S&P Dow Jones Indices

A Division of S&P Global

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How Safe Is Your Sector?
Discovering Potential Returns for Taking Sector Risk in Stocks and Bonds

INTRODUCTION

In this paper, the required returns of stock and bond sectors will be analyzed to understand weighting opportunities within each asset class and to find the relative value between asset classes within each sector. Also, a duration factor will be introduced to adjust for required returns in the corporate bond sectors. Finally, a measure of market sentiment will be explored by studying the history of sector risk premiums, which shows optimism when market participants hope to benefit from the upside of stocks and pessimism when they prefer the potential protection offered by bonds.

The Capital Asset Pricing Model (CAPM)[1] is a well-known economic theory that describes the return one may expect from investing in a single asset like a stock. The logic behind the idea is that one expects a higher return for holding an asset riskier than the market portfolio,[2] where the market portfolio is a well-diversified basket that only contains systematic risk, or undiversifiable market risk. Typically in CAPM, the risk measure that helps value a single stock is called beta.[3] Beta is the sensitivity of a single stock to the market portfolio as measured by the ratio of the covariance of the single stock and the market portfolio to the variance of the market portfolio. The S&P 500® is commonly used as the benchmark for the market portfolio to represent large-cap U.S. stocks and the associated market risk.

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[1] The CAPM was introduced by Jack Treynor (1961, 1962), William F. Sharpe (1964), John Lintner (1965a,b), and Jan Mossin (1966) independently, building on the earlier work of Harry Markowitz on diversification and modern portfolio theory. https://en.wikipedia.org/wiki/Capital_asset_pricing_model

[2] Markowitz, H. (1952), PORTFOLIO SELECTION. The Journal of Finance, 7: 77–91. doi: 10.1111/j.1540-6261.1952.tb01525.x. Read more at http://econpapers.repec.org/article/blajfinan/v_3a7_3ay_3a1952_3ai_3a1_3ap_3a77-91.htm. A market portfolio is a theoretical bundle of investments that includes every type of asset available in the world financial market, with each asset weighted in proportion to its total presence in the market.

[3] Source: Sharpe, William F., Capital Asset Prices With and Without Negative Holdings, Nobel Lecture, December 7, 1990, Stanford University Graduate School of Business, Stanford, California, USA. Beta is a measure of the volatility, or systematic risk, of a security or a portfolio in comparison to the market as a whole. Beta is used in the CAPM, which calculates the required return of an asset based on its beta and required market returns. Beta is also known as the beta coefficient.

However, there are several potentially problematic assumptions underlying CAPM,[4] such as the following.

- All investors are price takers.
- All investors plan to invest over the same time horizon.
- No taxes or transaction costs.
- All investors can borrow/lend at the same risk-free rate.
- Investors only care about expected return (like) and variance (dislike).
- All investors have the same information and beliefs about distribution of returns.
- The market portfolio that determines beta consists of all publicly traded assets.[5]

Despite these issues, the general philosophy of requiring more return for more risk makes sense. Some (passive) market participants prefer the idea of taking only the necessary market risk, but others (active) prefer taking extra risk for the possibility of higher returns.

Recently, demand has grown for passive investing through index-based products like exchange traded funds (ETFs),[6] which have facilitated tracking the underlying assets of indices representing the market portfolio. However, it is not just the broad S&P 500 index that has become more accessible—sectors have also become easier and more popular to access via ETFs.

The CAPM can be used to explore the required return of a sector based on its beta.

Due to innovations in listed products, market participants can now trade a sector just like a single stock, so the CAPM can be used to explore the required return of a sector based on its beta. Further, with the launch of the S&P 500 Bond Index, a new market portfolio of U.S. investment-grade corporate bonds can be used to measure required returns of corporate bond sectors based on each of their betas.

DATA AND DEFINITIONS

The index data used in this analysis are monthly index levels of the S&P 500, the S&P 500 Bond Index, and each of their sectors from December 1994 to December 2016. The sectors include consumer discretionary, consumer staples, energy, financials, health care, industrials, information technology, materials, telecommunication services, and utilities. Since real estate only became its own sector in September 2016, it is excluded from

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4   Markowitz, H. (1952), PORTFOLIO SELECTION. The Journal of Finance, 7: 77–91. doi: 10.1111/j.1540-6261.1952.tb01525.x. Read more at http://econpapers.repec.org/article/blajfinan/v_3a7_3ay_3a1952_3ai_3a1_3ap_3a77-91.htm

5   Roll, Richard. A Critique of the Asset Pricing Theory's Tests, Part I: On Past and Potential Testability of the Theory, University of California, Los Angeles, CA 90024, U.S.A. Received June 1976, revised version received October 1976. Read more at http://schwert.ssb.rochester.edu/f532/JFE77_RR.pdf

6   Deborah Fuhr, ETFGI http://etfgi.com/news/detail/newsid/1639. Feb. 28, 2017.

this analysis. The three-month U.S. Treasury bill is used for the risk-free rate.[7]

The CAPM used in this paper is defined as the following:

$$r_s = r_f + \beta_s * (\overline{r_m} - r_f)$$

where:

$\overline{r_s}$ = required return of sector$_s$ given its risk, β_s
r_f = risk-free rate
β_s = beta of sector$_s$[8]
$\overline{r_m}$ = required market return[9]

The S&P 500 serves as the measure of the equities market portfolio and the S&P 500 Bond Index serves as the measure of the bond market portfolio, representing large-cap U.S. stocks and U.S. investment-grade corporate bonds, respectively.

> The duration premium is measured by subtracting the average returns of the three lowest effective duration sectors from the average returns of the three highest effective duration sectors.

Additionally, an expanded version of the CAPM for bonds that adjusts for the duration of each bond sector is shown. The duration premium is measured by subtracting the average returns of the three lowest effective duration sectors from the average returns of the three highest effective duration sectors. Although the impact is limited, since the duration of each sector is relatively close in the S&P 500 Bond Index, it is an interesting exercise that could be more meaningful with a broader bond market index, or it could be extended to include other bond factors like credit quality. A similar idea is portrayed in the Fama-French Model,[10] in which small-cap and value premiums are expressed in a multi-factor stock model.

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[7] Title: 3-Month Treasury Bill: Secondary Market Rate, Series ID: TB3MS, Source: Board of Governors of the Federal Reserve System (US), Release: H.15 Selected Interest Rates, Seasonal Adjustment: Not Seasonally Adjusted, Frequency: Monthly, Units: Percent, Date Range: 1995-01-01 to 2016-12-01, Last Updated: 2017-03-01 3:41 PM CST, Notes: Averages of Business Days, Discount Basis. https://fred.stlouisfed.org/series/TB3MS

[8] Beta = covariance [(excess return of sector$_s$), (excess return of market portfolio)] /variance (excess return of market portfolio)

[9] The S&P 500 serves as the stock market portfolio and the S&P 500 Bond Index serves as the bond market portfolio, representing large-cap U.S. stocks and U.S. investment-grade bonds, respectively.

