Syntax

Diversify for the Upside, not just the Downside

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The risk reduction benefits of diversification are well understood by investors and form the cornerstone of risk management. This paper shows that diversification can also improve upside capture and lead to higher portfolio returns.

Our core finding is that markets are frequently led by only one or two sectors or themes which skew the distribution of returns, meaning that each year there are usually more sectors with below average returns than above average. As such, a simple average of sector returns consistently outperforms the aggregate index or portfolio (Exhibit 1). Furthermore, we find this to be true across different universes and strategies.

This paper extends our previous research regarding the concentration risks in the main cap-weighted benchmarks by showing how the major alternative beta benchmarks also carry large sector related business exposures and that diversifying these risks usually adds to the performance of the strategy.

We explore the drivers of this phenomenon and show that performance could be improved by applying a Stratified Weight approach which neutralizes sector and industry exposure while diversifying company weights.

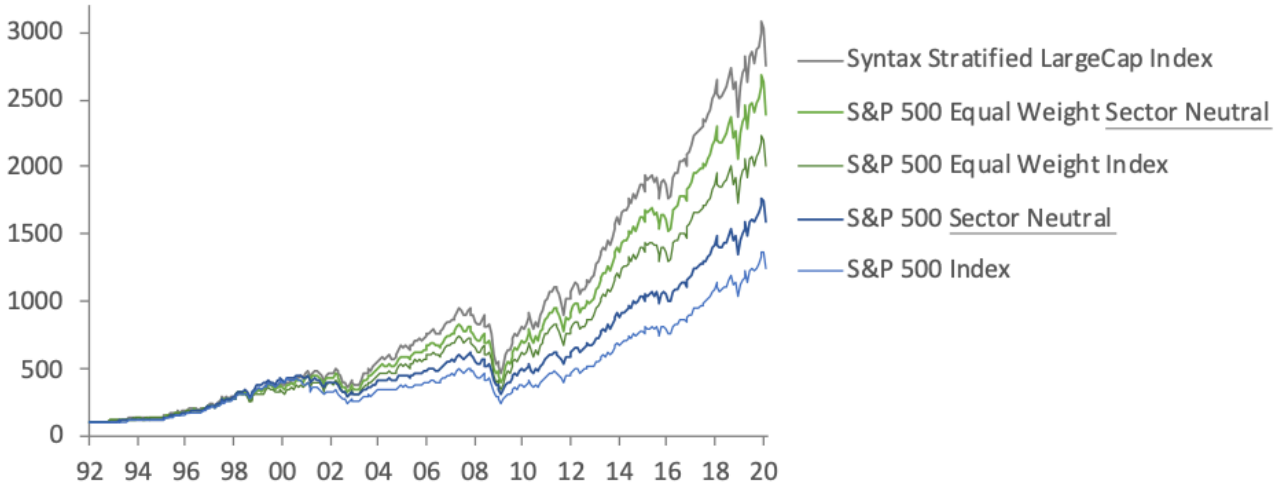
Alternative Sources of Beta Often Carry Significant Sector Risks

Equal weight indices offer an 'Alternative Beta' to those investors who wish to capture the equity risk premium without taking a view on any one company over another, in terms of both future returns and risk. As opposed to traditional cap-weighted indices,

equal weight indices track the average performance of all stocks in an index.

Equal weight indices are a welcome step towards a more diversified beta and over the long run the strategy can be shown to outperform cap-weighted indices of the same universe of stocks (Exhibit 1). The cause for this performance difference is commonly explained by the small cap and value exposures that naturally occur in many alternative weight indices.

Exhibit 1: Diversifying Sector Risk Improves Performance



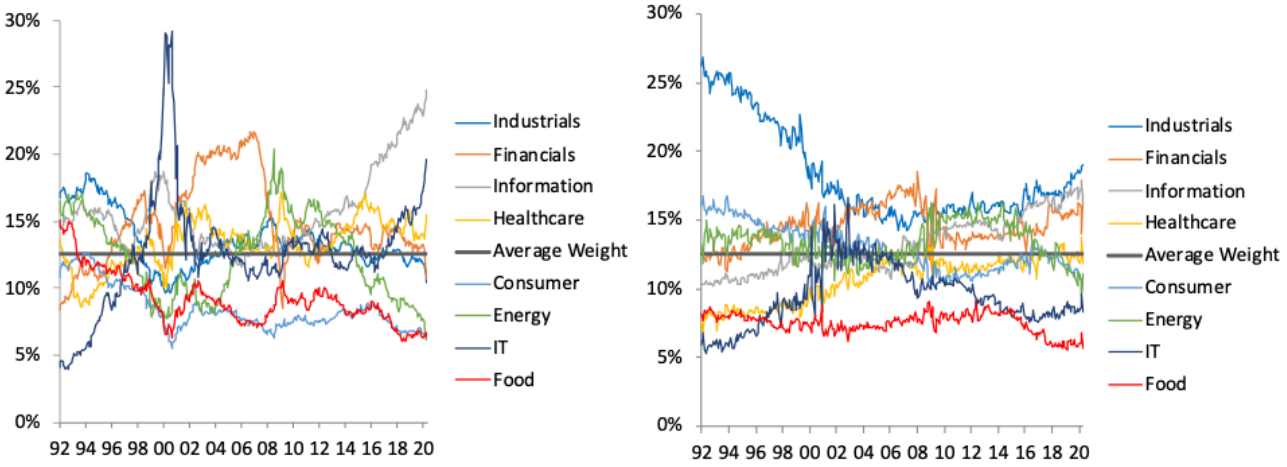
Cumulative total return, 12.31.1992 – 12.31.2019. Performance does not reflect fees or implementation costs as an investor cannot directly invest in an index. Please see important disclaimers regarding backtested data prior to inception. Source: S&P Dow Jones Indices, Syntax.

