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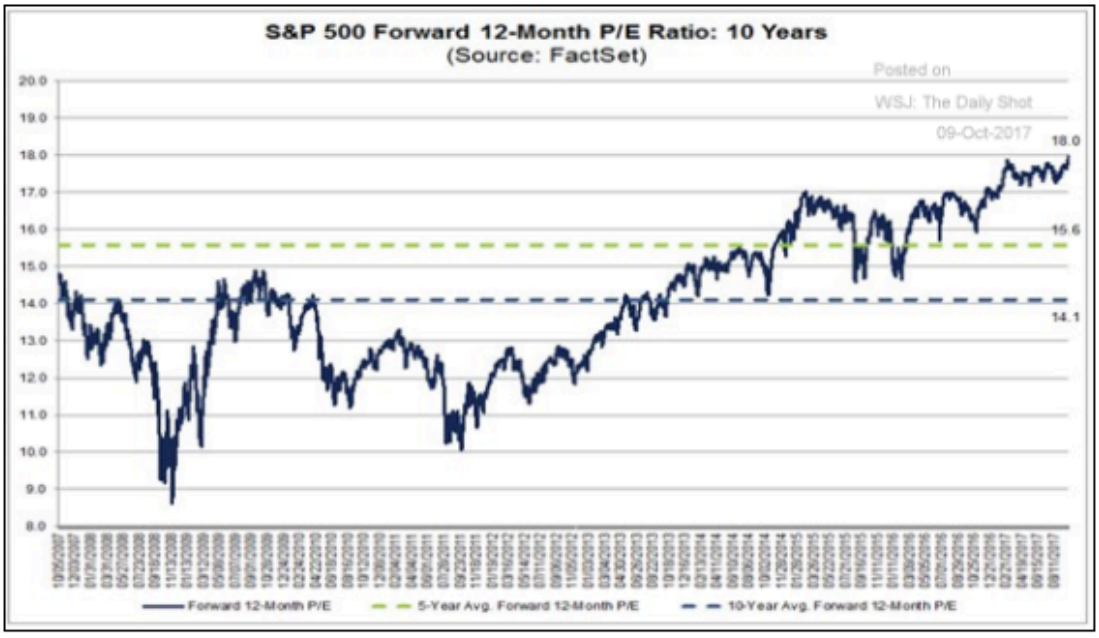
OCTAVIA'S OUTLOOK
JANUARY 2018 - US EQUITY MARKET VALUATION ASSESSMENT

This Octavia's Outlook addresses the number one question in markets today: is the US stock market overvalued or possibly even in a bubble? In analyzing this question, I take a quantitative approach. That said, whether or not the US stock market is overvalued does not mean the market is going to go up or down. Financial asset prices are a function of supply and demand; are there more buyers or more sellers and what is the conviction of the buyers and sellers (meaning, do they have to buy/sell). And, numerous factors impact the number and ferocity of buyers and sellers: cash inflows/outflows (think 401K contributions); portfolio rebalancing (think retiring baby boomers); relative valuations among different asset classes (an asset could be "expensive" but another asset could be even more expensive and thus the "expensive" asset looks cheap on a relative basis); and, of course, actual quantitative valuation metrics. In this letter, I use the lens of classical financial valuation techniques, but please understand that while all assets should ultimately be valued based on the expected future stream of cash flows discounted back to the present, that does not automatically mean that assets will actually trade at those valuations.

Before addressing the topic of this letter, a quick Octavia update. In 2017, Octavia launched two new strategies: Equity Passive Index and Equity Active Index (complete descriptions available on the Octavia website). Equity Passive Index holds a few ETFs and is designed to mirror returns of global equity markets. Equity Active Index typically holds about 15 to 20 ETFs that track specific industry sectors and geographies. In 2017, Equity Passive Index returned 24.2% (net of fees), Equity Active Index returned 22.6% (net of fees) and the S&P500 represented by the ETF SPY returned 21.7%.

Now, back to the topic of this letter. In chart 1 below, I show graphically the issue being raised. The S&P500, which is a measure of the US stock market, is currently (as of January 17, 2018) valued at 18.7x 12 month forward expected earnings versus about 14x to 15x this metric over the past 10 years. As a result, many investors and financial pundits state that the US stock market is grossly over-valued, even bordering on being a bubble.

