“Wings of the Black Swan” – Summary Slides

By Brent Burns, President

Jeremy Fletcher, Director of Investments

Stephen J. Huxley, PhD, Director of Research

Asset Dedication, LLC


THE PILOT HAS INDICATED WE ARE GOING TO EXPERIENCE A LITTLE TURBULENCE. PLEASE FASTEN YOUR SEAT BELTS.
WE'RE GOING TO DIE!
HE'S A FINANCIAL REPORTER.

Outline

- Introduction
- 100 Year trend of the S&P 500
- The classic bell curve normal distribution
- Distribution of Actual **Daily** Returns of the S&P 500 since 1928, 1950, 1975
- Ditto for Actual **Weekly** Returns
- Ditto for Actual **Monthly, Quarterly, and Annual** Returns since 1928
- Percentage of Positive Returns Since 1928

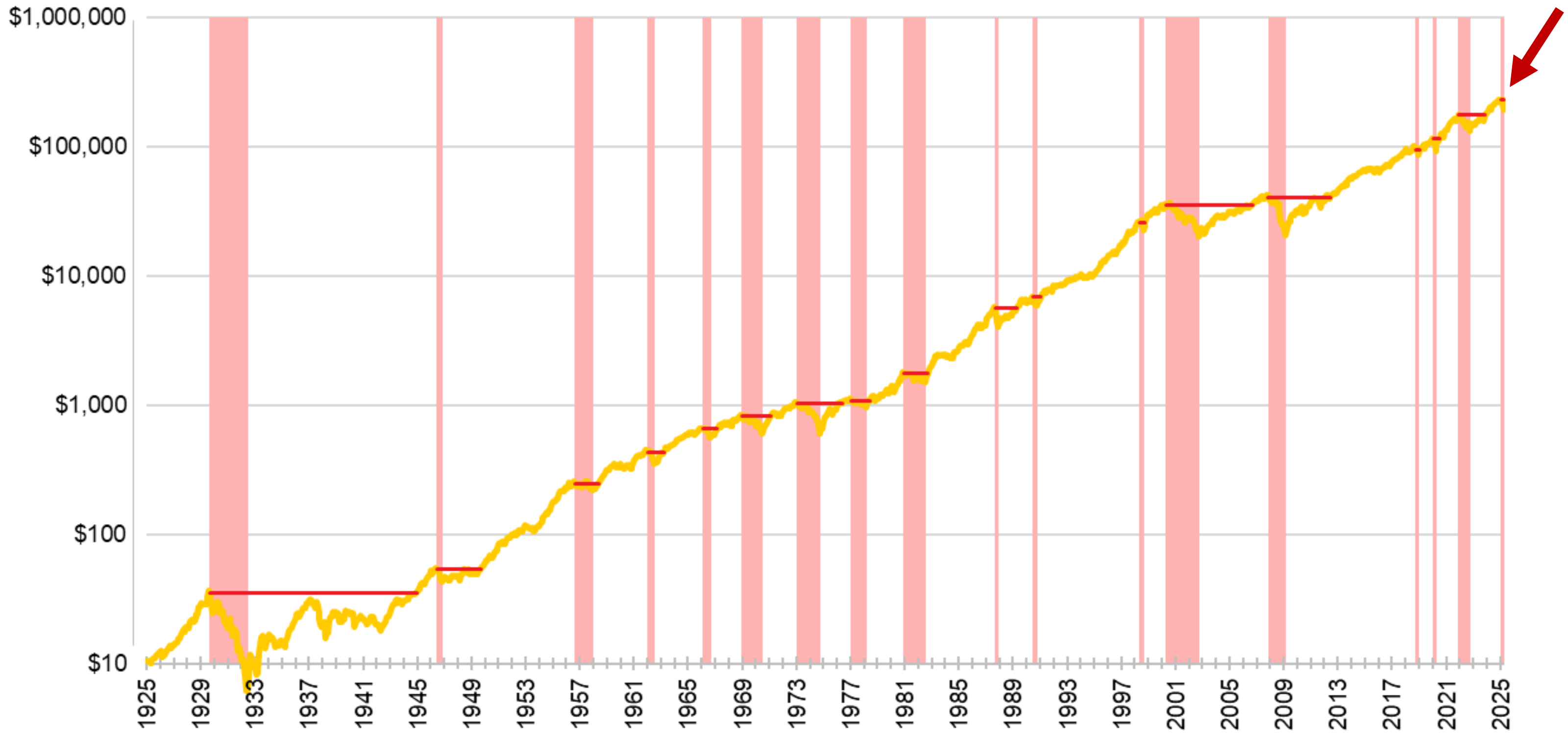
Introduction

- These slides provide the exhibits found in the article “Wings of the Black Swan” by Brent Burns, President, Jeremy Fletcher, Managing Director of Investments, and Stephen J. Huxley, PhD, Director of Research, Asset Dedication
- Additional exhibits are also included that extend those found in the article itself.

Introduction – cont’d.

- The majority of advisors suggest adopting a long-term, historical view for investing.
- During periods of short-term market volatility, the common advice is to “Stay the course!”
- Daily and weekly market fluctuations, often called “black swan” events, are generally considered best disregarded.
- This presentation highlights the empirical data supporting the long-term investment approach.

100 Years of the S&P 500



Time and diversification neither assure a profit nor guarantee against loss in a declining market. The data on this page illustrates the bull and bear market cycles for the S&P 500 from January 1st, 1925 through April 8th, 2025 exclusive of fees, trading costs, and taxes.
See Data Disclosures.

