Russell Investments

Optical Illusions in Investing

September 19, 2019

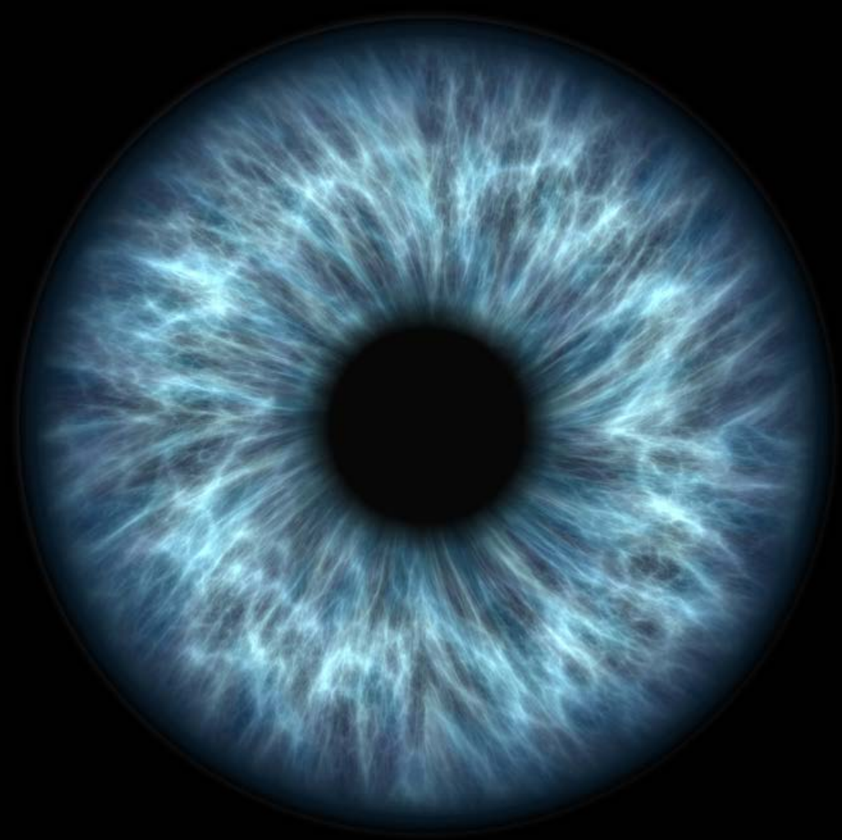
Exhibit A: Page 2

Photo source: Google images

Exhibit A: Page 3

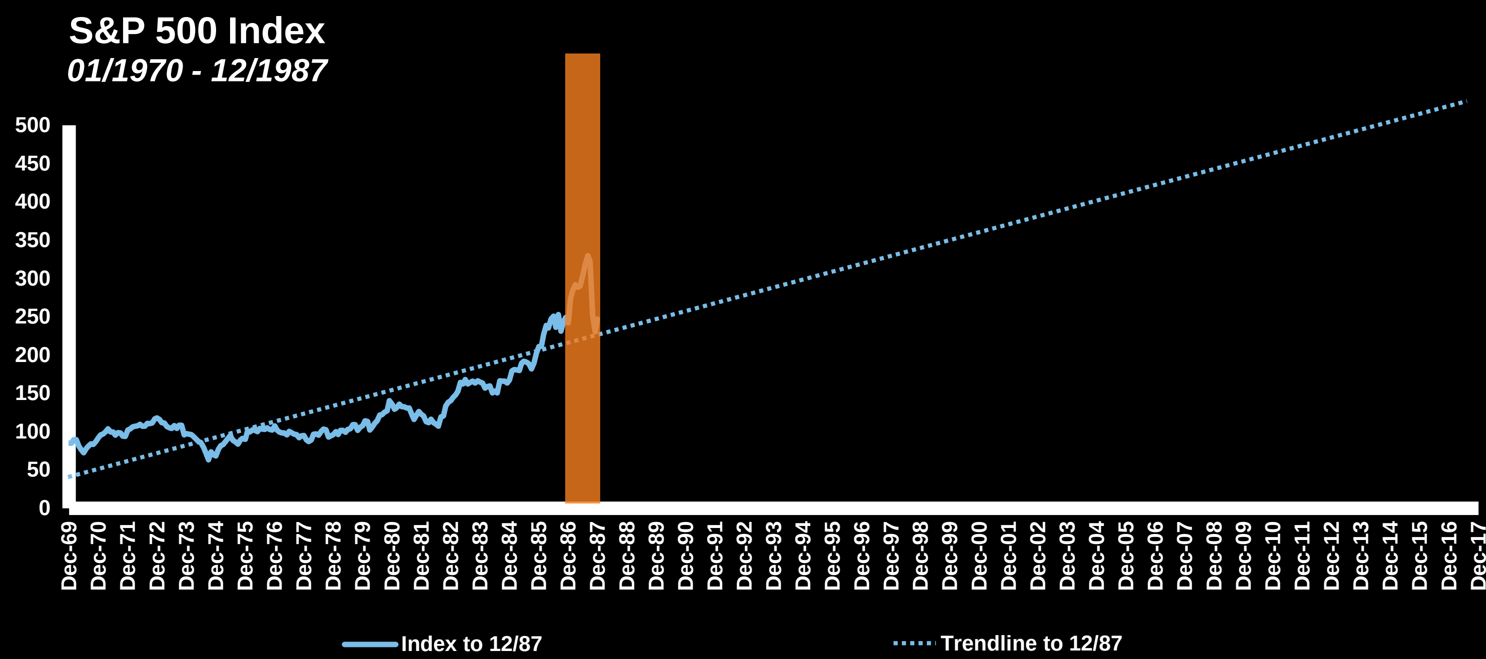
Photo source: Mike's iPhone

Perspective matters



Illusion #1: Trendlines

Overvalued or undervalued?



