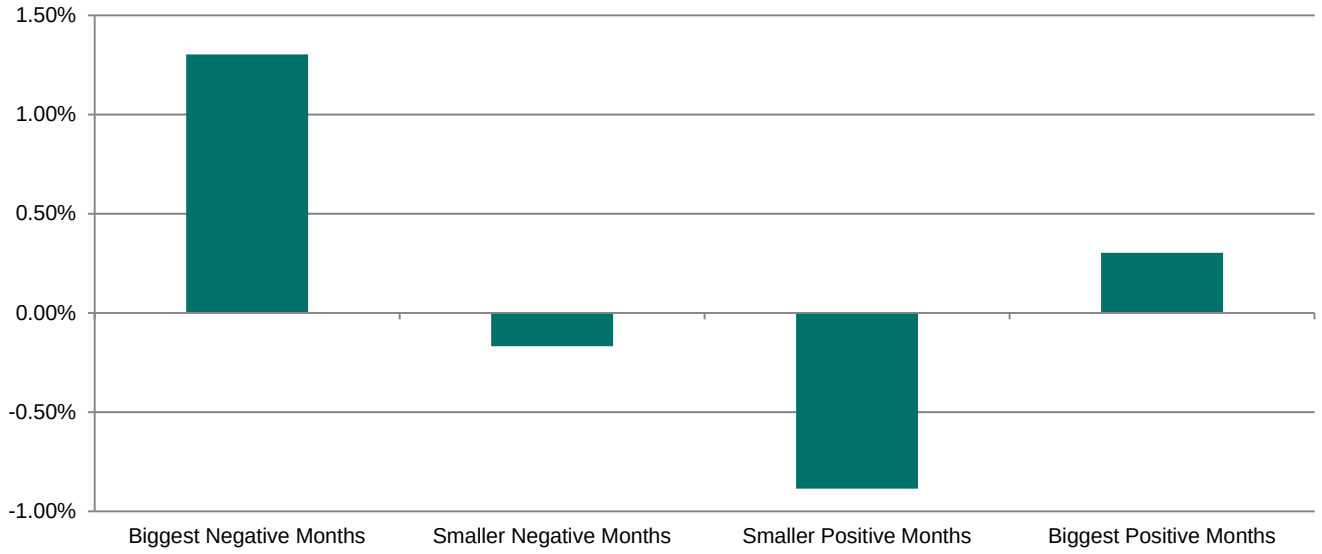
Exhibit 5: S&P 500 Average Dispersion in Different Market Regimes

	Biggest Negative Months	Smaller Negative Months	Smaller Positive Months	Biggest Positive Months	Overall
Average Dispersion (%)	8.31	6.84	6.12	7.31	7.01

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, to Dec. 31, 2014. Charts and tables are provided for illustrative purposes. Past performance is not a guarantee of future results.

[10] It's important to use the mean *absolute* deviation. We care about the magnitude of each factor index's relative return, not its sign.
[11] Chan, Fei Mei and Craig J. Lazzara, "Gauging Differential Returns," January 2014.

Exhibit 6: Deviation of Dispersion from Overall Monthly Average in Different Market Regimes



Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, to Dec. 31, 2014. Charts and tables are provided for illustrative purposes. Past performance is not a guarantee of future results.

