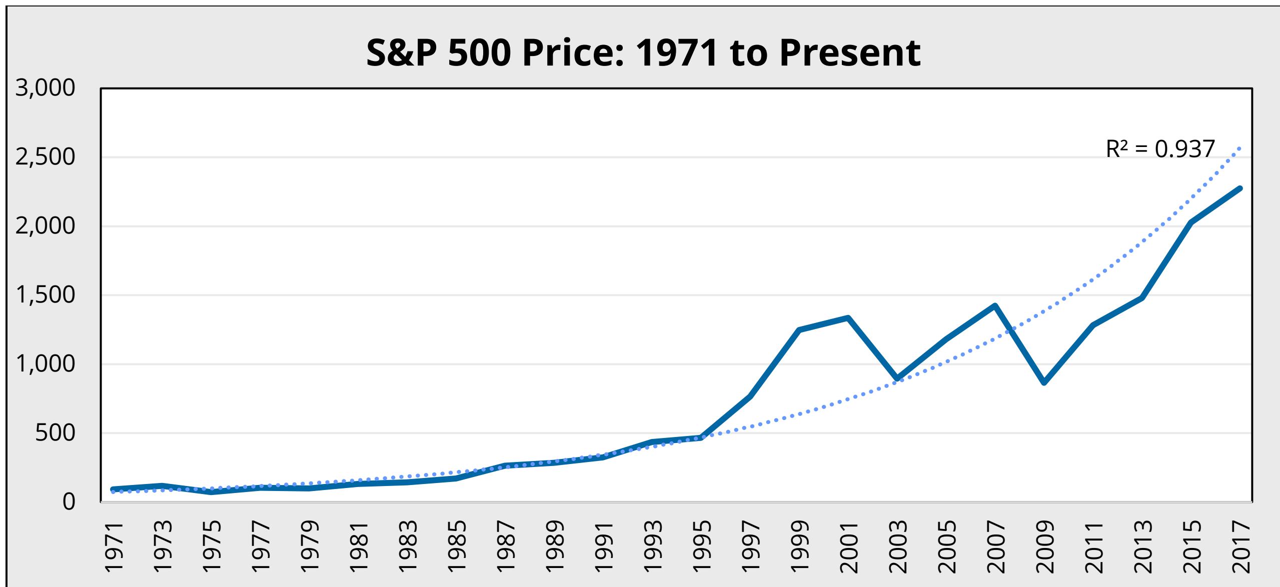
S&P 500 Returns: A Historical Perspective – Part 2

The S&P 500 has been up for 8 years in a row, and more than halfway through this year, it appears that the streak will grow to 9, which would tie as the longest streak since 1928. This paper, the second in a three-part series, will analyze the S&P 500's price and returns, focusing on streaks. Our previous whitepaper analyzed the Price/Earnings (PE) ratio and can be read here. The final paper will pull all of this together and discuss modeling portfolio returns and the trade-offs between varying portfolio weights between cash and equities.