[10] Womack, Kent L. and Zhang, Ying, Understanding Risk and Return, the CAPM, and the Fama-French Three-Factor Model. Tuck Case No. 03-111. Available at SSRN: https://ssrn.com/abstract=481881

The CAPM expanded for a duration factor used in this paper is defined as the following:

$$\overline{r_s} = r_f + \beta_{(mrkt)} * (\overline{r_m} - r_f) + \beta_{(dur)} * (\overline{r_{dh}} - \overline{r_{dl}})$$

where:

$\overline{r_s}$ = required return of sector$_s$ given its risks, $\beta_{(mrkt)}$ and $\beta_{(dur)}$
r_f = risk-free rate
$\beta_{(mrkt)}$ = market beta of sector$_s$[11]
$\overline{r_m}$ = required market return, where the S&P 500 Bond Index is the market portfolio
$\beta_{(dur)}$ = duration beta of sector$_s$[12]
$\overline{r_{dh}}$ = required return of high duration sectors
$\overline{r_{dl}}$ = required return of low duration sectors

ANALYSIS

The required returns of sectors from CAPM can be compared within each asset class.

By using the CAPM to value the sectors of stocks and bonds, the results can be analyzed and applied in at least two different ways, in addition to the risk premium that can be measured from the sector performance difference. The required returns of sectors from CAPM can be compared within each asset class (for example, information technology stocks versus energy stocks or information technology bonds versus energy bonds) to find weighting opportunities. Also, the required returns between the assets of each sector can be compared (for example, information technology stocks versus information technology bonds or energy stocks versus energy bonds) to understand opportunities in the capital structure. Lastly, the performance difference between stocks and bonds within each sector can show market sentiment. When stocks outperform (underperform) bonds within a sector, it is called the equity risk premium (discount), reflecting how strongly the market believes stocks will rise or fall.

Exhibit 1 shows the results of the average risk premium and the CAPM with the duration-adjusted measure, along with the calculated risk inputs of beta and duration-adjusted beta.

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[11] $\beta_{(mrkt)}$ = (variance(duration high-low)*covariance(excess return of sectors, excess return of market portfolio)-covariance(duration high-low, excess return of market portfolio)* covariance (duration high-low, excess return of sectors))/(variance(excess return of market portfolio)* variance(duration high-low)-covariance(excess return of market portfolio, duration high-low)^2)

[12] $\beta_{(dur)}$ = (variance(excess return of market portfolio)*covariance(excess return of sectors, duration high-low)-covariance(duration high-low, excess return of market portfolio)* covariance (excess return of market portfolio, excess return of sectors))/(variance(excess return of market portfolio)* variance(duration high-low)-covariance(excess return of market portfolio, duration high-low)^2)

Exhibit 1: CAPM, Beta, and Risk Premium

SECTOR	CAPM (%)			BETA		EFFECTIVE DURATION	DURATION-ADJUSTED BETA		AVERAGE MONTHLY RISK PREMIUM (%)
	STOCK	BOND	DURATION ADJUSTED	STOCK	BOND		MARKET BETA	BETA OF DURATION FACTOR	
S&P 500	8.39	-	-	1	-	-	-	-	0.3
S&P 500 Bond Index	-	4.73	4.73	-	1	6.61	1	0	-
Consumer Discretionary	8.96	5.11	5.05	1.07	1.09	6.77	1.07	0.14	0.36
Consumer Staples	4.6	4.2	4.17	0.52	0.87	6.97	0.87	0.07	0.33
Energy	6.82	4.86	4.99	0.8	1.03	6.72	1.07	-0.32	0.39
Financials	10.2	4.6	4.84	1.23	0.97	5.34	1.04	-0.57	0.38
Health Care	5.74	4.38	4.28	0.66	0.92	7.05	0.89	0.24	0.45
Industrials	8.95	4.37	4.39	1.07	0.91	6.88	0.92	-0.04	0.38
Information Technology	11.78	4	3.96	1.43	0.83	6.67	0.81	0.12	0.59
Materials	9.09	4.42	4.49	1.09	0.93	6.74	0.95	-0.17	0.22
Telecommunication Services	7.1	5.74	5.27	0.84	1.24	7.88	1.09	1.12	0.14
Utilities	3.77	5.01	4.65	0.41	1.07	8.52	0.95	0.86	0.18

Source: S&P Dow Jones Indices LLC. Monthly data from January 1995 to December 2016. Effective duration as of Dec. 30, 2016. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Within equities, information technology and financials had the highest betas.

CAPM Results Within Each Asset Class

Within equities, information technology and financials had the highest betas of 1.43 and 1.23, respectively, so they had the highest required returns of 11.8% and 10.2%, respectively, according to CAPM. Materials, consumer discretionary, and industrials also had betas of slighter higher than 1, so they required higher returns than the market expectation of the S&P 500, which was 8.4%. This is because market participants usually expect to be compensated for the additional risk taken in higher beta sectors.

On the other hand, utilities, consumer staples, and health care had the lowest stock betas of 0.41, 0.52, and 0.66, respectively, giving them the lowest required returns of 3.8%, 4.6%, and 5.7%, respectively. Since these sectors tend to be less sensitive to stock market moves and are considered less risky, their required returns are less than the 8.4% excess return of the S&P 500.

Exhibit 2 highlights two observations about the high and low beta stock sectors: 1) the required returns of the high beta sectors were only greater than the required returns of low beta sectors in rising markets, and 2) there was a wide range of required returns between high beta and low beta sectors in distinct bear and bull markets, with convergence as the market transitioned between the phases.

Therefore, based on historical trends, overweighting financials and information technology and underweighting utilities, consumer staples, and health care in stocks may be beneficial in rising markets. The opposite is true for implementing a defensive strategy if the market is expected to fall. Since 2014, the spread between required returns of high beta sectors and low beta sectors has narrowed, which could indicate that the end of this bull market is nearing. If this is the case, at some point soon, there may be little advantage to taking sector bets until a bear market becomes clear.

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Exhibit 2: Required Returns of High Beta Versus Low Beta Stock Sectors
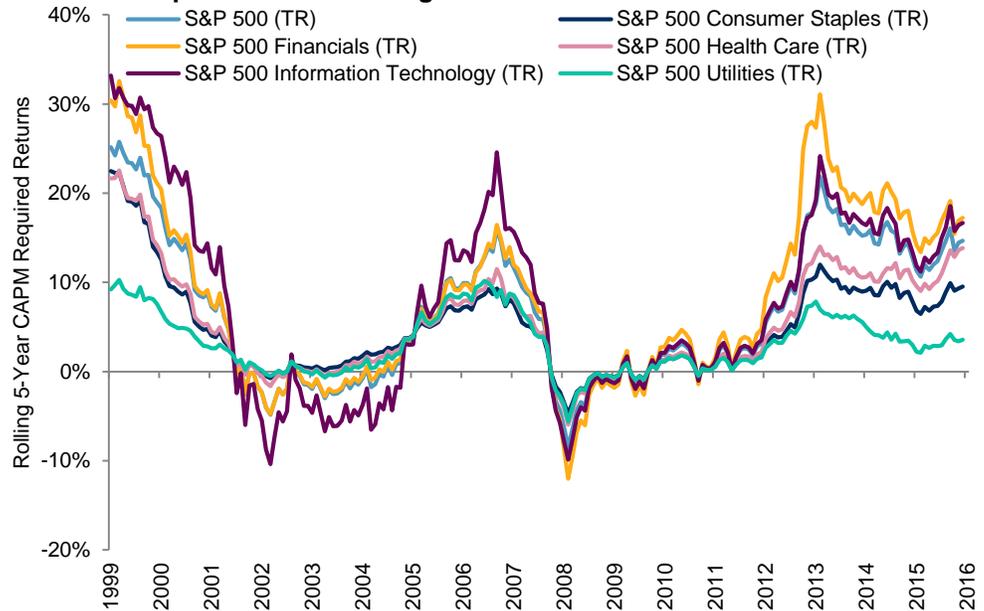
Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Within bonds, there was a much tighter range around one of the sector betas to the S&P 500 Bond Index. The telecommunication services sector had the highest beta of 1.24, which made its required return 5.7%. Consumer discretionary, utilities, and energy also had betas slightly higher than 1, bringing their required returns slightly above the 4.7% level for the S&P 500 Bond Index.