Data source: S&P Dow Jones Indices. Indexes and/or benchmarks are unmanaged and cannot be invested in directly. Returns represent past performance, are not a guarantee of future performance, and are not indicative of any specific investment.

Assessment

	GROUP 1	GROUP 2	GROUP 3	GROUP 4
1987				

As concluded by students in Mike's FIN 490 – Asset Management Class Spring 2019 (University of Washington Foster School of Business).

Exhibit A: Page 8

Overvalued or undervalued?

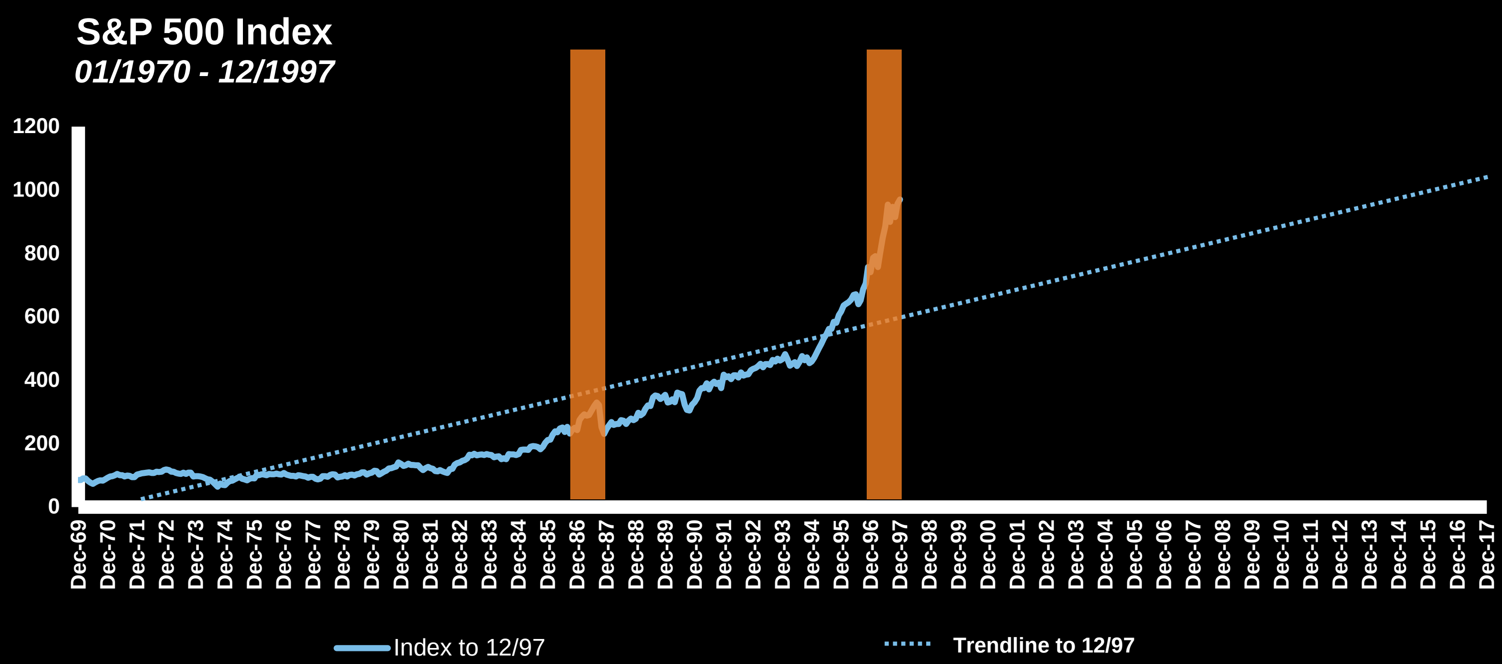


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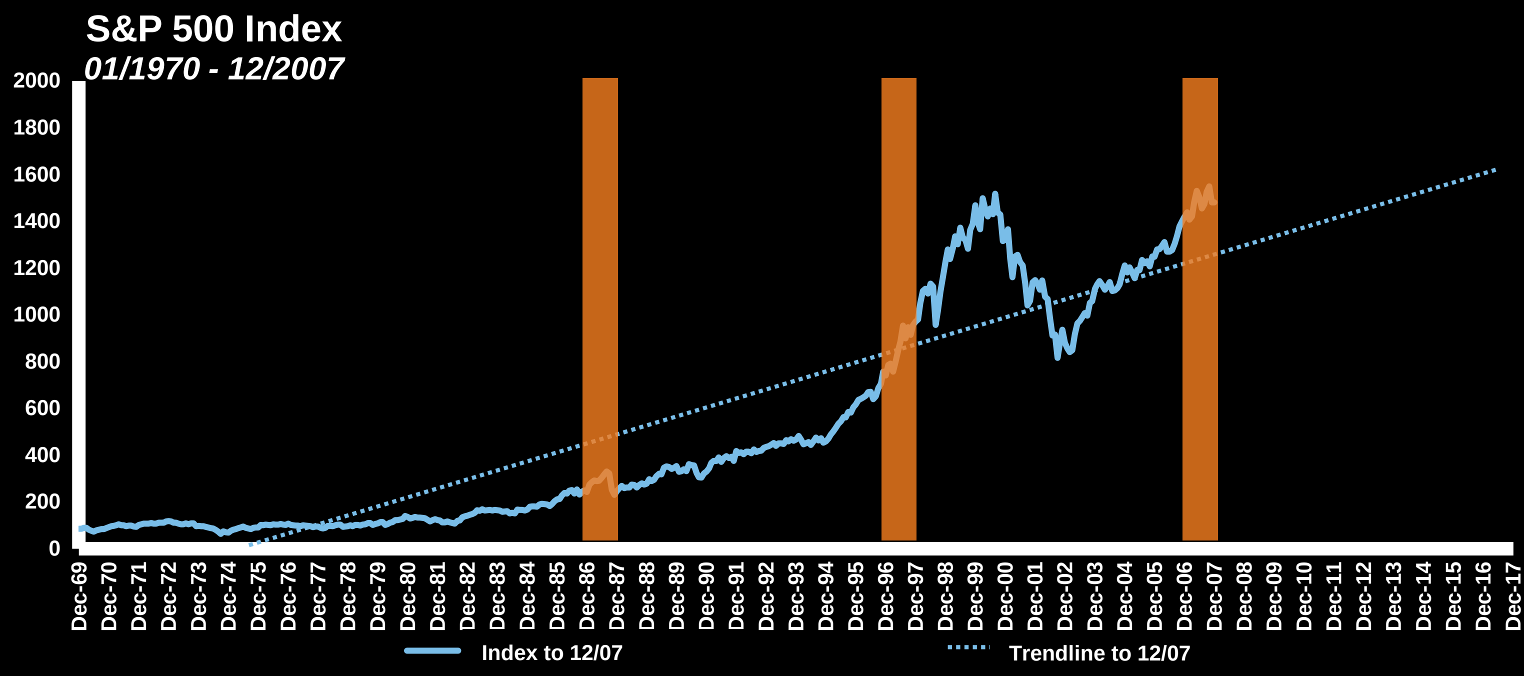
Exhibit A: Page 9

