

MARKET CORRECTIONS, RECOVERIES,
AND LONG-TERM RETURNS:
Stay The Course Through Market Volatility
A Matrix whitepaper – Updated September 2025

It has been well-settled in the investment literature over the years that an appropriate asset allocation generally accounts for 85 to 90% of an investor's ultimate success. The objective is to find a stock/bond mix that participates in good markets¹, provides a desired level of protection during market declines, and allows the investor to sleep at night.

With the media and investment commentators' constant focus on trying to predict the stock market's direction and the progressively negative drumbeat that accompanies most every market downturn, it is easy to lose the proper long-term perspective and get spooked out of the market unnecessarily, most often at the exact wrong time.

The main problem with this thinking is that it is difficult, if not impossible, to correctly time the market. The stock market generally increases over time, and being out of it even just for short periods can significantly reduce returns. Additionally, some of the biggest upward moves come during periods of peak negativity, and stocks generally recover much more quickly than most think possible. Historically, trying to reduce equity exposure in the midst of a market pullback, in an effort to avoid additional losses, has been a formula for failure.

Overview:

The catalyst for preparing this whitepaper was to give investors a historical perspective about market volatility, corrections, and recoveries, in order to equip them with better tools to navigate turbulent investment times. We extended the timeframe from our original study to update our work through 7/31/2025, which

¹ The "market" or "stocks" refers to the S&P 500® Index as representative of U.S. stocks overall.

includes the significant market swings during 2024 and 2025. The original study was published in August 2021, using data from the 12/31/1992 – 6/30/2021 period.²

To put market selloffs in perspective, we studied the period 12/31/1992 through 7/31/2025 (32 years, 7 months). We examined stock market returns³ over the entire time frame, using the S&P 500® ETF (SPY⁴) as a proxy for the S&P 500® Index (“S&P 500®”) and stock market, and studied market pullbacks, corrections, and bear markets, the subsequent time to recover back to the previous high, and the total returns through the stock market’s ups and downs.

In addition, we looked at the dangers of market timing resulting from missing just a few days where the market had its biggest gains, the timing of which is unknowable in advance.

Methodology and Observations:

- We studied the period of 12/31/1992 through 7/31/2025 and looked at the daily price movements of the SPY. We assumed that dividends were reinvested and looked at total returns.
- From this data, we identified market pullbacks of 5% or more and broke the declines into three groups: declines of 5 to 9.99%, 10 to 19.99%, and 20% or greater.
- For each correction, we recorded the percentage decline from the peak price to the decline’s trough, the number of days that it took from the peak to the trough, and the number of days that it took to recover to the previous peak (from the trough).
- Over the study period, there were 43 market pullbacks of 5% or more, giving an average of 1.32 pullbacks per year (as seen in Figure 1). Twenty-eight were in the 5-9.99% range, 11 were in the 10-19.99% range, and four were in the 20+% range. So generally, there was a pullback or correction on average every 9.1 months. The

² A prior version of this paper was originally written in August 2021, based on data from 12/31/1992 through 6/30/2021. Previous updates included data through 12/31/2021, 9/30/2022, and 12/31/2023.

³ Daily stock returns data for the SPDR S&P 500® ETF (SPY) was obtained from the Center for Research in Security Prices, FROM the Wharton Research Data Services database. The SPY began to trade on January 22, 1993; daily returns from the S&P 500® index were used to back into price data for the SPY for the missing period of 1993.

⁴ SPY is the ticker for the SPDR S&P 500® ETF, which is designed to replicate the investment results of the S&P 500 Index. As the S&P 500 is an index, it is not directly investible, while the SPY is.

time between corrections varied and the magnitude of the decline was also unpredictable.

