

The goal of investing at Bristol Gate is to grow income and capital over time. However, during an adverse market shock such as the one we are currently experiencing with the COVID-19 virus, our defensive nature kicks in to protect ourselves from near-term potential losses. As Daniel Kahneman describes in his book, *Thinking, Fast and Slow*, this defensive “self” is the result of our “system one” thinking which wants to conclude in haste.

Acting instinctively and emotionally is often not ideal in such circumstances and therefore we must awaken our “system two” thinking, which is more deliberate and logical. Analyzing the market over a long period of time using mathematics and fact checking can help inform us to make better decisions.

The data we are using is for S&P500 since 1928 and is sourced from Yahoo Finance.

The very first item that needs to be investigated is the daily distribution of the market returns. This distribution is shown in Figure 1 below.

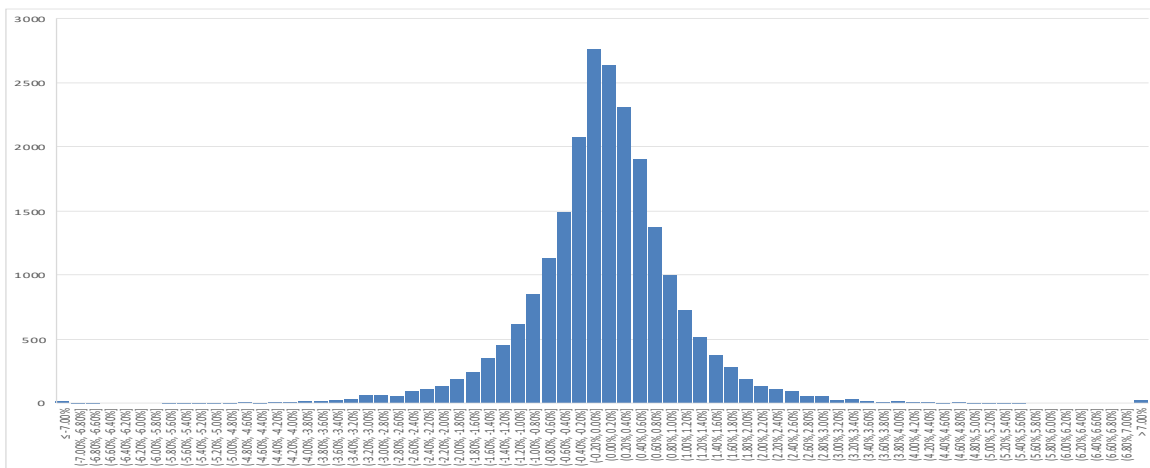


Figure 1: S&P500 daily return distribution from 1928-01-03 until 2020-03-05.

From December 31st, 1928 until March 5th, 2020, there are 23,150 trading days. Among those days, there are only 26 days that the daily market drawdown was more than 7%. On the upside though, there are 34 days that the daily market return was more than 7% percent.

Each of these extreme market movements are shown in Figure 2 below. These market movements are roughly 0.2% of the total trading dates in the period of the study. It is worth noting that most of the movements occurred mainly in three periods: the 1930s when the world was suffering from the Great Depression, the 1987 Black Monday stock market crash, and the 2008 Global Financial Crisis.

1933-03-15	16.6%	1987-10-21	9.1%	1931-06-03	7.5%
1929-10-30	12.5%	1929-11-14	8.9%	1935-08-19	7.5%
1931-10-06	12.4%	1933-06-19	8.9%	1932-11-10	7.5%
1939-09-05	11.9%	1932-08-03	8.9%	1938-01-06	7.5%
1932-09-21	11.8%	1933-07-24	8.8%	1937-10-20	7.5%
2008-10-13	11.6%	1931-10-08	8.6%	1932-05-06	7.2%
2008-10-28	10.8%	1931-12-18	8.3%	1933-04-19	7.2%
1931-06-22	10.5%	1932-02-11	8.3%	1932-10-11	7.2%
1935-04-17	9.6%	1938-10-10	8.2%	2009-03-23	7.1%
1933-04-20	9.5%	1933-05-01	7.7%	1932-01-06	7.0%
1935-05-17	9.4%	1932-06-10	7.7%		
1932-08-08	9.3%	1931-01-08	7.6%		

