

# US Stock Market Volatility and the Pandemic

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# 1. Short term Horizon Investment

## 1.1 Historical Crashes in the Stock Market

Stocks tend to be more risky than usual when investing in a short-term horizon. These short-term horizons occur during an economic downturn, such as the pandemic which closed a lot of jobs and businesses, the 2008 housing crisis caused by the large number of investors investing in bad asset backed securities, and more. These periods usually show a huge drop in the stock market in a short period of time but would take longer to recover to the previous peak period. This will be discussed in a later paragraph about the pandemic.

We can see in *Exhibit 1-1* which contains the annual returns of large US stocks (stocks with a market cap of \$12.7 billion or more) and the years with bad returns. For example, between 1929 to 1931, stocks fell by 8.3%, 25.12%, and 43.84% annually, or a total of -77.26% return in just three years, this happened after a boom in the stock market. “The Great Depression,” as it’s known, happened due to the mistrust of the stock market from the public due to unpredictable price movements after a boom period. (Federal Reserve History, 2013) Other similar example includes the market crash in 2008 caused by the housing crisis. *Exhibit 1-1* shows that the large stock market had a positive return for five consecutive years before it fell by 36.55% in 2008. (Investment Analysis and Portfolio Management Class, 2024)

## 1.2 Drops of the US Stock Market during the Pandemic

During the pandemic, the US stock market experienced a huge drop in just 33 days, which took 135 days to recover back to the price before the fall. *Exhibit 1-2* shows the drop of the whole of the US stock market during the pandemic and other similar events starting from 1929. The image on the exhibit shows that stocks fall rapidly during an economic downturn and take a lot longer to recover back to the price before the fall. We can also understand that the stock market crash caused

by the pandemic is a lot less severe compared to other crashes. (Investment Analysis and Portfolio Management Class, 2024)

## 2. Extreme Daily Losses in the US Stock Market

Extreme daily losses occur rarely in the US stock market, but they occur more often than the statistics suggest. Probability of a stock's or a Portfolio's daily loss can be calculated using the Value at Risk method. Value at risk assumes normal distribution, meaning the probability of extreme gains or losses get smaller the further the percentage is on either side. We can use the variance-covariance approach, which uses the state of the economy to determine a confidence level, and the standard deviation of the stock, or the historical extreme daily losses. Either method suggests that stocks have a low probability of extreme losses as opposed to how often they occur.

*Exhibit 2-1* and *2-2* are good examples of this suggestion. *2-1* shows the maximum loss possible with an investment of \$100,000 in IBM, which is at \$6,990 or 6.99% while *2-2* displays the historical losses of IBM in which all 5 exceed the 6.99% mark.

Using the historical simulation or the conditional value at risk approach can reduce the likelihood of a reduced number of maximum daily loss, but both methods could still be prone to underestimating the exposure risk during periods of economic crisis. To divert this underestimation, we use 'Stress Testing' using extreme events such as the 2008 housing crisis and the pandemic.

Between 1926 – 2020, there are 13 conditions where the US stock market experienced an 8% drop or more. *Exhibit 2-3* shows how the pandemic had one of the highest daily losses at 11.99%. The normal distribution suggests that an 8% or more of daily losses for a standard deviation of 4% occur once in 126 years, but in 95 years, the US stock market has been through 13 daily losses of 8% or more for a standard deviation of 4%. Extreme daily losses happen during an economic

downturn, just like *Exhibit 2-3* suggests, events such as the pandemic and “The Great Depression” are causes for extreme daily losses. (Investment Analysis and Portfolio Management Class, 2024)

### 3. Stock Diversification During Economic Crisis

A diversified portfolio is important to avoid unique risk of a specific stock while still being exposed to market risk. In other words, a single stock is exposed to more risk than a bundle of stocks in a portfolio because of news, earning reports, or the like on the specific stock. This only works when the stocks in a portfolio are uncorrelated to each other. A highly correlated stocks could be Coca-Cola and Pepsi. Both companies are exposed to the same risk. For example, in the hypothetical scenario where research finds that carbonated drinks are the cause for some common health problems, both companies are exposed to the same risk. A portfolio with a large mix of uncorrelated stocks aims at imitating the market risk of the whole stock market. (Investment Analysis and Portfolio Management Class, 2024)

A portfolio of stocks, however, is still exposed to market risk. This means that a portfolio will not be safe from losses during an economic downturn as we’ll see later using the pandemic as an example. The Vanguard Total Stock Market Index Fund Admiral Shares (Ticker: VTSAX) is a good index in measuring the market risk since it is exposed to the entire US equity market. (Vanguard, 2024) Vanguard’s intermediate corporate bond (VICSX) and Intermediate Term Treasury track medium term corporate bonds and medium-term treasury bonds respectively. (Vanguard, 2024) & (Vanguard, 2024). Referring to *Exhibit 3-1*, the pandemic resulted in a loss of 20.87% in Vanguard’s Total Stock Market Index Fund. This is a good example in showing how an eliminated or reduced unique risk is still open to market risk.