- Overall, the average pullback lasted for 2.85 months and took 4.26 months to return to the previous high. The average pullback was -11.97%. Each decline that occurred during the study period was followed by a rebound, and the market moved to new highs thereafter.
 - In the 5-9.99% pullback range, the average pullback was -6.87% with corrections lasting an average of 1.20 months. It took an average of 1.52 months to travel back up to previous high.
 - In the 10-19.99% pullback range, the average pullback was -14.69% with pullbacks lasting an average of 2.73 months. For these declines, it took an average of 2.77 months to recover back up to the previous high.
 - Looking at the biggest market declines (the bucket of 20+% pullbacks that usually define bear markets), which includes the 2000-2002 Dot.Com Bust, the 2008 Global Financial Crisis, the 2020 Covid Pandemic, and the 2022 Fed Tightening, the average pullback was -40.23%. The duration of the pullbacks varied widely, with the 2000-2002 pullback lasting 31.0 months, 2008 lasting 17.2 months, 2020 lasting just 1.10 months, and 2022 lasting 9.4 months. The time to recovery also had a very widespread, with the recovery from 2000-2002 taking 49.3 months, the recovery from 2008 taking 41.9 months, the recovery from 2020 taking 4.7 months and the recovery from 2022 taking 14.2 months. The average amount of time to get back to the previous high in this bucket was 27.5 months and the longest time to recover was 49.3 months. So even while infrequent major bear markets are painful to live through and the subsequent recoveries seem to progress slowly, markets have rebounded fully to the previous high point in about 2¼ years on average. The data for each of the categories of declines can be seen in Figure 2.
- Market volatility, corrections, and bear markets are part-and-parcel of equity investing. Even including these negative periods, however, stock investing has resulted in attractive returns over time:
 - For the full study period (32 years, 7 months), stocks returned 2,504% cumulatively, or 10.52% compounded annually.
 - Over the last 3-, 5-, 10- and 20-year periods, the compound annual returns for stocks were +16.85%, +15.69%, +13.52% and +10.53% respectively.
 - And on a rolling 3-, 5- and 10-year average over the period (based on quarterly data only), annual returns averaged +10.63%, +10.04%, and +8.47% respectively.

- Only 10% of 3-year rolling returns over the study period were down as much as -5.54%. Similarly, the 10% cut-offs for 5- and 10-year rolling returns were -1.44%, and +2.64% respectively.
 - 75% of the 3-year rolling returns during the study were at least +4.11%. Likewise, three-quarters of the 5- and 10-year rolling returns were over +2.12%, and +6.94% respectively.
- Over time, stocks have provided favorable returns, including the downturns. The emotional appeal of timing the market is to hopefully avoid the downturns, though very few have been able to execute this repeatedly and reliably. The flipside is that often the best returns from stocks occur in short bursts when they are least expected. The +30.4% gains on the S&P 500® from March 23, 2020, to April 30, 2020, during the worst moments of the Covid Pandemic, is a great example of this.
- To highlight the danger of market timing, we looked at the entire study period (32 years, 7 months), a total of 11,900 days. Over the period, stocks returned +10.52% per year on average.
 - If an investor missed just the top 10 days during that period (less than one-tenth of 1% of the days), that average return drops to +7.73%. Without the top 20 days, returns drop to +5.94%. And if one missed the top 50 days, then the average return dropped to just +1.89%.
- A \$1,000 investment made on 12/31/1992, the inception date of this study, grew to \$26,045 with dividends reinvested and no further purchases or sales.

Conclusions:

- While stocks have and will likely continue to earn favorable returns over time, returns for any future period are entirely unpredictable. Sell-offs can occur at any time. Historically, however, sell-offs have been followed by equally robust recoveries.
- Corrections and bear markets are difficult, if not impossible, to predict with any level of consistency. Historically, trying to do so has been to the detriment of the investor.
- Reducing equity exposure during market selloffs, in an effort to avoid further losses, can be a costly exercise, as additional declines are unpredictable and market recoveries frequently start when they are least anticipated.
- While pullbacks can be scary and very uncomfortable, they historically have been followed by equally robust rebounds. Most of the rebounds occurred at a faster pace than expected and started when least expected.

- Market corrections have proven to be temporary, with each correction returning to, and then exceeding, its previous high. On average, it only took 4.26 months for markets to recover back to the previous highs, and the corrections themselves lasted 2.85 months on average. Patience during pullbacks has been the best course of action, and not trying to time the market has been a good practice^{5,6}.
- **So, we believe the best course of action is to set an appropriate asset allocation and stay with it through the ups, downs, and subsequent ups of the market.**

⁵ Investing in stocks entails risks. Past performance is not indicative of future results.

⁶ Matrix acknowledges and appreciates the contributions to this whitepaper by intern Justin Moskowitz.