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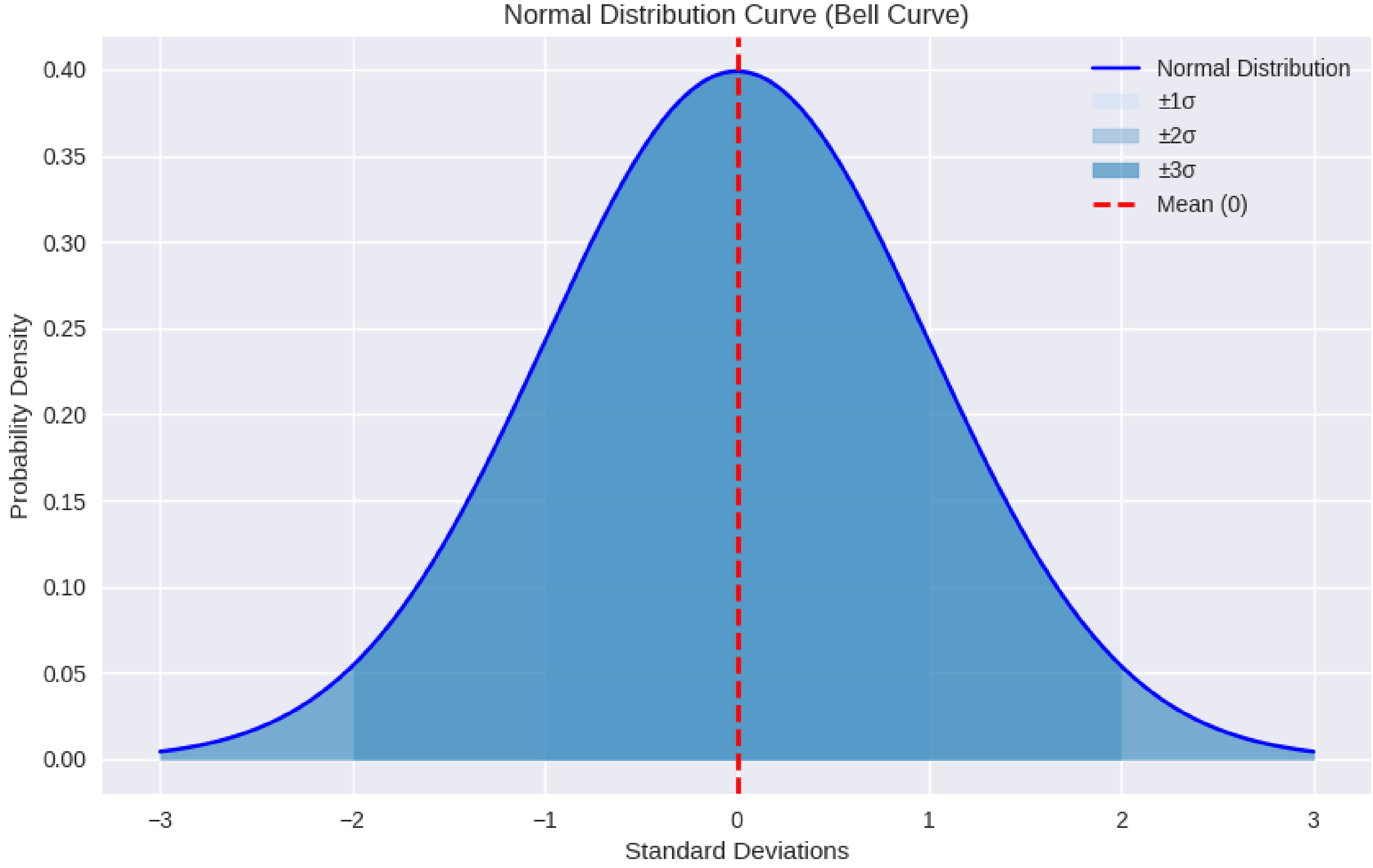
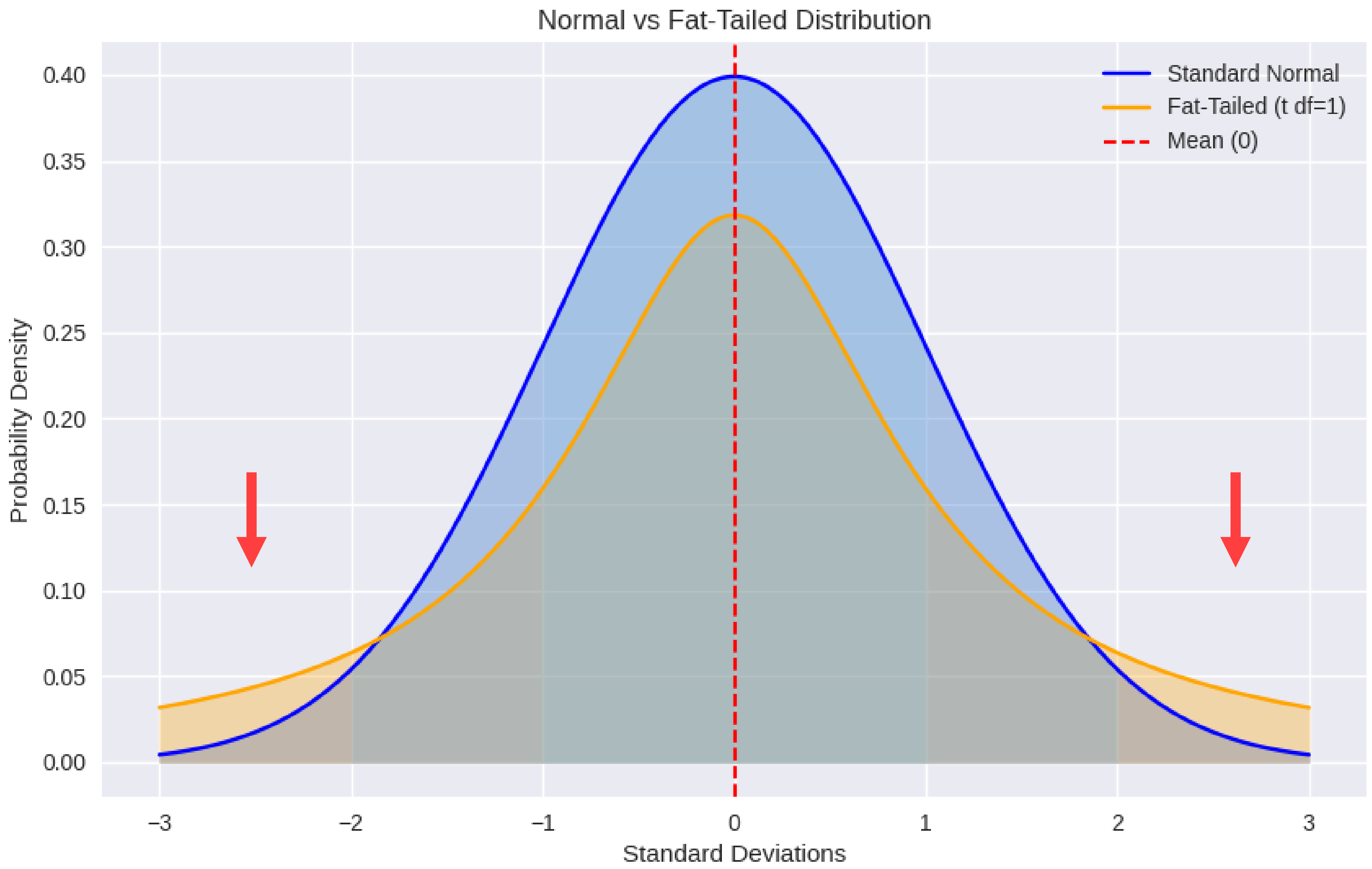
The Classic Bell Curve



Taleb’s Fat Tails



<u>Daily</u> Returns of the S&P 500 Since 1928, 1950, and 1975

One-Day S&P 500 Returns

1928, 1950, 1975 - Summary Statistics

Statistic	Since 1/3/1928	Since 1/3/1950	Since 1/2/1975
Total Days	25,577	19,086	12,736
Percent Positive	52.2%	53.1%	53.3%
Percent Negative	47.8%	46.9%	46.7%
Average Return	0.030%	0.036%	0.041%
Maximum Return	16.6%	11.6%	11.6%
Date	3/15/1933	10/13/2008	10/13/2008
Std. Dev. From Mean	14.1	11.6	10.5
Minimum Return	-20.5%	-20.5%	-20.5%
Date	10/19/1987	10/19/1987	10/19/1987
Std. Dev. From Mean	-17.4	-20.7	-18.7
Std. Dev.	1.2%	1.0%	1.1%
Excess Kurtosis	18.1	20.2	19.4

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
See Data Disclosures.

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One-Day S&P 500 Returns

1928, 1950, 1975 - Summary Statistics

Not Normal!

Statistic	Since 1/3/1928	Since 1/3/1950	Since 1/2/1975
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Minimum Return	-20.5%	-20.5%	-20.5%
Date	10/19/1987	10/19/1987	10/19/1987
Std. Dev. From Mean	-17.4	-20.7	-18.7
Std. Dev.	1.2%	1.0%	1.1%
Excess Kurtosis	18.1	20.2	19.4

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
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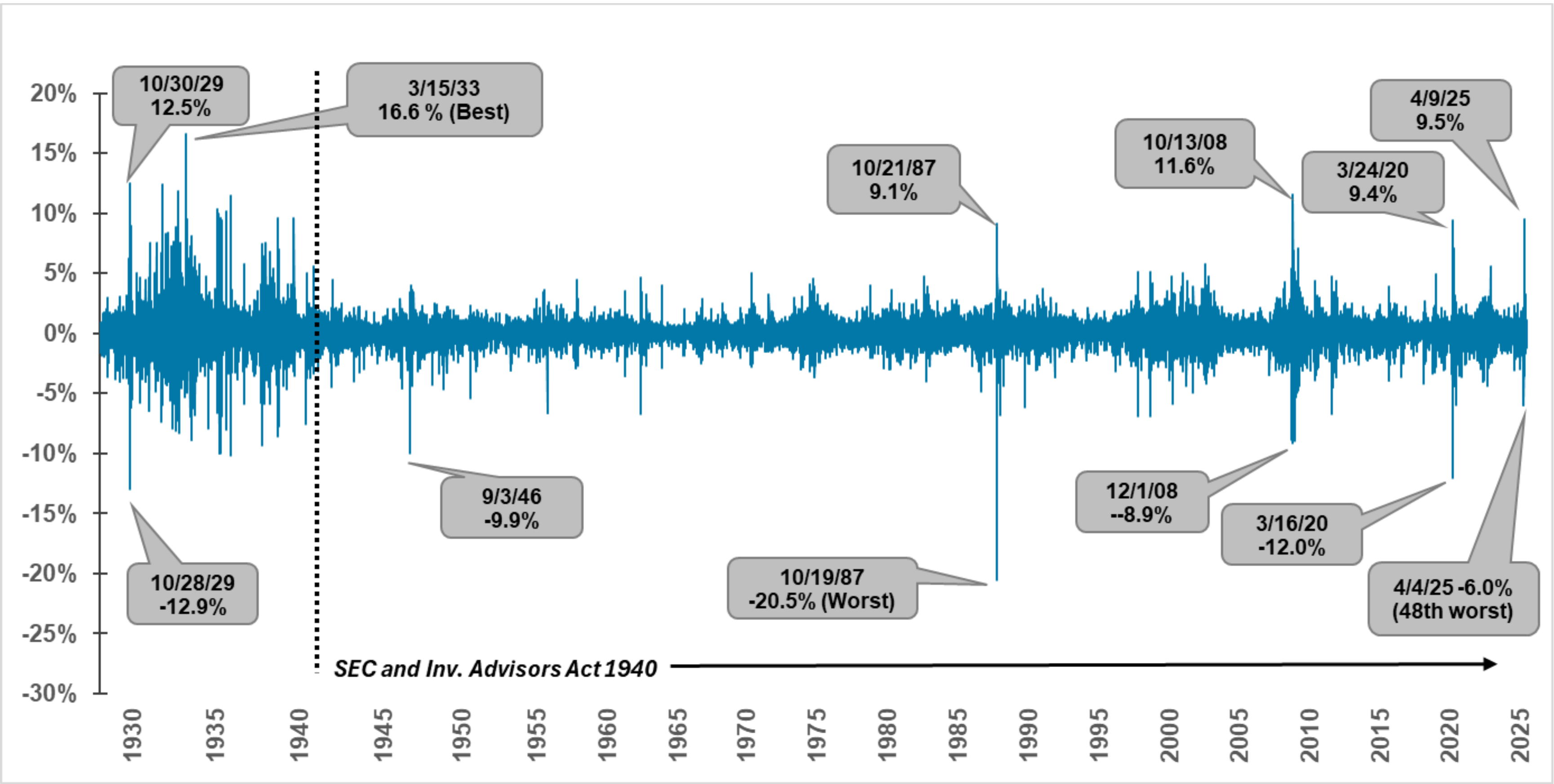
One-Day Fluctuations 1/3/28-6/30/25