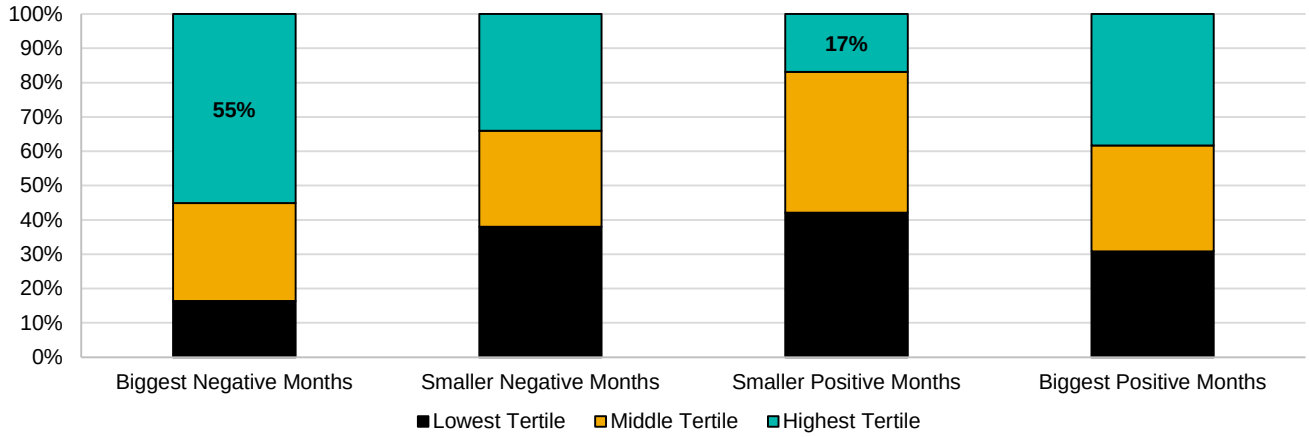
We can explore the connection between dispersion and the market's direction by classifying months according to their performance, as in Exhibits 1, 5, and 6, while also categorizing their dispersion. For this purpose, we used dispersion tertiles, creating a total of 12 dispersion-direction categories. Exhibit 7 shows how many months fall into each category, but the disparity in the distribution of months in each return category is easier to visualize in Exhibit 8.

Exhibit 7: Distibution of S&P 500 Monthly Return

Dispersion	Biggest Negative Months	Smaller Negative Months	Smaller Positive Months	Biggest Positive Months	Total Months
Lowest Tertile	8	19	40	29	96
Middle Tertile	14	14	39	29	96
Highest Tertile	27	17	16	36	96
Total Months	49	50	95	94	288

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, to Dec. 31, 2014. Charts and tables are provided for illustrative purposes. Past performance is not a guarantee of future results.

Exhibit 8: Distribution of Dispersion in Different Market Regimes



Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, to Dec. 31, 2014. Charts and tables are provided for illustrative purposes. Past performance is not a guarantee of future results.

Each bar in Exhibit 8 reflects a specific cross-section of dispersion and return. If dispersion were unrelated to the market's direction, we would expect roughly one-third of the months in each return environment to fall into each dispersion tertile. That's more or less the way the smaller negative months line up in the second bar from the left. Roughly one-third of those months are in the lowest dispersion tertile, roughly one-third in the middle, and roughly one-third in the highest dispersion tertile.[12]

What is most significant about Exhibit 8 is how far away from random the biggest negative months are. We'd expect to find 33% of the biggest negative months in the highest dispersion tertile; instead we find 55%. On the other hand, when we look at the smaller positive months, we don't see 33% in the highest dispersion tertile, but only 17%. This tells us something about both the *likelihood* of success and the *payoff* from success. We know from Exhibit 1 that the S&P 500 Low Volatility Index is most likely to add value in months when the S&P 500 is down significantly. Exhibit 8 tells us that in those months, dispersion is likely to be well above average. In other words, **the S&P 500 Low Volatility Index is most likely to be right when the stakes are high.** Moreover, the skew away from the highest dispersion tertile in the smaller positive months would have limited the S&P 500 Low Volatility Index's losses (at a time when the strategy was likely to lag).

DEFENSE = DIRECTION + DISPERSION

Any strategy's outperformance over time depends on the frequency with which it beats its benchmark (the "hit rate") and the size of those hits. Any investment strategy—active or indicized[13]—will score some hits and some misses; more formally stated, sometimes it will outperform and sometimes it will underperform. Regardless of whether the direction is positive or negative, the magnitude of the performance differences is driven by the market's dispersion. If given a choice, it would be preferable for hits to occur when dispersion is high and for misses to occur when dispersion is low. **A strategy is advantaged to the degree that its hits occur in times of high dispersion**.

Since defensive strategies tend to outperform when the market is weak, and since market weakness tends to be accompanied by high dispersion, **it's not surprising that defensive strategies often have a long-term advantage**. The opposite is true of aggressive strategies.