Historical Distribution of Price

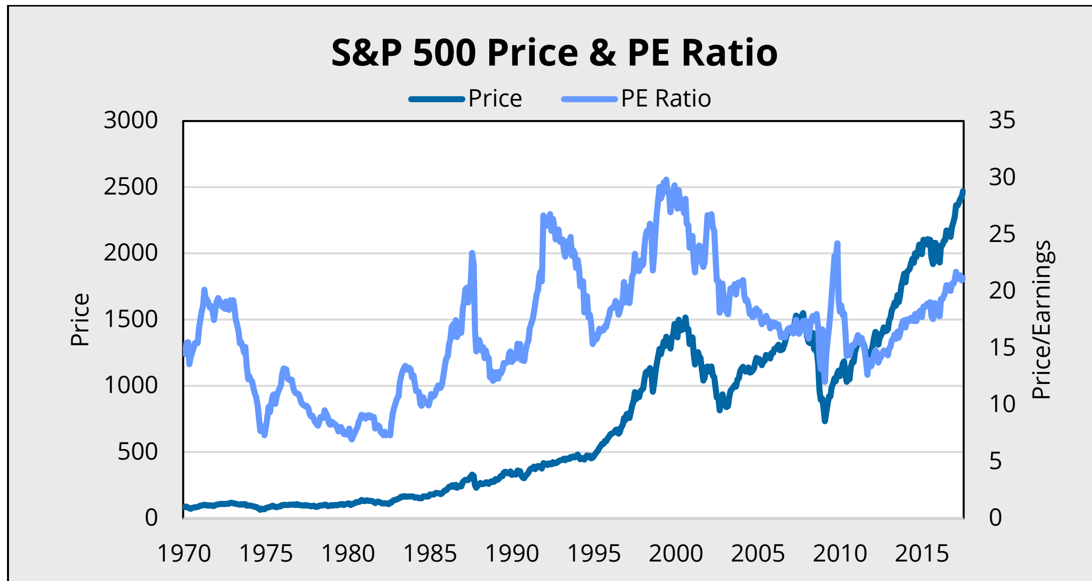
The S&P closed at $2,470.30 on July 31, 2017 which is just under its historical high of $2,477.83 reached only a few days prior on July 26th.[1] The low for the S&P 500 since 1971 was on October 3, 1974 when the S&P closed at $62.28. Over the past half century, the S&P 500 has risen in value at a steady pace with the exception of the tech bubble, which crashed in early 2000 and the financial crisis of 2008. The rate of increase along with the volume of trading, significantly rose during the mid-1990s and has kept a higher rate of growth since. For that reason, the following graph of S&P prices since 1971 closely fits an exponential trendline.



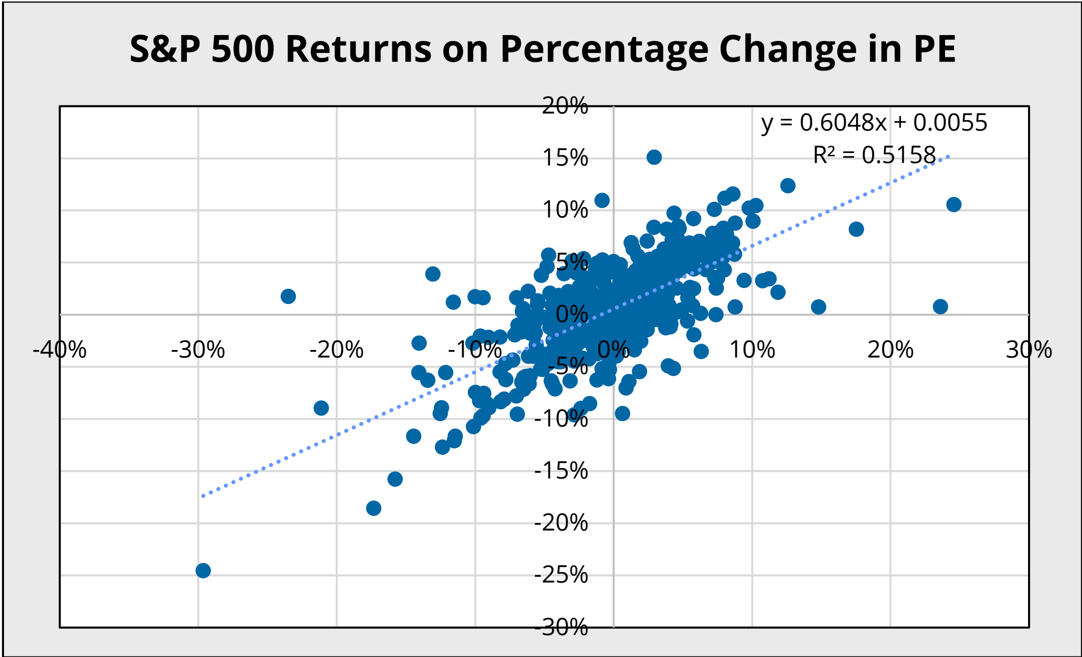
[1] Bloomberg

Price Earnings Ratio & Returns

The following graph displays the price of the S&P 500 alongside the price earnings ratio of the S&P, since 1970. The average PE ratio since 1971 was 19.4x and the median was 17.7x. As of July 31, 2017, this ratio was at 21.2x. The relatively high PE ratio may be due to historically low interest rates, potential boosts to earnings from tax cuts among other reasons. For more on the PE ratio, its relationships to other variables, and history, please read our previous whitepaper here.