*Exhibit 3-1* also shows that the pandemic affected the return on the corporate bonds market. Treasury bills had higher returns most likely because investors chose to move their money to a

more safer investment vehicle rather than stocks and corporate bonds. (Investment Analysis and Portfolio Management Class, 2024)

## 4. Do Stock Prices reflect the available information?

The fact that stock prices reflect the available information has been a big debate, specifically between Eugene Fama and Robert Shiller. While Fama is of the opinion that stock prices reflect all available information in the market, Shiller believed that stock prices were ‘irrational’. The two Nobel prize winners had theories that were far from similar. Fama’s theory stated that investors could not consistently beat the market using available information because new information is quickly and accurately incorporated into stock prices. This theory is known as “Efficient Market Hypothesis (EMH).” Shiller’s theory stated that stock prices can deviate from their intrinsic value due to psychological factors and herd mentality of investors. He coined the term “irrational exuberance” to refer to this. (ChatGPT, 2024)

If we go based on previous market events, there are several conditions where Shiller could be right. During the pandemic, the stock price of the polarizing GameStop (GME) reached prices it could never reach had it not been for internet chat groups teaming up to buy and hold the stock and its options. The stock reached highs that did not match the fundamentals. Another example is the shorting of Herbalife by Bill Ackman, and then the long position held by Carl Icahn, both investors were able to cause the stock price to move in the opposite directions, which shows that stocks don’t necessarily have to follow the fundamentals. (Chang, 2019) The pandemic showed us exaggerated falls and recoveries of stocks which cannot all make sense. *Exhibit 4-1* shows a list of stocks with high percentage growth by February 2020. The list includes industries that were not supportive of pandemic events such as people not being able to leave their homes. (Krantz, 2020)

We can then see Fama's point in our everyday life with the stock market. For example, Facebook (Ticker: META) had a bad period due to high expenses and investments in its Meta world that investors didn't believe in. The stock price was at one of its lowest periods until its earnings report after market closed on February 1, 2024. Meta jumped by 16% by the end of the week, which was a direct effect to its earnings report, and thus the proof of the efficient market hypothesis. In fact, Meta's stock jumped by about 22% in a matter of minutes after the company reported its earnings. *Exhibit 4-2* shows a candle chart with an hour time frame for Meta on that day. We can see just how quick investors were able to react to the release of the company's earnings report.

Given the examples above, both Fama and Shiller are correct about their theory. However, Fama's theory is far more prevalent in the stock market. Shiller's theory is more like a glimpse when we zoom out and look at the stock market in an extended period. The media is interested in covering news related Shiller's theory, which could lead inexperienced listeners to believe it is prevalent, but the reality of the stock market is dominated by math, news releases and overall company performance rather than illogical investments.

We should also keep in mind that investors and analysts could be wrong about the performance of a company. Although this could be a cause for stocks to perform good or bad, it will eventually get closer to its intrinsic value. (Investment Analysis and Portfolio Managment Class, 2024)

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## Exhibits

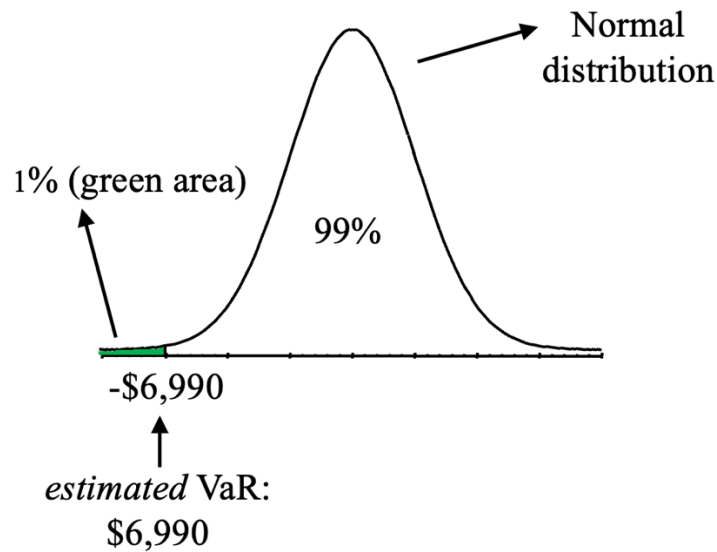
Year	Large Stocks	Year	Large Stocks
1928	43.81%	1976	23.83%
1929	-8.30%	1977	-6.98%
1930	-25.12%	1978	6.51%
1931	-43.84%	1979	18.52%
1932	-8.64%	1980	31.74%
1933	49.98%	1981	-4.70%
1934	-1.19%	1982	20.42%
1935	46.74%	1983	22.34%
1936	31.94%	1984	6.15%
1937	-35.34%	1985	31.24%
1938	29.28%	1986	18.49%
1939	-1.10%	1987	5.81%
1940	-10.67%	1988	16.54%
1941	-12.77%	1989	31.48%
1942	19.17%	1990	-3.06%
1943	25.06%	1991	30.23%
1944	19.03%	1992	7.49%
1945	35.82%	1993	9.97%
1946	-8.43%	1994	1.33%
1947	5.20%	1995	37.20%
1948	5.70%	1996	22.68%
1949	18.30%	1997	33.10%
1950	30.81%	1998	28.34%
1951	23.68%	1999	20.89%
1952	18.15%	2000	-9.03%
1953	-1.21%	2001	-11.85%
1954	52.56%	2002	-21.97%
1955	32.60%	2003	28.36%
1956	7.44%	2004	10.74%
1957	-10.46%	2005	4.83%
1958	43.72%	2006	15.61%
1959	12.06%	2007	5.48%
1960	0.34%	2008	-36.55%
1961	26.64%	2009	25.94%
1962	-8.81%	2010	14.82%
1963	22.61%	2011	2.10%
1964	16.42%	2012	15.89%
1965	12.40%	2013	32.15%
1966	-9.97%	2014	13.52%
1967	23.80%	2015	1.38%
1968	10.81%	2016	11.77%
1969	-8.24%	2017	21.61%
1970	3.56%	2018	-4.23%
1971	14.22%	2019	31.21%
1972	18.76%	2020	18.02%
1973	-14.31%	2021	28.47%
1974	-25.90%	2022	-18.01%
1975	37.00%		