Interestingly, the sector with the lowest bond sector beta had the highest stock market beta: information technology. It had a bond sector beta of just 0.83, with a required return of 4.0%. The consumer staples sector also had a relatively low beta of 0.87 for a required return of just 4.2%. Exhibit 3 illustrates the relative required returns of bond sectors based on the S&P 500 Bond Index over five-year rolling periods, demonstrating the sensitivity of high and low beta sectors to market movements.

A key point from Exhibit 3 is that, unlike in the stock sectors, in which there may be opportunities to make sector bets and times when those bets matter less, the high beta bond sectors seem to be attractive all the time. Notice there was much more sector upside from high beta bond sectors like

telecommunication services in the rising bond markets, with little to no downside in the falling markets. One may conclude that it may be beneficial to overweight high beta bond sectors.

Exhibit 3: Required Returns of High Beta Versus Low Beta Bond Sectors

One may conclude that it may be beneficial to overweight high beta bond sectors.
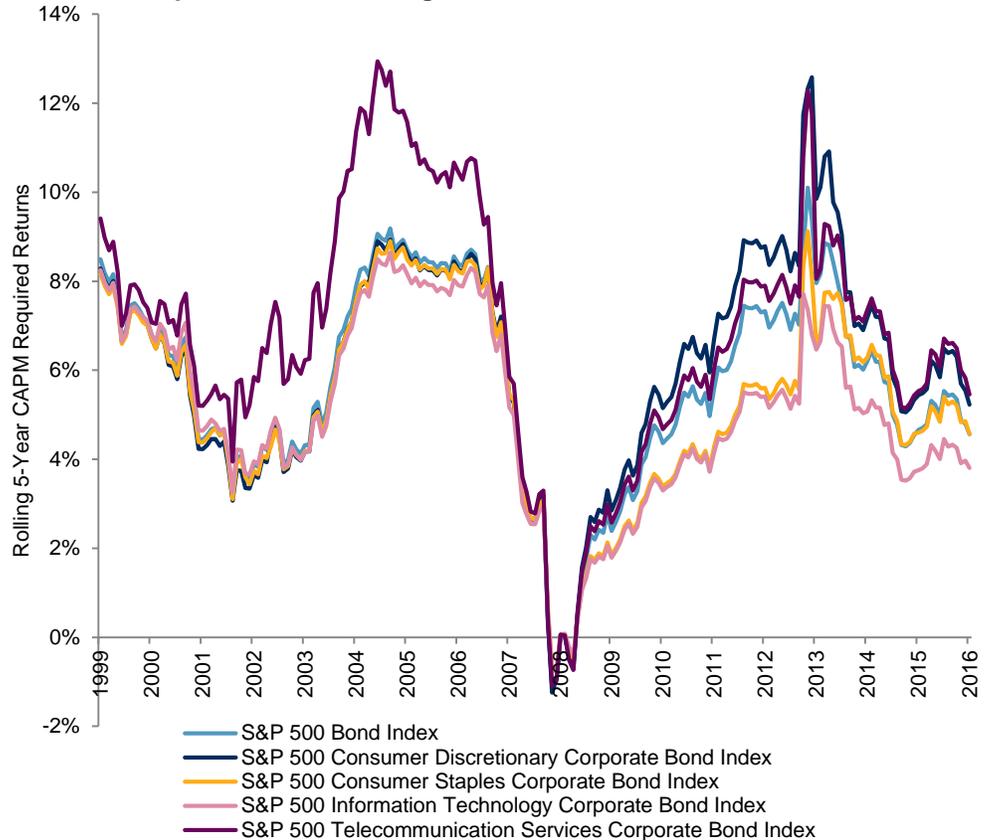
Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Yet, when constructing bond portfolios, duration risk is generally an important consideration, so a duration factor was added to adjust for the required returns of sectors within the S&P 500 Bond Index. The average excess monthly returns of the three lowest effective duration sectors (financials, information technology, and energy) were subtracted from the average excess monthly returns of the three highest effective duration sectors (utilities, telecommunication services, and health care) for an annualized duration premium of 0.14%.[13] The premium was small because the average duration difference between the high and the low was only 1.6.

Although the duration factor barely changed the relative required returns for the bond sectors, especially for the most- and least-sensitive sectors, it did affect some of the relative rankings that may influence decisions about

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[13] The effective duration in the duration factor is based on the static number as of Dec. 30, 2016.

sector weights. For example, once adjusted for the duration factor, the utilities sector becomes less attractive than energy and financials, on average. Another important result is that the range of required bond sector returns widens after the duration adjustment; this could make a difference in down markets, when utilities provides more protection than financials. Energy also shows a more favorable upside to downside profile with the adjustment (see Exhibits 4 and 5).

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Exhibit 4: Relative Required Bond Sector Return Before Duration Adjustment
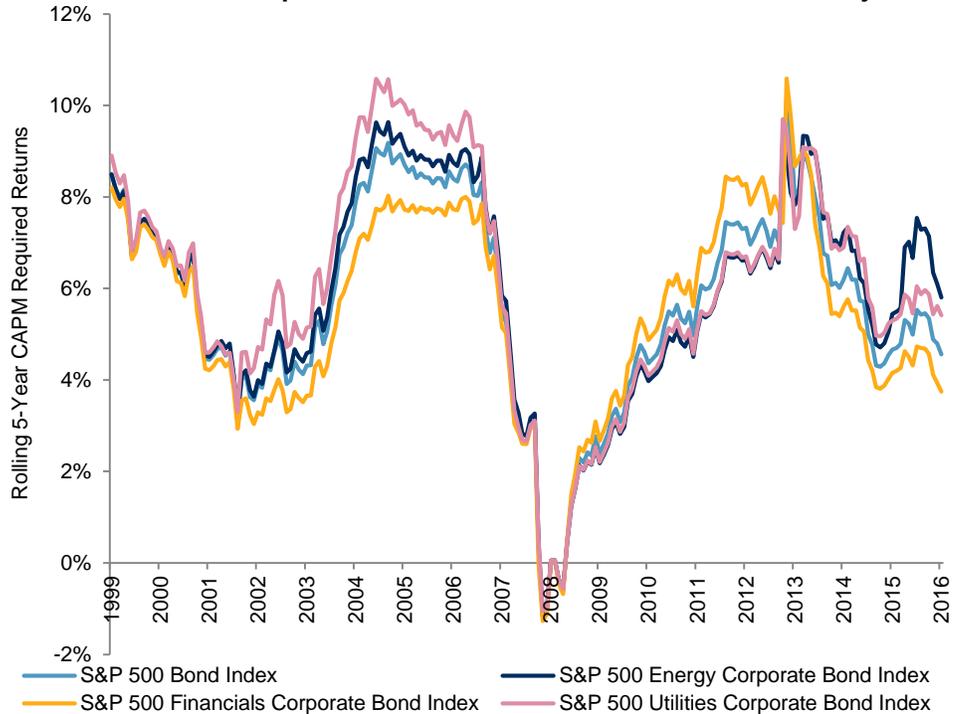
Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 5: Relative Required Bond Sector Return After Duration Adjustment

Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

The required returns from the CAPM were higher for stocks than bonds in every sector except utilities.