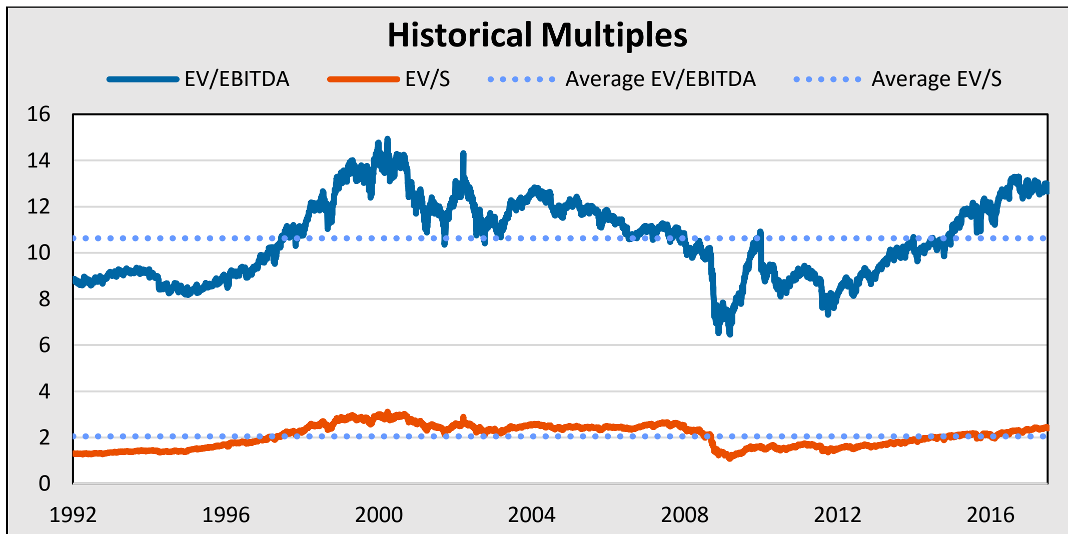


The relationship between the PE ratio and the price of the S&P appears to be insignificant; however, a regression of the S&P 500 returns on the percent change in the PE ratio reveals that 51.6% of the variation in the S&P returns was due to changes in the PE ratio. The line plot is shown in the graph below.