*Exhibit 1-1* (Investment Analysis and Portfolio Managment Class, 2024)



Peak	Trough	Return between Peak and Trough	Number of days between Peak and Trough	Recovery (to Peak in the first column)	Number of days between Peak and Recovery
<b>20200219</b>	<b>20200323</b>	<b>-34.3%</b>	<b>33</b>	<b>20200805</b>	<b>168</b>
20180920	20181224	-20.5%	95	20190423	215
<b>20071009</b>	<b>20090309</b>	<b>-54.7%</b>	<b>517</b>	<b>20120313</b>	<b>1,617</b>
20000324	20021009	-49.6%	929	20061023	2,404
19980717	19981008	-21.9%	83	19981223	159
19900716	19901011	-20.8%	87	19910211	210
19870825	19871204	-33.2%	101	19890515	629
19810811	19820812	-20.1%	366	19821007	422
19730111	19741003	-48.4%	630	19761231	1,450
19681129	19700526	-36.8%	543	19710427	879
19660209	19661007	-20.6%	240	19670309	393
19611212	19620626	-27.7%	196	19630531	535
19570715	19571022	-20.6%	99	19580725	375
19460529	19470517	-28.2%	353	19491203	1,284
<b>19290903</b>	<b>19320708</b>	<b>-83.9%</b>	<b>1,039</b>	<b>19441215</b>	<b>5,582</b>

*Exhibit 1-2* (Investment Analysis and Portfolio Management Class, 2024)



*Exhibit 2-1* (Investment Analysis and Portfolio Management Class, 2024)

Day	Daily return
Worst	-11.0%
Second worst	-9.0%
Third worst	-8.6%
Fourth worst	-8.4%
Fifth worst	-8.0%

*Exhibit 2-2* (Investment Analysis and Portfolio Management Class, 2024)

Day	Loss
10/19/1987	17.41%
3/16/2020	11.99%
10/29/1929	11.99%
10/28/1929	11.27%
11/6/1929	9.73%
3/12/2020	9.62%

Day	Loss
7/21/1933	9.21%
12/1/2008	8.95%
10/15/2008	8.78%
7/20/1933	8.49%
10/26/1987	8.28%
9/29/2008	8.25%
10/18/1937	8.20%

*Exhibit 2-3* (Investment Analysis and Portfolio Management Class, 2024)

Mutual Fund	Quarterly return in the first quarter of 2020
Vanguard Total <i>Stock</i> Market Index Fund Admiral Shares, VTSAX	<b>-20.87%</b>
Vanguard Intermediate-Term <i>Corporate Bond</i> Index Fund Admiral Shares, VICSX	<b>-3.99%</b>
Vanguard Intermediate-Term <i>Treasury</i> Index Fund Admiral Shares, VSIGX	<b>7.11%</b>

*Exhibit 3-1* (Investment Analysis and Portfolio Management Class, 2024)

Company	Ticker	Ch.	Sector
Moderna	(MRNA)	746.2%	Health Care
EQT	(EQT)	415.1	Energy
Steel Dynamics	(STLD)	329.0	Materials
Onsemi	(ON)	279.4	Information Technology
Quanta Services	(PWR)	276.5	Industrials
Enphase Energy	(ENPH)	252.4	Information Technology
Freeport-McMoRan	(FCX)	252.6	Materials
Nucor	(NUE)	242.8	Materials
Tesla	(TSLA)	222.7	Consumer Discretionary

*Exhibit 4-1 (Krantz, 2020)*



*Exhibit 4-2 (Webull Corporations, 2024)*