For instance, the S&P 500 Low Volatility Index outperformed its parent in 50% of the months between 1991 and 2014. However, in the worst-performing months—the months skewed to the highest dispersion tertile—it beat the S&P 500 88% of the time. Not surprisingly, most defensive indices exhibit a similar pattern in hit rates—they tend to score more hits when the markets are at their worst. This means that **the distribution of dispersion is an advantage from which defensive strategies, as a group, may benefit.** Exhibit 9 illustrates this principle with two other defensive strategies derived from the S&P 500. In each case, hit rates are at their highest when the market is weakest. Since the market's biggest weakness occurs when dispersion is well above average, defensive strategies benefit: they are more likely to outperform when the benefit of outperformance is high.

Exhibit 9: Hit Rates for Defensive Strategies in Different Market Regimes

	S&P 500 (# of Months)	S&P 500 Low Volatility Index (%)	S&P 500 Dividend Aristocrats (%)	S&P 500 Low Volatility High Dividend Index (%)
Biggest Negative Months	49	88	71	67
Smaller Negative Months	50	76	68	52
Smaller Positive Months	95	47	49	41
Biggest Positive Months	94	18	36	26
Overall	288	50	52	42
Compound Annual Return (%)	10.18	11.19	12.52	13.10

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, to Dec. 31, 2014. Past performance is not a guarantee of future results. Charts and tables are provided for illustrative purposes and may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

[12] Actually 35.4%, 29.2%, and 35.4%, respectively.
[13] See "Coming Soon to a Dictionary Near You," Nov. 29, 2013.

Inevitably, a boost for defensive strategies translates to a hindrance for aggressive strategies. For instance, the S&P 500 High Beta Index,[14] which seeks to accentuate the performance of its parent, has been disadvantaged by the distribution of market dispersion over the past 24 years. As shown in Exhibit 10, the S&P 500 High Beta Index scored the fewest hits when dispersion was skewed towards its highest level. The high beta strategy outperforms roughly as often as the low volatility strategy (49% vs. 50%). The problem for the S&P 500 High Beta Index is that it typically underperforms weak markets. **The confluence of high dispersion and market weakness means that the S&P 500 High Beta Index is likely to underperform when the penalty for underperformance is high.**

Exhibit 10: S&P 500 High Beta Index Hit Rates in Different Enviroments

	S&P 500 (# of Months)	S&P 500 High Beta Index Hit Rates (%)
Biggest Negative Months	49	12
Smaller Negative Months	50	22
Smaller Positive Months	95	55
Biggest Positive Months	94	78
Overall	288	49
Compound Annual Return (%)	10.18	9.82

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, to Dec. 31, 2014. Past performance is not a guarantee of future results. Charts and tables are provided for illustrative purposes and may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

NO LOCAL PARTIALITY

Our illustrations thus far have focused on the S&P 500, but the same distribution of dispersion and market direction also occurs outside the U.S. large-cap segment. The phenomenon extends to mid-cap and small-cap stocks, as well as internationally. In Canada, for instance, the S&P/TSX Composite exhibits a similar pattern of market dispersion (see Appendix A). Also, as in the U.S., defensive strategies in Canada (Low Volatility and Dividend Aristocrats) have an edge due to this distribution. Data for the S&P Europe 350 point to similar results.