a) up-market days

1987-10-19	-20.5%	1932-10-10	-8.5%
1929-10-28	-12.9%	1987-10-26	-8.3%
1929-10-29	-10.2%	1932-10-05	-8.2%
1935-04-16	-10.0%	1932-08-12	-8.0%
1929-11-06	-9.9%	1935-08-16	-8.0%
1946-09-03	-9.9%	1934-07-26	-7.8%
1937-10-18	-9.1%	1938-10-11	-7.7%
1931-10-05	-9.1%	1930-06-16	-7.6%
2008-10-15	-9.0%	2008-10-09	-7.6%
2008-12-01	-8.9%	1940-05-14	-7.5%
1933-07-20	-8.9%	1932-05-31	-7.5%
2008-09-29	-8.8%	1931-09-24	-7.3%
1933-07-21	-8.7%	1933-06-15	-7.0%

b) down market

Figure 2: Dates with (a) daily returns more than 7% and (b) daily drawdown more than 7%.

The first, and most important lesson from this distribution is that the mean and median of daily market return is 0.029% and 0.046%. In other words, your odds of producing a positive outcome everyday are higher than that of a negative one, and it pays to stay invested in the market over the long term because the payoff profile is skewed positive.

Now, let's turn to the question of the recent market movements and examine whether there are any precedents in the history of the stock market since 1928. To be more specific, has there ever been a period where the daily and total returns over a continuous two-weeks are similar to the period starting on February 21, 2020 and ending on March 5, 2020. From a mathematical perspective, Norm 2 definition is used to identify such periods.¹

The following characteristics are the studied in those periods:

- Total annual return
- Maximum drawdown
- Total market return from the two-week low
- Recovery time of the drawdown

The answers to the above questions are shown in Figure 3 below, where the 19 most similar periods from a daily price return perspective are shown historically. In order to create the Similarity Rank, we matched the periods with the most similar price return days as well as the final total return. The very first row in the table is the current period and is shown for the sake of comparison.

Similarity Rank	Definition #1 Based on Deviation							
	date	2-week Return	Annual Return	Annual Max DDown	fm total return	max_ddn_date	recovery_date	Under Water Period
0	2020-03-05	-10.4%	-6.4%	-12.8%	---	---	---	---
1	1930-10-06	-7.7%	-28.5%	-44.3%	-29.8%	1930-12-16	1952-12-09	8029
2	2009-01-22	-8.7%	23.5%	-27.6%	22.6%	2009-03-09	2009-06-01	84
3	1931-12-23	-9.5%	-47.1%	-57.5%	1.2%	1931-12-17	1937-02-11	1883
4	1934-05-09	-9.7%	-4.7%	-29.3%	-10.4%	1934-07-26	1935-09-10	411
5	1930-12-22	-6.8%	-28.5%	-44.3%	-9.9%	1930-12-16	1952-12-09	8029
6	1939-04-06	-10.6%	-5.2%	-21.2%	11.8%	1939-04-11	1944-07-10	1917
7	1931-12-08	-7.0%	-47.1%	-57.5%	-17.3%	1931-12-17	1937-02-11	1883
8	1936-04-27	-9.5%	27.9%	-12.8%	17.2%	1936-04-29	1936-07-14	76
9	1970-05-04	-7.5%	0.1%	-25.9%	12.9%	1970-05-26	1971-01-19	238
10	1931-04-09	-7.7%	-47.1%	-57.5%	-53.2%	1931-12-17	1937-02-11	1883
11	1932-07-07	-6.7%	-14.8%	-51.0%	50.7%	1932-06-01	1932-09-07	98
12	2016-01-15	-8.0%	9.5%	-9.3%	12.6%	2016-02-11	2016-03-11	29
13	1932-07-05	-8.0%	-14.8%	-51.0%	27.0%	1932-06-01	1932-09-07	98
14	1939-03-24	-7.9%	-5.2%	-21.2%	3.1%	1939-04-11	1944-07-10	1917
15	1998-08-04	-8.0%	26.7%	-19.3%	21.3%	1998-08-31	1998-11-23	84
16	1974-07-10	-10.1%	-29.7%	-37.6%	3.5%	1974-10-03	1976-01-29	483
17	1974-08-21	-11.1%	-29.7%	-37.6%	16.5%	1974-10-03	1976-01-29	483
18	1937-09-17	-5.1%	-38.6%	-45.5%	-37.7%	1937-11-24	1946-02-05	2995
19	1933-03-31	-11.8%	44.1%	-29.4%	66.9%	1933-10-19	1935-10-22	733