25,577 Days – Avg = 0.03% / Max = 16.6% / Min = -20.5%



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Daily Returns as Standard Deviations Since 1928
(3.0 or more or less should be 35 each if normal)
1/3/28 to 6/30/25

Standard Deviations	Number	As %
3.0 or more	202	0.8%
2.0 up to 3.0	395	1.5%
1.0 up to 2.0	2,116	8.3%
0.0 up to 1.0	10,311	40.3%
0.0 down to - 1.0	10,151	39.7%
-1.0 down to -2.0	1,763	6.9%
-2.0 down to -3.0	423	1.7%
-3.0 or less	216	0.8%
Total	25,577	100.0%

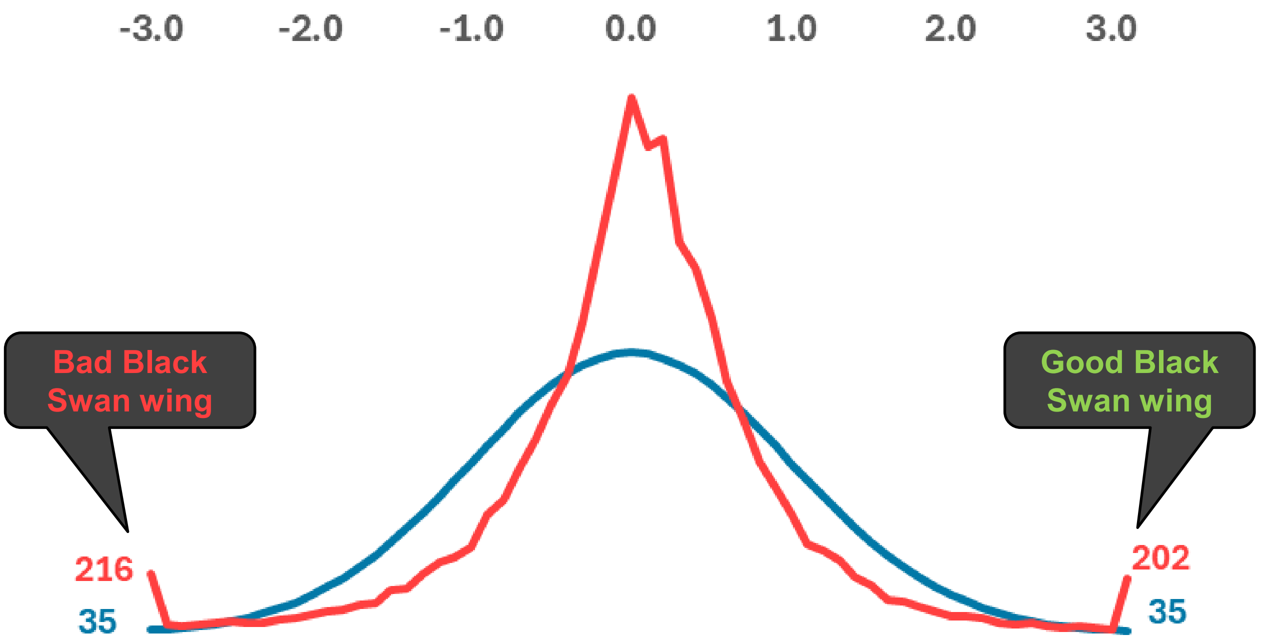
35

35

(25,577 Days – Avg = 0.03% / Max = 16.6% / Min = -20.5%

Actual Returns Distribution vs. Normal Distribution Since 1928

S&P 500 vs. Normal Distribution



The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
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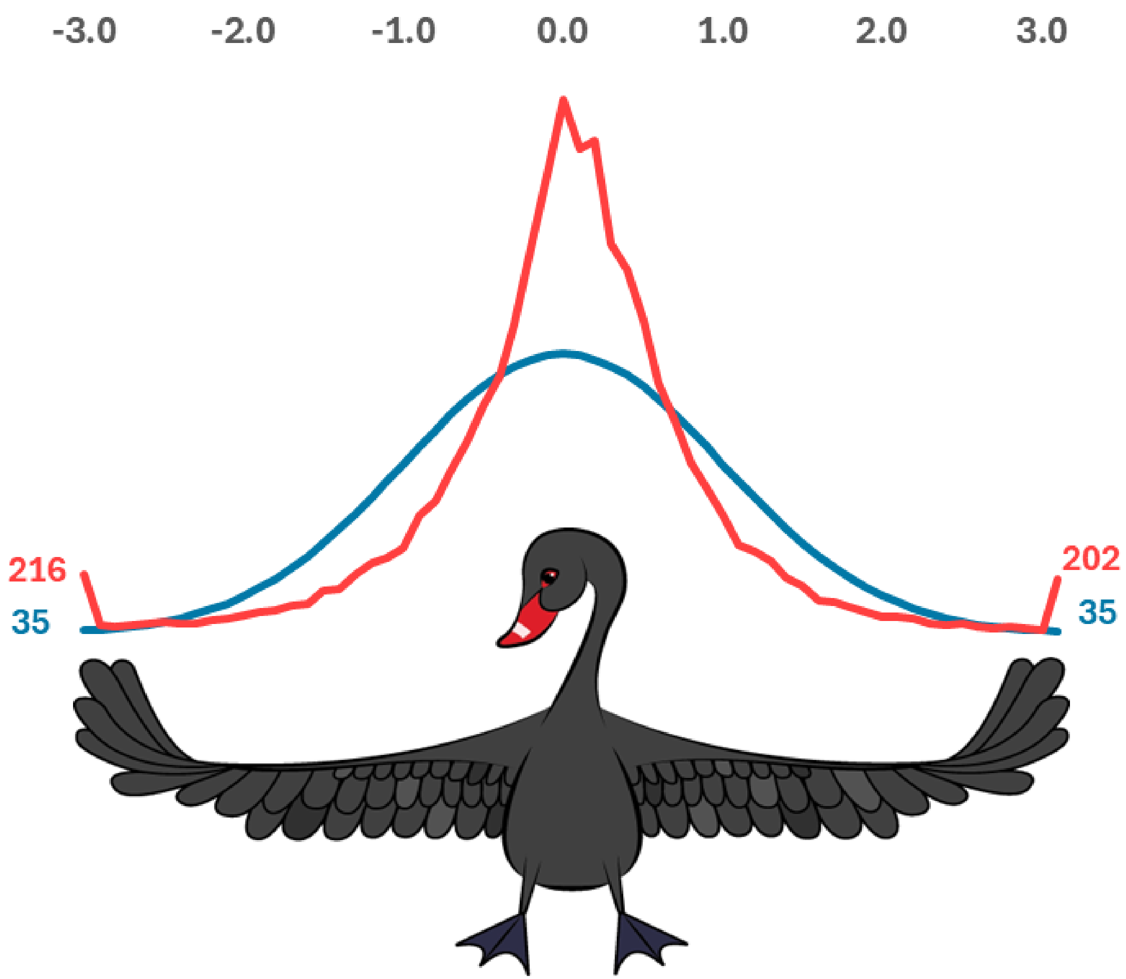
Actual Returns Distribution vs. Normal Distribution Since 1928