APPENDIX

Figure 1: Market corrections of 5+% since 12/31/1992, with relevant time-period information and summary statistics

YEAR	DATE OF PEAK	DATE CORRECTION ENDED	CORRECTION %	DATE OF RECOVERY TO PREVIOUS HIGH	#DAYS UNTIL PREV HIGH RECOVERED	Correction Type
1994	2/2/1994	4/4/1994	-8.54%	8/26/1994	144	minor
1994	10/28/1994	12/8/1994	-5.84%	2/2/1995	56	minor
1996	5/22/1996	7/15/1996	-7.63%	9/13/1996	60	minor
1997	2/18/1997	4/11/1997	-10.04%	5/5/1997	24	Correction
1997	8/6/1997	8/15/1997	-6.51%	10/2/1997	48	minor
1997	10/7/1997	10/27/1997	-11.20%	12/1/1997	35	Correction
1997-1998	12/1/1997	1/9/1998	-6.32%	2/2/1998	24	minor
1998	7/17/1998	8/31/1998	-19.03%	11/23/1998	84	Correction
1999	1/8/1999	1/14/1999	-5.11%	3/8/1999	53	minor
1999	5/13/1999	5/27/1999	-6.39%	6/30/1999	34	minor
1999	7/16/1999	10/15/1999	-11.70%	11/17/1999	33	Correction
2000	12/31/1999	1/6/2000	-6.21%	1/14/2000	8	minor
2000	1/14/2000	2/25/2000	-9.28%	3/17/2000	21	minor
2000-2002	3/24/2000	10/9/2002	-47.50%	10/26/2006	1,478	BEAR
2002-2003	11/27/2002	3/11/2003	-14.08%	5/6/2003	56	Correction
2004	3/5/2004	8/6/2004	-7.53%	11/4/2004	90	minor
2005	3/7/2005	4/20/2005	-6.96%	7/11/2005	82	minor
2005	8/3/2005	10/13/2005	-5.45%	11/17/2005	35	minor
2006	5/9/2006	6/13/2006	-7.59%	9/13/2006	92	minor
2007	2/20/2007	3/5/2007	-5.95%	4/16/2007	42	minor
2007	7/19/2007	8/15/2007	-9.05%	10/5/2007	51	minor
2007-2009	10/9/2007	3/9/2009	-55.20%	8/16/2012	1,256	BEAR
2010	4/23/2010	7/2/2010	-15.70%	11/5/2010	126	Correction
2011	2/18/2011	3/16/2011	-6.21%	4/26/2011	41	minor
2011	4/29/2011	10/3/2011	-18.61%	2/3/2012	123	Correction
2012	4/12/2012	6/4/2012	-9.69%	8/6/2012	63	minor
2012	9/14/2012	11/15/2012	-7.35%	1/2/2013	48	minor
2013	5/21/2013	6/24/2013	-5.55%	7/11/2013	17	minor
2014	12/31/2013	2/13/2014	-5.70%	2/24/2014	11	minor
2014	9/18/2014	10/16/2014	-7.27%	10/31/2014	15	minor
2015-2016	7/20/2015	2/11/2016	-13.01%	4/18/2016	67	Correction
2016	6/18/2016	6/27/2016	-5.52%	7/8/2016	11	minor
2018	1/26/2018	2/8/2018	-10.10%	8/6/2018	179	Correction
2018	9/20/2018	12/24/2018	-19.34%	4/12/2019	109	Correction
2019	5/3/2019	6/3/2019	-6.62%	6/20/2019	17	minor
2019	7/26/2019	8/5/2019	-6.02%	10/25/2019	81	minor
2020	2/19/2020	3/23/2020	-33.70%	8/10/2020	140	BEAR
2020	9/2/2020	9/23/2020	-9.44%	11/11/2020	49	minor
2021	9/2/2021	10/4/2021	-5.11%	10/20/2021	16	minor
2022	1/3/2022	10/12/2022	-24.50%	12/13/2023	427	BEAR
2024	3/27/2024	4/19/2024	-5.35%	5/14/2024	25	minor
2024	7/16/2024	8/7/2024	-8.18%	9/19/2024	43	minor
2025	2/19/2025	4/8/2025	-18.76%	6/26/2025	79	Correction
		<u>count</u>	<u>average</u>			
	minor	28	-6.87%			
	Correction	11	-14.69%			
	BEAR	4	-40.23%			
	OVERALL	43	-11.97%			

Figure 2: Market corrections broken down into 5-9.99%, 10-19.99%, and 20+% (bear market) buckets

