

# Reversion to the Mean - Fact or Fiction?

September 2009 • by Jack Kraus

A common belief in the investment arena is that returns of a certain investment have a mean or a long-term average return. For instance, the stock market, as defined by Ibbotson, returns 10% a year over the long term. Thereby, it is believed in periods where the returns generated by market are above the long term average, future returns will be lower or revert to the mean so to say. Conversely, in periods where the returns from the market are below the average, the future returns will be above average to once again revert to the mean.

Considering the ten year return on the market is negative for the first time since 1930 through 1939, reversion to the mean is giving many investors and advisors optimism for the next ten years.

On the other side of the coin, there is the belief that the returns are based on the long-term economic environment and not driven by the reversion to the mean process. For example, Bill Gross, of PIMCO, has been talking about the “New Normal”, in which he expects a period of below average growth and, therefore, below average returns.

This paper will explore if reversion to the mean has occurred in the past and over what timeframe did it happen.

Examining the 74 overlapping ten year holding periods from 1926 through 2008, there are 35 below and 39 above a 10% return, the long-term average. The best period was 1949-1958 with a market return of 20.1% and the worst was 1999-2008 with a -1.4% market loss. What I was struck by at a first glance of the data is how the periods of out-performance and under-performance were lumped together and not evenly distributed.

The first 15 ten year holding periods produce sub 10% returns. This covers a period of nineteen years from 1926 through 1949. This was followed by 16 ten year periods of 10% or higher returns, which

started with the 1941-1950 period through the 1956-1965 period. There was another stretch of 13 ten year periods of below average results followed by 19 of above average returns. We are currently in a streak of five sub-par periods starting with the 1996-2005 period.

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Switching to five year holding periods, of which there is 79 with 33 producing below and 46 above 10% returns. These were not as clustered as the ten year

holding periods. The longer streaks of under-performance were the six 5 year periods starting in 1926 through 1935, which covers a ten year time frame. This was followed by four 5 year periods that produced above 10% returns. Another stretch of under-performance was the ten 5 year periods from 1965 through 1978, a fourteen year time frame.

Six of the last seven 5 year periods have been below the 10% average with four of those periods being negative.

Looking at the past 83 calendar year returns, 36 have been below 10%, while 47 have been above. There has only been four stretches of three or more below 10% years and five stretches of 10% and above returns. The longest sub-par stretch was the four years from 1929 through 1932. The longest above average stretch was the five years from 1995 through 1999.

What can we conclude from our observations this far? First, the shorter the time frame the less clustered the results are, where as when the period length is increased, we get long stretches using overlapping rolling periods of above or below average performance.

Second, is that in an absolute sense, overlapping rolling periods do not seem to have quick reversion attributes.

If we take a twist on our reversion to the mean

idea, and instead of looking at periods that are just above or below average, we instead look at periods of disappointing and strong favorable returns.

We will define disappointing periods that produced a 5% or below return, or half of the average long term results, and favorable results that are 15% and above.

If we examine the 83 calendar results, 28 are classified as disappointing and 40 as favorable. The remaining 15 calendar years produced a return between 5% and 15%. This translates that 82% of the time we will either be disappointed or elated with the calendar year result. While the results do exhibit some streakiness, the year-to-year result can and has moved from disappointing to favorable or vice versa very quickly. One explanation of this would be reversion to the mean. Another viable explanation would be the market is moved to extremes in either direction in the short run driven by the emotion of the underlying market participants and as cooler heads prevail, the market reverses course.

If we lengthen our time horizon to a five year holding period, what do the past results tell us? First, that 70% of the time the returns will fall in the disappointing or favorable ranges and that are split almost even between the two. So on a five year holding period versus an annual period, the occurrence of the neutral results of 5% to 15% increases from

18% to 30%. I was expecting a larger percentage of neutral results.

The reversion to the mean is not readily evident in the 5 year holding period results. There have been long stretches of disappointing results in a row and long stretches of favorable results in a row.

Examining the 74 ten year holding periods, ten were disappointing while eighteen were favorable. This means 46 of the periods were neutral for 62% of the time. As you can also see, we had favorable results almost twice as often as we had disappointing results. The streakiness of the disappointing results became less so, but stay very streaky on the favorable side.

Davis Funds have put together information showing that periods of disappointment for stocks have been followed by periods of recovery. What is different with how Davis is looking at the data is that they are not looking at the next overlapping ten year period, but at the next ten years starting with the year after the last year in the disappointing period.