By construction, equally weighted portfolios have more small cap exposure than their market cap-weighted counterparts. Small cap stocks are generally more volatile and less liquid than large caps and therefore command a higher risk premium. On top of that, when the index is periodically rebalanced back to equal weights, the trading generally involves selling stocks that have become more expensive and buying stocks that have recently become cheaper than they were, thereby injecting a value risk premium.

While equal weighting is an effective way to diversify single company risk and capture size and value risk premia, the strategy takes significant sector risk, as it overweights sectors with larger numbers of listed equities. Over time, the variability and magnitude in sector allocations can carry similar levels of sector risk as their cap-weighted

counterparts (Exhibits 2 & 3). Like cap-weighted benchmarks, we believe that the sector biases that prevail in equal weight indices cause a drag on overall index performance.

Exhibit 2: S&P 500 (Cap Weight) Sector* Exposure **Exhibit 3.** S&P 500 Equal Weight Sector* Exposure



Source: S&P Dow Jones Indices, Syntax, Factset. * Using Functional Information System (FIS) sector definitions.

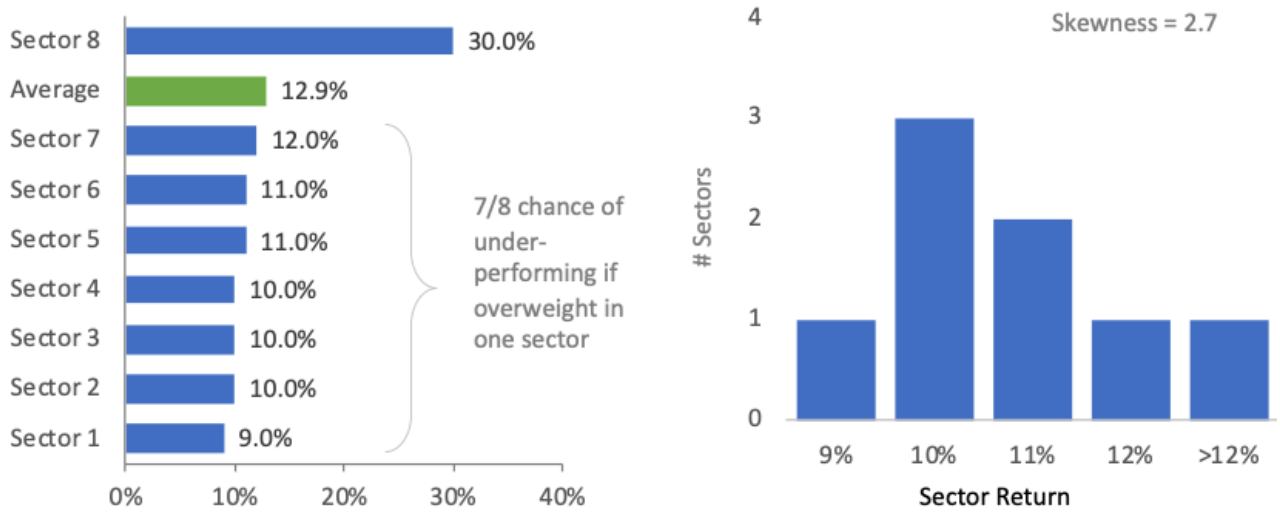
Sector Bias and Skewness

By choosing to be passive rather than active, it is easy for investors to justify the sector biases as a benign risk. After all, they are not trying to outperform the index, merely replicate it and therefore are not actively taking a view on whether one sector should outperform another. Some sectors will go up more than others, but in the end the relative performance will even out, and it won't matter that the weights in one sector were larger than in another. This assumption may hold given a symmetric distribution of sector returns. However, we find that though sector returns may be random, they often follow a positively skewed distribution where the market is driven by the strong performance of only one or two sectors. Such a skewed distribution implies that investors are usually better off taking a sector neutral approach.

To understand why, consider the annual returns of eight sectors (9%, 10%, 10%, 10%, 11%, 11%, 12%, 30%), as shown in Exhibit 4. The majority of sectors have a 10% or 11% return, but Sector 8 outperforms the others by a wide margin and positively skews the distribution (see Exhibit 5). (*Skewness* represents the imbalance or asymmetry of a data distribution. Positive Skewness means that the tail on the right side of the distribution is longer or fatter. For positive skewness the average of the data will be greater than the median.)