Chart 1



Source: @FactSet

To start, a company is worth the net present value of its future expected cash flows (for the purposes of this analysis we will treat "earnings" and "cash flows" as the same, assuming capital expenditures and depreciation approximate each other). Thus, there are two variables. One, at what rate will current earnings grow. And, two, at what interest rate do you discount back those earnings. There is a very simple formula to calculate the net present value using these inputs.

Net Present Value = (1 Year Forward Expected Cash Flow) divided by (Discount Rate minus Annual Cash Flow Growth Rate in Perpetuity)

The problem with someone saying the market is overvalued because it trades at a higher multiple today than historically is that the net present value (and resulting multiple of current earnings) should take into account interest rates and earnings growth rates at that point in time. To compare multiples today with multiples from five, ten or twenty years ago is comparing apples and oranges unless interest rates and earnings growth rates were the same at those same points in time. Looking at historical multiples relative to current multiples is therefore misleading.

Based on current earnings levels, future expected growth rates and future expected interest rates, what do the numbers tell us about the current market valuation? To start, the S&P500 closed today (January 17, 2018) at 2802.56 and the estimate for 2018 S&P500 earnings is $150.15. Thus, the S&P500 is trading at 18.7x 2018 earnings, which as I stated before is higher than the average of 14x to 15x over the past 10 years.

The next thing we need to consider is what should we assume for our earnings growth rate. Over the past 100 years, the S&P500 has averaged 7% annual, nominal (i.e., not inflation adjusted) earnings growth. And, over the past 30 years, the S&P500 has averaged 10% annual, nominal earnings growth. For our analysis, let's for now assume earnings growth reverts back to the long-term average of 7%.

Finally, we need to determine our discount rate. Without going into the Capital Asset Pricing Model, I use a 6.5% risk premium. Thus, the discount rate is the risk-free rate plus 6.5%. Based on these assumptions, the S&P500's current valuation of 2802.56 implies a 5.86% risk free interest rate. Remember from our formula before:

NPV = 1 Year Forward Cash Flow divided by (Discount Rate minus Cash Flow Growth Rate), so

2802.56 = 150.12 / ((6.5% + Risk Free Rate) – 7%). Thus, the risk-free rate implied by the current S&P500 level is 5.86%.

Chart 2 shows the various earnings growth rates and risk-free interest rates that result in the current S&P500 valuation, assuming a 6.5% risk premium to calculate the discount rate.

Chart 2

Implied PE of 1 Year Forward Estimated SP500 Earnings Based on 6.5% Risk Premium							
Risk Free Rate	**Nominal Annual Earnings Growth Rate**						
	4.00%	**5.00%**	**6.00%**	**7.00%**	**8.00%**	**9.00%**	**10.00%**
2.86%	18.7x	22.9x	29.8x	42.4x	73.7x	279.6x	n/a
3.86%	15.7x	18.7x	22.9x	29.8x	42.4x	73.7x	279.6x
4.86%	13.6x	15.7x	18.7x	22.9x	29.8x	42.4x	73.7x
5.86%	12.0x	13.6x	15.7x	18.7x	22.9x	29.8x	42.4x
6.86%	10.7x	12.0x	13.6x	15.7x	18.7x	22.9x	29.8x
7.86%	9.7x	10.7x	12.0x	13.6x	15.7x	18.7x	22.9x
8.86%	8.8x	9.7x	10.7x	12.0x	13.6x	15.7x	18.7x