S&P 500 vs. Normal Distribution



The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
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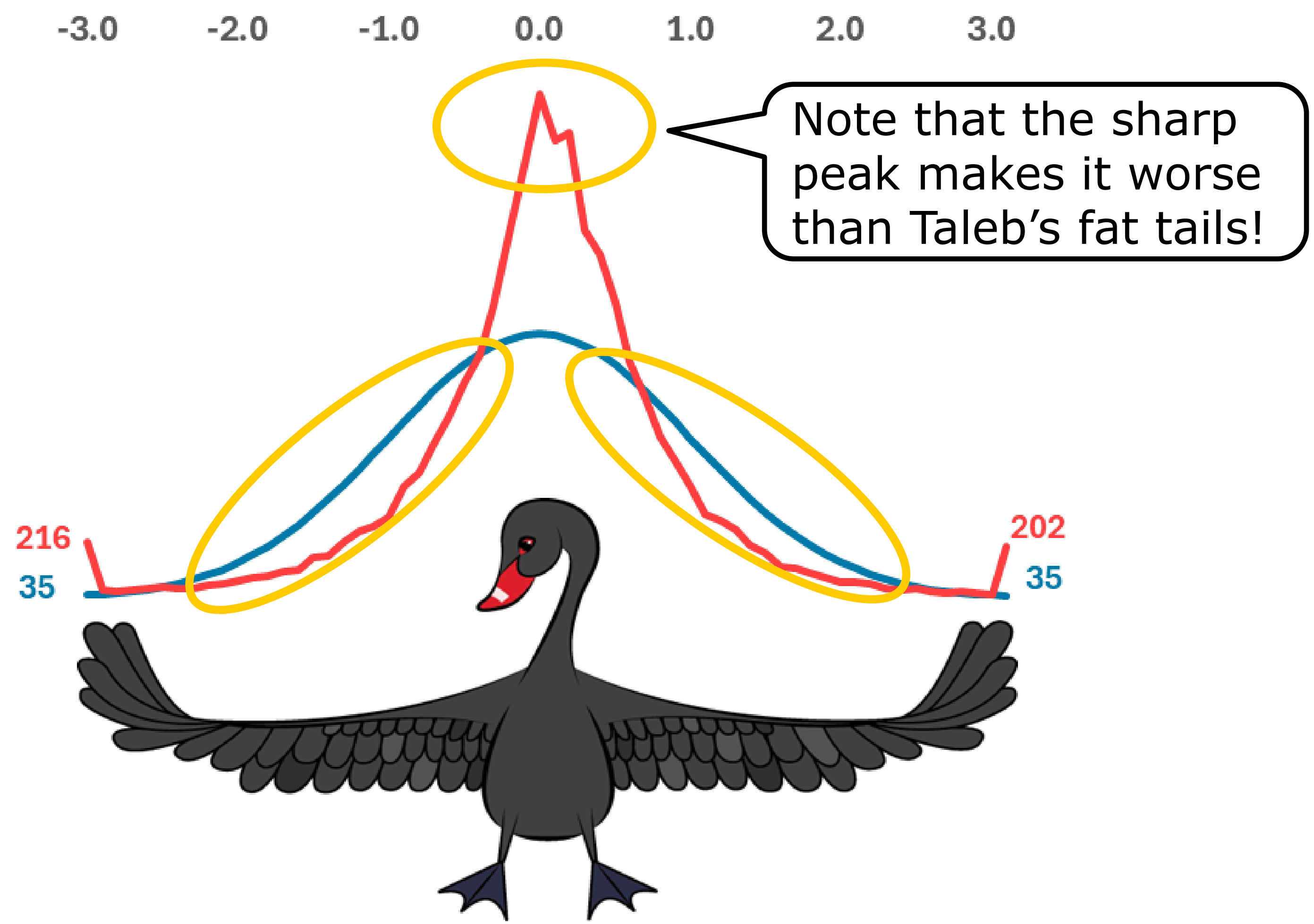
Actual Returns Distribution vs. Normal Distribution Since 1928

S&P 500 vs. Normal Distribution



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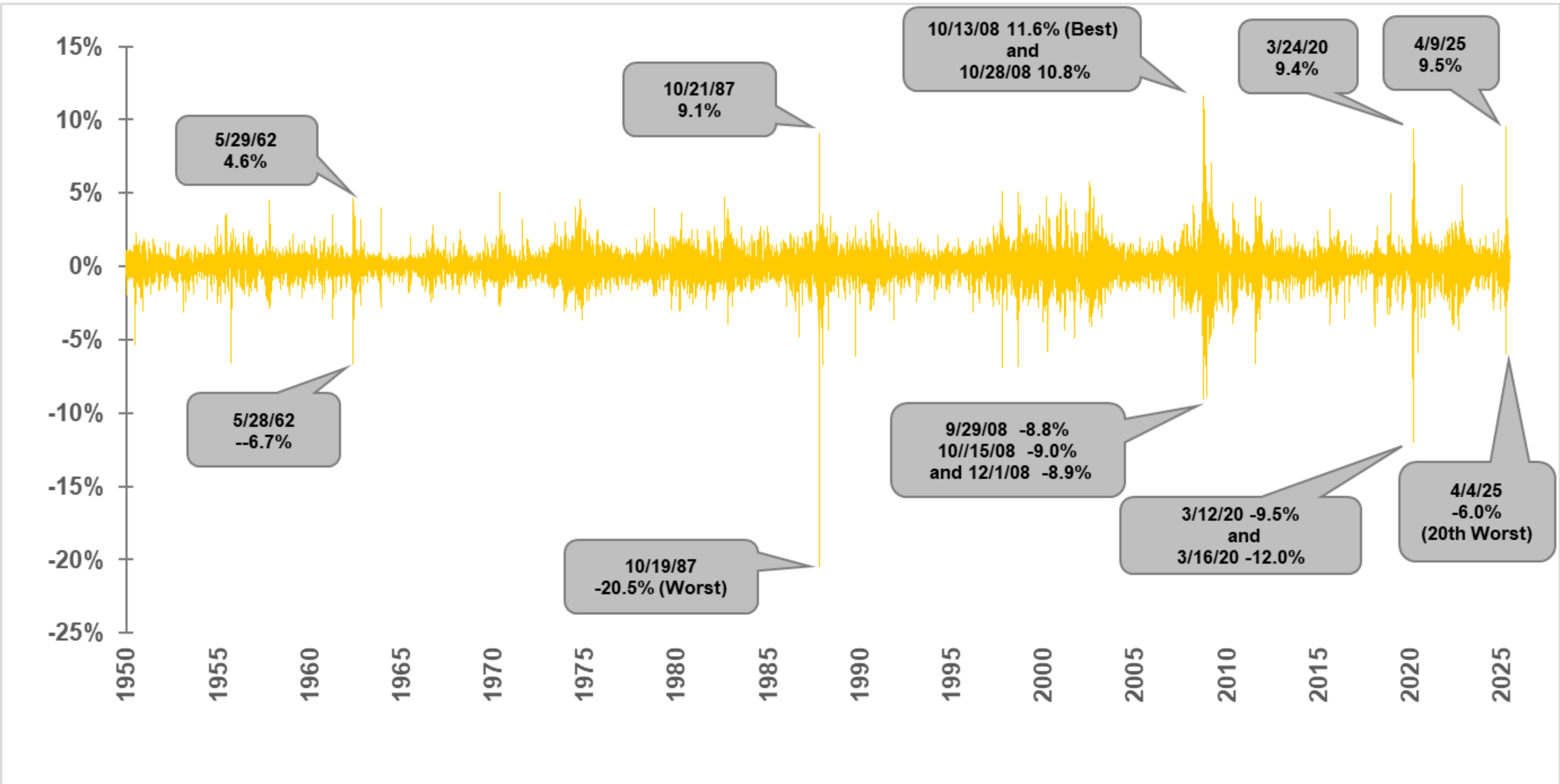
One-Day Fluctuations Since 1950

