Active Business Risk

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Abstract

This paper introduces a new risk measure called Active Business Risk, based on the excess level of sector or industry exposure in a portfolio or index and shows that Active Business Risk is an important driver of portfolio return.

Most passive indices carry unmanaged industry exposures due to their weighting methodology (e.g. market cap or equal weight). The paper compares the Active Business Risk Score for several core equity indices that are perceived to be well diversified and shows that they currently carry an elevated level of Active Business Risk.

Portfolios with high Active Business Risk Scores have higher sensitivity to economic shocks which impact companies with related business risks, often causing the portfolio to perform poorly relative to more diversified alternatives. We conclude that Active Business Risk is a quantifiable risk that is not adequately diversified by cap weighted indices, leading to inefficient capture of their potential equity risk premia.

Key words: *Active Business Risk, Active Share, Market Cap Weight, Core Equity Exposure, Diversification, Stratified Weight.*

T he vast majority of core equity investment products follow market cap weighted indices. Investors perceive them to be a passive way to gain diversfied equity exposure, however such indices do not control the concentrated sector or industry exposures that can occur due to general ebb and flow of markets. Such risk concentrations challenge the notion of diversfication and whether cap weighted indices are taking on excess sector or industry risk, versus a more neutral benchmark.

The degree to which a fund is considered active is often summarized by calculating its *Active Share*. Active Share[1] is defined as the turnover that the portfolio would incur in order to bring its weights back to a chosen benchmark (usually market-cap-weighted). For example, a US large cap investor looking to outperform the S&P 500 might have a strong view that JP Morgan is trading cheaply, especially relative to Microsoft. This investor may express their view by overweighting JP Morgan by 3% and funding this position with an equal-sized underweight in Microsoft, while keeping their other positions at identical weights to the S&P 500 (as in Exhibit 1 below). The Active Share for this portfolio against its designated benchmark, the S&P 500, is 3%. The general formula is simply the sum of each position's absolute active weight divided by 2.

Active Share was originally designed to expose closet index managers who professed to be actively managing their funds, while taking very little relative risk. It follows that if such funds charge a high fee (e.g. 60bps or higher), they will most likely underperform their benchmarks. Active Share is a useful tool to avoid

overpriced funds, however it tells us very little about the risk exposures taken by the strategy.

For example, when a manager selects stocks that they consider to be good value, they may have taken an indirect risk at the sector or industry level. In our example, the manager is overweight banks and underweight software. Such *business risks[2]* are not fully quantified by most active strategies and hence are not adequately controlled.

We define *Active Business Risk* as the amount of trading necessary in order to bring the portfolio's sector or industry weightings back to a neutral exposure (which we will define shortly).

Active Business Risk is conceptually analogous with Active Share. For example, a portfolio with neutral sector weights other than a 3% overweight in Financials, funded by a 3% underweight in the IT would have a Active Business Risk of 3% at the sector level (see Exhibit 2 below).

Economic shocks frequently occur and often have a profound effect on the earnings of groups of companies that share related business risks (e.g. oil price volatility impacting consumer confidence, in turn impacting the returns and volatilities for many stocks in the Consumer Discretionary Sector). Therefore, measuring the proportion in which a manager is taking on excess business risk can have significant implications for portfolio returns[3].