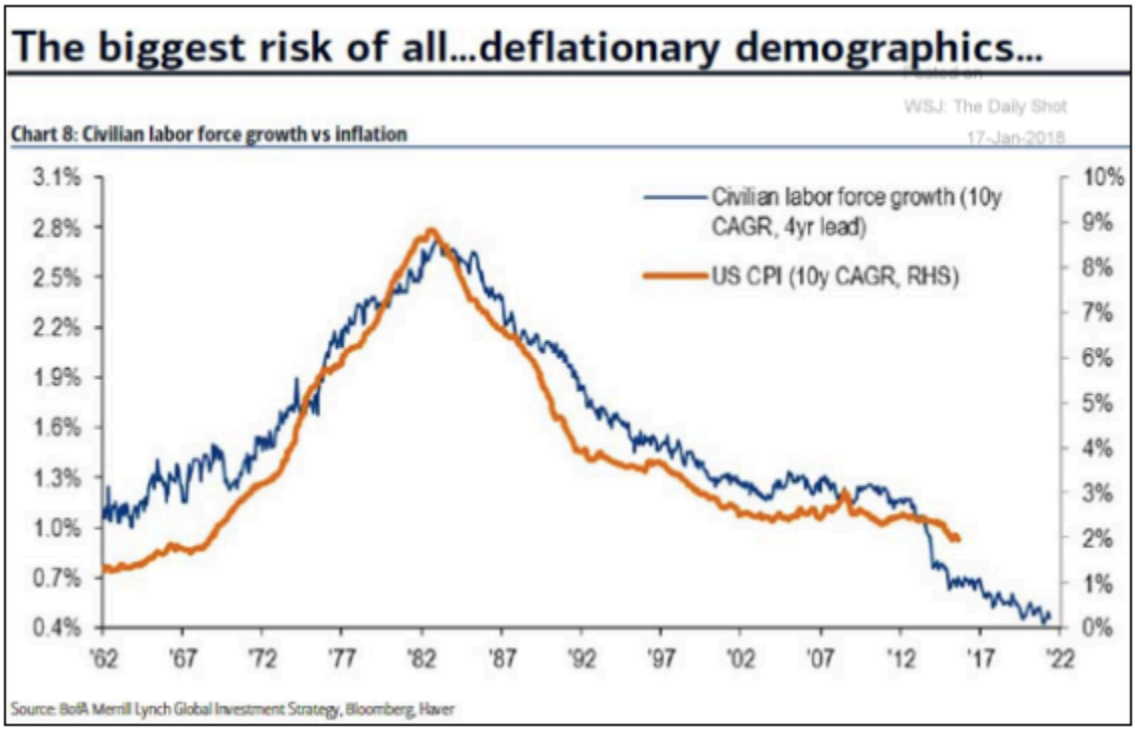
In order to derive a fair value for the S&P500, we need to apply our judgement regarding what we believe the long-term earnings growth rate and risk-free interest rate will be. I believe that the global economy is beset with structurally deflationary trends, be they (i) aging global populations, (ii) growth in free trade and the resulting continual shift to lower cost production and labor and (iii) technology advancements which (a) enable more efficient supply chains and lower inventory levels, (b) drive down manufacturing costs, (c) reduce the need for labor and thus enhance productivity and (d) provide price

transparency and resulting lower prices. In addition, as demonstrated in Chart 3, global capacity utilization is still at historical low levels, reducing the impetus for price increases.

Chart 3

Chart 4 shows the strong relationship between demographics (aging population) and inflation. The global economy is aging, which is deflationary.

Chart 4



And, yet, the S&P500 implies a 5.86% risk free rate (assuming the market is applying 7% annual earnings growth). I believe this is a function or recency bias, where investors believe that everything mean reverts and thus interest rates have to go back to where they were over the past 10 or 20 years. I have two problems with this thinking. First, rates do not need to go

back to historical levels because long-term interest rates are mostly a function of inflation expectations, and as I stated, there are long-term deflationary factors at work. Just look at Japan's interest rates if you need further proof. Second, while rates hit all time high levels in the early 1980s, this was an exception and not the rule. Per Chart 5, over the past roughly 150 years, the 10 Year US Treasury has averaged about 4%, ranging between 2% and 5%.