19,086 Days – Avg = 0.04% / Max = 11.6% / Min = -20.5%

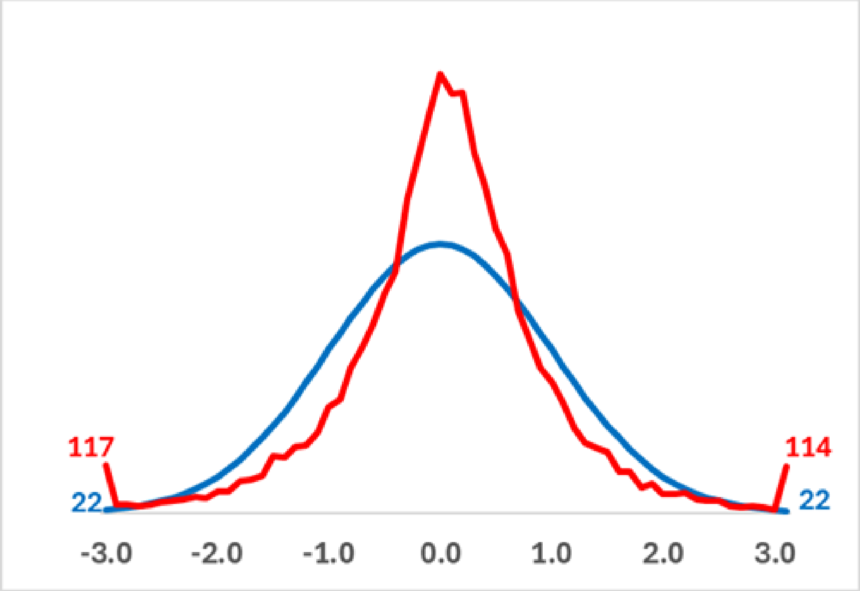


The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
See Data Disclosures.

Frequency Distribution of Daily Returns as Standard Deviations Since 1950
S&P 500 vs. Normal Distribution

1/3/50 - 6/30/25

Standard Deviations	Number	As %
3.0 or more	124	0.6%
2.0 up to 3.0	294	1.5%
1.0 up to 2.0	1,544	8.1%
0.0 up to 1.0	7,754	40.6%
0.0 down to - 1.0	7,352	38.5%
-1.0 down to -2.0	1,551	8.1%
-2.0 down to -3.0	323	1.7%
-3.0 or less	144	0.8%
Total	19,086	100.0%



19,086 Days
Avg/Max/Min = 0.036%/11.6%/-20.5%)

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
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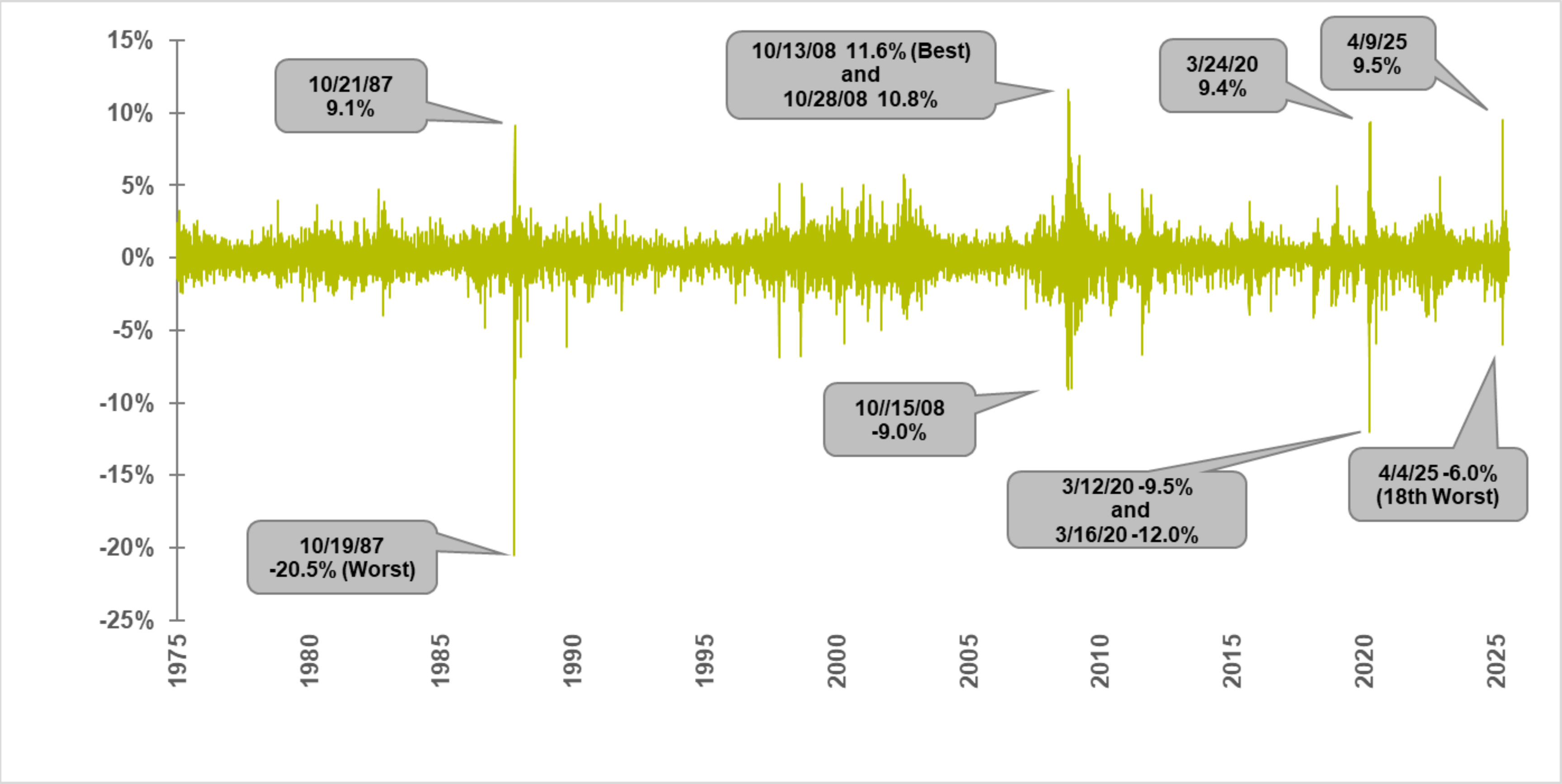
One-Day Fluctuations Since 1975

12,736 Days – Avg = 0.04% / Max = 11.6% / Min = -20.5%



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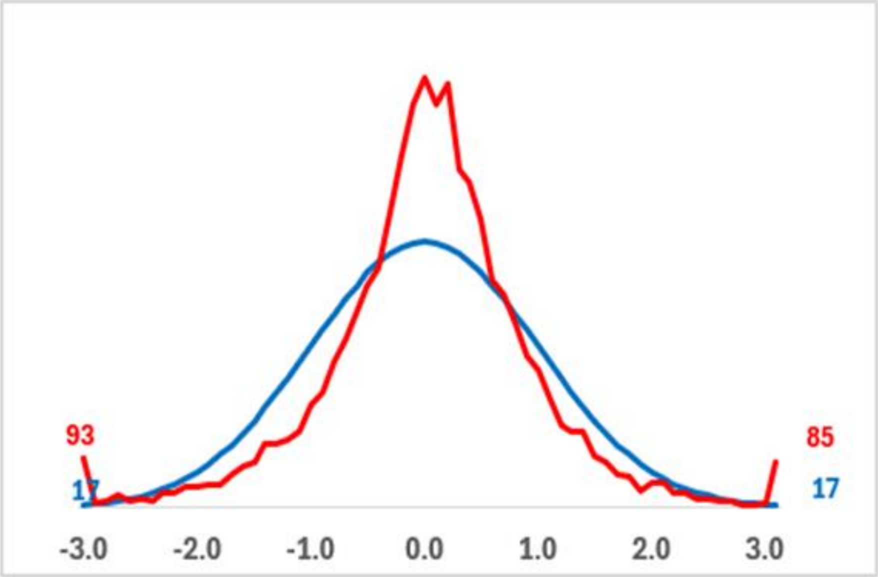
See Data Disclosures.