Exhibit 1: Active Share Example

Exhibit 2: Active Business Risk Example
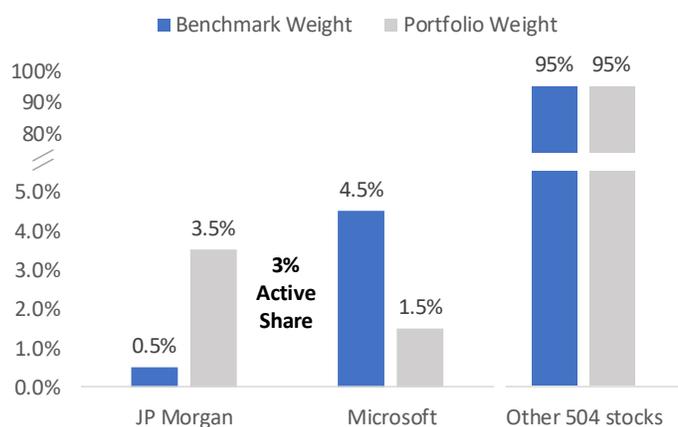
$$Active\ Share = \frac{1}{2}\sum_{i=1}^{N}\left| w_{stock_i,\ portfolio} - w_{stock_i,\ benchmark} \right|$$
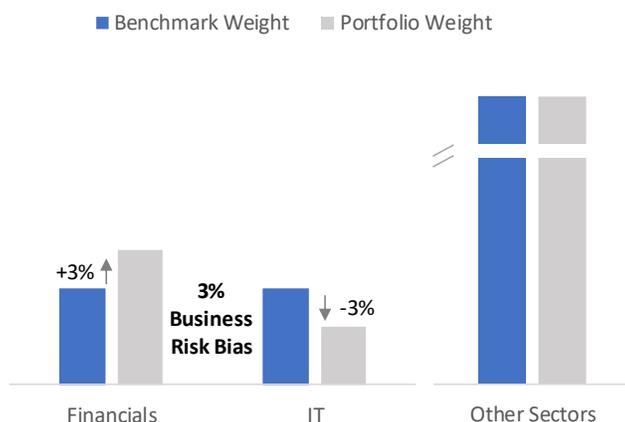
Business Risk and Sector Performance

The impact of business risk is shown in Table 1 below. The annual total return of the Global Industry Classification Standard (GICS)[4] sectors in the S&P 500 are shown from 1992-2018. We highlight the worst three performing sectors where their returns were negative. During the 26-year history, each sector experienced a significant negative event at some time, in many cases underperforming the S&P 500 by over 20%. During such a time, a 10% overweight in these sectors would have led to roughly 2% of portfolio underperformance.

There are myriad examples of economic shocks causing sector volatility, from large shocks such as those seen following the DotCom bubble in 1999-2000 or the Financial Crisis in 2008 to smaller shocks such as Health Care reform in 1992 or oil prices rising in 2005 negatively impacting the Consumer Discretionary sector.

Given that the average investor cannot predict when and where economic shocks may occur, a diversified exposure to all business risk groups is a prudent strategy for investors who do not have a clear preference for the prospects of one sector over another. However, this strategy calls for a different weighting approach to cap weighting.

Historically, investors have managed sector risks by using GICS. Company weights are aggregated to GICS sector or industry group and then constrained to a maximum or minimum level.

However, this approach is inadequate for managing Business Risk concentrations, as GICS sectors were not developed to specifically diversify business risk. Narrow GICS sectors such as Utilities and Materials have less economic importance than broader Financials and Industrials and hence GICS should not be used to determine a neutral level of business risk.

A Functional Information System (FIS) allows Business Risk to be diversified by using a functional tagging system to define each aspect of a company's business model, including the customer groups, supply chains and product types for each of its business lines. Using FIS, Business Risk exposures can be accurately quantified, allowing for a benchmark with neutral business risks to be determined. This benchmark is said to be *Stratified Weight* (Exhibit 3).

**Exhibit 3 – Stratified Weight Index**
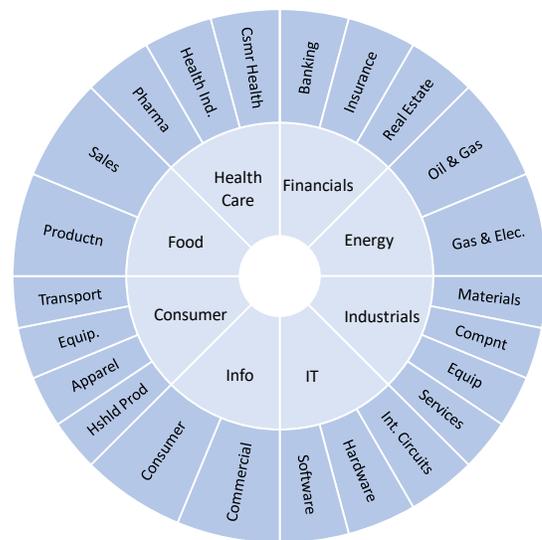
Table 1 – GICS Sector Performance in the S&P 500 Index