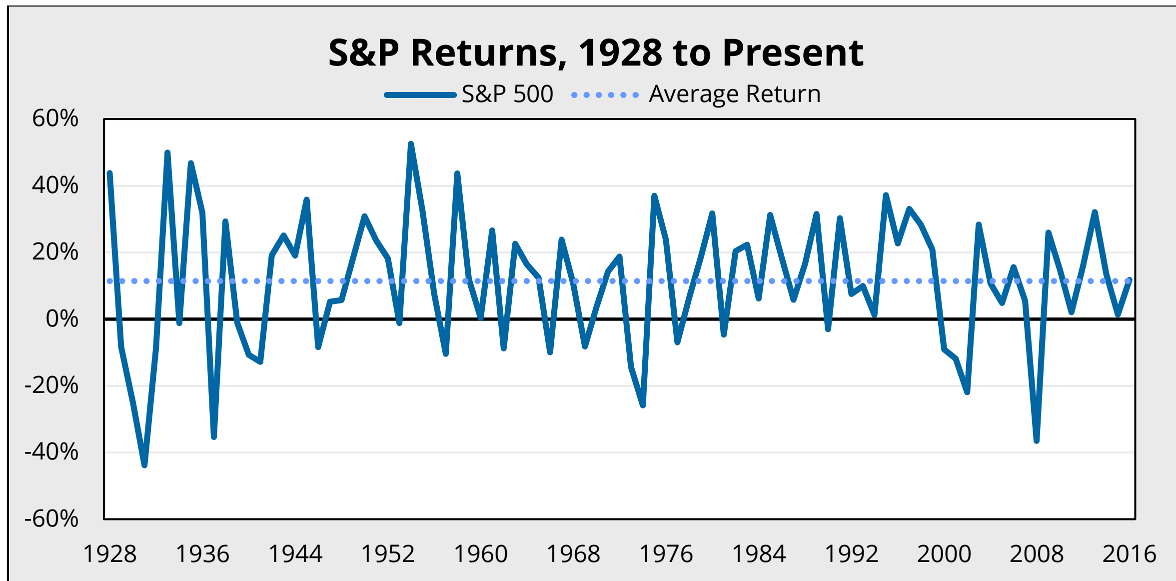


Other Indications of Value

Looking at other multiples for indications of value, it is clear the current multiples are somewhat in line with historical norms. As of June 30, 2017, the Enterprise Value to Sales ratio was 2.40 times, and Enterprise Value over EBITDA was 12.65. The average of these ratios since 1992 was 10.62 and 2.05, respectively. The multiples as of July 31, 2017 were in the 87th percentile for EV/EBITDA, and the 67th percentile for EV/S. While current multiples are higher than their respective historical averages, the reasons parallel those to the relatively high PE ratio.



Historical Analysis of Returns



The trailing twelve months return as of July 31, 2017 was 11.74%, which is 0.32% higher than the mean annual return and is at the 46.5th percentile of the historical distribution.[2] The median annual return was 13.5%. Since 1928, the highest annual return recorded was in 1954, when the S&P posted a 52.56% return. The lowest annual return was, as one might expect, in 1931 when the S&P posted a negative 43.84% return. The standard deviation[3] of the S&P returns since 1928 was 19.7%.

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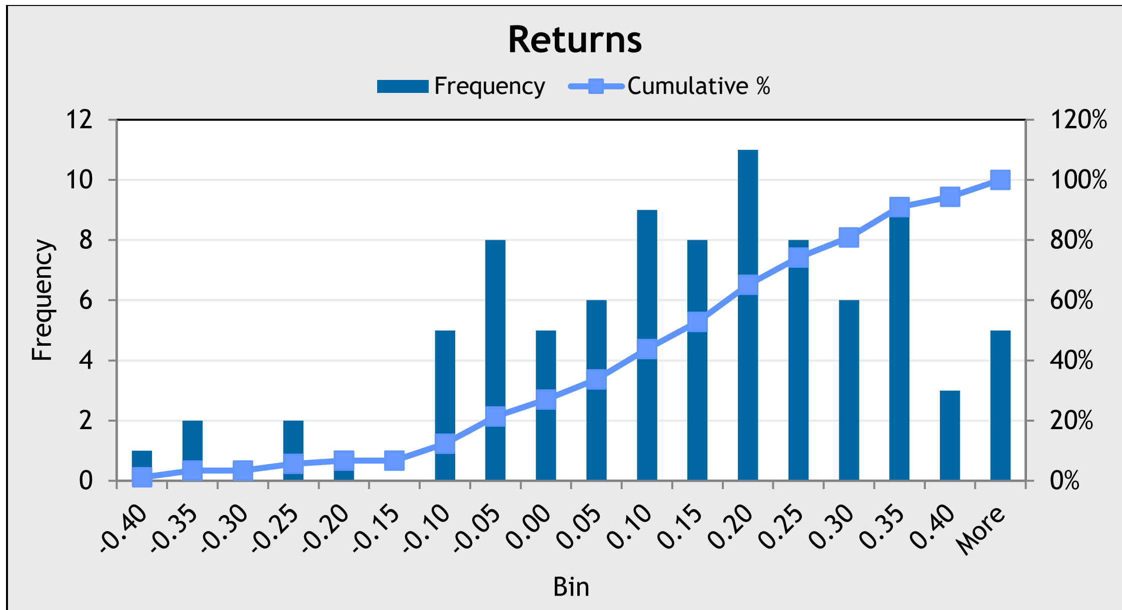
[2] New York University, http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html

[3] Standard deviation is a measurement intended to quantify the amount of variation among a set of values. A low standard deviation indicates that the set of values tend to be close to the mean, while a high standard deviation indicates the opposite.