Frequency Distribution of Daily Returns as Standard Deviations Since 1975
S&P 500 vs. Normal Distribution

1/2/75 - 6/30/25

Standard Deviations	Number	As %
3.0 or more	85	0.7%
2.0 up to 3.0	187	1.5%
1.0 up to 2.0	1,047	8.2%
0.0 up to 1.0	5,149	40.4%
0.0 down to - 1.0	4,915	38.6%
-1.0 down to -2.0	1,035	8.1%
-2.0 down to -3.0	225	1.8%
-3.0 or less	93	0.7%
Total	12,736	100.0%



12,736 Days
Avg/Max/Min = 0.041%/11.6%/-20.5%)

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
See Data Disclosures.

Weekly Returns of the S&P 500 Since 1928, 1950, and 1975

Weekly S&P 500 Returns - Summary Statistics

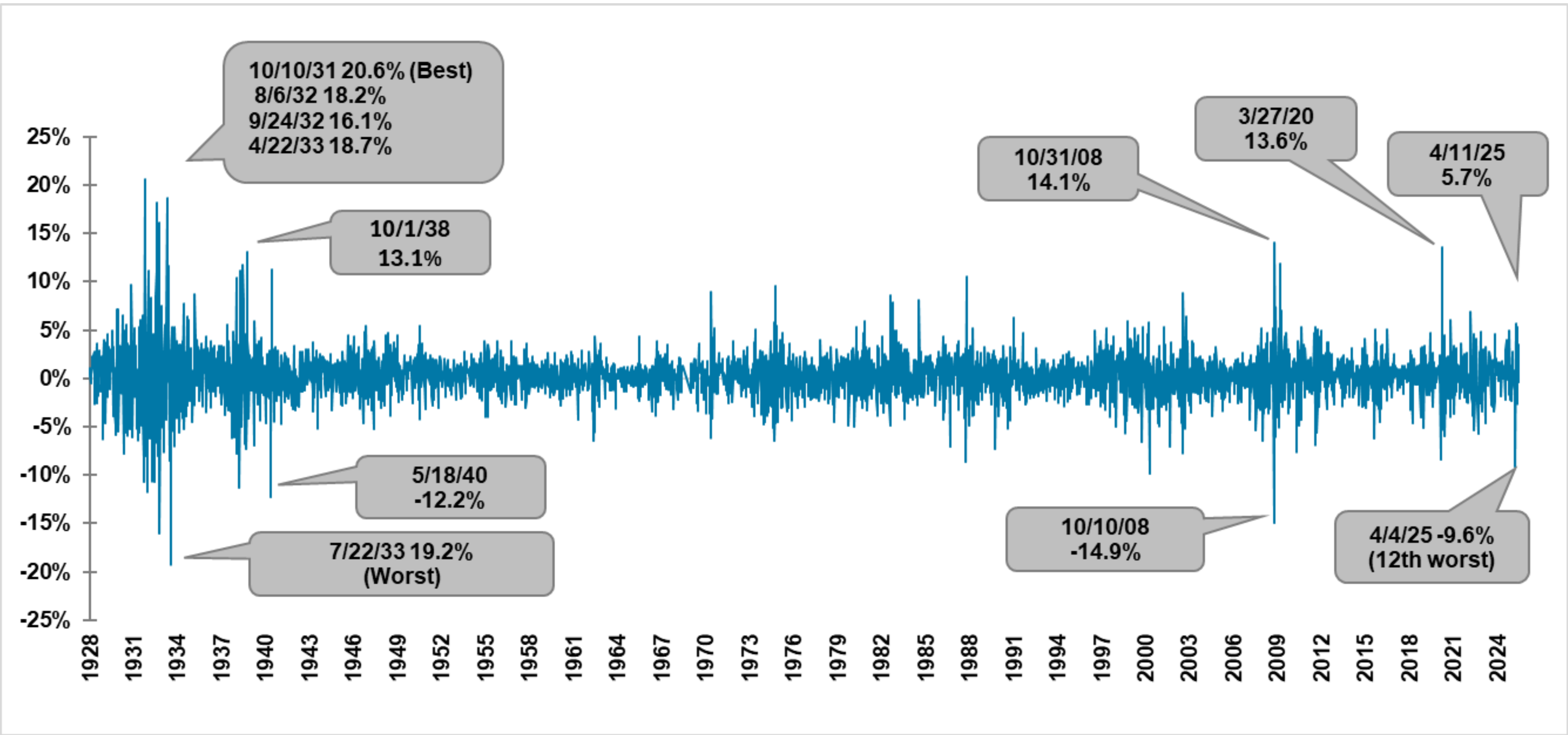
Since 1928, 1950, 1975

Statistic	Since 1/3/1928	Since 1/3/1950	Since 1/2/1975
Total Weeks	4,165	3,254	2,201
Percent Positive	57.9%	57.5%	55.5%
Percent Negative	42.1%	42.5%	44.5%
Average Return	0.222%	0.197%	0.178%
Maximum Return	20.6%	14.1%	14.1%
Friday Date	10/10/1931	10/31/2008	10/31/2008
Std. Dev. From Mean	8.8	7.1	6.6
Minimum Return	-19.2%	-14.9%	-14.9%
Friday Date	7/22/1933	10/10/2008	10/10/2008
Std. Dev. From Mean	-8.1	-7.5	-7.0
Std. Dev.	2.4%	2.0%	2.1%
Excess Kurtosis	8.8	5.1	4.8

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
See Data Disclosures.

One-Week Fluctuations Since 1928

4,153 Weeks – Avg = 0.22% / Max = 20.6% / Min = -19.2%



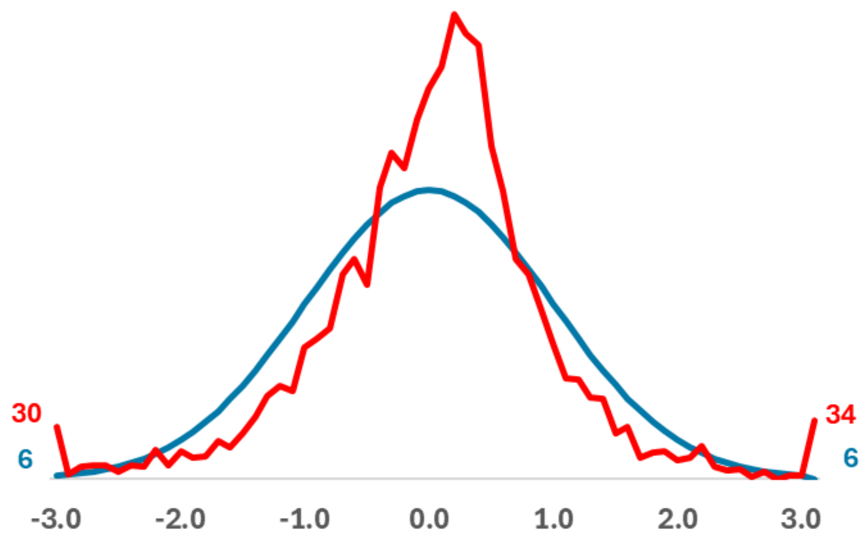
The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
See Data Disclosures.

Frequency Distribution of Weekly Returns as Standard Deviations Since 1928

S&P 500 vs. Normal Distribution

1/7/28 - 6/30/25

Standard Deviations	Number	As %
3.0 or more	34	0.8%
2.0 up to 3.0	58	1.4%
1.0 up to 2.0	318	7.6%
0.0 up to 1.0	1,791	43.0%
0.0 down to - 1.0	1,492	35.8%
-1.0 down to -2.0	356	8.5%
-2.0 down to -3.0	86	2.1%
-3.0 or less	30	0.7%
Total	4,165	100.0%