Assessment

	GROUP 1	GROUP 2	GROUP 3	GROUP 4
1987	Over	Under		
1997		Over		

As concluded by students in Mike's FIN 490 – Asset Management Class Spring 2019 (University of Washington Foster School of Business).

Overvalued or undervalued?



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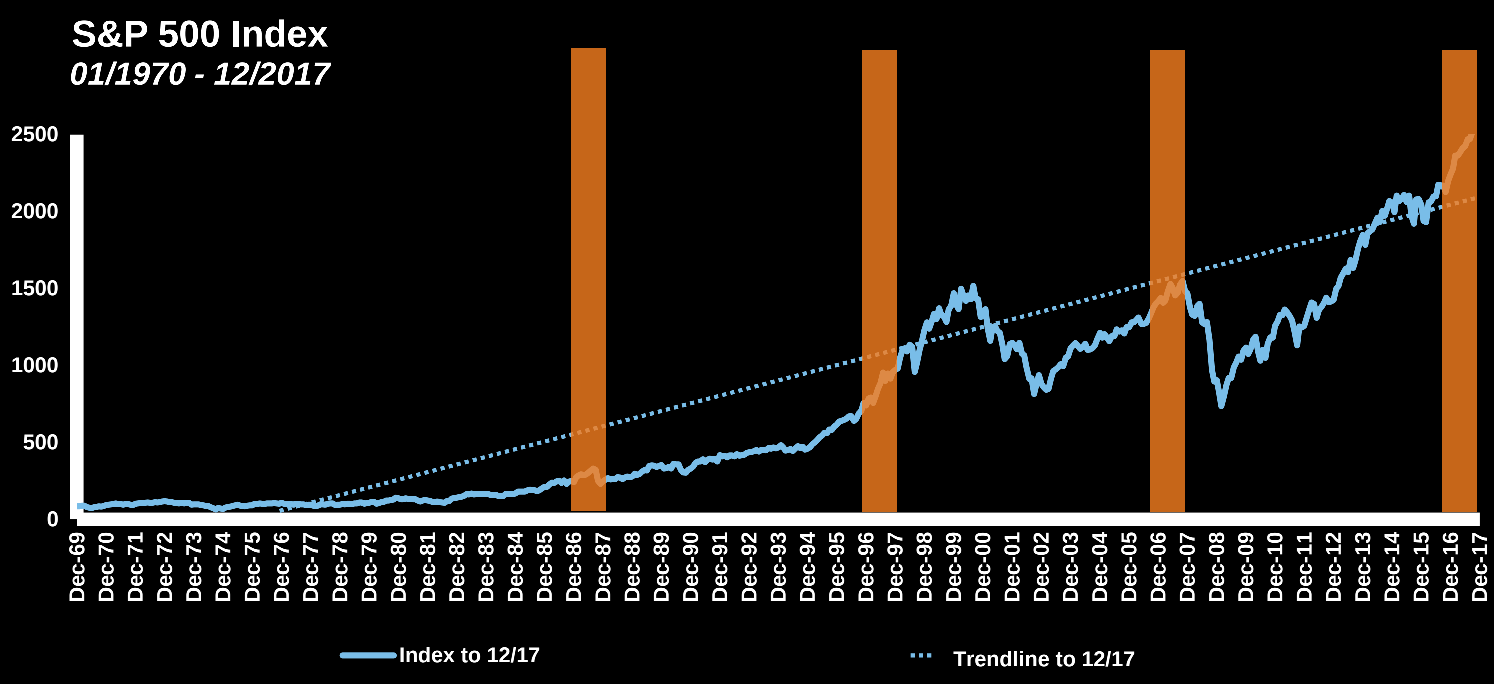
Assessment

	GROUP 1	GROUP 2	GROUP 3	GROUP 4
1987	Over	Under		
1997		Over		
2007				

As concluded by students in Mike's FIN 490 – Asset Management Class Spring 2019 (University of Washington Foster School of Business).

Overvalued or undervalued?