Since 1928, the S&P 500 has posted 65 positive and 24 negative returns, so in 73.0% of those years, the S&P reported a positive return. Following a down year, the S&P reported a positive return in 16 years and negative return in 8. Following an up year, the S&P reported a positive return in 48 years and negative return in 16. This statistic implies that following an up year, the S&P has a 75% probability of reporting a positive return.

Streaks of 5 or greater consecutive positive years include:

- 1947-52, 6 years
- 1982-89, 8 years
- 1991-99, 9 years
- 2003-07, 5 years
- Current period, 2010-2017, 8 years and ongoing

The following table presents the frequency of outcomes in the current year, given an up or down year prior. When the previous year for the S&P was up, the current year was also up 48 times.

		Current Year		
Prior Year		Up	Down	Total
	Up	48	16	64
	Down	16	8	24
	Total	64	24	64

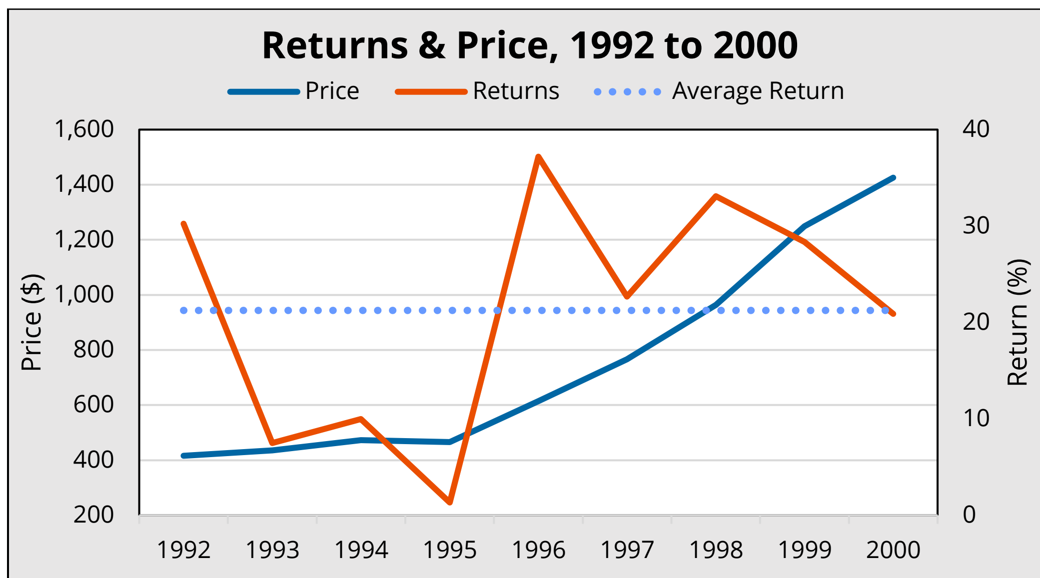
Probabilities derived from the table and data since 1928 are as follows:

- Unconditional probability of an up year: 75.0%
- Probability of an up year after a down year: 66.7%
- Probability of an up year after one up year: 75.0%
- Probability of an up year after two up years: 72.3%
- Probability of an up year after three up years: 69.7%
- Probability of an up year after five up years: 68.8%
- Probability of an up year after eight up years: 33.3%

These results exemplify a phenomenon known as the “Gambler’s Fallacy,” which is when people assume that increased frequency of a given result in one period means it will occur with less frequency in the next.