Exhibit 4: Annual sector returns example

Exhibit 5: Histogram of annual sector returns in Exhibit 4

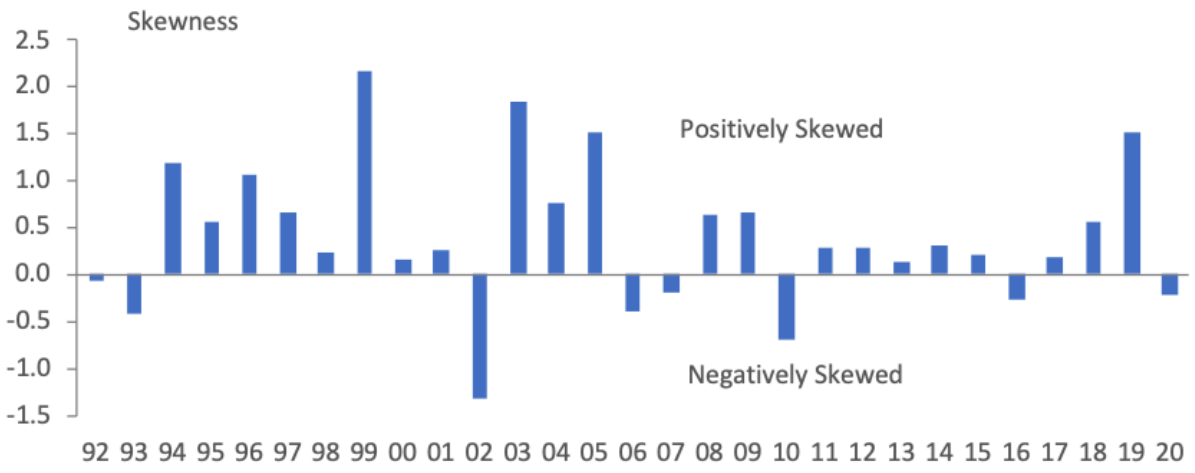


Hypothetical Example. Source: Syntax

This distribution has an interesting property in that the average of the sectors (12.9%) is higher than all but one of the individual sectors. Therefore, if you choose to be overweight in one sector at random you would only have a 12.5% (i.e. 1 in 8) chance of outperforming a sector neutral portfolio. Large sector positions therefore tend to create a performance drag in years when the distribution of sector returns is positively skewed.

In our extreme example the skewness of the eight sectors was 2.7. Though this is high we observe significantly positive skewness levels over time for a variety of different universes (e.g. Exhibit 6 shows the skewness each year for the sectors in the S&P 500 Equal Weight Index).

Exhibit 6: Skewness of sector returns for S&P 500 Equal Weight Index



Source: Syntax, Factset

A Sector Neutral Exposure Improves Returns

To highlight the importance of sector diversification we look at sector returns within the S&P 500 Equal Weight Index in order to reduce the impact of single stock or factor effects which could further bias the results (Exhibit 7).

Exhibit 7: The average of the sectors consistently beats the equally weighted index

S&P 500 Eq. wt	Full*	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
Financials	10.1	12.1	-6.2	35.1	-0.3	-8.5	35.9	**20.3**	9.4	18.3	-23.8	-53.0	37.4	**28.4**	-12.0	**30.8**	37.4	14.4	0.7	18.3	17.9	-14.1	30.7
Energy	8.2	-4.1	-0.2	**48.8**	-13.7	-22.2	33.9	**29.9**	**30.9**	17.7	**29.5**	-37.9	33.0	20.2	**8.8**	8.6	23.1	2.3	-16.0	**28.2**	3.7	-7.9	19.5
Industrials	9.9	-6.2	16.5	-9.1	**9.2**	**-4.9**	**49.7**	19.1	7.3	**24.1**	**15.7**	-40.6	47.1	23.8	-4.8	15.3	34.0	9.1	-8.9	21.7	**27.9**	-11.8	**32.4**
IT	14.0	**52.6**	**108**	-29.0	-16.5	-45.7	**79.6**	7.8	1.8	8.2	-1.2	-44.8	**73.8**	24.7	-4.6	7.2	38.0	**23.0**	-5.1	**27.2**	**35.2**	**2.7**	**49.4**
Information	10.9	**33.6**	**31.2**	-11.0	1.1	-25.1	32.7	12.5	2.4	15.4	1.5	-42.8	54.7	16.7	-2.0	**24.5**	**51.0**	11.7	5.6	9.5	22.0	-5.0	30.2
Consumer	7.9	6.0	-3.7	-3.4	**22.0**	-14.5	33.3	18.5	-2.7	16.2	-10.7	-38.4	**60.6**	**28.2**	1.9	20.3	38.2	16.8	-6.8	7.1	10.4	-11.2	24.8
Food	11.4	27.4	-13.2	22.3	5.7	**-4.4**	20.7	15.9	1.2	**18.8**	5.7	**-19.3**	28.6	23.4	**16.3**	12.2	33.1	19.0	**15.7**	7.8	15.3	-6.9	30.2
Healthcare	12.9	33.4	-5.5	**58.6**	-2.5	-15.3	34.5	12.6	**15.4**	7.6	13.4	**-26.3**	40.4	12.6	6.8	20.9	**39.1**	**31.5**	**7.6**	-4.0	18.8	**1.6**	24.2
Sector Neutral	**11.4**	**19.3**	**15.8**	**14.0**	**0.7**	**-17.6**	**40.0**	**17.1**	**8.2**	**15.8**	**3.8**	**-37.9**	**46.9**	**22.2**	**1.3**	**17.5**	**36.7**	**16.0**	**-0.9**	**14.5**	**18.9**	**-6.6**	**30.2**
S&P 500 Eq. wt	10.6	13.3	11.7	10.5	1.6	-18.0	41.0	17.4	8.4	16.2	1.8	-38.9	47.7	22.1	0.4	18.1	36.5	14.8	-2.2	14.8	18.6	-7.3	29.6
Differential	**0.8**	**6.0**	**4.1**	**3.5**	**-1.0**	**0.4**	**-0.9**	**-0.3**	**-0.1**	**-0.4**	**2.0**	**1.0**	**-0.8**	**0.1**	**1.0**	**-0.6**	**0.2**	**1.1**	**1.3**	**-0.4**	**0.3**	**0.8**	**0.5**
Sector Skewness	0.3	0.2	2.2	0.2	0.3	-1.3	1.8	0.8	1.5	-0.4	-0.2	0.6	0.7	-0.7	0.3	0.3	0.1	0.3	0.2	-0.3	0.2	0.6	1.5