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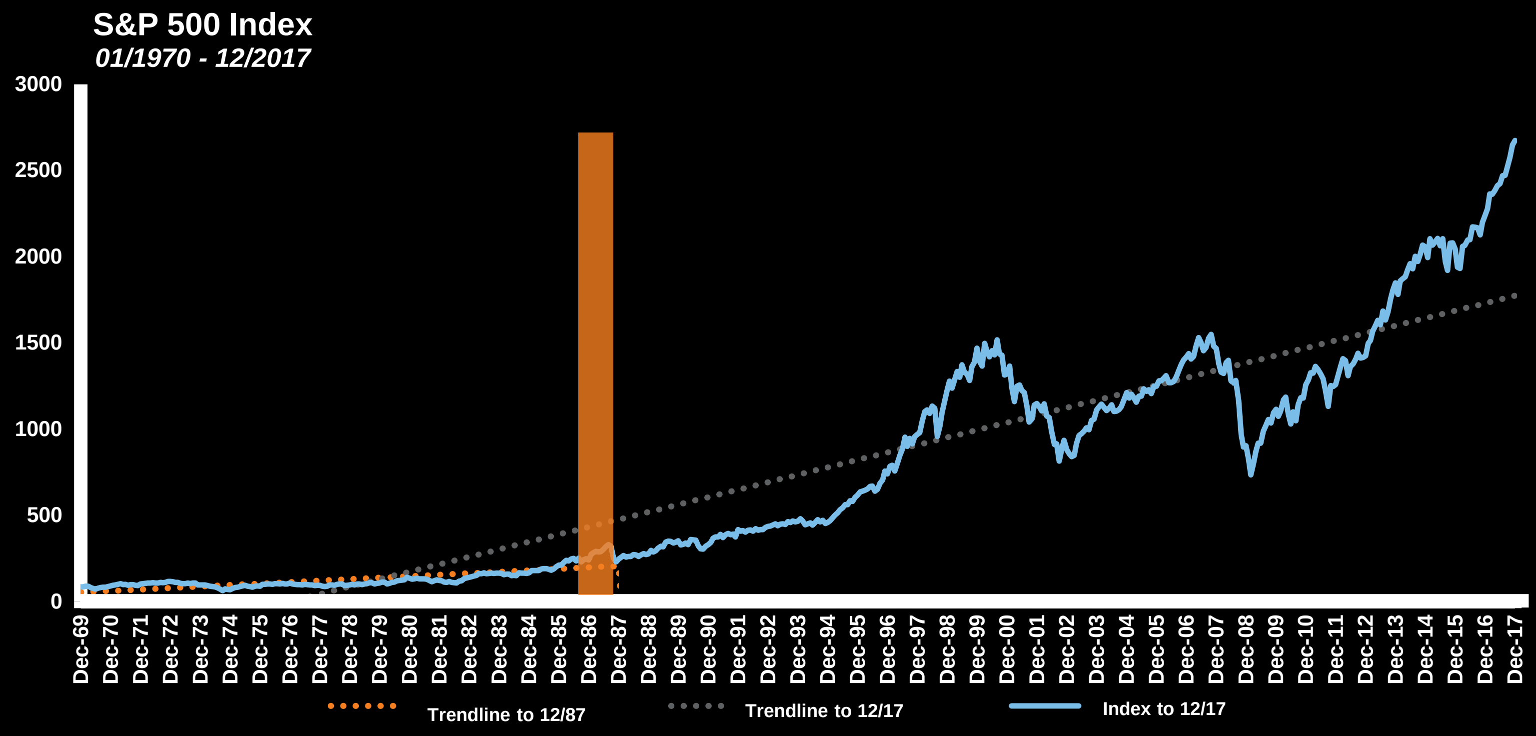
Assessment

	GROUP 1	GROUP 2	GROUP 3	GROUP 4
1987	Over	Under	Under	
1997		Over	Both	
2007			Over	
2017				

As concluded by students in Mike's FIN 490 – Asset Management Class Spring 2019 (University of Washington Foster School of Business).

How can the same period be assessed so differently?



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Illusion #1 takeaway: The *past* may not be what it appears

We tend to make two implicit assumptions when we look at trendlines:

- Today's trend line will continue with the current slope
- The trend line that exists today was knowable back in time

Let's take 1987 as an example . . .

- In 1987, for you to have concluded that the market was overvalued, you had to implicitly assume that the trendline that existed at that time would continue (it did not)
- Looking back, for you to conclude that the market was undervalued, you are implicitly assuming you could have known how the trend line would evolve