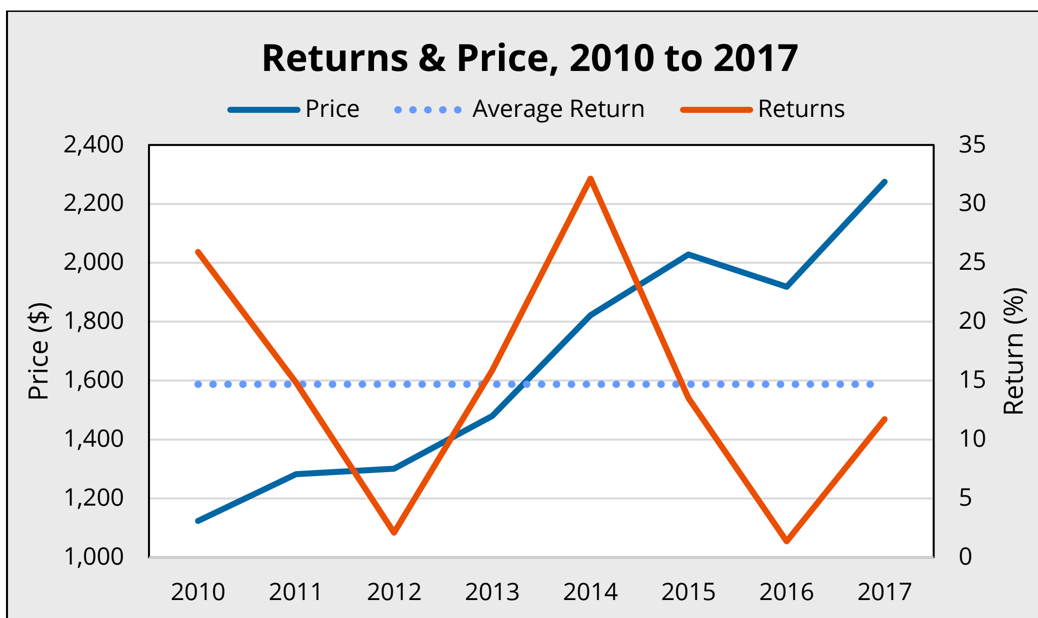
Streaks, Past vs. Present

Prior to the current streak, the last time the S&P 500 reported a positive return for 9 consecutive years was the period of 1992 to 2001. The average return for this period was 21.25%, and the S&P more than tripled in price. The average real GDP growth during this period was 3.8%, and CPI was 2.6%.[4] The unemployment rate declined from 7.4% in 1992 to 4.0% in 2000. This was a relatively calm period for U.S. foreign policy. This period was post-Cold War and pre-9/11, and there was tremendous growth in the technology industry, up until the tech bubble burst in 2000. It is also worth noting that the negative return of 3.1% in 1991 followed 8 consecutive years with positive returns. The following graph shows the S&P 500's price, annual returns, and the average return over that period.



[4] Federal Reserve Bank of St. Louis, Federal Reserve Economic Database, https://fred.stlouisfed.org/

The S&P 500 has reported positive returns for the last 8 years with an average return of 14.7%. This period followed a deep recession in 2008, and the circumstances are quite different from the aforementioned period. The national debt has risen to high levels, interest rates have remained near zero in most countries (even negative in some), and the global economy seems far less stable. The U.S. government has also been at war in the Middle East, and the European Union continues to struggle with a debt crisis of their own. The average U.S. CPI and real GDP growth were 1.7% and 2.1%, respectively. However, the unemployment rate declined from 9.8% in 2010 to 4.4% as of April 2017. The following graph shows the S&P 500's price, annual returns and the average return over that period.



To conclude, the fact that the S&P 500 has been up for 8 years in a row is not an indication that the S&P will have a down year this year. The streak appears likely to extend to 9 years, which would tie the longest streak since 1928. Additionally, the relatively high valuation multiples seen currently can be explained with the historically low interest rates in the past decade and potential tax cuts, among other reasons.

The information presented here is not nor should it be treated as investment, financial or tax advice and is not intended to be used to make investment decisions.