Chart 5

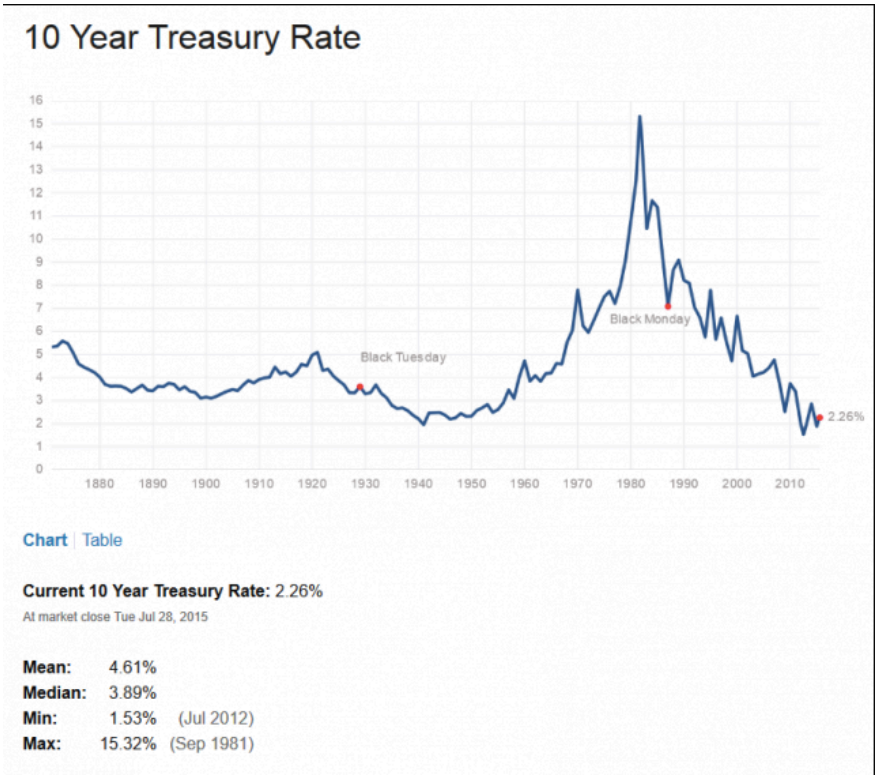


Chart 6 shows the trend in inflation over the past 100 plus years. Inflation, measured by CPI, has been steady and trending downward

Chart 6

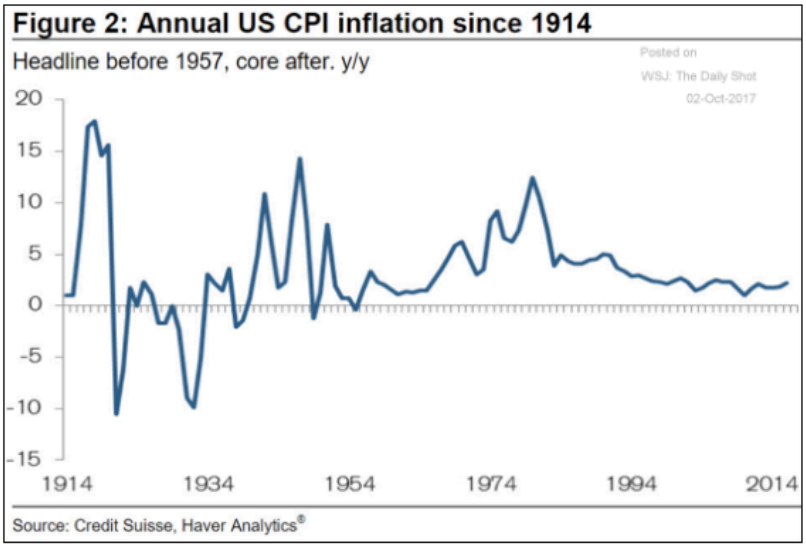
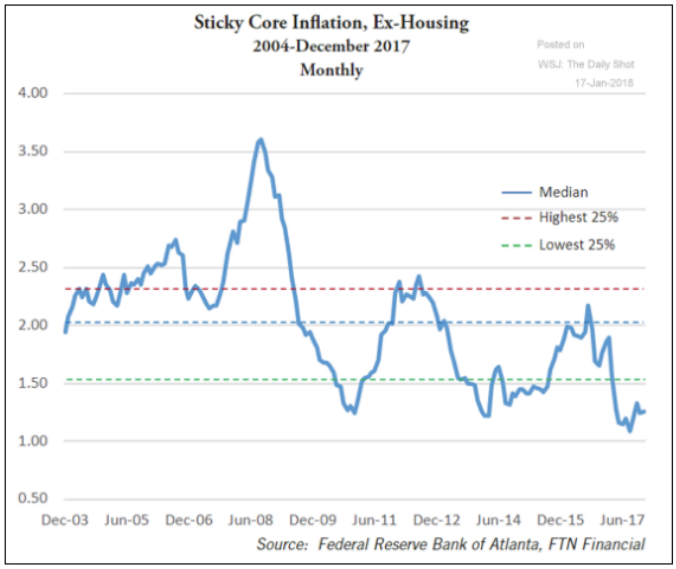


Chart 7 shows inflation trends over the past 13 years. Inflation is trending downward, leading to lower long-term interest rates relative to recent history.