Figure 3: Analysis of similar periods to the two-week period ending on March 05, 2020

Linking these dates to some of the social and financial events in the history may shed light to the nature of the down market. These events were extracted from the Wikipedia.

- 1930 events are generally related to the effect of the Great Depression, activities of social parties and the people's reluctance or inability to borrow though the interest rates were low
- 1931: Political instabilities and banking panics

¹ Norm 2 is a mathematical measure given by the square root of the sum of the squares. Other definitions of similarity like correlations and angular difference (angle between n-dimensional vectors) may at first seem to be appropriate, however those approaches capture the trend rather than the absolute proximity.

- July of 1932: The Dow Jones Industrial Average bottomed down to its lowest level, UK and Ireland initiated a trade war and German Nazis gain plurality in federal elections began movements got a little bit aggressive
- March 1933: Attempted assassination of Franklin Roosevelt and an ongoing banking panic
- End of April 1934: Establishment of Austrofascist Federal State of Austria
- April 1936: Spanish civil war
- In 1939 two-week down market is the result of the onset of World War II
- May 1970: Cambodia war and Nixon threatening in widening the Vietnam war
- August 1974: Dramatic rise in energy prices, President Nixon resignation
- July and August 1998: Russian financial crisis
- January 2009: Ongoing global financial crisis

Although none of the events above are identical to the current global pandemic that could lead to global recession, the behavior of market participants in a panic is often similar because of that “system one” thinking mentioned earlier. We can therefore use these past events to help inform our decision making.

If we look at the data, we can see that the annual return of the years when market had a similar behavior to the current period are not pleasant. In all but five of the instances, annual returns were negative, and every instance had significant intra period drawdowns.

On the other hand, 12 months from the end of those two-week periods, the market returns were generally positive, with only six negative returns one year later, all in the 1930’s when the world was suffering from a universal weak economy and the global financial system lacked the institutions and co-ordination to take effective action.

In the US during the 1930s, unemployment had risen to 25%, deflation was rampant, and GDP was cut in half. Instead of implementing policies that would alleviate some the challenges, the US authorities implemented tight monetary policies that only exacerbated the difficulties.

We do not believe this is the 1930s where their challenges lasted almost the entire decade, ultimately resulting in a world war. With COVID-19 we have already seen several blueprints on how to deal with the impact of the virus from China, South Korea, Japan and Singapore who have all materially slowed the spread of the virus via various measures. While the impact of the virus on near-term economic conditions will be significant, we do not expect it to be of long duration.

We believe central banks have learned from the mistakes of the past and there are better safeguards (fiscal, social and monetary) in place to protect against a disaster such as the Great Depression. Governments and central banks globally have been active, using conventional and non-conventional fiscal and monetary policies to ensure functioning financial systems.

Using our “system two” thinking and the data above, we believe investors will be well served staying invested in fundamentally strong companies identified through a consistent and evidence-based investment process.

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