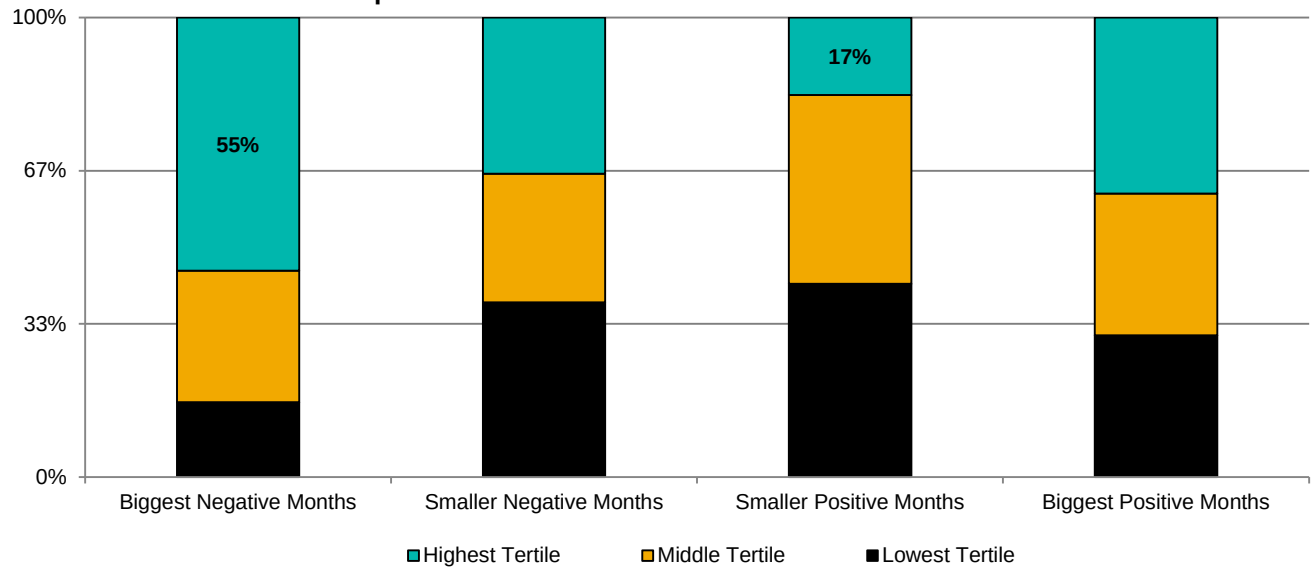
By no means does the success of every strategy hinge on its relationship to dispersion.[15] Each strategy has its own idiosyncratic performance patterns. When those idiosyncrasies include a strong relationship between the strategy's *relative* return and the *absolute* return of its parent index, however, dispersion can be decisive. **The historical distribution of market dispersion favors strategies that tend to do well in down markets and hinders those that shine in up markets.**

[14] The S&P 500 High Beta Index measures the performance of the 100 highest beta stocks in the S&P 500.

[15] For example, the S&P 500 Equal Weight Index doesn't benefit from the skew to higher dispersion in the worst-performing months (hit rate of just 41%). However, between 1991 and 2014, the S&P 500 Equal Weight Index has outperformed the market-cap-weighted S&P 500 (see Appendix B).

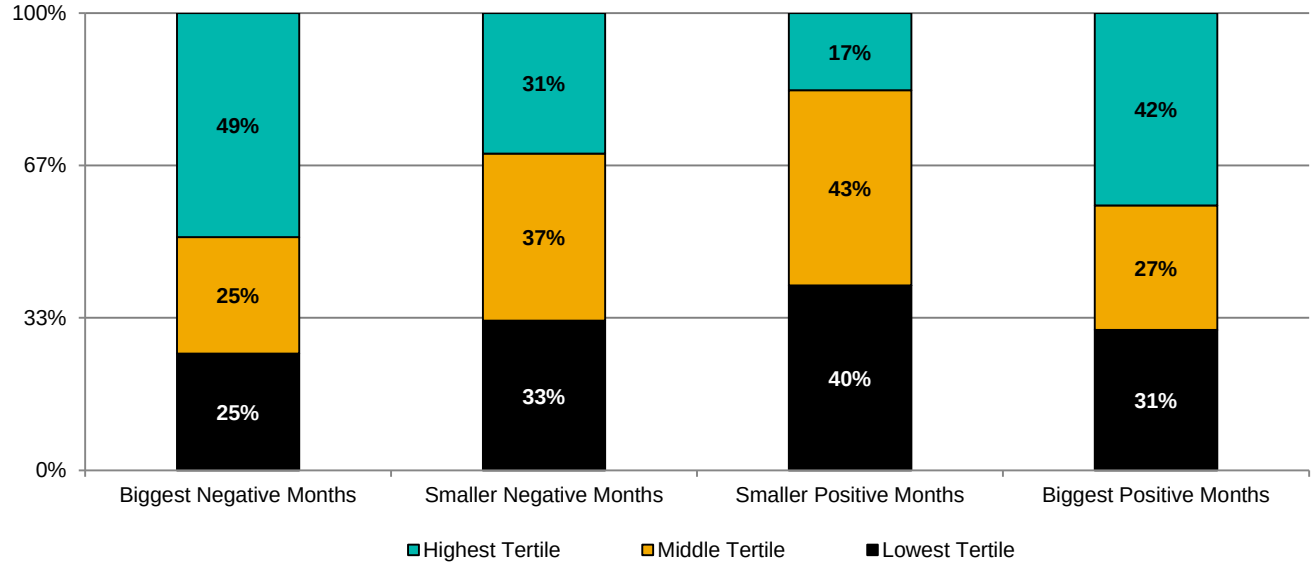
APPENDIX A: DISTRIBUTION OF DISPERSION IN VARIOUS MARKET REGIMES ACROSS ASSET CLASSES AND REGIONS