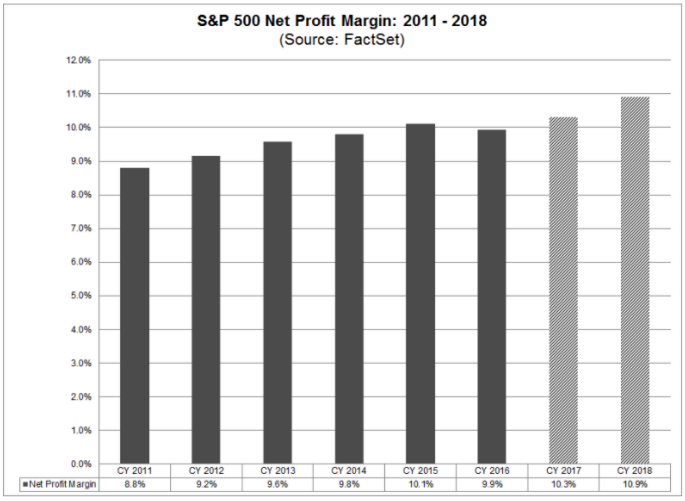
Chart 7



Taking into account these charts on interest rates and inflation, it makes sense why interest rates are where they are today. And, if inflation is not forecast to increase, then it is reasonable to assume interest rates will not increase meaningfully from current levels. This supports my view that 5.86% is not the correct risk-free interest rate to apply in calculating a discount rate. I would argue that the correct risk-free rate to use is 4%, which is 2% inflation plus 2% for term structure. It also approximates the median rate over the past 150 years.

But, maybe the market is not assuming 5.86% as the risk-free rate. Maybe the market is assuming an earnings growth rate less than 7%. Going back to Chart 2 on page 2, if the risk-free rate were assumed to be 3.86% (closer to my 4% assumption), then the current S&P500 level implies a future annual earnings growth rate of 5%. But, looking at the trends in earnings, including the growth of the global economy, the growth of US corporations' share of the global economy and the increases in margins, I believe that 7% annual earnings growth is a reasonable base-case assumption. Chart 8 shows the recent trend in S&P500 company profit margins.

Chart 8



Having discussed risk free rates and earnings growth rates, in Chart 9 I lay out the implied multiple of various risk-free interest rate and earnings growth rate scenarios. Chart 10 shows the resulting implied level of the S&P500 of such scenarios. And, Chart 11 shows the implied percentage change from current levels of the S&P500 of such scenarios.

Chart 9

Implied PE of 1 Year Forward Estimated SP500 Earnings Based on 6.5% Risk Premium							
Risk Free Rate	**Nominal Annual Earnings Growth Rate**						
	4.00%	**5.00%**	**6.00%**	**7.00%**	**8.00%**	**9.00%**	**10.00%**
2.25%	21.1x	26.7x	36.4x	57.1x	133.3x	n/a	n/a
3.00%	18.2x	22.2x	28.6x	40.0x	66.7x	200.0x	n/a
3.75%	16.0x	19.0x	23.5x	30.8x	44.4x	80.0x	400.0x
4.50%	14.3x	16.7x	20.0x	25.0x	33.3x	50.0x	100.0x
5.25%	12.9x	14.8x	17.4x	21.1x	26.7x	36.4x	57.1x
6.00%	11.8x	13.3x	15.4x	18.2x	22.2x	28.6x	40.0x
6.75%	10.8x	12.1x	13.8x	16.0x	19.0x	23.5x	30.8x

Chart 10

Implied Current SP500 Value							
Risk Free Rate	**Nominal Annual Earnings Growth Rate**						
	4.00%	**5.00%**	**6.00%**	**7.00%**	**8.00%**	**9.00%**	**10.00%**
2.25%	3,161	4,004	5,460	8,580	20,020	n/a	n/a
3.00%	2,730	3,337	4,290	6,006	10,010	30,030	n/a
3.75%	2,402	2,860	3,533	4,620	6,673	12,012	60,062
4.50%	2,145	2,503	3,003	3,754	5,005	7,508	15,015
5.25%	1,937	2,224	2,611	3,161	4,004	5,460	8,580
6.00%	1,766	2,002	2,310	2,730	3,337	4,290	6,006
6.75%	1,623	1,820	2,071	2,402	2,860	3,533	4,620