Again, the factor concept may help change weighting decisions in the aforementioned bond sectors. However, it is potentially more important because it can be applied to broader bond market indices with a greater duration range across sectors, or it may apply to other factors like credit quality that are important in constructing bond portfolios.

CAPM Results Within Each Sector Between Asset Classes

The required returns from CAPM during the period studied were higher for stocks than bonds in every sector except utilities. This was due to the low beta of the utilities sector to stocks (0.41) that, on average, brought the required return down to a lower level than the required return for the utilities bonds, which had a beta near 1. On the other hand, some sectors, like information technology, required a much higher return from the equity sector than the bond sector, based on similar reasoning—the information technology equity beta was relatively high, at 1.43, while the bond beta was relatively low, at 0.83. Other sectors, like consumer staples, required relatively similar returns from both their equities and bonds, as they had just slightly higher bond beta than stock beta.

It may be counterintuitive for a sector's bonds to be more risky than its stocks, since bonds sit higher in the capital structure. However, the utilities sector usually carries comparatively high debt loads to service their

infrastructure, which can not only make utilities bonds sensitive to interest rates (notice that the utilities sector has the highest duration in the S&P 500 Bond Index, at 8.52), but it can make the sector's equities sensitive to interest rates too. Also, because of the sector's capital-intensive business, its equities could suffer from high cost of capital, leading to increased operational costs. Utilities equities can be attractive, as utilities is one of the more defensive or higher-dividend-paying sectors, but if the required return from stocks is generally lower than that of bonds, it may make sense to invest only in bonds. Exhibit 6 illustrates how the fundamentals of this sector carried over time for a consistently higher required return from bonds than stocks in the utilities sector.

Utilities equities can be attractive, utilities is one of the more defensive or higher-dividend-paying sectors.
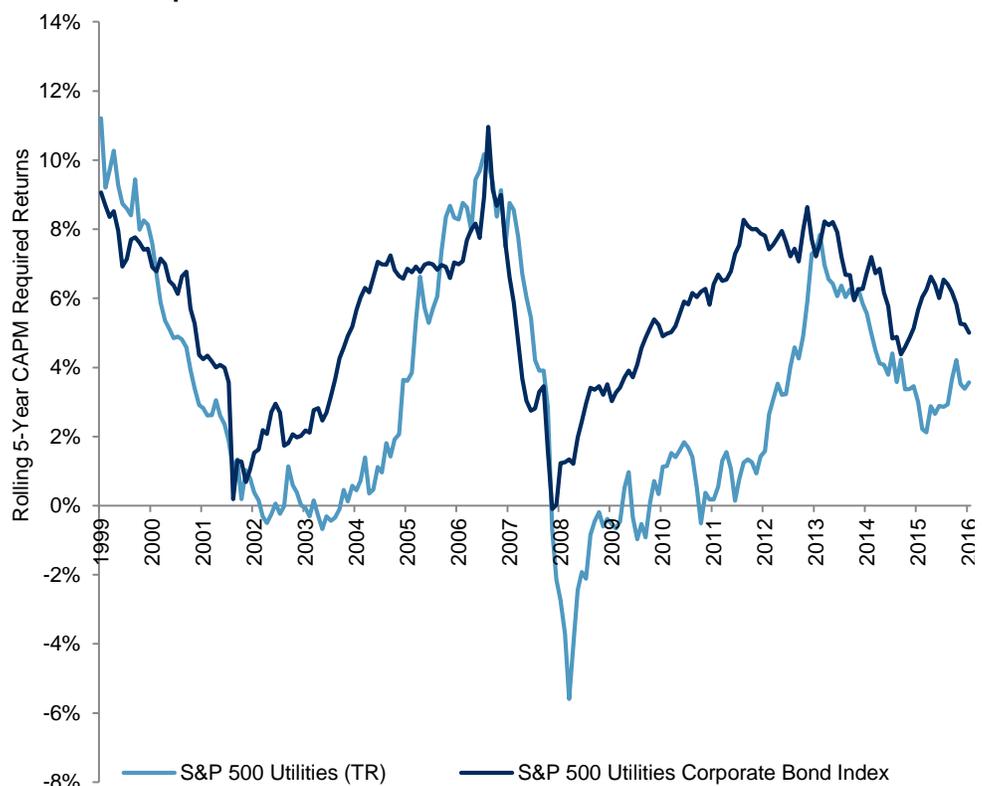
Exhibit 6: Required Returns of Utilities Stocks Versus Utilities Bonds

Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Consumer staples and health care were also low beta sectors with only slightly higher required returns from their stocks than bonds. However, there are two interesting observations from analyzing their CAPM results over time. The required returns from the stocks and bonds cycle and the cycles between asset classes of both sectors were similar. They also had similar effective durations of 6.97 and 7.05, respectively. Exhibits 7 and 8 illustrate these points and show that there were times when it may be have better to hold either the stocks or bonds.

Exhibit 7: Cycles of Required Returns in Consumer Staples Stocks and Bonds
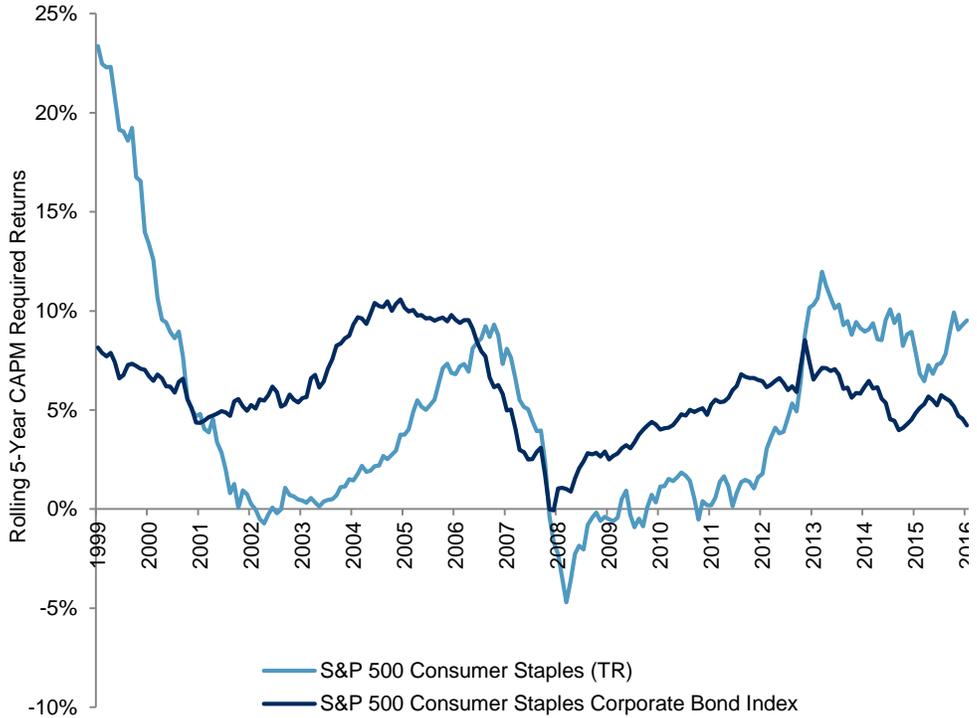
There were times when it may be have better to hold either the stocks or bonds.

Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 8: Cycles of Required Returns in Health Care Stocks and Bonds
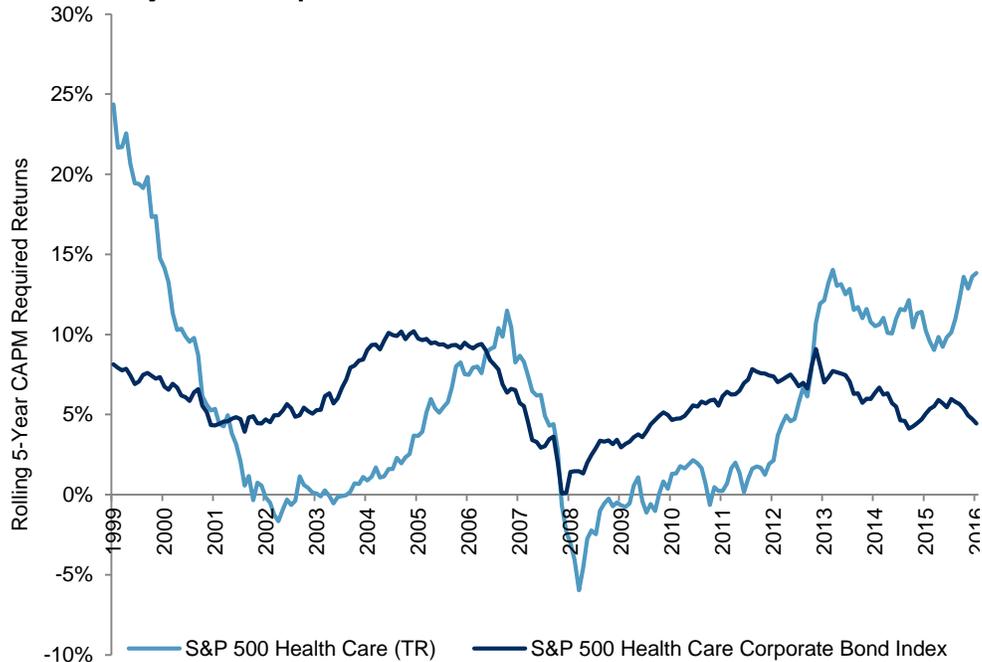
Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Lastly, there are higher beta stock sectors like information technology and financials. Their required returns between stocks and bonds cycled like the lower beta sectors of consumer staples and health care, but the patterns were more variable, with times of greater risk leading to higher required returns from the stocks, especially relative to the less-variable required returns from the bonds. The peaks of required returns were noticeably high during the technology bubble, the period before the global financial crisis (more so for information technology), and the most recent bull market. Exhibit 9 shows how the required returns of the high beta stock sectors changed over time compared with their relatively low beta, stable bond sectors. The information technology stock sector's required return spiked much higher than the financial stock sector's required return just before the global financial crisis, reflecting the great risk experienced at the time when Cisco reported concerns of selling communications gear to the struggling financials sector, which suffered from the subprime mortgage crisis.[14] However, the required return of the financials stock sector grew higher than the information technology stock sector by the end of 2013, as the sector's risk increased due to fines, scandals, and fraud.[15]

The required return of the financials stock sector grew higher than the information technology stock sector by the end of 2013, as the sector's risk increased due to fines, scandals, and fraud.

Exhibit 9: Required Returns of Information Technology and Financials Stocks Versus Information Technology and Financials Bonds
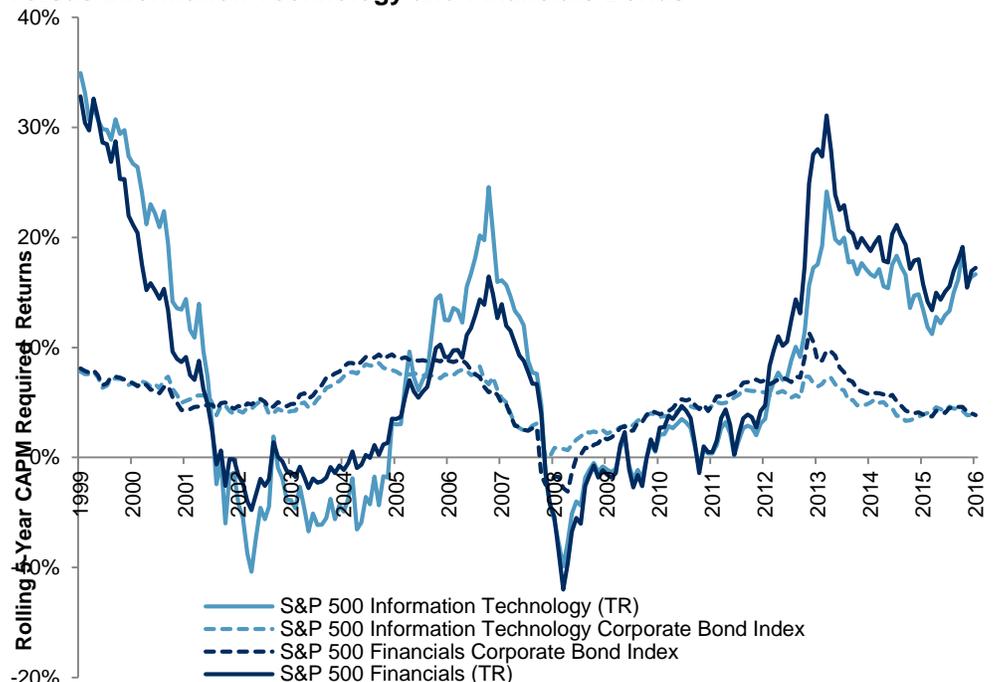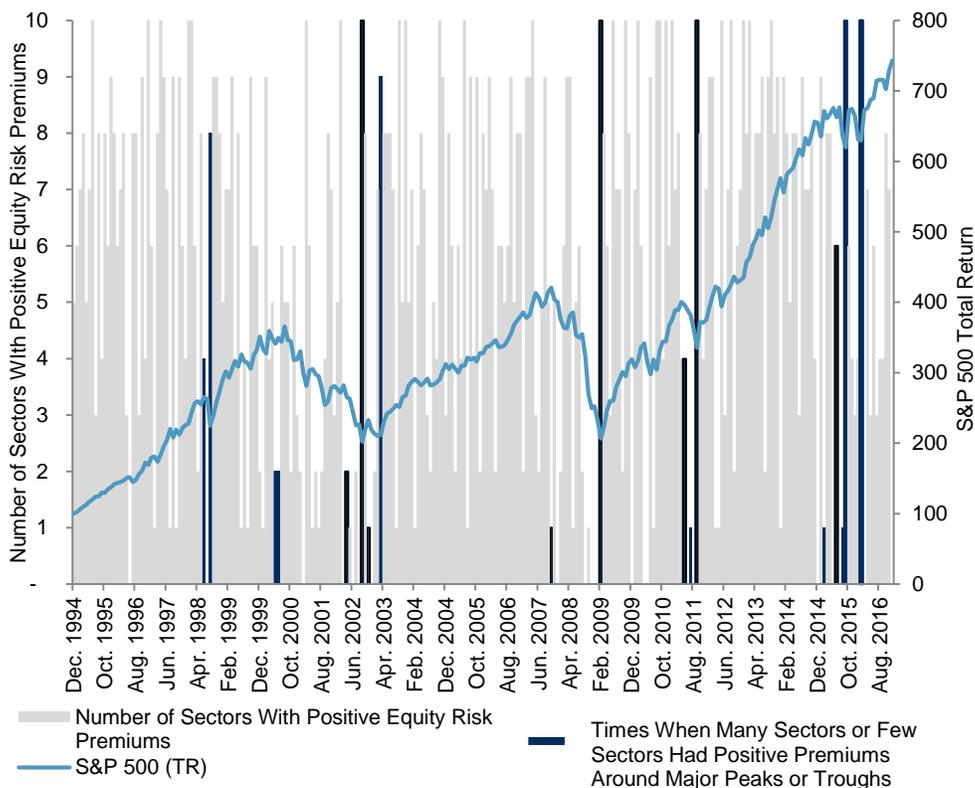

Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

[14] Barr, Colin. Fortune Magazine, Navigating Tech's Choppy Waters. Nov. 19, 2007. Viewed on March 30, 2017. http://archive.fortune.com/2007/11/19/magazines/fortune/barr_techstocks.fortune/index.htm?section=money_latest

[15] Gongloff, Mark. Huffington Post, Finance Stocks Dominate the Market in 2012 Despite Continuous Fines, Scandals and Fraud. Dec. 28, 2012. Viewed on March 30, 2017. http://www.huffingtonpost.com/2012/12/28/finance-stocks-2012-fines-scandals-fraud_n_2366090.html

Applying Sector Risk Premiums to Measure Market Sentiment

Another reason to compare matching sectors inside the S&P 500 and S&P 500 Bond Index is to better understand market sentiment. The difference in the monthly performance between the stocks and bonds within a sector can be used to calculate the equity risk premium or discount. If there is equity outperformance, it is called an equity risk premium, and it indicates that market participants may be more inclined to participate in the upside of a sector than to be protected by the limited downside risk of the bonds. Conversely, if the bonds outperform the stocks, it is called an equity risk discount, and it reflects bearish feelings about a sector, so market participants may be more likely to capitalize from the bonds rather than the stocks in the sector.

During months when the equity risk premium was positive for the S&P 500, the premium was an average of 3.01%, compared with the average monthly discount of -3.55%. However, the index had a premium almost 60% of the time, so the average monthly equity risk premium was 30 bps. Although most sectors had a larger average absolute discount than premium, Exhibit 10 shows that every sector had an average positive monthly equity risk premium, with premiums in more than 50% of the months studied. This suggests generally more optimism than pessimism about the stock market during this period.

Every sector had an average positive monthly equity risk premium.

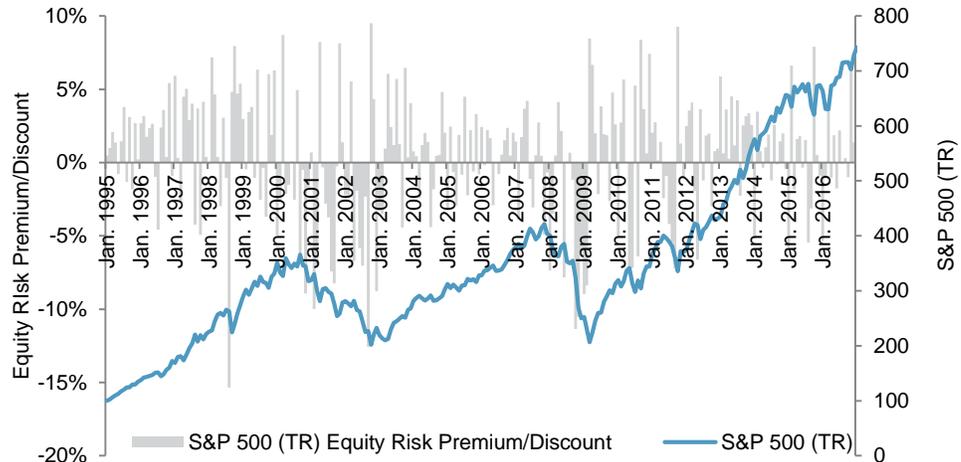**Exhibit 10: S&P 500 Average Sector Risk Premiums and Discounts**
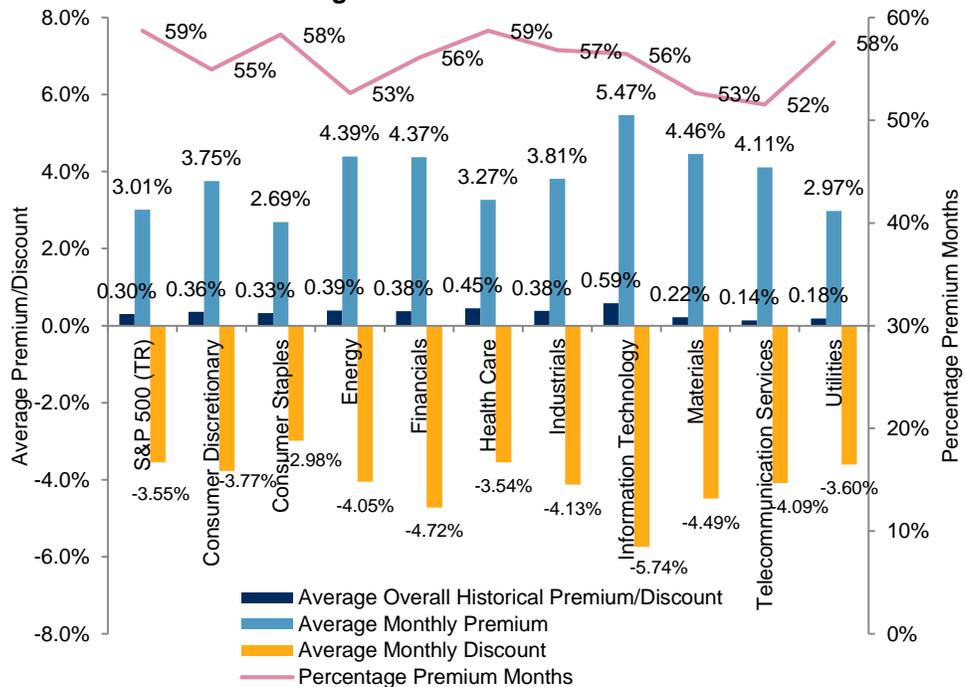
Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