Exhibit 11: Distribution of Dispersion in the S&P 500



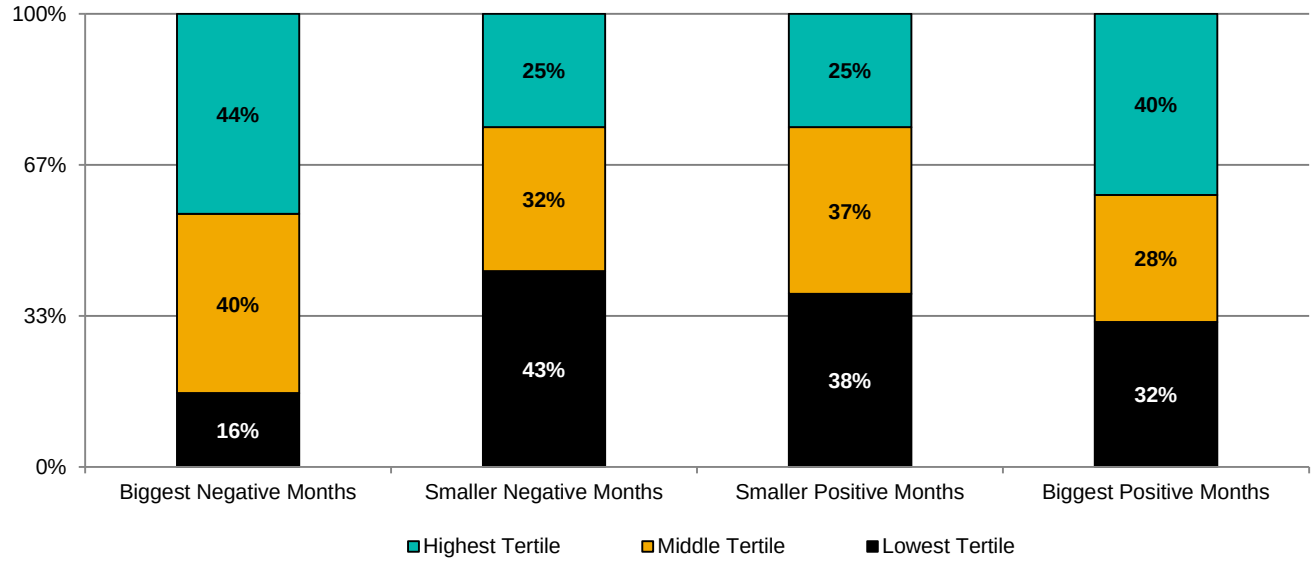
Source: S&P Dow Jones Indices LLC. Data from January 1991 to December 2014. Charts and tables are provided for illustrative purposes. Past performance is not a guarantee of future results.