Annual total return of S&P 500 Equal Weight Index sectors as defined by Syntax's Functional Information System. Performance does not reflect fees or implementation costs as an investor cannot directly invest in an index. Please see important disclaimers regarding backtested data prior to inception. Source: S&P Dow Jones Indices, Syntax. * Full sector average annualized from 12.31.1991 – 12.31.2019.

For example, in 2019 only one sector (IT) significantly outperformed the average, while three sectors (Energy, Consumer and Healthcare) underperformed. Given this 3 to 1 underperform-to-outperform ratio, investors choosing to be overweight in a single sector at random were more likely to choose a below average sector (Exhibit 8). The distribution of all sector returns versus their average for the year is shown in Exhibit 9 (from 1992-2019). The entire distribution has a statistically significant skewness of 1.5.

Exhibit 8: 2019 Equal Weight Sector Returns Annual Sector Returns (1992-2019)

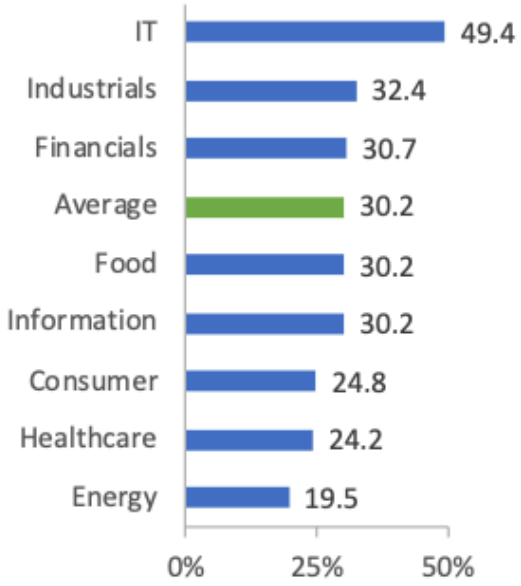
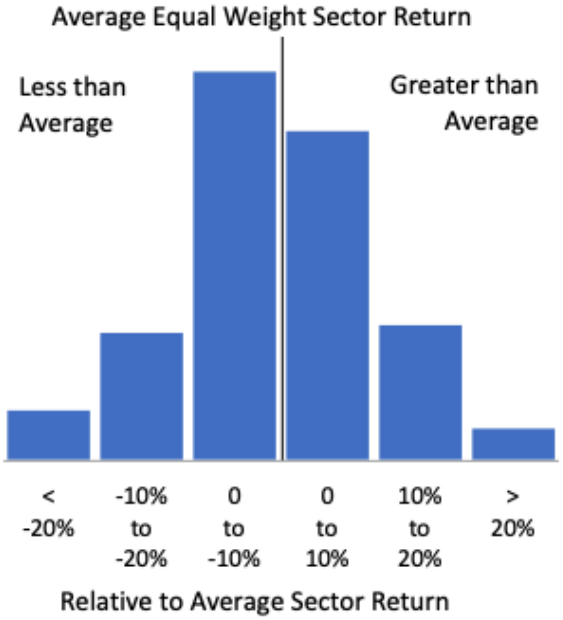


Exhibit 9: Histogram of Relative



While occasionally the sector overweights will coincide with the best performing sectors, leading to outperformance (e.g. in 2003), most of the time they will not (Exhibit 7, 16). Therefore large sector biases often detract from performance and sector neutral portfolios usually have superior returns.

As shown in Exhibit 7 the average of the sector returns (i.e. sector neutral) S&P 500 Equal Weight Index consistently outperformed the vanilla S&P 500 Equal Weight Index by 77 bps per year.