Illusion #2: Moving Averages

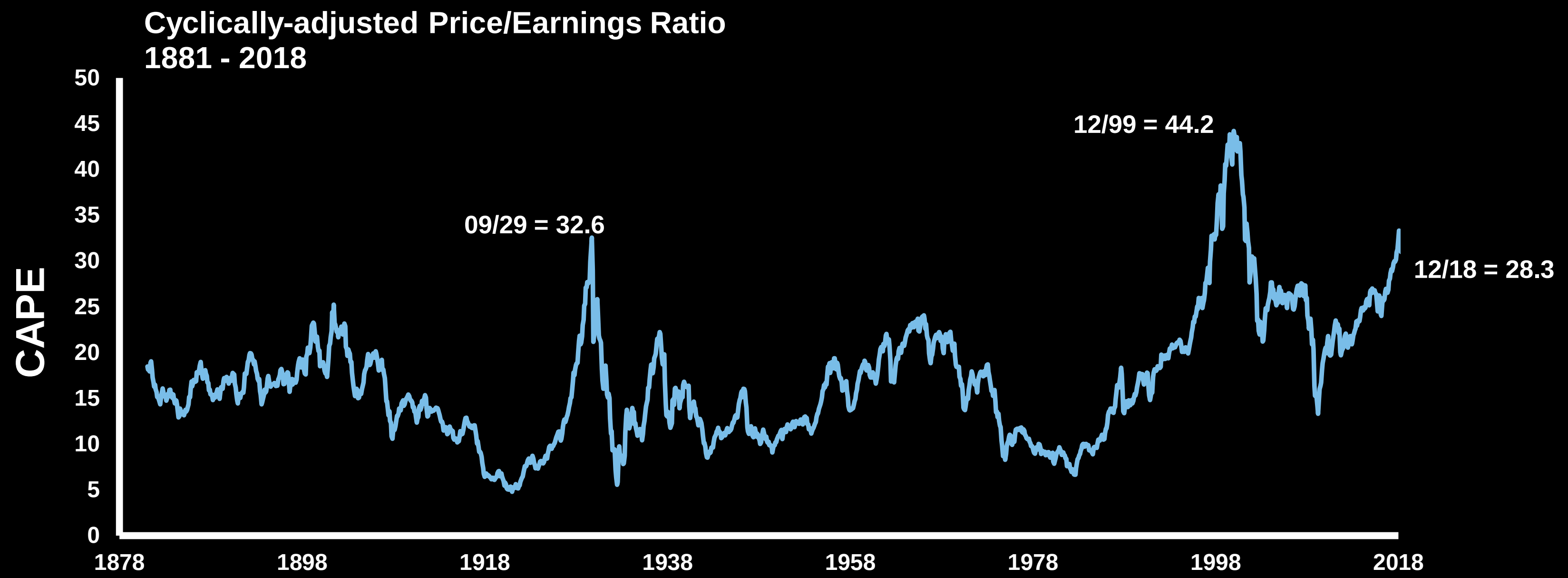
CAPE refresher

Like a traditional P/E ratio but with earnings smoothed

$$\frac{\textbf{S\&P 500 Index value}\ \textit{(adjusted for inflation)}}{\textbf{10-year average operating earnings}\ \textit{(adjusted for inflation)}} \xrightarrow{\text{12/2018}} \frac{\textbf{2561.14}}{\textbf{\$90.51}} = \textbf{28.3}$$

Data source: http://www.multpl.com/shiller-pe/

CAPE since 1881



Since 1881, the CAPE ratio has only been higher than it has been recently on two occasions:

> September 1929

> December 1999

Data source: http://www.multpl.com/shiller-pe/

Would you be a buyer if . . .

		Equivalent CAPE[1]
5% sell-off	$\frac{2561.14 * 0.95}{\$90.51}$	= 26.9
10% sell-off		= 25.5
15% sell-off		= 24.1
20% sell-off		= 22.6

[1]Assumes 10 year average earnings (the denominator in the CAPE ratio) remains unchanged. Forecasting represents predictions of market prices and/or volume patterns utilizing varying analytical data. There is no guarantee that any stated results will occur.

A closer look

$$28.3 = \frac{2561.14}{\$90.51}$$

$$\$90.51 \rightarrow \frac{\$15.72 + \$74.67 + \$92.87 + \$95.59 + \$98.04 + \$108.80 + \$101.04 + \$91.96 + \$105.23 + \$121.17}{10}$$

Data source: http://www.multpl.com/shiller-pe/

Guess what’s about to roll out of the moving average?

$$28.3 = \frac{\$2561.14}{\$90.51}$$

$\$90.51 \rightarrow \dfrac{\$15.72 + \$74.67 + \$92.87 + \$95.59 + \$98.04 + \$108.80 + \$101.04 + \$91.96 + \$105.23 + \$121.17}{10}$

Data source: http://www.multpl.com/shiller-pe/

Let’s fast forward to the end of 2020

$$\frac{2561.14}{\left\{\dfrac{\cancel{\$15.72 + \$74.67} + \$92.87 + \$95.59 + \$98.04 + \$108.80 + \$101.04 + \$91.96 + \$105.23 + \$121.17 + \$121.17 + \$121.17}{10}\right\}}$$

Care to guess what the CAPE Ratio would be?

24.2

Data source: http://www.multpl.com/shiller-pe/

Are you still a buyer?

	Equivalent CAPE[1]
5% correction	26.9
10% correction	25.5
15% correction	24.1
20% correction	22.6

‘20 CAPE = 24.2
Earnings flat

Still above the 85th percentile

Forecasting represents predictions of market prices and/or volume patterns utilizing varying analytical data. There is no guarantee that any stated results will occur.

Illusion #2 takeaway: Armchair market timers beware

Moving data series are complicated by what rolls off AND what rolls in making the results highly unstable

When assessing market attractiveness, consider . . .

- Multiple valuation metrics
- Other perspectives including market sentiment and business cycle

More broadly . . .

- Don’t ignore inception-to-date numbers (at least one of the bookends is set)
- Rolling charts over time can provide information that fixed 1, 3 and 5-yr numbers cannot

Illusion #3: Historical Manager Performance

Typical situation

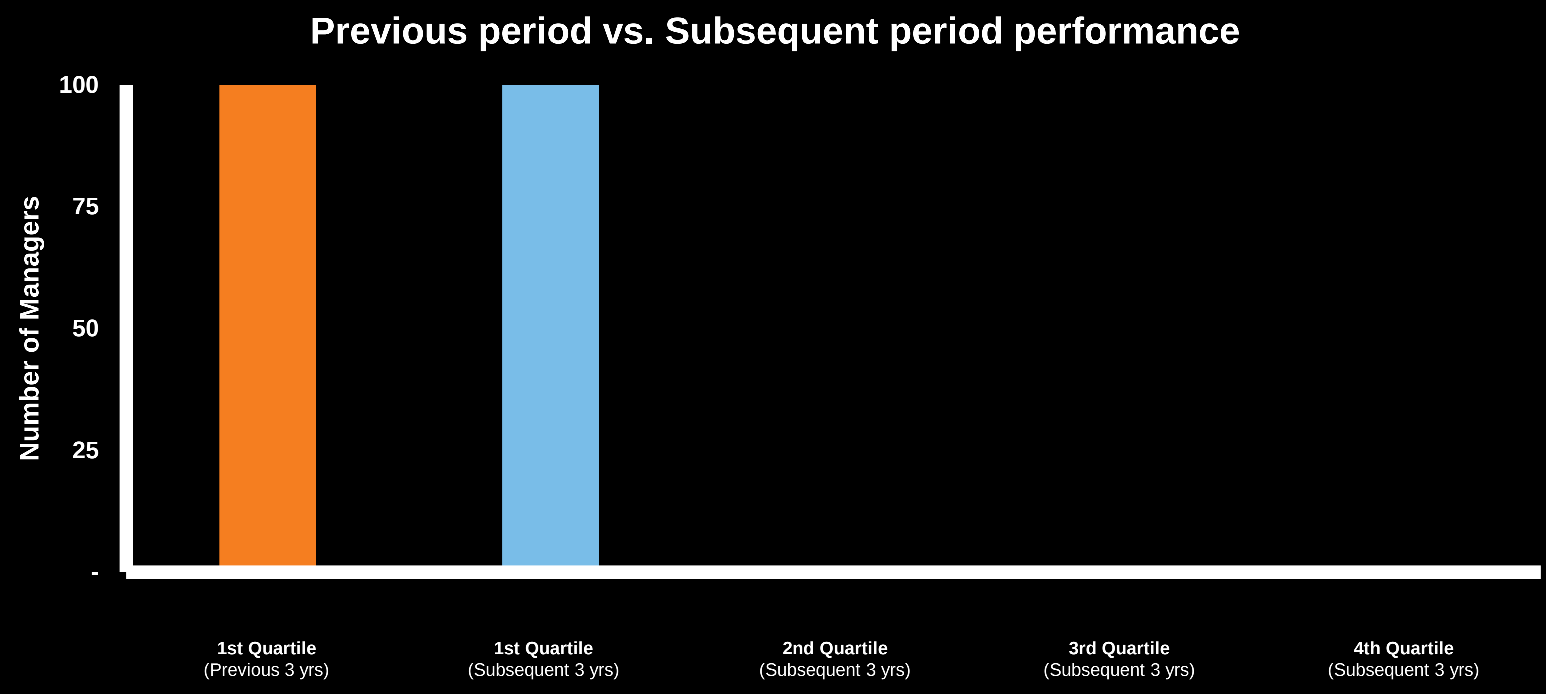
	MANAGER A	MANAGER B	MANAGER C
Qualitative Assessment			