Exhibit 12: Distribution of Dispersion in the S&P MidCap 400



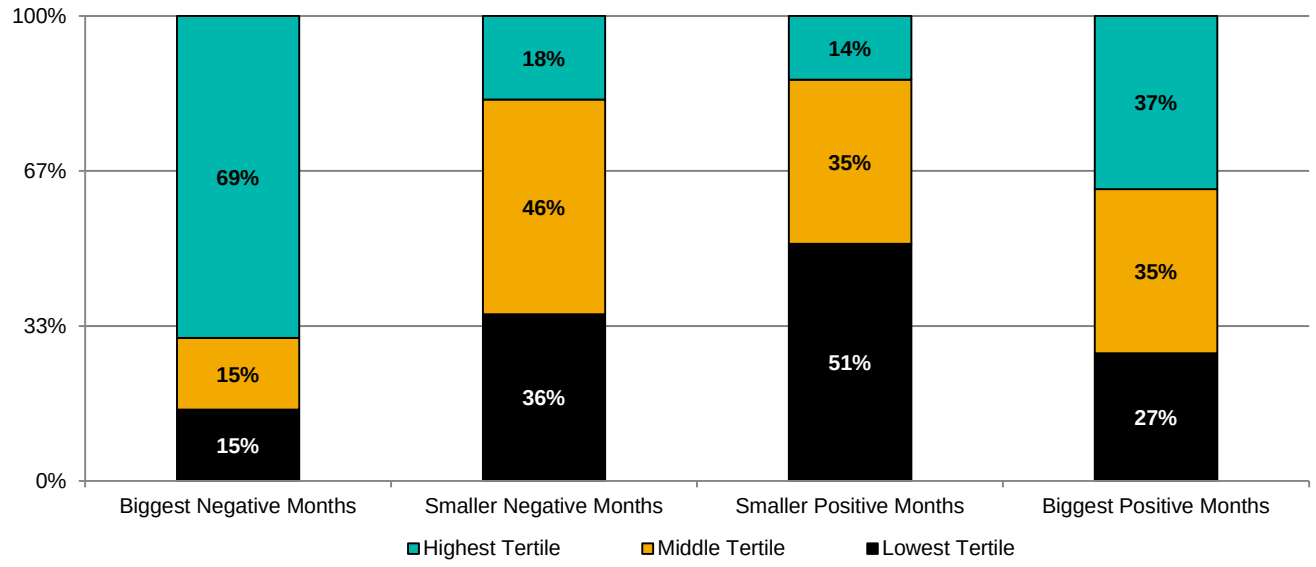
Source: S&P Dow Jones Indices LLC. Data from September 1991 to December 2014. Charts and tables are provided for illustrative purposes. Past performance is not a guarantee of future results.

Exhibit 13: Distribution of Dispersion in the S&P SmallCap 600



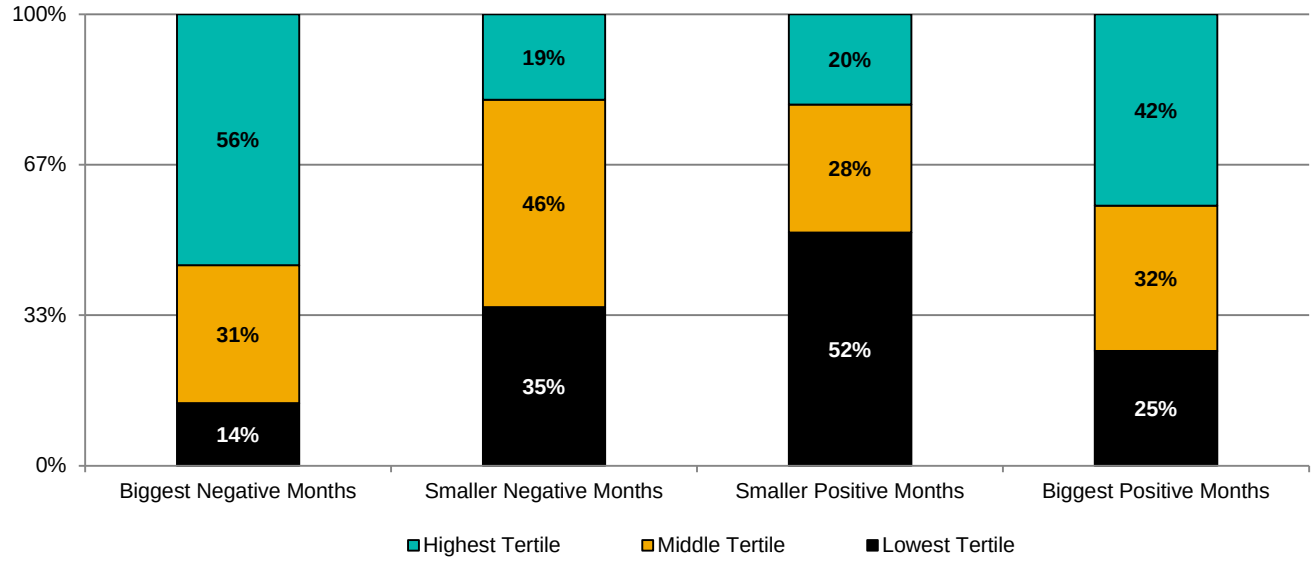
Source: S&P Dow Jones Indices LLC. Data from March 1995 to December 2014. Charts and tables are provided for illustrative purposes. Past performance is not a guarantee of future results.