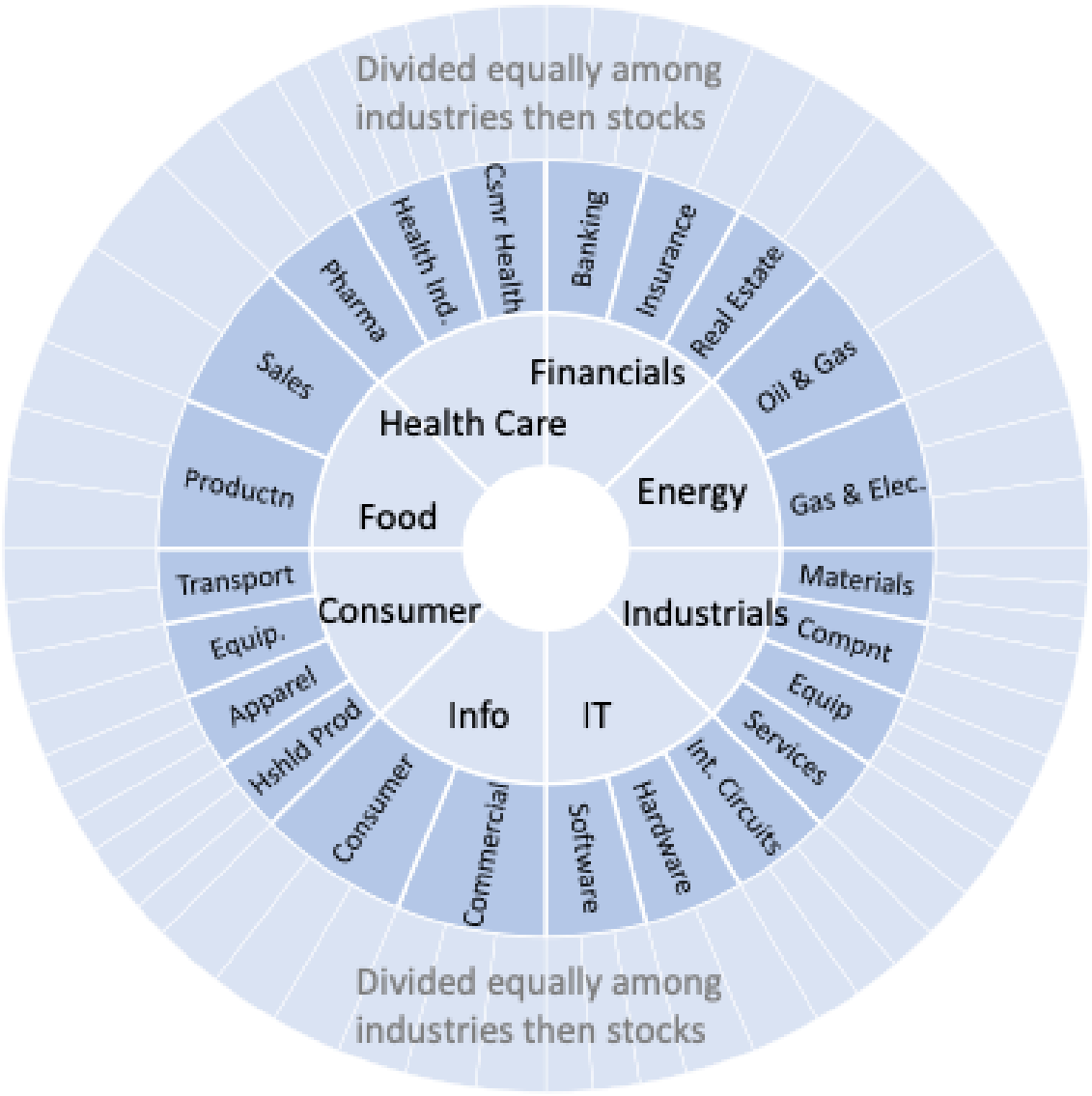
We find that this result is true in a variety of commonly used benchmark indices such as the S&P 500, MSCI EAFE, the S&P 500 Value index and the S&P MidCap 400, all of which carry significant sector biases over time. Notably, *which* sectors each of these indices is biased toward varies considerably, both between index universes and over time and in each of these indices we find that the sector neutral return is consistently higher than the broad index (see Exhibit 15 at the end of the report).

Stratified Weight Effectively Diversifies Stock and Sector risk

Syntax Stratified Weight indices diversify sector, industry, and company risk

simultaneously. The Stratified Weight process gives a sector neutral allocation at each rebalance. Sector weight is then disbursed equally between component industries, sub-industries and eventually the lowest level is divided equally between constituent stocks (Exhibit 10). The process ensures that no business type is over- represented in the index and that homogenous companies are treated equally.

Exhibit 10: Stratified Weight



The superior diversification gained by taking a Stratified Weight approach achieves higher returns than the more naïve sector neutral methodology. Since 1992 Stratified Weight indices rose 11.9% per year, versus 10.6% for the S&P 500 Equal Weight Index and 11.4% for the sector neutral version (Exhibit 15 on the following page). The same pattern can be seen in the S&P 500, S&P MidCap 400, MSCI EAFE and S&P 500 Value index

(Exhibits 11-14).