	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Communications	15%	14%	-5%	42%	1%	41%	52%	19%	-39%	-12%	-34%	7%	20%	-6%	37%	12%	-30%	9%	19%	6%	18%	11%	3%	3%	23%	-1%	-13%
Discretionary	20%	15%	-8%	20%	12%	34%	41%	25%	-20%	3%	-24%	37%	13%	-6%	19%	-13%	-33%	41%	28%	6%	24%	43%	10%	10%	6%	23%	1%
Energy	2%	16%	4%	31%	26%	25%	1%	19%	16%	-10%	-11%	26%	32%	31%	24%	35%	-35%	14%	20%	5%	5%	25%	-8%	-21%	27%	-1%	-18%
Financials	23%	11%	-4%	54%	35%	48%	11%	4%	26%	-9%	-15%	31%	11%	6%	19%	-19%	-55%	17%	12%	-17%	29%	36%	15%	-2%	23%	22%	-13%
Health Care	-16%	-8%	14%	58%	21%	44%	44%	-11%	37%	-12%	-19%	15%	2%	6%	8%	7%	-23%	20%	3%	13%	18%	41%	25%	7%	-3%	22%	6%
Industrials	9%	19%	-2%	39%	25%	27%	11%	21%	6%	-6%	-26%	32%	18%	2%	13%	12%	-40%	21%	27%	-1%	15%	41%	10%	-3%	19%	21%	-13%
IT	3%	22%	20%	39%	44%	29%	78%	79%	-41%	-26%	-37%	47%	3%	1%	8%	16%	-43%	62%	10%	2%	15%	28%	20%	6%	14%	39%	0%
Materials	10%	13%	6%	20%	16%	8%	-6%	25%	-16%	3%	-5%	38%	13%	4%	18%	22%	-46%	49%	22%	-10%	15%	26%	7%	-8%	17%	24%	-15%
Real Estate											-15%	21%	22%	7%	37%	-20%	-45%	21%	28%	8%	16%	-2%	26%	1%	1%	11%	-2%
Staples	5%	-4%	10%	40%	26%	33%	16%	-15%	17%	-6%	-4%	12%	8%	4%	14%	14%	-15%	15%	14%	14%	11%	26%	16%	7%	5%	13%	-8%
Utilities	7%	14%	-12%	33%	6%	25%	15%	-9%	57%	-30%	-30%	26%	24%	17%	21%	19%	-29%	12%	5%	20%	1%	13%	29%	-5%	16%	12%	4%
S&P 500	8%	10%	1%	38%	23%	33%	29%	21%	-9%	-12%	-22%	29%	11%	5%	16%	5%	-37%	26%	15%	2%	16%	32%	14%	1%	12%	22%	-4%

Source: Syntax, Bloomberg. Annual total return for the S&P 500 and GICS sectors, 12.31.1991 - 12.31.2018. Shaded cells indicate negative returns; darker shading indicates the three most negative returns in each year.

Table 2 – Business Risk Bias and Active Business Risk

Ford Motor Company (+3.0%)	American Airlines Group (-3.0%)	Active Business Risk
Level 1 - Consumer	Level 1 - Consumer	0.0%
Level 2 - Consumer Transportation	Level 2 - Consumer Transportation	0.0%
Level 3 - Auto Products	Level 3 - Transportation Services	3.0%
	Active Business Risk Score	**1.0%**

In a Stratified Weight index, weight is equally allocated across different business risks, from broad sector risks (the innermost ring in Exhibit 4) to narrower level 3 groups (the outermost ring) and beyond. Constituent stocks are allocated an equal weight within their lowest level group.