For example the market returned -0.9% for the ten years ending in 1938. So, if you look at the next ten years from 1939-1948, what did the market make? The market returned 7.3%, which is in the neutral range of results.

### **Exhibit 1**

<b>Disappointing Period</b>		<b>Subsequent Period</b>		<b>Rank</b>
1928-1937	0.02%	1938-1947	9.62%	Neutral
1929-1938	-0.89%	1939-1948	7.26%	Neutral
1930-1939	-0.05%	1940-1949	9.17%	Neutral
1931-1940	1.80%	1941-1950	13.38%	Neutral
1937-1946	4.41%	1947-1956	18.43%	Favorable
1965-1974	1.22%	1975-1984	14.81%	Neutral
1966-1975	3.26%	1976-1985	14.34%	Neutral
1968-1972	3.58%	1978-1987	15.29%	Favorable
1969-1978	3.15%	1979-1988	16.33%	Favorable
1999-2008	-1.38%	2009-2018	?	?

As can be seen in Exhibit 1, nine out of the ten disappointing ten year periods have a corresponding ten year period. The latest disappointing period is the ten years ending in 2008, so we won't know how that turns out for some time. The average return is 1.83% for those nine periods. The average return for the nine subsequent periods is 13.18%. While this return is above the long-term average, it is not in the favorable category. In fact, six of the nine subsequent periods produced neutral returns, while three produced favorable returns.

This shows a degree of reversion to the mean. How does it look when we examine the favorable periods with the subsequent ten year period? Sixteen of the eighteen favorable periods have a completed ten year subsequent period. The average return of those sixteen periods is 17.30%. The average return of the sixteen subsequent periods is 10.73%, which is above our long-term average. As can be seen in Exhibit 2, eleven of the sixteen periods produced neutral range results, four produced favorable results and only one period produced a disappointing result.

For reversion to the mean to be true, it must work in both directions. In other words, when the market is below the long-term average it must have stronger than average results to revert to the mean and when the market has provided favorable returns it must produce disappointing results to revert to the mean. I do not see overwhelming evidence in looking at the ten year periods.

If we shorten our time frame to five year periods, do we get the same or different answer? Well, we have 19 disappointing five year periods with an average return of -0.80% return. In the subsequent five years, we have ten neutral periods, five disappointing periods and only four favorable periods with an average return of 10.72% over those 19 periods. Like the ten year periods, the subsequent periods' average is above the long-term average, but is not strong enough to be classified to be reverting to the mean.

Even more troubling are the 23 favorable periods that produced an average return of 19.35%. The subsequent five year periods produced an above average 11.00% return with nine being favorable, nine being neutral and only five being unfavorable. Therefore, coming off of strong returns we see even more strong returns.

In conclusion, I do see returns that are favorable or disappointing revert in the very short run, i.e. calendar years. However, I do not see it happening in the five or ten year periods. Also, when you put common sense around the thought of a non-living object having a mean that it reverts to, it seems to lose its plausibility. How does the market know that it just had a disappointing five or ten years and, therefore, should have a favorable five or ten years to revert to its long-term average? It doesn't. Investors move the market based on their perceptions, right or wrong, of what future economic activity and the resulting profitability of companies that underlie the market will be.

In my opinion, reversion to the mean is a myth that is busted. ■

## Exhibit 2

Favorable Period		Subsequent Period		Rank
1945-1954	17.12%	1955-1964	12.82%	Neutral
1946-1955	16.69%	1956-1965	11.06%	Neutral
1947-1956	18.43%	1957-1966	9.20%	Neutral
1948-1957	16.44%	1958-1967	12.85%	Neutral
1949-1958	20.06%	1959-1968	10.00%	Neutral
1950-1959	19.35%	1960-1969	7.81%	Neutral
1951-1960	16.16%	1961-1970	8.16%	Neutral
1952-1961	16.43%	1962-1971	7.04%	Neutral
1954-1963	15.91%	1964-1973	5.99%	Neutral
1978-1987	15.29%	1988-1997	18.05%	Favorable
1979-1988	16.33%	1989-1998	19.21%	Favorable
1980-1989	17.55%	1990-1999	18.21%	Favorable
1982-1991	17.59%	1992-2001	17.46%	Favorable
1983-1992	16.17%	1993-2002	9.34%	Neutral
1988-1997	18.05%	1998-2007	5.91%	Neutral
1989-1998	19.21%	1999-2008	-1.38%	Disappointing

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