Exhibit 11: S&P 500 Index

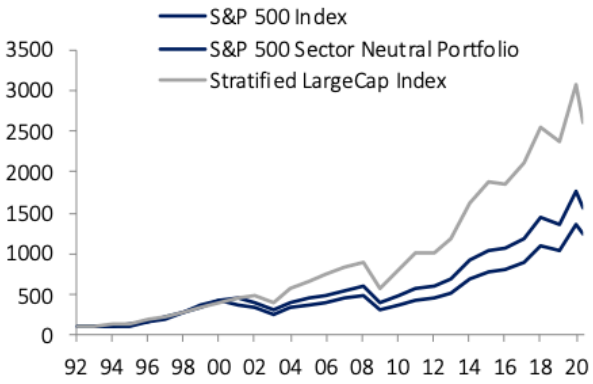


Exhibit 12: S&P MidCap 400 Index

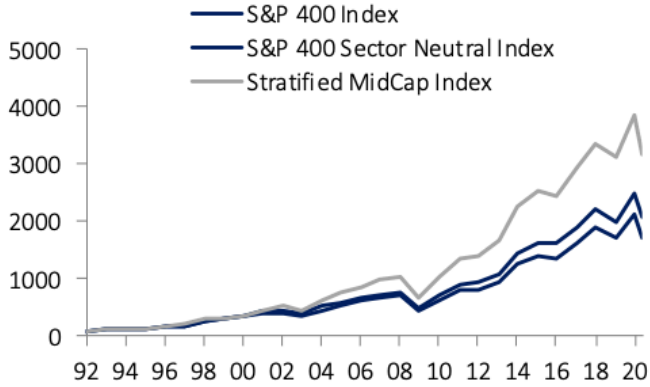


Exhibit 13: S&P 500 Value Index

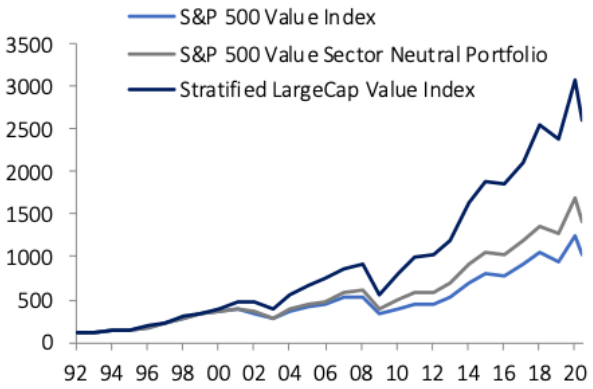
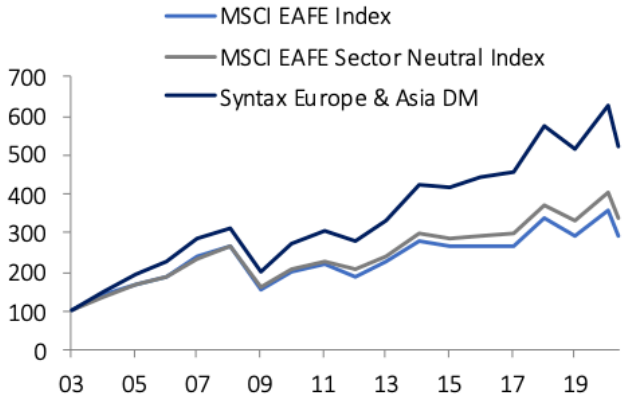


Exhibit 14: MSCI EAFE Index



Cumulative total return of each index compared with sector neutral (annual rebalanced) and Stratified Weight 12.31.1991 – 12.31.2019 (*12.31.2002 – 12.31.2019 for MSCI EAFE Index). Performance does not reflect fees or implementation costs as an investor cannot directly invest in an index. Please see important disclaimers regarding backtested data prior to inception. Source: S&P Dow Jones Indices, MSCI, Syntax.

Conclusion

Sector exposure is a significant, but sometimes overlooked driver of benchmark returns. We find that each year the distribution of sector returns is consistently skewed with a small number of sectors significantly outperforming the others. As such, a more

diversified, sector neutral approach ensures that the portfolio gains at least some exposure to the outperforming themes.

Given that many passive products, whether cap-weighted or not, carry significant positions in certain sectors, we find that the sector neutral versions outperform their traditional sector-biased benchmarks. The broad implication is that although investors look for diversification to reduce portfolio volatility, we find that there is value in diversification to improve upside capture (Exhibit 15).

Exhibit 15: Performance Summary

	Index Return	**Sector Neutral Return**	Differential (vs Index)	**Stratified Weight Return**	Differential (vs Index)
S&P 500	**9.1%**	**10.0%**	0.88%	**11.9%**	2.82%
S&P 500 Equal Weight	**10.6%**	**11.4%**	0.81%	**11.9%**	1.27%
S&P 500 Value	**8.4%**	**9.6%**	1.17%	**10.0%**	1.61%
S&P 400	**10.3%**	**11.0%**	0.69%	**12.7%**	2.36%
MSCI EAFE*	**6.2%**	**7.0%**	0.81%	**9.6%**	3.39%

Annualized total return of each index compared with sector neutral version of that index (annual rebalanced), Stratified Weight column shows the Stratified Weight index returns for the same universe 12.31.1991 – 12.31.2019 (*12.31.2002 – 12.31.2019 for MSCI EAFE Index). Performance does not reflect fees or implementation costs as an investor cannot directly invest in an index. Please see important disclaimers regarding backtested data prior to inception. Source: S&P Dow Jones Indices, Factset, Syntax.