We use this equal business risk hierarchy to define our measure of total excess business risk, i.e. *Active Business Risk*, as the difference between the weights at each level of the hierarchy. For example, Active Business Risk for the S&P 500 at the sector level is calculated by differencing the slices in the inner most ring in the left pie (the cap-weight portfolio) from the slices of the innermost ring of the right pie (the stratified weight benchmark).

It is important to consider each of the levels of the FIS industry hierarchy when considering business risk, as shocks can influence broad or narrow groups depending on their severity or breadth.

For example, an oil shock could affect most Consumer Transport stocks. Therefore, a portfolio which has an overweight of Ford of 3.0%, funded by an underweight of American Airlines at -3.0% should have hedged out some of the effects of an oil-related shock. However, a trade-related shock could affect the car manufacturers in the Auto Products group more than the airlines in the Transportation Services group (see Table 2 above), therefore the trade related business risk is not adequately hedged.

The Active Business Risk Score for the portfolio in Table 2 is (0% + 0% + 3%) / 3 = 1.0%. In general, we define Active Business Risk by the formula below.

$$Active\ Business\ Risk\ (sector\ level) = \frac{1}{2} \sum_{j=1}^{N} \left| w_{sector_j,\ portfolio} - w_{sector_j,\ benchmark} \right|$$

The Active Business Risk Score is the average Active Business Risk for all levels of the hierarchy.

Exhibit 4: Cap Weighted Index by FIS Groups
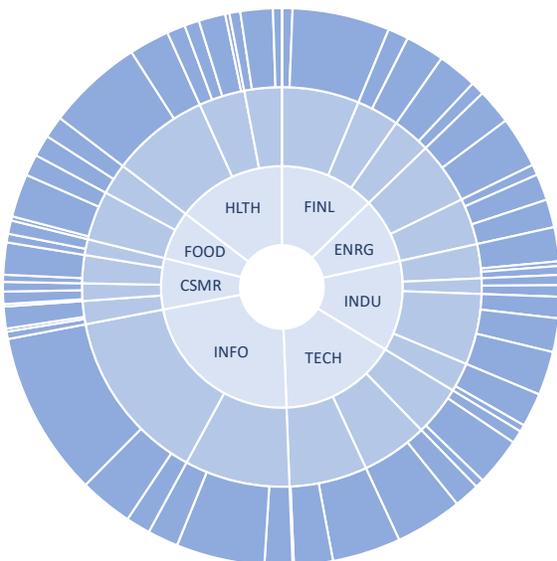
Stratified Weighted Index by FIS Groups
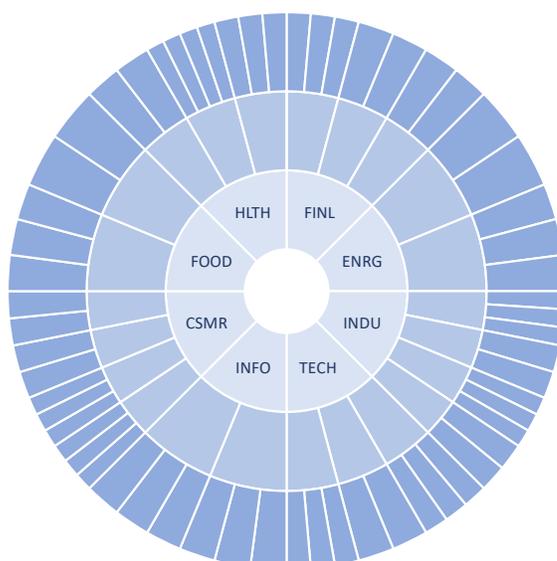
The Impact of Business Risk on Index Performance

Business risk is largely unconstrained in market cap weighted indices (which dominate the four trillion dollars of passive AUM in the US). As industry themes come in and out of favor, concentrated business risk exposures and hence high Active Business Risk Scores occur (large pie slices in Exhibit 5).

