Persistence, Gambler's Fallacy, and the Faulty Logic of "We're Due":

Perspective on US Equity Market Corrections Since 1950

Scott Helfstein, PhD
Center for Global Investment and Market Intelligence
BNY Mellon Investment Management

- Clustering or persistence is a prominent feature of capital markets, and the notion that equity markets are "due" for a correction sounds a lot like the so-called gambler's fallacy.
- From 2000 to 2013, US equities increased a mere 2.9% cumulatively and spent 3,177 days trading below a previous peak.
- The market's current advance only ranks as the sixth longest of the 13 that have taken place since 1950, while the average daily gain of 0.05% during this expansion is the eighth highest among those 13.

Noisy markets make avoiding a range of logical fallacies that lead to faulty conclusions difficult.

After another year of strong performance in US equity markets, the average price to earnings ratio of the Standard & Poor's 500 sat at 18.4x with a dividend yield of 1.99% on April 7, 2015 amid warnings about stretched fundamental valuations and the mounting risk of correction. While the potential tripwires for a correction are numerous, markets can defy gravity for a while.[1]

Clustering or persistence is a prominent feature of capital markets, meaning that past returns can influence future returns and trends frequently persevere.[2] Nonetheless, noisy markets make avoiding a range of logical fallacies that lead to faulty conclusions difficult.

One such logical error was famously observed at a Monte Carlo casino in 1913, where red came up on a roulette wheel 26 straight times, the odds of which were 1 in 136,823,183.[3] With each spin of the wheel, more and more gamblers bet heavily on black. Of course, the win streak was no more likely to end on the 26th spin than

1 A brief list of possible triggers includes an adverse market reaction to higher interest rates, decline in record high productivity of US firms, softening of the world's largest economies, impact of a strong dollar, deflationary risk from declining oil prices, or a geopolitical bolt from the blue.

2 Evidence of persistence is common in capital markets. Some examples include Andrew W. Lo and A. Craig MacKinlay, "Stock Market Prices Do Not Follow Random Walks: Evidence from a Simple Specification Test," *Review of Financial Studies* 1988, Volume 1, Number 2, pp.41-66 and Edgar E. Peters, "Fractal Structure in the Capital Markets," *Financial Analysts Journal* July/August 1989, pp. 32-37.

3 European roulette wheels have a single 0. US wheels have green 0 and 00, changing the probability of red on a single spin to $^{18}/_{38}$ (47.4%).

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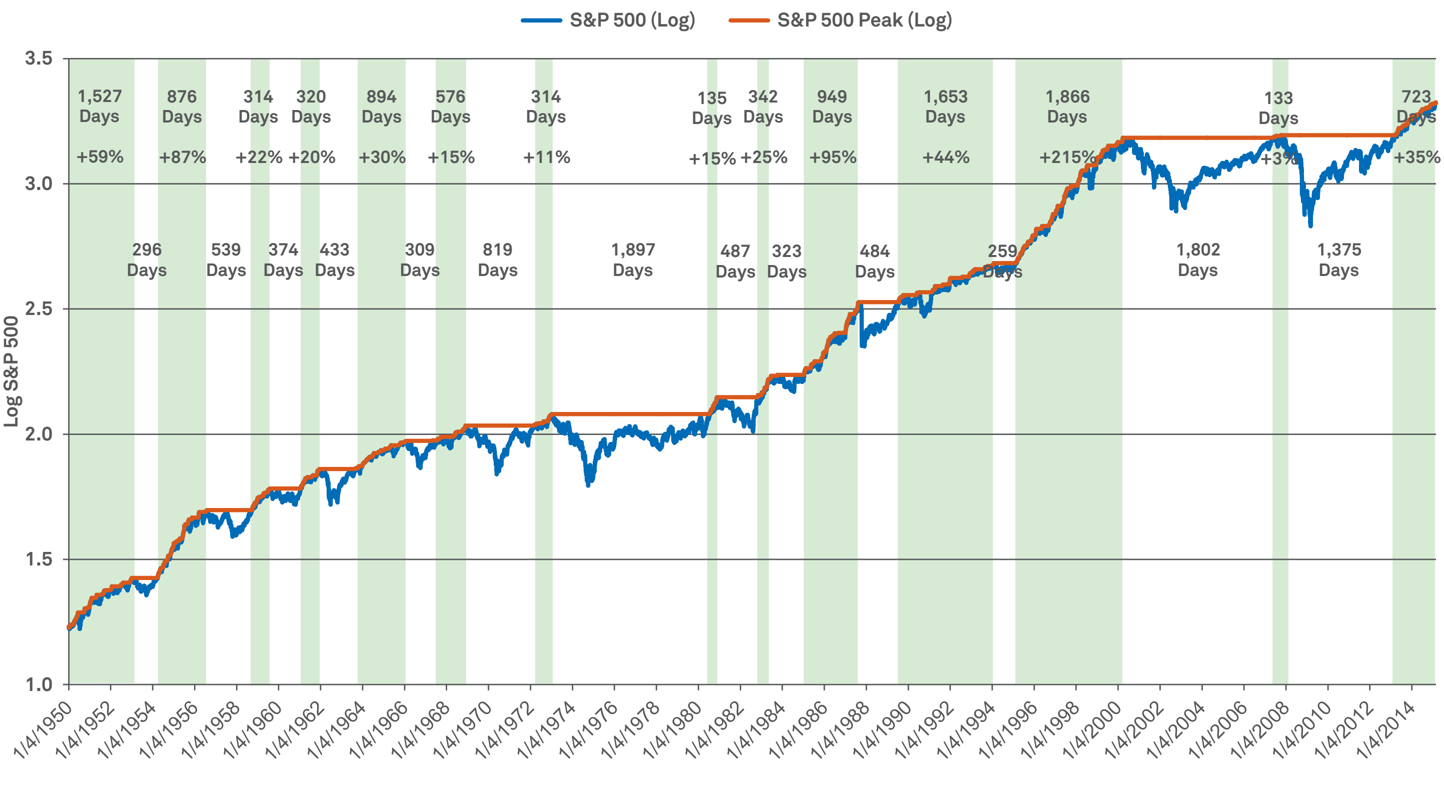
the second. Each spin is an independent draw, meaning that results from past spins have no impact on the future. The tendency to confuse probability with causality is often referred to as the "gambler's fallacy."