Are historical excess returns useful?

[1] Managers with different excess returns can have similar correlations and tracking errors because these measures are based on the returns of the specific manager relative to the mean of it's own distribution of returns.

Testing for excess return persistence

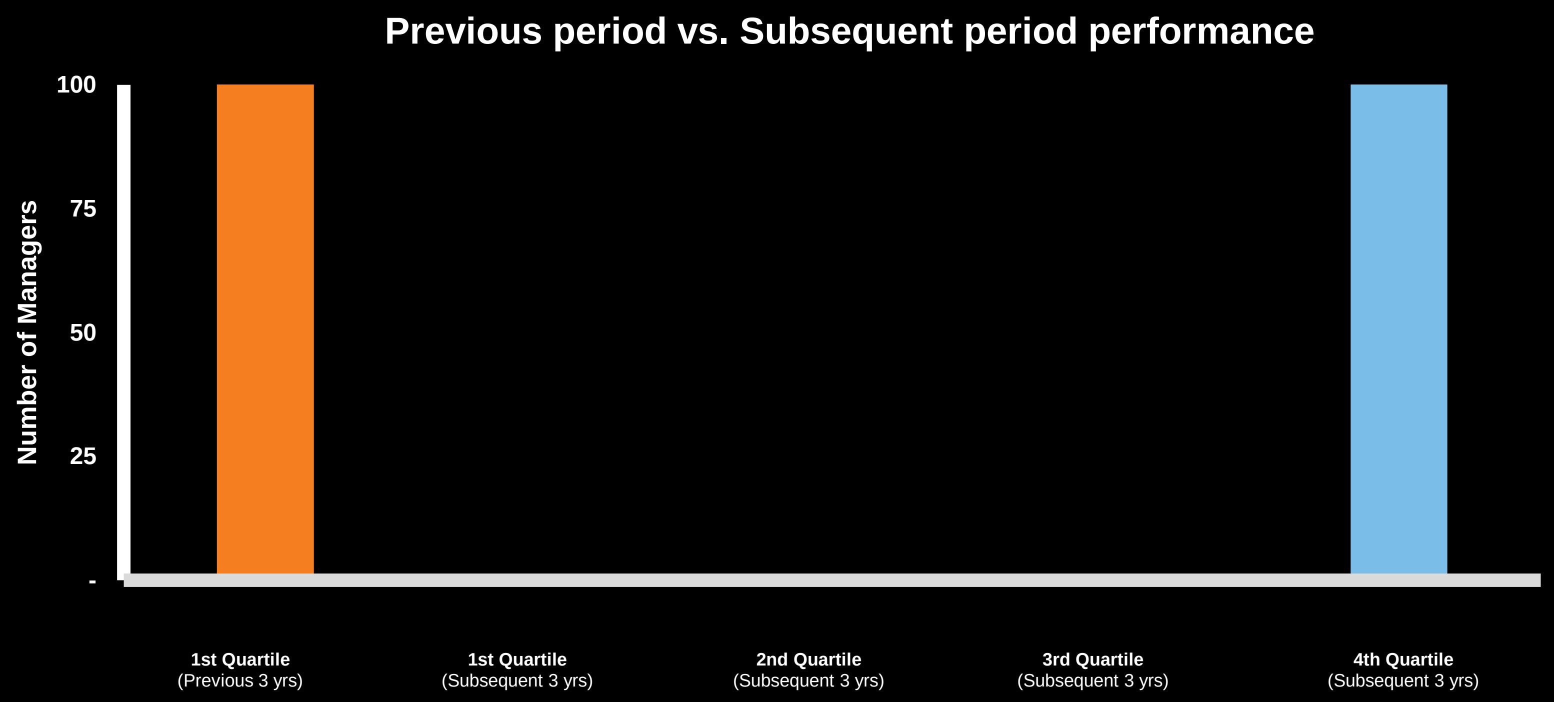
Results like this would suggest that historical performance persists



For illustrative purposes only.