Active Business Risk Scores for major market indices were at their highest levels during the DotCom bubble. In March 2000, investor euphoria had pushed technology related companies to triple digit P/E ratios and in turn their market cap weights were almost half (47%) of the S&P 500.

Panel (a) in Exhibit 5 shows the oversized weight of the IT and Information sectors, together with their level 2 and level 3 FIS groups. The color of each segment denotes the subsequent 5-year performance of that group from March 2000 (i.e. after the tech bubble burst).

The Stratified Weight version of the S&P 500 (same constituents, different weights) allocated equal weight to each FIS sector and disbursed weight equally among constituent groups (down to the stock level). This equal business risk approach would have limited much of the impact of the tech bubble, as can be seen by the smaller proportion of red slices in panel (b) of Exhibit 5 below.

Table 3 – Sector Performance post Tech bubble

	weight	Years after March 2000		
		1	**3**	**5**
Info. Tools	29.0%	-63.3	-39.2	-20.5
Information	17.5%	-30.9	-24.8	-10.4
Financials	12.3%	15.8	-0.9	7.2
Healthcare	11.5%	15.1	-1.4	2.4
Industrials	9.9%	-10.7	-12.0	2.3
Energy	7.8%	14.7	-6.1	9.0
Consumer	6.8%	-8.6	-6.7	3.7
Food	6.6%	13.8	1.1	6.7
S&P 500		-19.7	-18.0	-5.0
S&P 500 ex tech		**7.0**	**-4.1**	**5.1**

The dramatic decline in tech stocks, coupled with their oversized weight in the S&P 500 dragged down the overall index (-19.7%) the following year. It is important to note that the rest of the market rose in the years following the bursting of the bubble (7.0% from March 2000 – March 2001, Table 3).

The DotCom Bubble highlights the impact that business risk bias can have on equity indices. Smaller scale sector booms and busts occur frequently (as seen in Table 1) and are usually coupled with weighting imbalances due to the simplistic way that market cap weighted indices operate. When viewed through a business risk lens, it is evident that investors may be taking significant positions in market segments that they do not realize or want.

Exhibit 5: Annualized Performance following DotCom Bubble: S&P 500 Index vs Stratified LargeCap Index

(a)　　　　　　　　　　　　　　　　　　　　　　　　(b)