4,153 Weeks
Avg/Max/Min = 0.222%/20.6%/-19.2%

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
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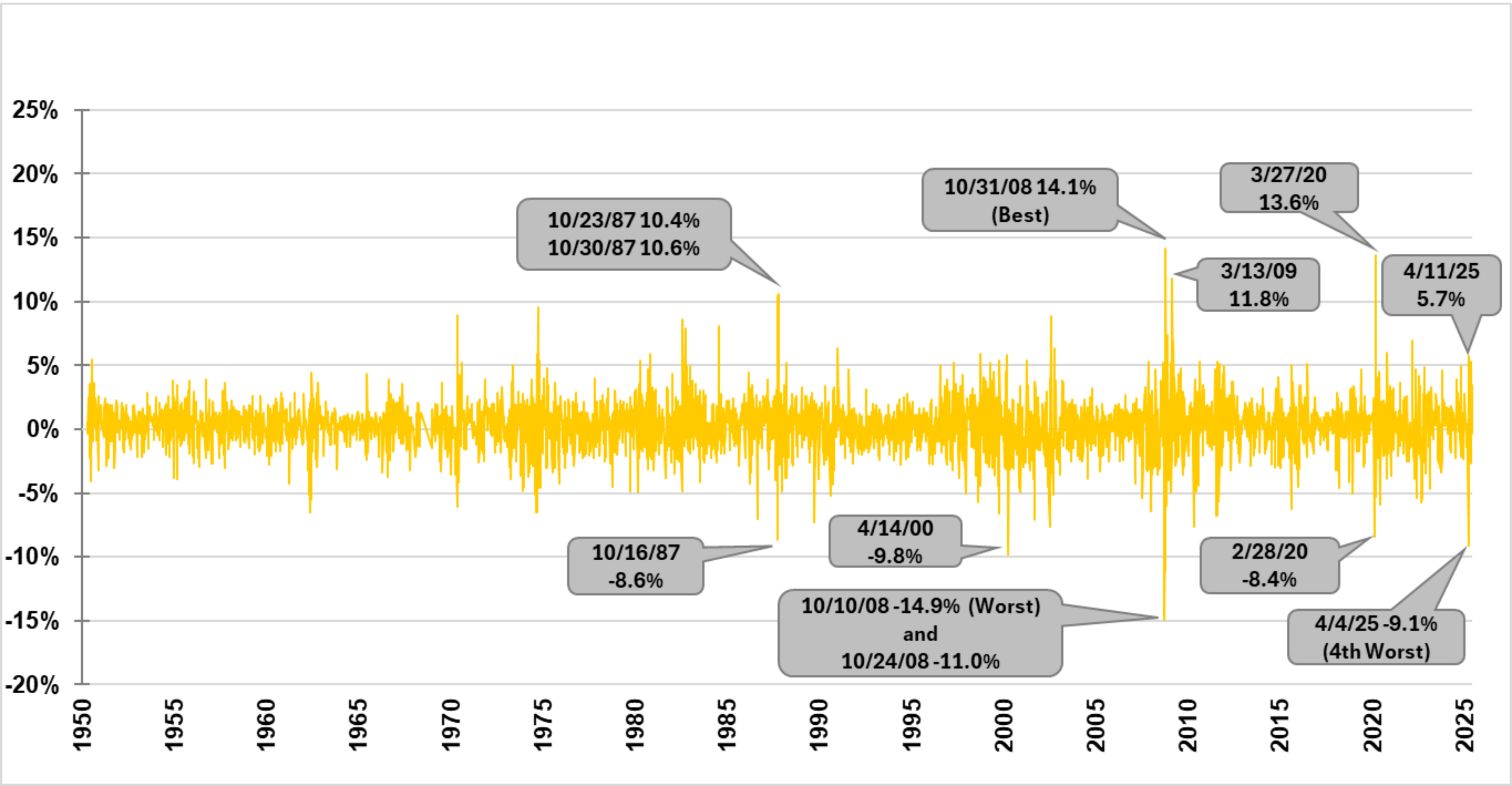
One-Week Fluctuations Since 1950

3,254 weeks – Avg = 0.20% / Max = 14.1% / Min = -14.9%



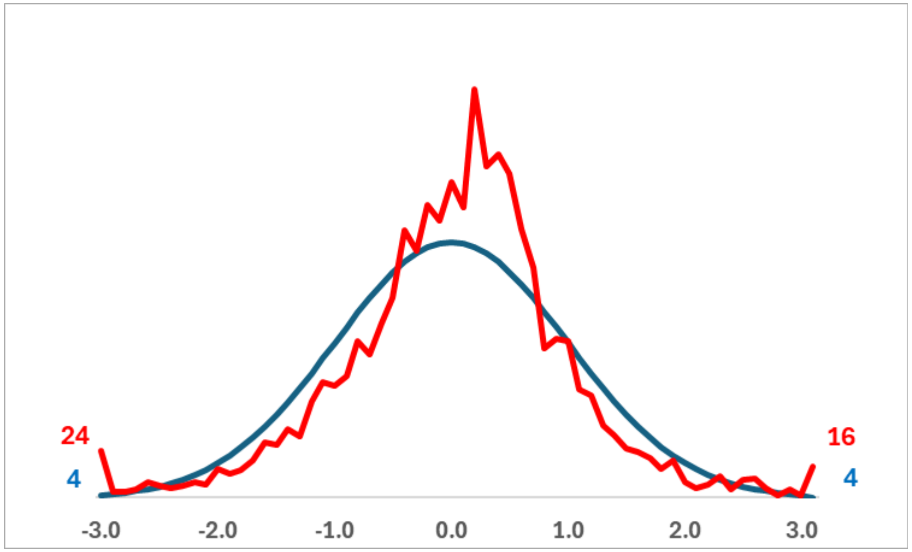
The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
See Data Disclosures.

Frequency Distribution of Weekly Returns as Standard Deviations Since 1950

S&P 500 vs. Normal Distribution

1/14/50 - 6/30/25

Weekly	Since 1/14/1950	
Standard Deviations	Number	As %
3.0 or more	16	0.5%
2.0 up to 3.0	57	1.8%
1.0 up to 2.0	286	8.8%
0.0 up to 1.0	1,356	41.7%
0.0 down to - 1.0	1,119	34.4%
-1.0 down to -2.0	331	10.2%
-2.0 down to -3.0	65	2.0%
-3.0 or less	24	0.7%
Total	3,254	100.0%



3,254 weeks
Avg/Max/Min = 0.197%/14.1%/-14.9%

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
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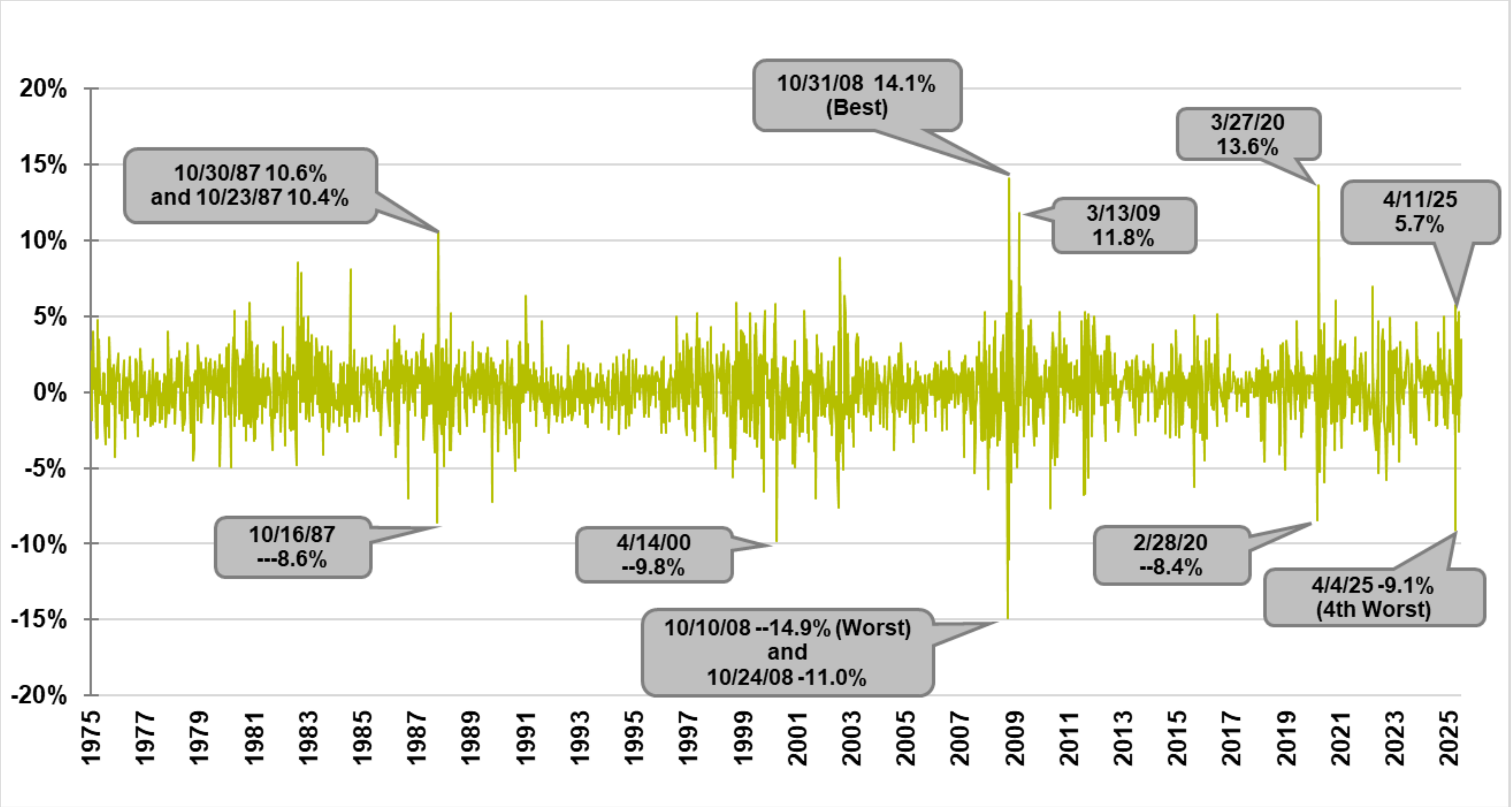
One-Week Fluctuations Since 1975