While the average equity risk premiums were positive and the majority of months had premiums rather than discounts, the positions changed often. The flipping between premiums and discounts happened in about 49% of months for the S&P 500, with the most frequent changes in about 55% of months for information technology and in only 45% of months for health care. Also, most of the time only some of the sectors had positive equity risk premiums, though sometimes all 10 sectors or none of the sectors had positive equity risk premiums. This can show a bullish or bearish sentiment in the market, especially when all sectors point in the same direction. In Exhibit 11, the dark blue lines highlight instances when either many or few of the sectors had positive equity risk premiums, and white spaces indicate times when zero sectors showed equity risk premiums. Note that white spaces and dark blue lines appear around some major peaks and troughs of the S&P 500.

While the average equity risk premiums were positive and the majority of months had premiums rather than discounts, the positions changed often.

Exhibit 11: Number of Sectors With Equity Risk Premiums or Discounts Can Show Bullish or Bearish Sentiment

Number of Sectors With Positive Equity Risk Premiums
S&P 500 (TR)

Times When Many Sectors or Few Sectors Had Positive Premiums Around Major Peaks or Troughs

Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

A similar pattern can be seen when looking at the monthly risk premiums and discounts of the S&P 500 in Exhibit 12. Note the discounts before some major declines, including in August 1998, August 2000, November 2007, May 2011, December 2014, August 2015, and December 2015. Also see some of the flips to premiums ahead of some big rebounds, like in

September 1998, October 2002, March 2009, October 2011, February 2015, October 2015, and November 2016. In 2016, the condition in the S&P 500 switched nine times between a premium and discount. There were also nine switches in 2014 and eight switches in 2015. These observations show that the market may be feeling more uncertain about the times ahead than the bullish sentiment seen in 2013, when there were solid premiums with only two switches.

Exhibit 12: S&P 500 Equity Risk Premiums or Discounts Can Also Show Bullish or Bearish Sentiment

Whether there is an equity risk premium or discount in each sector can have a different impact depending on its sector beta.
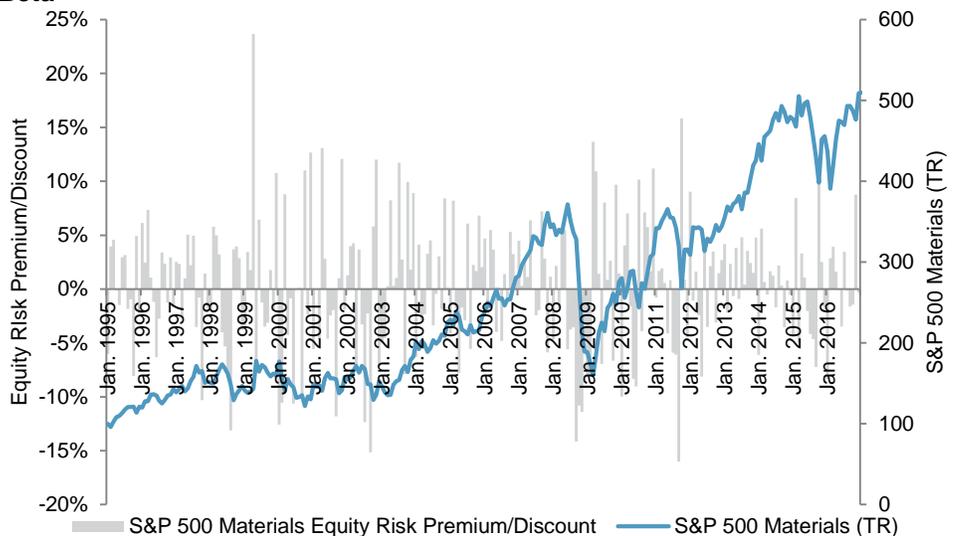

Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Whether there is an equity risk premium or discount in each sector can have a different impact depending on its sector beta. While the sentiment is directional, with persistence measurable by the percentage of time the condition switches (remember that information technology had the highest frequency of switching, at 55%, while health care had the lowest, at 45%), the magnitude can be greater for a higher beta sector. For example, let us compare information technology and health care, since they had the highest average monthly equity risk premiums, but one had high beta and the other low. Information technology, the sector with the highest monthly average equity risk premium (0.59%), also had the highest stock beta (1.43), but the beta is more powerful for the magnitude of returns, while the risk premium drives direction. Health care had the second-highest monthly average historical risk premium of 0.45%, but it had a relatively low stock beta of 0.66.

In Exhibit 13, notice that the index levels of information technology increased from 100 to over 900, then fell to under 200 and increased to near 500, only to drop to under 300 and rise again to almost 1,000. Despite the large gains from the high beta, the moments of big losses and lack of persistent optimism appear to have limited the growth of the sector over the long term compared with health care.

Exhibit 13: Information Technology's High Stock Beta Drives Large Moves, but Long-Term Growth Is Limited From Big Losses and Lack of Equity Risk Premium Persistence
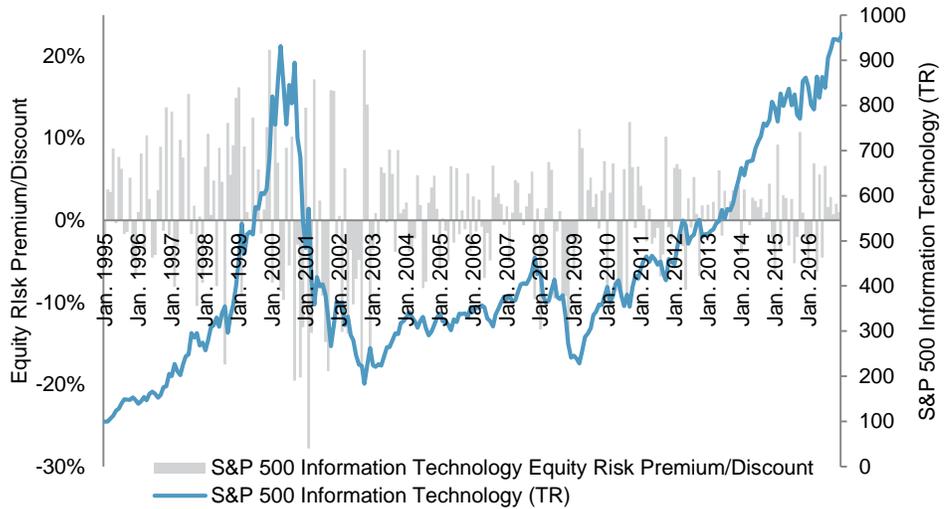
Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Health care also had a relatively high average equity risk premium, but it had a higher persistence of sentiment as well as a much lower beta.