Testing for historical return persistence

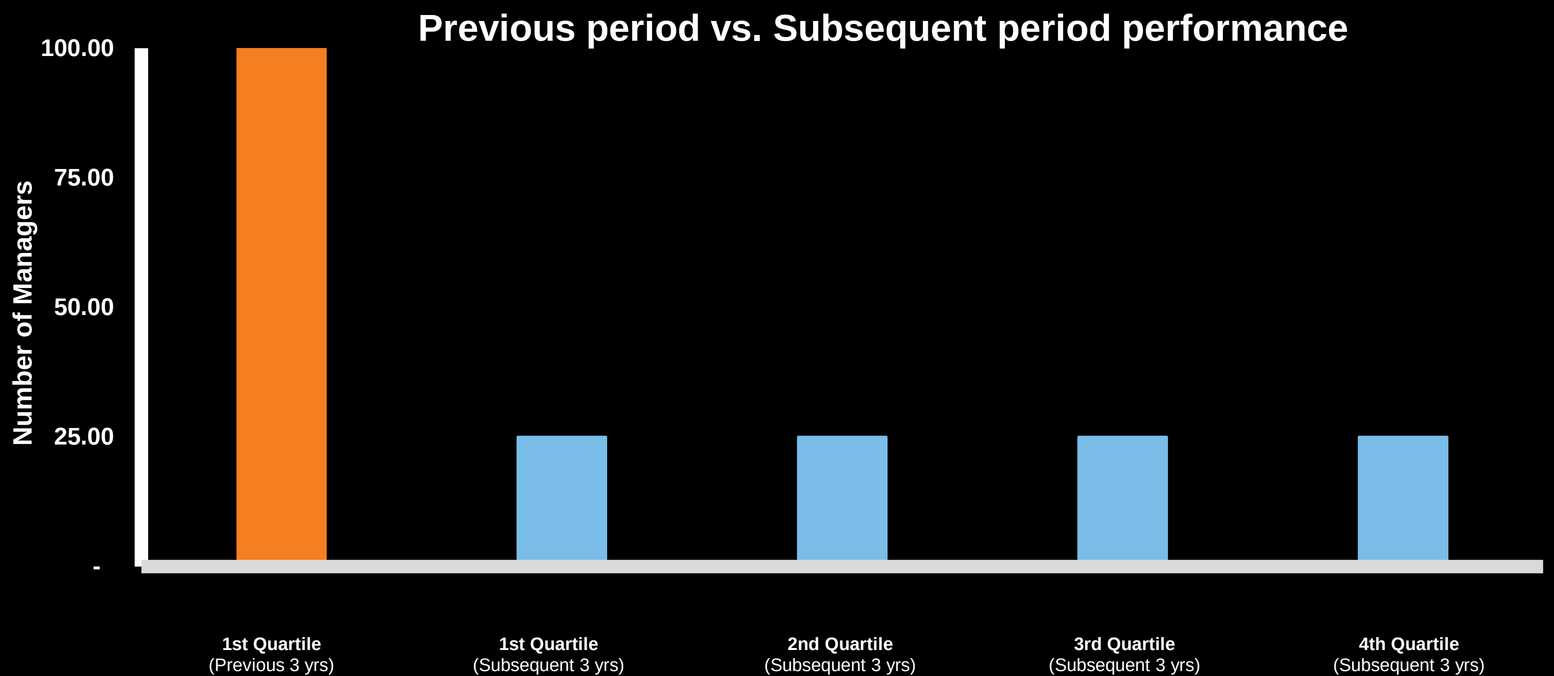
Results like this would suggest that historical performance reverts



For illustrative purposes only.

Testing for historical return persistence

This would suggest that historical performance is not indicative of future returns



Let’s use this as our null hypothesis

For illustrative purposes only.

Top quartile equity managers by universe

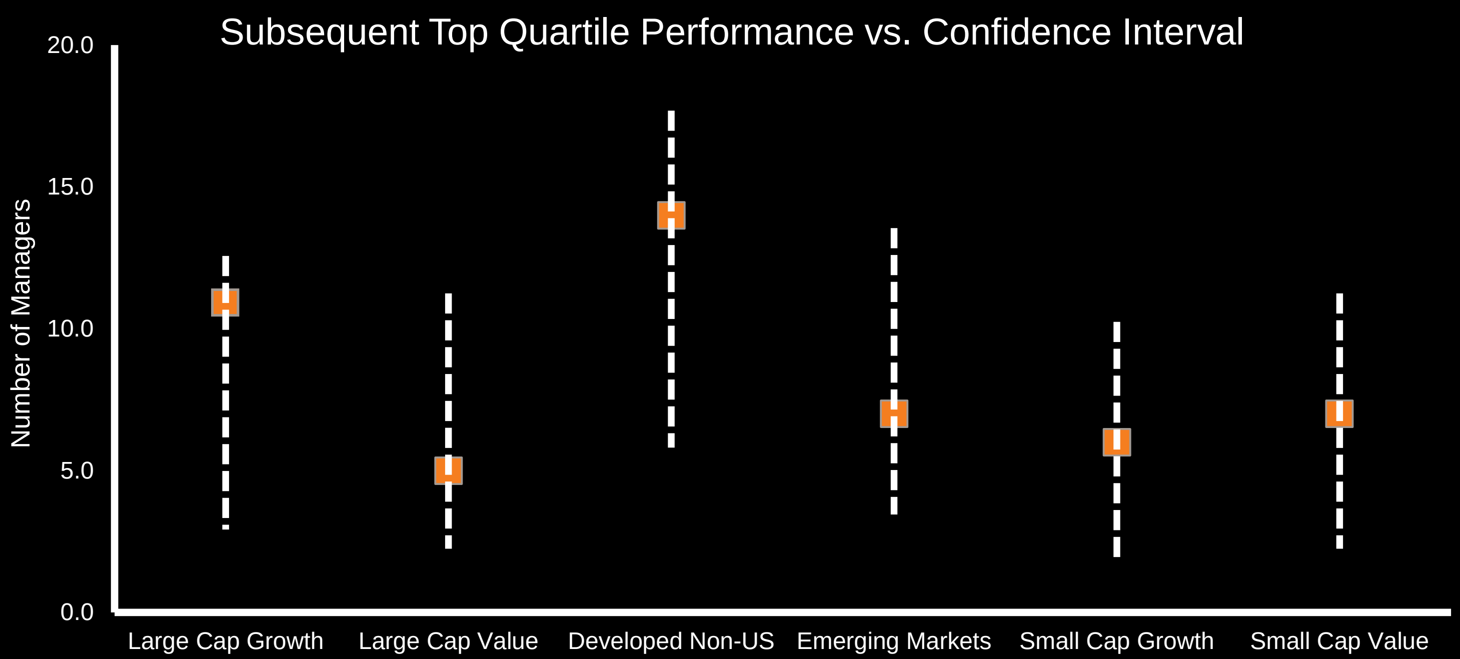
	Actual # in Top Quartile *2013 - 2015*	Expected # in Top Quartile *2016 - 2018*	~95% Confidence Interval[1]