<-15%　<-10%　<-5%　<0%　>0%　>5%　>10%　>15%
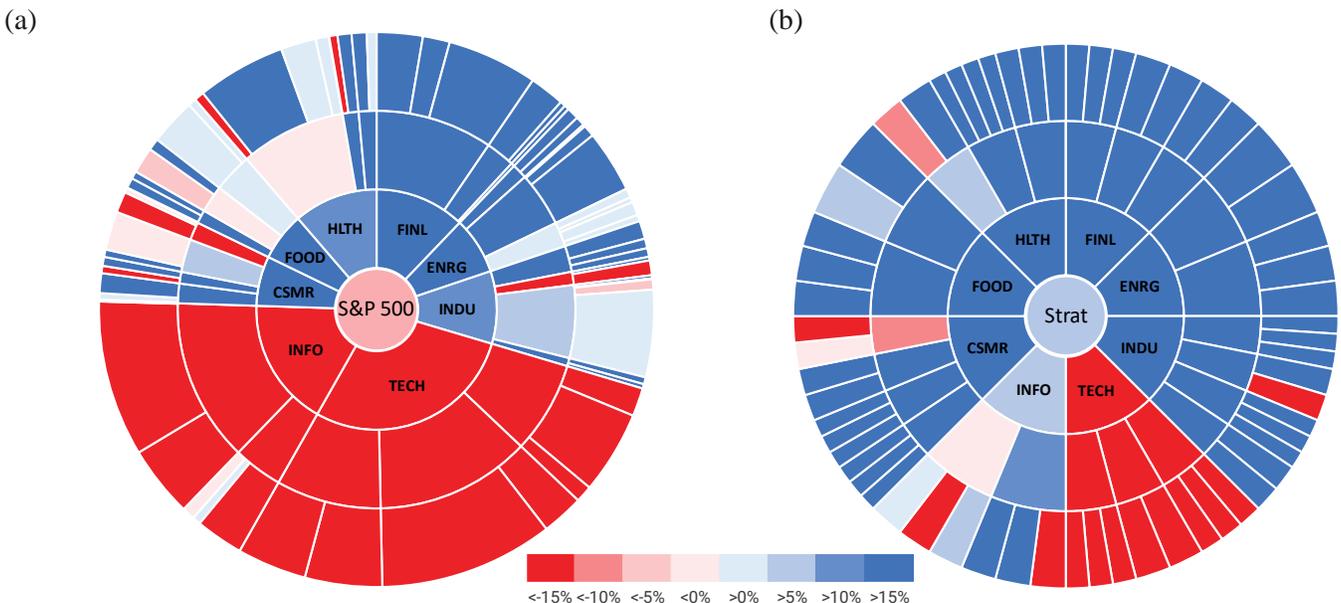
Source: Syntax, Factset. Annualized performance from March 2000 to March 2005.

Active Business Risk and Relative Performance

We find that portfolios with high Active Business Risk scores are more likely to exhibit high downside volatility, given their concentrated exposure to specific business risk groups. If one of these groups experiences an economic shock, the concentrated portfolio will suffer a larger negative return than periods where the same strategy has a lower Active Business Risk.

Exhibit 11 shows the average annualized performance for the S&P 500, S&P 500 Value and S&P 500 Growth in quarters following high Active Business Risk (> 75th percentile) for each index. Each index had significantly lower performance than it did following periods when the Active Business Risk was not high. Active Business Risk Scores for each index over time are shown in the Appendix.

Exhibit 12 shows the performance of the S&P 500 following different levels of Active Business Risk Scores. In general, the higher the Active Business Risk score, the worse the S&P 500 performed the following quarter.

Following periods of above average Active Business Risk, the cap weighted S&P 500 underperformed the Stratified weighted version of the index (comprising the same stocks) by 5.0%.

Table 4 – Impact of High Active Business Risk

	Active Business Risk	
	High*	Not High*
S&P 500 (market cap)	3.1%	12.7%
S&P 500 Value	9.6%	13.8%
S&P 500 Growth	7.6%	16.9%

High = Active Business Risk > 75th Percentile.

Table 5 – S&P 500 by Active Business Risk Decile

	Active Business Risk	S&P 500	Stratified	Differential
H	> 90%	-0.2%	15.8%	**16.0%**
I	> 80%	2.7%	14.4%	**11.7%**
G	> 70%	8.8%	17.8%	**9.1%**
H	> 60%	9.1%	15.4%	**6.3%**
	> 50%	10.9%	15.9%	**5.0%**
	< 50%	10.1%	11.7%	**1.6%**
	< 40%	9.9%	11.7%	**1.8%**
L	< 30%	13.7%	16.0%	**2.3%**
O	< 20%	14.0%	16.1%	**2.0%**
W	< 10%	19.0%	20.4%	**1.4%**

Source: Factset, Syntax. Total return gross of fees and implementation costs from January 1992 to September 2019.