									5 - 9.99% minor DECLINES			10 - 19.99% CORRECTIONS			>20% BEAR MARKETS				
		DATE		DATE OF		#DAYS	#DAYS UNTIL												
		CORRECTION	CORRECTION	RECOVERY TO			PREV HIGH	Correction		#DAYS	#DAYS UNTIL PREV		#DAYS	#DAYS UNTIL PREV		#DAYS	#DAYS UNTIL PREV		
YEAR	DATE OF PEAK	ENDED	%	PREVIOUS HIGH	DOWN	RECOVERED		Type	% PULLBACK	DOWN	HIGH RECOVERED	% PULLBACK	DOWN	HIGH RECOVERED	% PULLBACK	DOWN	HIGH RECOVERED		
1994	2/2/1994	4/4/1994	-8.54%	8/26/1994	61	144		minor	-8.54%	61	144								
1994	10/28/1994	12/8/1994	-5.84%	2/2/1995	41	56		minor	-5.84%	41	56								
1996	5/22/1996	7/15/1996	-7.63%	9/13/1996	54	60		minor	-7.63%	54	60								
1997	2/18/1997	4/11/1997	-10.04%	5/5/1997	52	24		Correction				-10.04%	52	24					
1997	8/6/1997	8/15/1997	-6.51%	10/2/1997	9	48		minor	-6.51%	9	48								
1997	10/7/1997	10/27/1997	-11.20%	12/1/1997	20	35		Correction				-11.20%	20	35					
1997-1998	12/1/1997	1/9/1998	-6.32%	2/2/1998	39	24		minor	-6.32%	39	24								
1998	7/17/1998	8/31/1998	-19.03%	11/23/1998	45	84		Correction				-19.03%	45	84					
1999	1/8/1999	1/14/1999	-5.11%	3/8/1999	6	53		minor	-5.11%	6	53								
1999	5/13/1999	5/27/1999	-6.39%	6/30/1999	14	34		minor	-6.39%	14	34								
1999	7/16/1999	10/15/1999	-11.70%	11/17/1999	91	33		Correction				-11.70%	91	33					
2000	12/31/1999	1/6/2000	-6.21%	1/14/2000	6	8		minor	-6.21%	6	8								
2000	1/14/2000	2/25/2000	-9.28%	3/17/2000	42	21		minor	-9.28%	42	21								
2000-2002	3/24/2000	10/9/2002	-47.50%	10/26/2006	929	1,478		BEAR							-47.50%	929	1478		
2002-2003	11/27/2002	3/11/2003	-14.08%	5/6/2003	104	56		Correction				-14.08%	104	56					
2004	3/5/2004	8/6/2004	-7.53%	11/4/2004	154	90		minor	-7.53%	154	90								
2005	3/7/2005	4/20/2005	-6.96%	7/11/2005	44	82		minor	-6.96%	44	82								
2005	8/3/2005	10/13/2005	-5.45%	11/17/2005	71	35		minor	-5.45%	71	35								
2006	5/9/2006	6/13/2006	-7.59%	9/13/2006	35	92		minor	-7.59%	35	92								
2007	2/20/2007	3/5/2007	-5.95%	4/16/2007	13	42		minor	-5.95%	13	42								
2007	7/19/2007	8/15/2007	-9.05%	10/5/2007	27	51		minor	-9.05%	27	51								
2007-2009	10/9/2007	3/9/2009	-55.20%	8/16/2012	517	1,256		BEAR							-55.20%	517	1256		
2010	4/23/2010	7/2/2010	-15.70%	11/5/2010	70	126		Correction				-15.70%	70	126					
2011	2/18/2011	3/16/2011	-6.21%	4/26/2011	26	41		minor	-6.21%	26	41								
2011	4/29/2011	10/3/2011	-18.61%	2/3/2012	157	123		Correction				-18.61%	157	123					
2012	4/12/2012	6/4/2012	-9.69%	8/6/2012	53	63		minor	-9.69%	53	63								
2012	9/14/2012	11/15/2012	-7.35%	1/2/2013	62	48		minor	-7.35%	62	48								
2013	5/21/2013	6/24/2013	-5.55%	7/11/2013	34	17		minor	-5.55%	34	17								
2014	12/31/2013	2/13/2014	-5.70%	2/24/2014	44	11		minor	-5.70%	44	11								
2014	9/18/2014	10/16/2014	-7.27%	10/31/2014	28	15		minor	-7.27%	28	15								
2015-2016	7/20/2015	2/11/2016	-13.01%	4/18/2016	206	67		Correction				-13.01%	206	67					
2016	6/18/2016	6/27/2016	-5.52%	7/8/2016	9	11		minor	-5.52%	9	11								
2018	1/26/2018	2/8/2018	-10.10%	8/6/2018	13	179		Correction				-10.10%	13	179					
2018	9/20/2018	12/24/2018	-19.34%	4/12/2019	95	109		Correction				-19.34%	95	109					
2019	5/3/2019	6/3/2019	-6.62%	6/20/2019	31	17		minor	-6.62%	31	17								
2019	7/26/2019	8/5/2019	-6.02%	10/25/2019	10	81		minor	-6.02%	10	81								
2020	2/19/2020	3/23/2020	-33.70%	8/10/2020	33	140		BEAR							-33.70%	33	140		
2020	9/2/2020	9/23/2020	-9.44%	11/11/2020	21	49		minor	-9.44%	21	49								
2021	9/2/2021	10/4/2021	-5.11%	10/20/2021	32	16		minor	-5.11%	32	16								
2022	1/3/2022	10/12/2022	-24.50%	12/13/2023	282	427		BEAR							-24.50%	282	427		
2024	3/27/2024	4/19/2024	-5.35%	5/14/2024	23	25		minor	-5.35%	23	25								
2024	7/16/2024	8/7/2024	-8.18%	9/19/2024	22	43		minor	-8.18%	22	43								
2025	2/19/2025	4/8/2025	-18.76%	6/26/2025	48	79		Correction				-18.76%	48	79					
									(months)			(months)			(months)				
average									-6.87%	1.20	1.52	-14.69%	2.73	2.77	-40.23%	14.68	27.51		
median									-6.45%	1.05	1.42	-14.08%	2.33	2.63	-40.60%	13.32	28.05		
number									28			11			4				