Chart 11

Implied Change in SP500 Value from Current SP500 Value							
Risk Free Rate	**Nominal Annual Earnings Growth Rate**						
	4.00%	**5.00%**	**6.00%**	**7.00%**	**8.00%**	**9.00%**	**10.00%**
2.25%	12.8%	42.9%	94.8%	206.1%	614.3%	n/a	n/a
3.00%	-2.6%	19.1%	53.1%	114.3%	257.2%	971.5%	n/a
3.75%	-14.3%	2.0%	26.1%	64.8%	138.1%	328.6%	2043.1%
4.50%	-23.5%	-10.7%	7.2%	33.9%	78.6%	167.9%	435.8%
5.25%	-30.9%	-20.6%	-6.8%	12.8%	42.9%	94.8%	206.2%
6.00%	-37.0%	-28.6%	-17.6%	-2.6%	19.1%	53.1%	114.3%
6.75%	-42.1%	-35.1%	-26.1%	-14.3%	2.0%	26.1%	64.8%

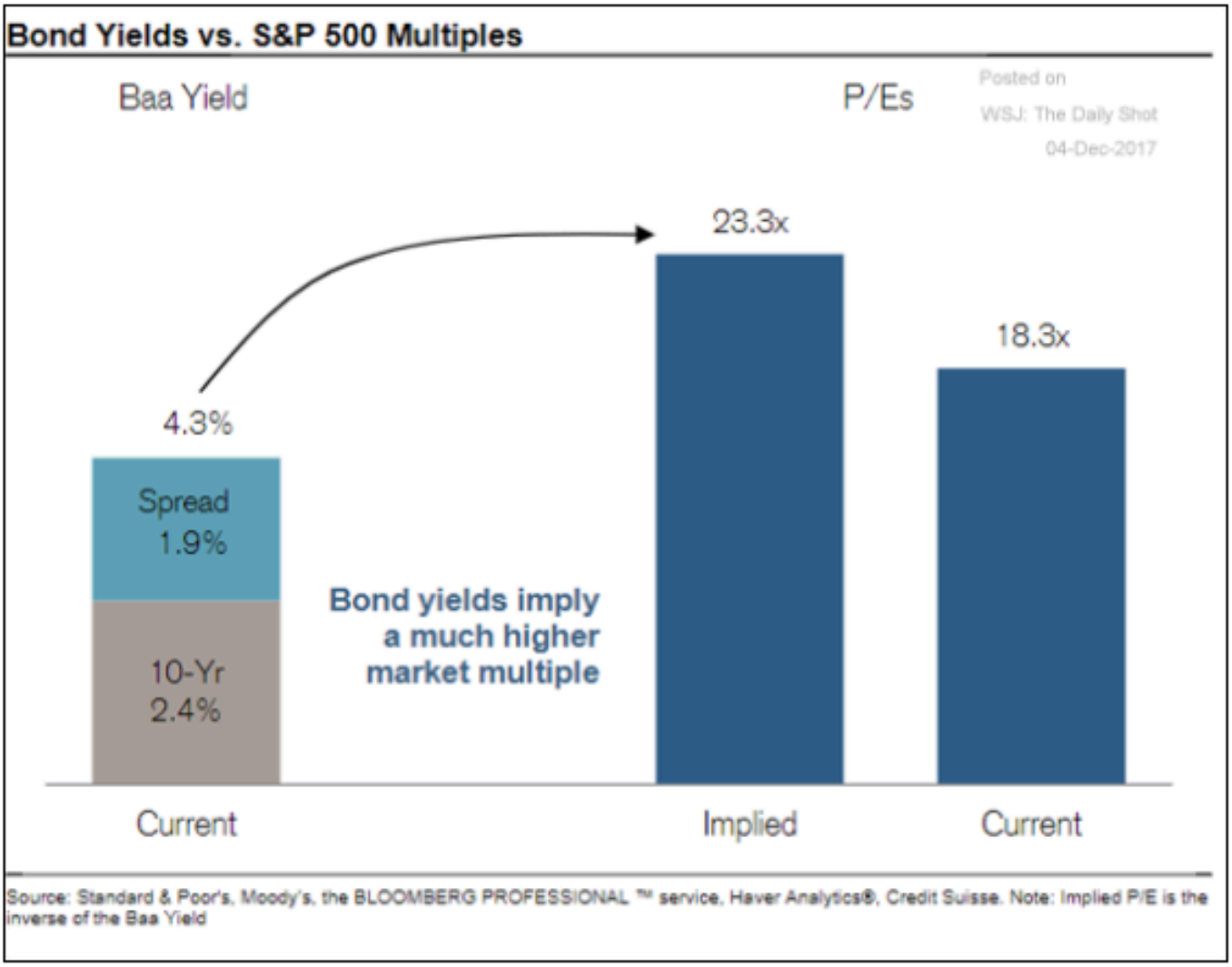
Using the above charts, let's walk through the results. The 10 year US treasury is currently about 2.6%. To be conservative, let's assume it increases to 4.5% (the upper band of the normalized average over the past 150 years). If we further assume 7% annual earnings growth in perpetuity, the correct multiple on 2018 S&P500 earnings is 25x, a 33.9% increase from current levels. But, what if annual earnings growth is 6% instead of 7%, then the implied multiple is 20x, still 7.2% upside from current levels. If you assume the interest rate on the 10 year US treasury is 3.75% and 7% long term annual earnings