Exhibit 6 – Active Business Risk and Underperformance (S&P 500 Index vs Stratified Weight Index)
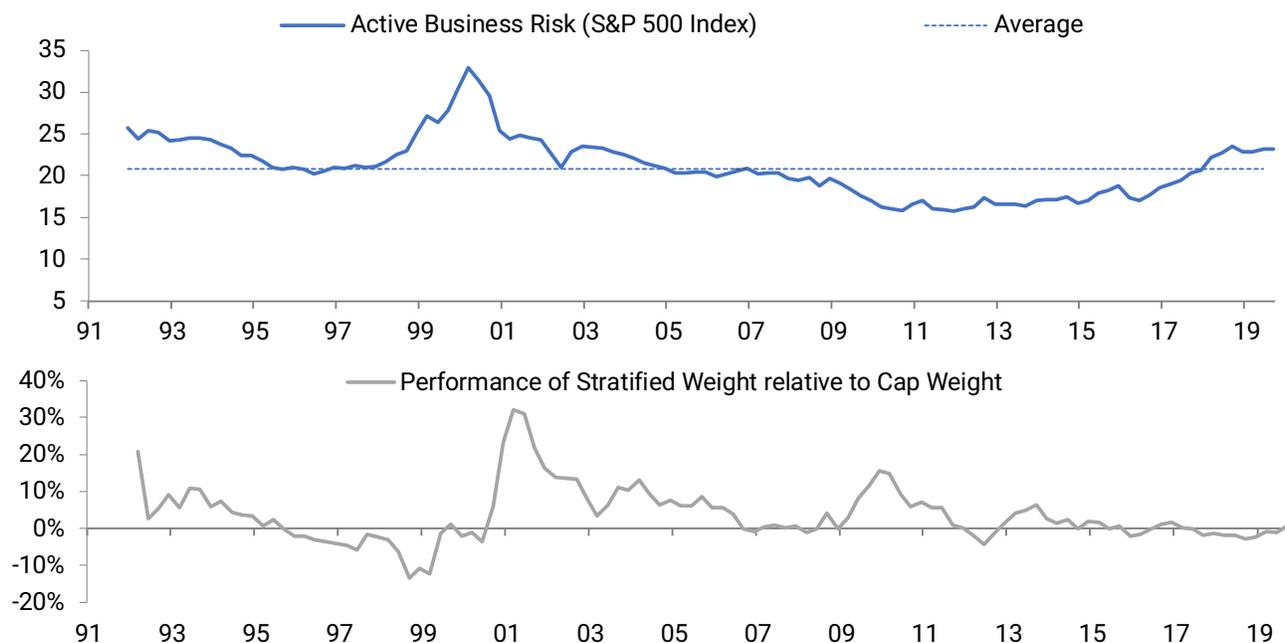
Conclusion

The objective of most core equity indices is to capture the broad equity risk premium for a market or economic area. The implication of such strategies is that they are fully diversified and that the investor is not overexposing themselves to any unintended risks.

Due to their weighting methodologies, many widely followed indices often have significant business risk Scores and hence exhibit high Active Business Risk scores. We find that high Active Business Risk is consistent with future underperformance both relative to periods of low Active Business Risk and also relative to more diversified Stratified Weight indices.

At the end of September 2019, the Active Business Risk of the S&P 500 Index was 23.2%. This is above its long-term average due to the oversized exposures to certain technology related business risks. Though the index is below the critical levels seen at the peak of the DotCom bubble, the Active Business Risk for the index is consistent with periods of poor performance.

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[2] Riggs R. "An Index Methodology for Diversifying Business Risk." *Journal of Index Investing*, Vol. 8, No. 3 (2017).

[3] King, B. "Market and Industry Factors in Stock Price Behavior." *Journal of Business*, Part II, vol. 39, no. 1 (January 1966).