We believe the notion that equity markets are "due" for a correction echoes the dangerous logic of the gambler's fallacy. Since 1950, the average monthly US equity market return following a positive month is 0.77% compared to 0.60% after a negative month. Just because markets have been in "the black" for a while does not necessarily indicate that a switch to red is at hand. Equity returns are not independent spins of a roulette wheel, but are closely tied to economic and business cycles. Fundamental and psychological factors perpetuate trends, belying set rules such as those found in physics.

Major events like corrections dissipate slowly over time from investors' memories, partially contributing to market persistence.

Predicting the next solar eclipse is far easier than divining the next US equity correction, but perspective can help avoid some pitfalls. While the six-year long expansion from 2009 low seems pretty impressive, long advances are not unprecedented (Figure 1). Major events like corrections dissipate slowly over time from investors' memories, partially contributing to market persistence.

Figure 1: Plateaus and Advances Since 1950



Source: BNY Mellon using data from Bloomberg. From January 1, 1950 to March 20, 2015, advances are highlighted in green.

From 2000 to 2013, the S&P 500 was essentially flat, but this masks two "V" patterns. In thirteen years, US equities increased a mere 2.9% cumulatively and spent 3,177 days trading below a previous peak. This is not the only such streak as the market also traded sideways for 1,897 days from 1973 to 1980.

The S&P 500 recaptured the 2000 high (1,527) in February 2013 and 2007 high (1,565) on the last day of March 2013. Since then, the market has been in an expansionary period. But even with that impressive run, the current post-plateau advance only ranks as the sixth longest of the 13 that have occurred since 1950.

If duration of expansions does not herald a correction, one could argue perhaps US equities are "due" because asset values have risen too quickly. The average daily gain of 0.05% during this expansion ranks only eighth out of 13, suggesting that the current rate of the S&P's rise is in line with prior advances and not excessively steep (Figure 2).

Astute investors should always keep a wary eye on the horizon, manage risk, and invest cautiously.

Figure 2: Length of S&P Expansions and Average Daily Returns Since 1950

Expansion				Average Daily	
Begins	Ends	Days	Return	Return	Rank
3/10/1954	8/2/1956	876	86.5%	0.099%	4
9/23/1958	8/3/1959	314	22.3%	0.071%	6
1/26/1961	12/12/1961	320	19.6%	0.061%	7
8/30/1963	2/9/1966	894	29.5%	0.033%	10
5/3/1967	11/29/1968	576	14.9%	0.026%	12
3/3/1972	1/11/1973	314	10.8%	0.034%	9
7/16/1980	11/28/1980	135	14.9%	0.111%	2
11/2/1982	10/10/1983	342	24.6%	0.072%	5
1/18/1985	8/25/1987	949	94.9%	0.100%	3
7/25/1989	2/2/1994	1,653	44.3%	0.027%	11
2/13/1995	3/24/2000	1,866	215.2%	0.115%	1
5/29/2007	10/9/2007	133	2.9%	0.022%	13
3/27/2013	3/20/2015	723	34.9%	0.048%	8

Source: BNY Mellon using data from Bloomberg.

Astute investors should always keep a wary eye on the horizon, manage risk, and invest cautiously. Rising markets typically snap back from modest corrections relatively quickly and the real risk comes from downturns that mark the onset of sideways trending prices. A 10% correction in 2015 is certainly a possibility, but not because "we're due."

Let's avoid the gambler's fallacy by remembering that equity markets are tied to business cycles rather than statistically random draws. Barring an unforeseen event, a so-called black swan, there are plenty of reasons, such as low interest rates and steady growth, for US equity investors to remain optimistic about returns in 2015.

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