growth, the correct multiple on 2018 S&P500 earnings is 30.8x, a 64.8% increase from current levels. Bring the earnings growth rate down to 6% and the multiple is still 23.5x, a 26.1% increase from current levels.

The conclusion I take from this analysis is that the S&P500 is not expensive and one could easily argue is quite inexpensive. Just because the market has increased substantially since the financial crisis does not automatically mean the market is expensive. What is more likely is that the S&P500 was simply over sold during the financial crisis and way, way too cheap. The current bull market is just catching up to the true S&P500 valuation. Also, the market does not believe that interest rates will stay low. The market implicitly believes that the 10 year US treasury is going back to nearly 5% or 6% since that is a "normal" rate. This, then, is the key debate. If you believe, as I do, that interest rates are staying low and earnings will be no less than the historical average of 7%, then the stock market is extremely cheap. If you believe that interest rates are going back to 5% or 6% and you believe that long term annual earnings growth will decline to below the 100 year average of 7%, then the S&P500 is 6.8% to 28.6% overvalued, assuming 6% and 5%, respectively, annual earnings growth rates.

Finally, Chart 12 shows a similar way of thinking about what I have discussed with you. It concludes that the S&P500 should trade at 23.3x 2018 earnings taking into account current interest rates, a roughly 25% increase in the S&P500 versus current levels.

Chart 12



On the topic of valuation, there is one more thing I want to address. In addition to P/E multiples, another statistic used to argue that the stock market is over-valued is the ratio of the value of US stocks to US GDP, as shown in Chart 13.

Chart 13

Based on the above chart, some argue that US stocks are at record valuations. I believe this chart is extremely mis-leading because it compares US stock market valuation to US GDP. In reality, S&P500 companies (which comprise nearly all of the US stock market capitalization) derive 30% to 50% of sales outside of the US. So, if you want to consider this ratio, you need to compare US stock market capitalization to global GDP, not US GDP.

I do not believe that US or international equity markets are over-valued. As a result, Octavia's portfolio strategies are fully invested in the relevant portfolio's equity allocation. That said, I am always looking for risks, which could impact portfolio asset allocations. On my radar are:

1. Central bank policies and the impact on capital flows and interest rates
2. China's economic growth and the risks inherent in the Chinese government's goal of deleveraging
3. The magnitude of US corporate share buybacks and dividends and resulting impact on demand for stocks
4. The rise of populism/nationalism and the impact on free trade
5. Global debt levels and the impact on future credit growth (which impacts GDP growth)
6. The level of the US dollar and the impact on S&P500 earnings and emerging market debt

I hope you found this letter of value and welcome any feedback. My goal is to make good investment decisions, so I welcome the input.

Warmest Regards,
Octavia Investments LLC