Exhibit 14: Distribution of Dispersion in the S&P Europe 350



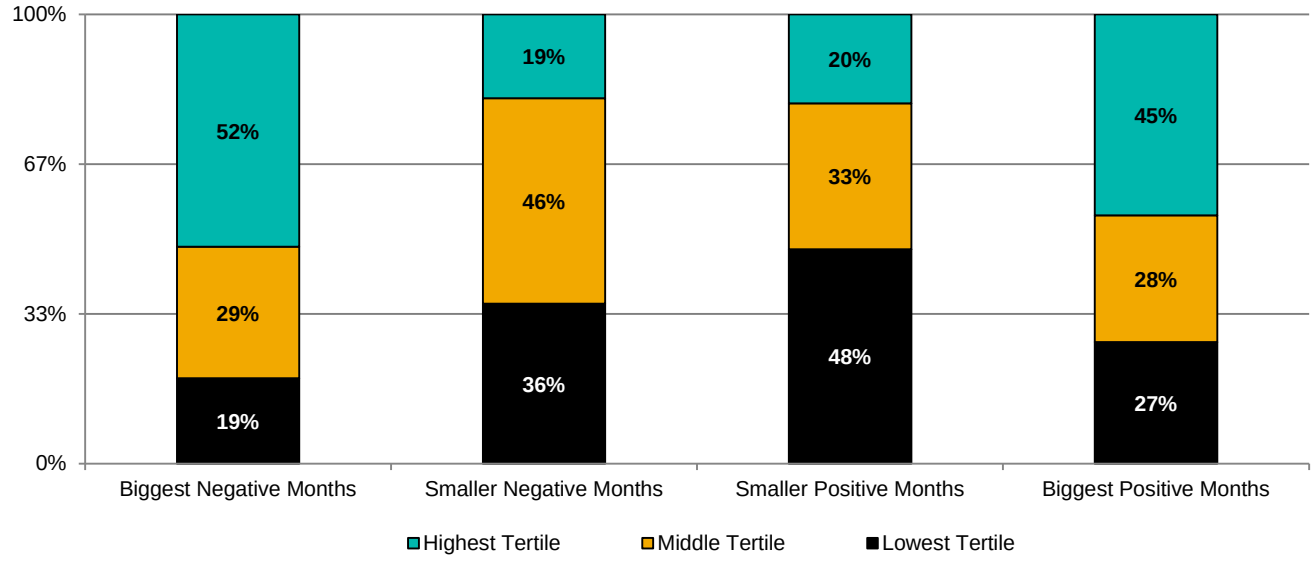
Source: S&P Dow Jones Indices LLC. Data from January 2000 to December 2014. Charts and tables are provided for illustrative purposes. Past performance is not a guarantee of future results.

Exhibit 15: Distribution of Dispersion in the S&P/TSX Composite



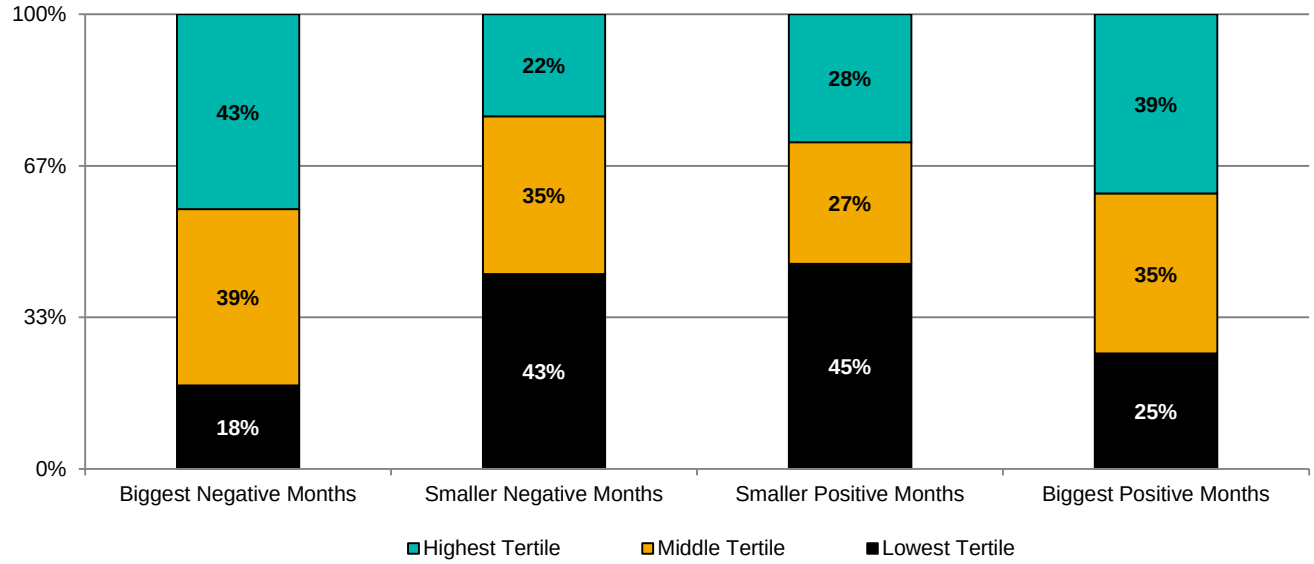
Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2014. Charts and tables are provided for illustrative purposes. Past performance is not a guarantee of future results.