[1] Confidence interval calculation assumes the managers within each universe have similar tracking error. High tracking error managers would tend to bounce between the top and bottom quartile simply as a function of their risk profile rather than being an indication of the persistence of skill. This assumption seems more reasonable for the growth and value universes where managers tend to be more similar than the broad developed non-US and emerging market universes where manager style differences can lead to more divergent returns. With that caveat, we are showing confidence intervals across all universes as a rough approximation.

Data source: Russell Investments Manager Universes.

Results

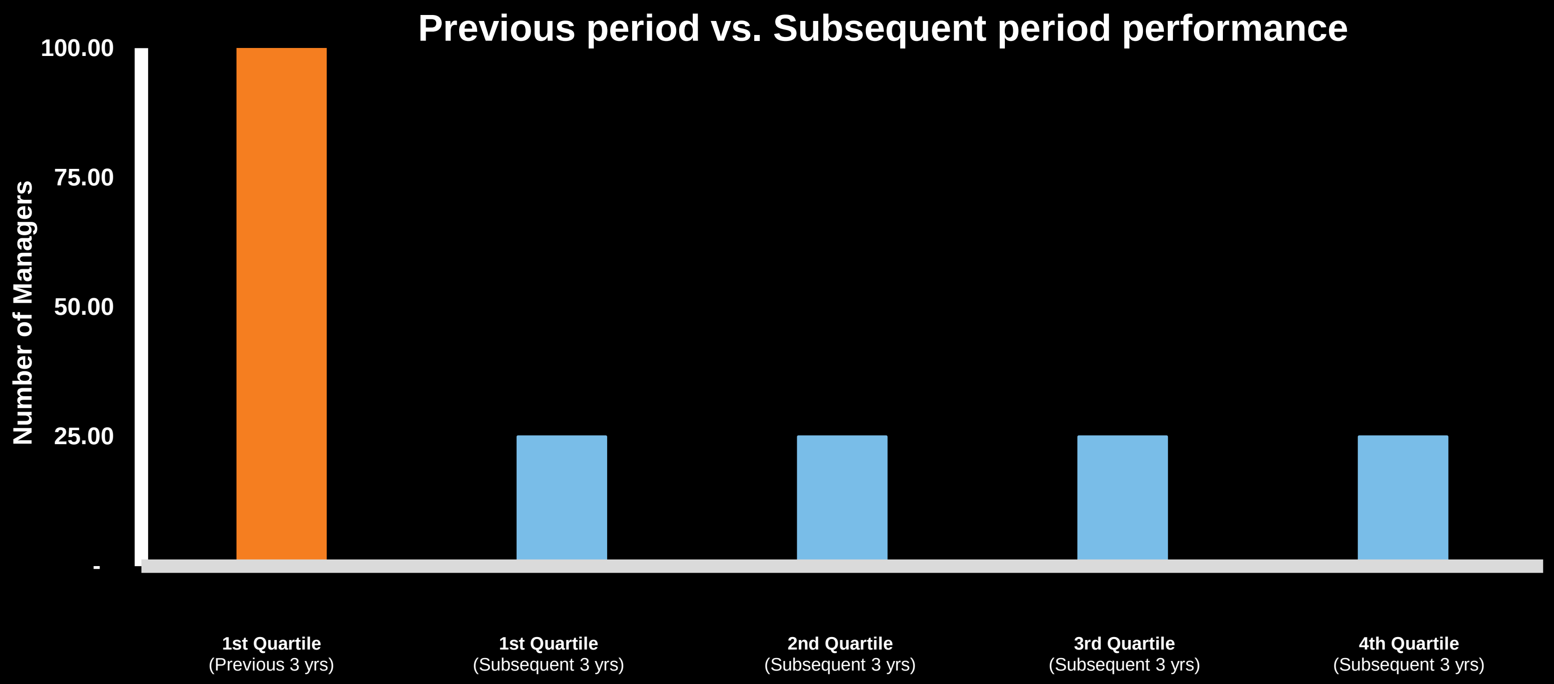
Top quartile performance persistence



We can not reject the null hypothesis

Data source: Russell Investments

Put another way, our results are not statistically different than random



For illustrative purposes only.

Illusion #3 takeaway: The past performance disclaimer appears to be accurate

may not even be indicative

Top quartile historical performance ~~is no guarantee~~ of future results

Unfortunately, ignoring historical returns goes against our natural inclinations . . . So what should we do?

Answer the question:

- "What is the underlying investment proposition?"
- In other words, what is the informational, analytical, or behavioral "edge" that is being exploited and why should it persist long enough to capitalize on?

Thank you.

Any questions?

Important information and disclosures

Please remember that all investments carry some level of risk, including the potential loss of principal invested. They do not typically grow at an even rate of return and may experience negative growth. As with any type of portfolio structuring, attempting to reduce risk and increase return could, at certain times, unintentionally reduce returns.

Diversification and strategic asset allocation do not assure profit or protect against loss in declining markets.

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