[4] Global Industry Classification Standard (GICS®) https://www.msci.com/gics

Appendix

Exhibit 15a – Active Business Risk for S&P 500 Value
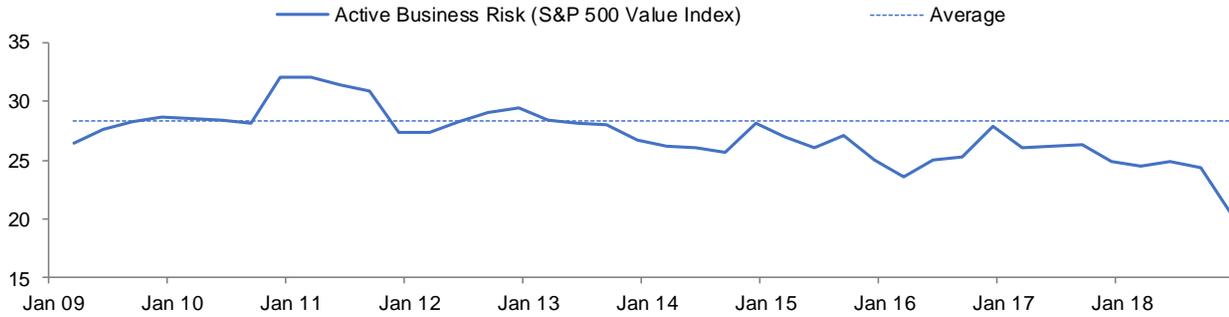
Exhibit 15b – Active Business Risk for S&P 500 Growth
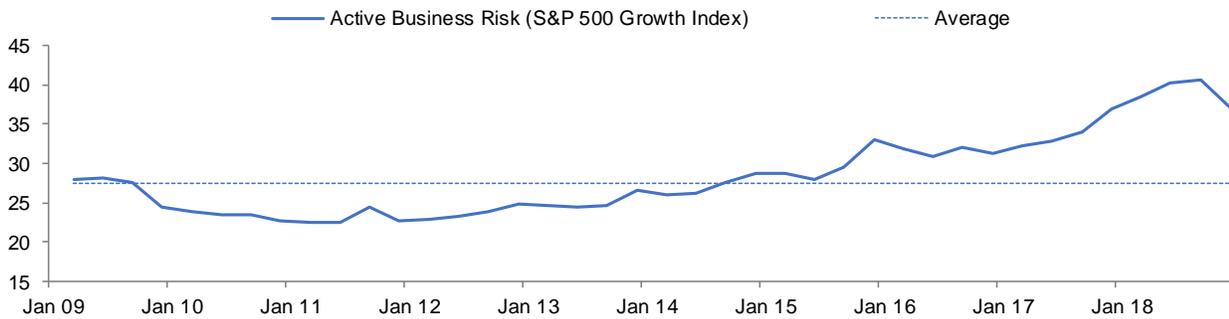
Exhibit 15c – Active Business Risk for S&P 500 Low Volatility
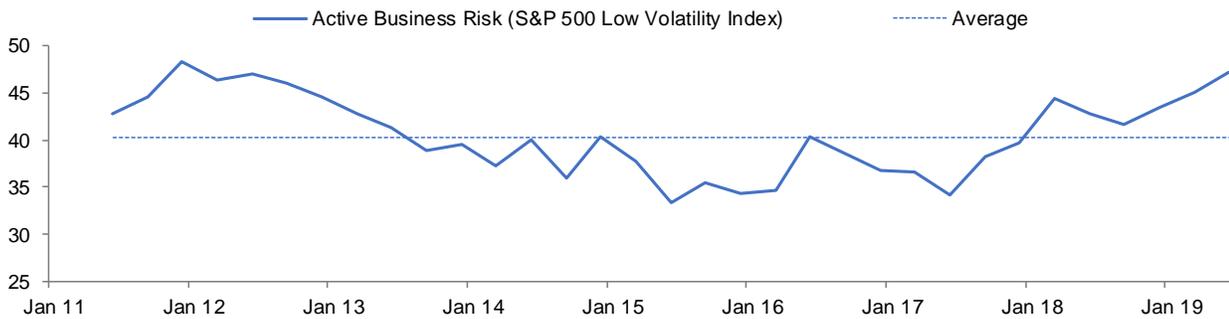
Source: Bloomberg, Syntax

Disclaimers

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