Exhibit 16: Distribution of Dispersion in the S&P Developed Ex-U.S. LargeMidCap



Source: S&P Dow Jones Indices LLC. Data from January 1991 to December 2014. Past performance is not a guarantee of future results. Charts and tables are provided for illustrative purposes and may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 17: Distribution of Dispersion in the S&P Emerging BMI



Source: S&P Dow Jones Indices LLC. Data from January 1995 to December 2014. Past performance is not a guarantee of future results. Charts and tables are provided for illustrative purposes and may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

APPENDIX B: S&P 500 EQUAL WEIGHT INDEX

Exhibit 18: S&P 500 Equal Weight Index Hit Rates in Different Enviroments

	S&P 500 (# of Months)	S&P 500 Equal Weight (%)
Biggest Negative Months	49	41
Smaller Negative Months	50	44
Smaller Positive Months	95	59
Biggest Positive Months	94	56
Overall	288	52
Compound Annual Return (%)	10.18	12.56

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, to Dec. 31, 2014. Past performance is not a guarantee of future results. Charts and tables are provided for illustrative purposes and may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

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PERFORMANCE DISCLOSURES

The S&P 500 Low Volatility Index and the S&P 500 High Beta Index were launched on April 4, 2011. The S&P 500 Equal Weight Index was launched on Jan. 8, 2003. The S&P 500 Dividend Aristocrats was launched on May 2, 2005. The S&P 500 Growth and the S&P 500 Value were launched on May 30, 1992. The S&P 500 Pure Growth and the S&P 500 Pure Value were launched on Dec. 16, 2005. The S&P 500 Low Volatility High Dividend Index was launched on Sept. 17, 2012. The S&P Developed Ex-U.S. LargeMidCap was launched Dec. 31, 1992. The S&P Emerging BMI was launched on Dec. 31, 1997.

All information presented prior to these launch dates is back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect on the launch date. Complete index methodology details are available at www.spdji.com.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency on their products. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the Index is set at a fixed value for calculation purposes. The Launch Date designates the date upon which the values of an index are first considered live; index values provided for any date or time period prior to the index's Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company's public Web site or its datafeed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed "Date of Introduction") is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index's public release date.

Past performance of the Index is not an indication of future results. Prospective application of the methodology used to construct the Index may not result in performance commensurate with the back-test returns shown. The back-test period does not necessarily correspond to the entire available history of the Index. Please refer to the methodology paper for the Index, available at www.spdji.com for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Another limitation of using back-tested information is that the back-tested calculation is generally prepared with the benefit of hindsight. Back-tested information reflects the application of the index methodology and selection of index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the equities (or fixed income, or commodities) markets in general which cannot be, and have not been accounted for in the preparation of the index information set forth, all of which can affect actual performance.

Additionally, it is not possible to invest directly in an Index. The Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices maintains the Index and calculates the Index levels and performance shown or discussed, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. For example, if an index returned 10% on a US $100,000 investment for a 12-month period (or US$ 10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US$ 1,650), the net return would be 8.35% (or US$ 8,350) for the year. Over a three-year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US$ 5,375, and a cumulative net return of 27.2% (or US$ 27,200).

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