Exhibit 16: The Average of the Sectors Consistently Beats the Equally Weighted index

S&P 500 Index	Full*	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
Financials	7.3	10.8	2.5	24.4	-8.4	-13.5	31.8	12.3	5.9	18.9	-21.3	-55.8	17.8	13.3	-17.9	30.4	35.0	15.1	-1.2	18.8	19.5	-12.8	31.9
Energy	7.2	4.8	9.0	27.4	-18.1	-17.3	25.8	29.2	27.2	23.3	30.8	-33.8	13.3	17.2	7.6	4.1	22.5	-0.1	-16.5	23.9	2.9	-10.8	17.5
Industrials	8.3	4.0	28.1	-4.0	-9.4	-18.0	35.1	16.0	4.4	15.0	15.1	-42.5	28.1	24.2	-3.6	14.1	36.4	7.9	-4.1	18.5	23.0	-12.7	28.8
IT	13.2	78.5	84	-40.5	-30.0	-36.4	49.6	0.4	1.6	9.6	15.6	-42.6	60.4	12.3	-0.9	13.5	24.5	28.6	-1.8	18.2	40.1	3.3	54.5
Information	9.4	45.8	26.5	-29.1	-3.2	-35.2	24.1	11.9	-7.6	19.3	5.4	-38.8	35.6	13.6	6.9	23.9	39.2	6.2	14.3	12.1	27.1	-1.3	32.9
Consumer	8.8	23.9	9.0	-15.4	8.8	-18.2	30.5	14.7	0.6	13.8	-5.2	-27.6	29.5	22.1	2.2	17.4	34.6	16.9	-1.0	2.8	17.0	-6.6	31.4
Food	9.8	27.0	-5.0	8.8	-1.8	-9.2	16.6	8.5	2.0	15.9	14.1	-12.7	16.3	19.0	18.6	8.9	24.4	12.9	12.4	7.4	17.0	-7.7	26.7
Healthcare	9.9	43.2	-10.1	37.1	-13.1	-19.0	16.0	2.1	7.1	7.6	7.2	-23.5	20.5	3.8	12.2	17.9	40.3	26.4	6.6	-3.0	19.7	6.4	19.5
Sector Neutral	**10.0**	**29.8**	**17.9**	**1.1**	**-9.4**	**-20.9**	**28.7**	**11.9**	**5.2**	**15.4**	**7.7**	**-34.7**	**27.7**	**15.7**	**3.1**	**16.3**	**32.1**	**14.2**	**1.1**	**12.3**	**20.8**	**-5.3**	**30.4**
S&P 500	9.1	28.7	21.0	-9.1	-11.9	-22.1	28.7	10.9	4.9	15.8	5.5	-37.0	26.4	15.1	2.1	16.0	32.4	13.7	1.4	12.0	21.8	-4.4	31.5
Differential	**0.9**	**1.0**	**-3.1**	**10.2**	**2.5**	**1.2**	**0.0**	**1.0**	**0.2**	**-0.3**	**2.2**	**2.3**	**1.3**	**0.6**	**1.0**	**0.3**	**-0.3**	**0.5**	**-0.3**	**0.4**	**-1.0**	**-0.9**	**-1.1**
Sector Skewness	1.3	1.0	1.8	-0.2	-0.3	-0.9	0.8	0.7	1.6	-0.1	-0.7	0.1	1.6	-0.6	-0.7	0.3	-0.4	0.2	-0.3	-0.6	0.3	0.6	1.4

S&P 500 Value	Full*	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
Financials	7.4	4.9	1.8	24.5	-3.5	-13.5	33.0	12.6	6.9	21.8	-21.5	-54.3	12.3	12.4	-21.6	31.4	36.4	15.9	-1.7	22.3	20.1	-13.7	34.2
Energy	7.8	8.4	9.0	27.4	-16.8	-17.5	25.5	28.3	23.5	24.8	26.9	-31.8	17.2	16.5	13.0	4.9	21.1	1.5	-13.6	23.3	4.8	-11.6	18.5
Industrials	7.9	-6.1	17.7	-1.7	-1.6	-7.4	38.5	15.6	5.8	16.7	16.2	-43.9	25.8	22.2	-3.6	15.7	36.1	4.1	-2.0	22.1	18.9	-17.3	27.4
IT	10.5	41.5	82	-35.8	-36.5	-47.5	67.0	12.7	10.5	5.5	17.2	-42.8	53.7	7.1	-4.9	-0.9	47.3	29.5	-9.0	21.7	30.3	1.9	69.5
Information	7.0	43.1	30.0	-23.2	-19.2	-37.7	19.9	9.0	-8.4	30.9	0.8	-32.7	18.7	18.0	1.0	27.4	24.6	6.8	-0.9	20.6	10.0	-6.7	29.2
Consumer	8.0	17.6	-2.8	-5.4	13.1	-21.5	42.4	13.9	-6.6	18.5	-11.9	-33.6	38.7	22.6	0.3	21.2	32.9	13.7	-9.0	7.6	15.9	-6.8	30.2
Food	9.9	37.6	-24.6	31.1	-0.2	-15.5	22.7	18.5	4.9	22.7	16.5	-15.8	16.8	17.1	14.4	12.3	28.4	13.8	6.5	10.4	15.8	-8.1	28.4
Healthcare	11.1	11.0	-15.8	66.1	-6.8	-11.6	30.3	20.2	13.2	12.6	18.0	-26.0	23.2	3.9	16.2	16.9	42.3	25.7	8.6	1.5	14.8	5.1	18.2
Sector Neutral	**9.6**	**19.7**	**12.2**	**10.4**	**-8.9**	**-21.5**	**34.9**	**16.3**	**6.2**	**19.2**	**7.8**	**-35.1**	**25.8**	**15.0**	**1.9**	**16.1**	**33.6**	**13.9**	**-2.6**	**16.2**	**16.3**	**-7.2**	**32.0**
S&P 500 Value	8.4	15.0	12.5	6.2	-11.7	-20.8	31.8	15.7	6.0	20.8	2.0	-39.2	21.2	15.1	-0.5	17.7	32.0	12.4	-3.1	17.4	15.4	-9.0	31.9
Differential	**1.2**	**4.7**	**-0.3**	**4.1**	**2.8**	**-0.7**	**3.1**	**0.6**	**0.2**	**-1.6**	**5.8**	**4.1**	**4.6**	**-0.1**	**2.3**	**-1.6**	**1.7**	**1.5**	**0.5**	**-1.2**	**1.0**	**1.8**	**0.0**
Sector Skewness	0.6	0.2	1.4	0.3	-0.6	-1.2	1.5	1.1	0.1	-0.4	-0.9	0.0	1.4	-0.6	-0.7	-0.2	0.1	0.4	0.2	-0.9	0.5	0.5	2.2