Health care also had a relatively high average equity risk premium, but it had a higher persistence of sentiment as well as a much lower beta. The result was steadier growth, with index levels increasing from 100 to over 400, then falling to about 330 before climbing to just over 500, only to fall back to 330 before a multi-year climb to 1,200 (see Exhibit 14). The sector has been far steadier than information technology, allowing it to grow more over time.

Exhibit 14: Health Care's Long-Term Growth Is Greater From a High Average Equity Risk Premium, a More Consistent Premium, and Lower Stock Beta
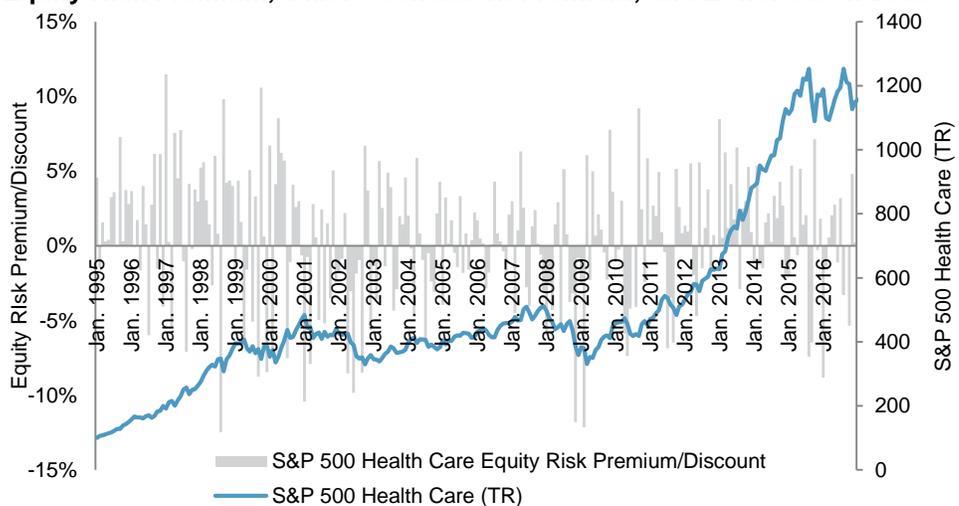
Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

A similar result can be observed in sectors with low average monthly equity risk premiums. For example, the materials sector had an average monthly equity risk premium of 0.22% with a stock beta of 1.09, whereas utilities also had a low average monthly equity risk premium of 0.18%, but with a stock beta of just 0.41. Both sectors had the same sentiment switching rate of 52%. While the materials sector had a beta slightly over 1, its low average risk premium and lack of persistence of sentiment curbed its growth compared with utilities, as well as health care and information technology. We see in Exhibit 15 that the materials index levels only ever hit as high as 500.

Exhibit 15: Material's Long-Term Growth Is Curbed From a Low Average Equity Risk Premium, a Less Stable Premium, and a Slightly Elevated Stock Beta

While the materials sector had a beta slightly over 1, its low average risk premium and lack of persistence of sentiment curbed its growth.

Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Both utilities and materials had low average equity risk premiums and frequent changes in sentiment, but the lower beta of the utilities sector allowed it to grow more steadily than materials, with its index levels almost reaching 650. The low beta seemed to work in favor of sectors with comparable risk premiums and less frequent changes in sentiment.

Exhibit 15: Utilities' Long-Term Growth Is Less Than Information Technology and Health Care From a Low Average Equity Risk Premium, but More Than Materials From a Low Stock Beta
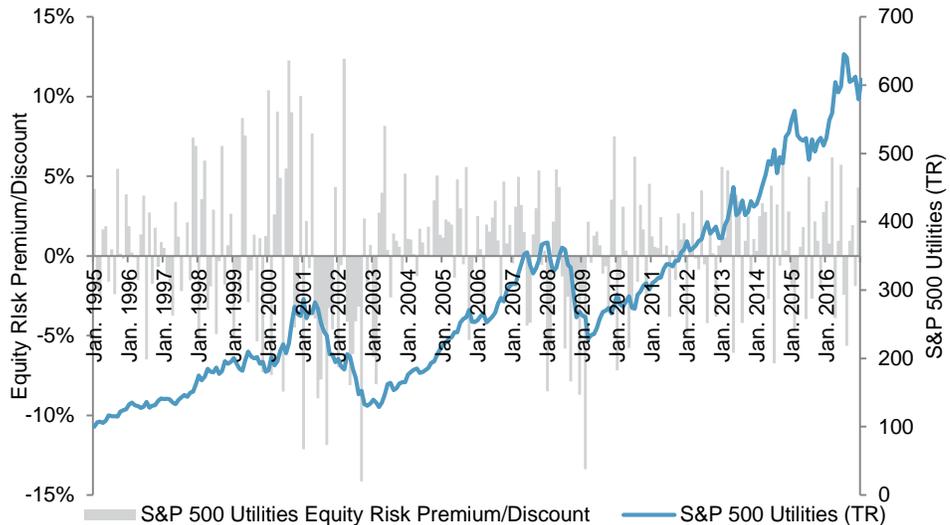
Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Low beta, high equity risk premiums, and stability of sentiment have been the best conditions for long-term growth, though they may present fewer trading opportunities due to lack of volatility.

It seems that higher beta coupled with a low average risk premium and frequent fluctuations of sentiment was the worst combination for a sector's growth prospects, although the switches may present some trading opportunities, especially in the stock-bond spreads. On the other hand, low beta, high equity risk premiums, and stability of sentiment have been the best conditions for long-term growth, though they may present fewer trading opportunities due to lack of volatility.

CONCLUSION

In this paper, the CAPM was expanded to value equity sectors rather than stocks by measuring the equity sector beta to the S&P 500. This is important, since there has been a trend among market participants to trade sectors rather than stocks using the sectors as the underlying indices, due to the availability of listed financial products. The analysis was extended further to create a required return on bond sectors using the CAPM, with the S&P 500 Bond Index as the benchmark for the market portfolio for investment-grade corporate domestic bonds. Not only was the CAPM applied to bond sectors, but a duration factor was added to adjust for duration risk and serve as a model for potential future factor expansion, especially for quality. The duration adjustment did not have a great impact, since the duration is relatively close between the sectors inside the S&P 500 Bond Index. Lastly, three applications were analyzed to measure: 1) relative value between sectors within each asset class, 2) relative value of asset class within each sector, and 3) spreads between the stocks and bonds of each sector to illustrate optimism and pessimism within the sector and how they might affect growth.

PERFORMANCE DISCLOSURE

The S&P 500 Bond Index, S&P 500 Consumer Discretionary Corporate Bond Index, S&P 500 Consumer Staples Corporate Bond Index, S&P 500 Information Technology Corporate Bond Index, S&P 500 Telecommunication Services Corporate Bond Index, S&P 500 Financials Corporate Bond Index, S&P 500 Energy Corporate Bond Index, S&P 500 Utilities Corporate Bond Index, S&P 500 Health Care Corporate Bond Index, S&P 500 Industrials Corporate Bond Index, and S&P 500 Materials Corporate Bond Index were launched on July 8, 2015. All information presented prior to an index's Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index 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. 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 website 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, 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.

The Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices LLC 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. As a simple 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).

GENERAL DISCLAIMER