Figure 3: Annualized total returns of the SPY ETF over specified time ranges

<u>All returns annualized through 7/31/2025</u>	<u>SPY RETURNS</u>
YTD 7/31/2025 *	8.17%
1 Yr	15.84%
3 Yrs	16.85%
5 Yrs	15.69%
10 Yrs	13.52%
20 Yrs	10.53%
from 12/31/1999 - 25 years, 7 months	7.77%
from 12/31/1992 - 32 years, 7 months	10.52%
* periods less than 1 year are not annualized	

Figure 4: Rolling average returns

<u>ROLLING AVERAGE RETURNS</u>			
based on linked calendar quarter results			
	<u>3yr CAGR</u>	<u>5yr CAGR</u>	<u>10yr CAGR</u>
Average annual return	10.63%	10.04%	8.47%
Number of measurements	119	111	91

DISCLOSURE

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DEFINITIONS:

Asset Allocation *the implementation of an investment strategy that attempts to balance risk versus reward by adjusting the percentage of each asset in an investment portfolio according to the investor's risk tolerance, goals, and investment time frame. The focus is on the characteristics of the overall portfolio.*

S&P500® Index *is a broad-based unmanaged index of 500 stocks, which is widely recognized as representative of the equity market in general. You cannot invest directly in an index.*

Dividends *is the distribution of a company's earnings to its shareholders and is determined by the company's board of directors.*

S&P 500® ETF *seeks to track the investment results of an index composed of large-capitalization U.S. equities.*

Volatility *is the degree of variation of a trading price series over time, usually measured by the standard deviation of logarithmic returns.*

Drawdowns *how much an investment or trading account is down from the peak before it recovers back to the peak.*

2008 Global Financial Crisis *was the most severe worldwide economic crisis since the Great Depression.*

2020 Covid Pandemic *a global outbreak of coronavirus – an infectious disease caused by the severe acute respiratory syndrome.*

2022 Fed Tightening *Federal Reserve reduced its balance sheet gradually (known as quantitative tightening, or QT) in June 2022 by not reinvesting all the proceeds of maturing securities.*

Rolling returns *are annualized average returns for a period, ending with the listed year. Rolling returns are useful for examining the behavior of returns for holding periods, similar to those actually experienced by investors.*

Compound Annual Returns *a measure of how well an investment's performance is doing over time. It's typically expressed as a percentage that applies annually.*

Average Annual Returns *a percentage that represents a mutual fund's historical average return, usually stated over three-, five-, and 10 years.*

Compound Annual Rate of Return (CARG) is the mean annual growth rate of an investment over a specified period of time longer than one year.

Federal Reserve is the central banking system of the United States. It was created on December 23, 1913, with the enactment of the Federal Reserve Act, after a series of financial panics led to the desire for central control of the monetary system in order to alleviate financial crises.

Total return is a comprehensive measure of an investment's performance over a specific period, incorporating both capital appreciation (changes in price) and income (dividends, interest, and other distributions).

Equity exposure is the portion of an investment portfolio that is allocated to equities, or stocks.