S&P 400 Index	Full*	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
Financials	9.3	7.9	-14.9	16.0	4.7	-4.3	41.4	23.1	8.6	14.0	-19.9	-28.3	12.3	17.2	-3.5	18.0	24.0	15.1	6.8	22.8	9.4	-14.3	27.5
Energy	7.3	-15.0	1.2	62.8	-11.0	-2.8	23.4	25.9	32.0	11.2	28.1	-39.2	40.3	22.3	1.0	3.5	27.6	-6.1	-17.0	21.8	1.3	-11.7	4.9
Industrials	8.7	-1.5	-3.6	1.7	6.3	-13.9	32.1	24.2	8.2	15.7	25.8	-41.6	43.5	28.0	-0.6	20.6	33.9	2.5	-13.4	35.1	24.9	-15.2	33.7
IT	13.1	52.3	134	-12.9	-9.2	-44.9	67.2	-14.9	9.5	9.7	1.0	-43.8	86.7	52.7	-19.6	2.5	24.7	11.2	4.0	18.0	16.7	-1.8	41.4
Information	11.1	87.9	8.0	0.2	-0.7	-18.6	23.1	14.6	4.1	12.5	5.6	-33.3	33.2	15.6	-10.2	27.1	38.0	6.7	3.5	15.2	28.2	-10.8	25.5
Consumer	8.8	25.3	1.3	-3.9	21.2	1.9	39.4	17.9	9.3	6.1	-9.1	-40.3	56.7	34.7	5.0	21.0	46.9	16.8	-2.0	7.8	10.2	-21.9	22.4
Food	10.5	9.8	-18.5	24.8	20.1	-0.9	23.4	12.4	6.1	8.2	-4.3	-24.6	25.1	45.4	31.3	20.0	35.5	24.2	-3.2	19.6	8.1	-2.0	14.5
Healthcare	11.5	30.8	2.8	59.1	-8.7	-21.1	44.9	15.7	18.7	-1.4	12.8	-31.5	30.0	22.0	1.4	29.1	41.9	25.4	7.4	8.1	20.1	10.1	23.3
Sector Neutral	**11.0**	**24.7**	**13.7**	**18.5**	**2.8**	**-13.1**	**36.9**	**14.9**	**12.1**	**9.5**	**5.0**	**-35.3**	**41.0**	**29.8**	**0.6**	**17.7**	**34.1**	**12.0**	**-1.7**	**18.5**	**14.9**	**-8.4**	**24.2**
S&P 400	**10.3**	**18.8**	**15.3**	**17.7**	**-0.6**	**-14.4**	**35.6**	**16.5**	**12.5**	**10.4**	**8.0**	**-36.3**	**37.4**	**26.6**	**-1.7**	**17.9**	**33.5**	**9.8**	**-2.2**	**20.7**	**16.2**	**-11.1**	**26.2**
Differential	**0.7**	**5.9**	**-1.5**	**0.8**	**3.4**	**1.4**	**1.3**	**-1.6**	**-0.5**	**-0.9**	**-3.0**	**0.9**	**3.6**	**3.1**	**2.3**	**-0.2**	**0.6**	**2.2**	**0.4**	**-2.2**	**-1.4**	**2.6**	**-2.0**
Sector Skewness	0.2	1.0	2.6	0.8	0.5	-1.3	1.2	-2.1	1.8	-1.2	0.1	0.3	1.1	0.8	1.2	-0.8	0.2	-0.4	-0.9	0.6	0.1	0.7	-0.3

Annual total return of S&P 500, S&P 500 Value and S&P MidCap 400 sectors as defined by Syntax's Functional Information System. Sector Neutral performance is a simple average for the individual sectors that year. Performance does not reflect fees or implementation costs as an investor cannot directly invest in an index. Please see important disclaimers regarding backtested data prior to inception. Source: S&P Dow Jones Indices, Syntax. * Full sector average annualized from 12.31.1991 – 12.31.2019

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