2,201 weeks – Avg = 0.18% / Max = 14.1% / Min = -14.9%



The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
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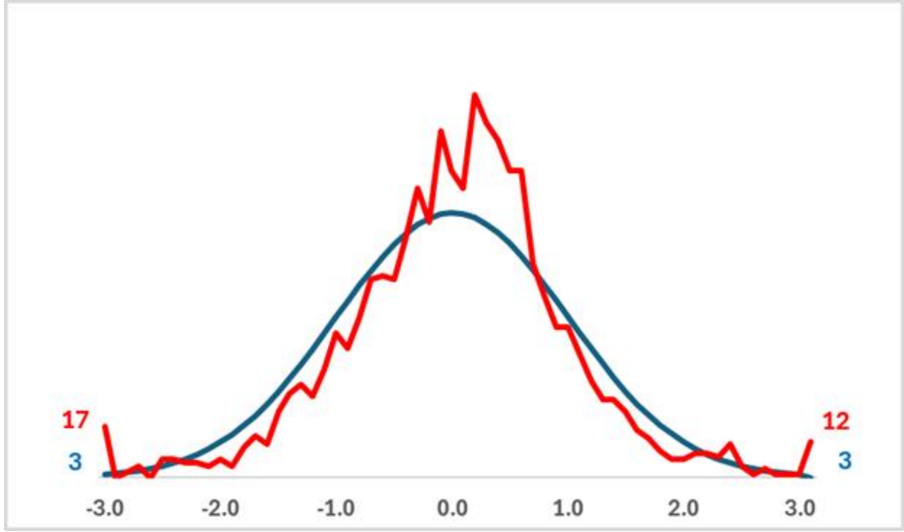
Frequency Distribution of Weekly Returns as Standard Deviations Since 1975

S&P 500 vs. Normal Distribution

1/14/50 - 6/30/25

Weekly	Since 1/10/1975	
Standard Deviations	Number	As %
3.0 or more	12	0.5%
2.0 up to 3.0	45	2.0%
1.0 up to 2.0	197	9.0%
0.0 up to 1.0	888	40.3%
0.0 down to - 1.0	773	35.1%
-1.0 down to -2.0	231	10.5%
-2.0 down to -3.0	38	1.7%
-3.0 or less	17	0.8%
Total	2,201	100.0%



2,201 weeks
Avg/Max/Min = 0.18%/14.1%/-14.9%

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
See Data Disclosures.

Monthly, Quarterly, and Annual Returns of the S&P 500 Since 1928

S&P 500 Returns Since 1928

Statistic	Monthly	Quarterly	Annual
Total	1,170	390	97
Percent Positive	62.6%	69.0%	73.2%
Percent Negative	37.4%	31.0%	26.8%
Average Return	1.0%	3.0%	12.0%*
Maximum Return	42.6%	88.8%	54.0%
Date	4/30/1933	6/30/1933	12/31/1933
Mininum Return	-29.7%	-37.7%	-43.3%
Date	9/30/1931	6/30/1932	12/31/1931
Std. Dev.	5.4%	10.9%	12.0%
Excess Kurtosis	9.3	17.9	0.0

* CAGR is 10.2%

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
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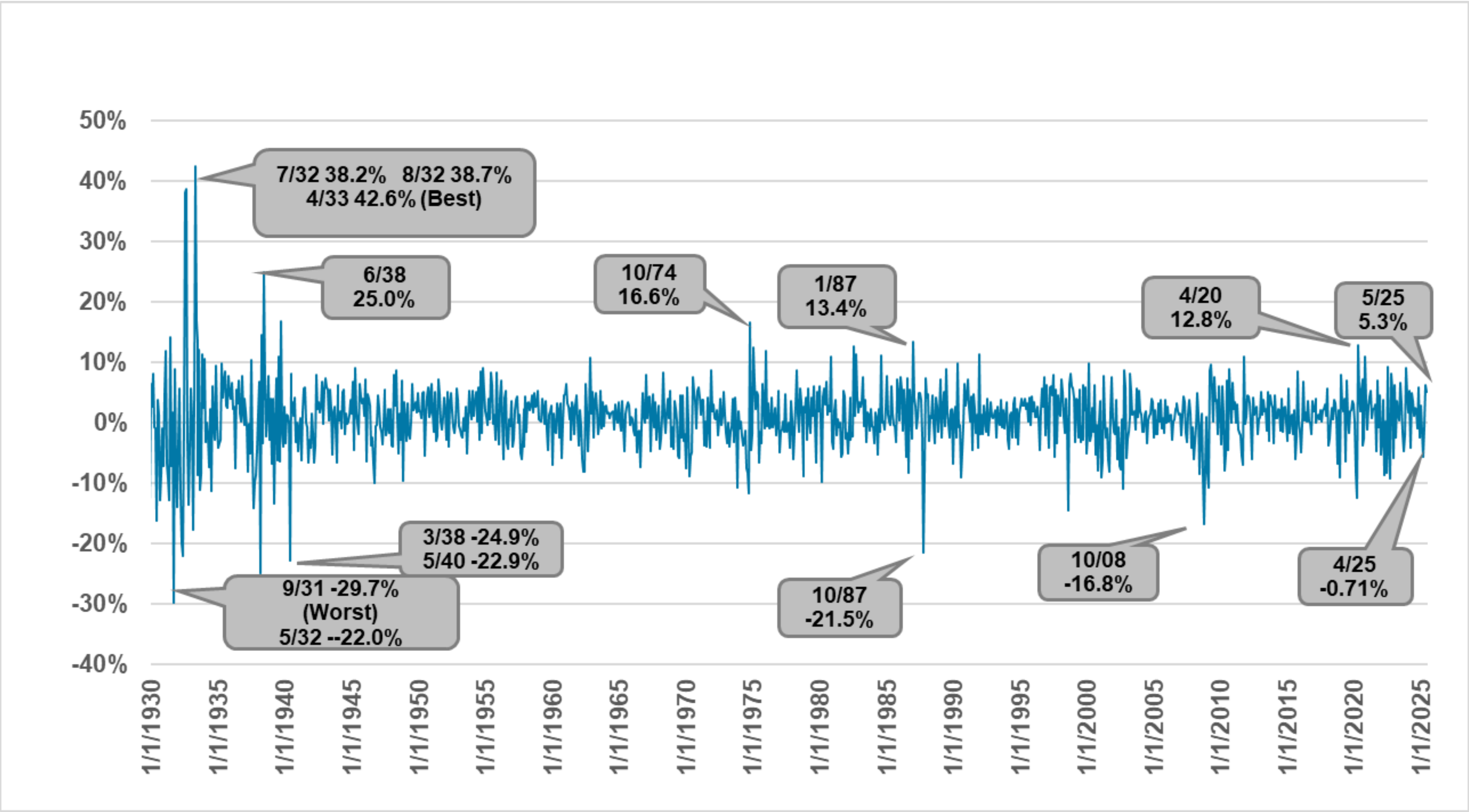
Monthly Fluctuations 1928-6/30/25

1,170 Months – Avg/Max/Min = 1.0%/42.6%/-29.7%



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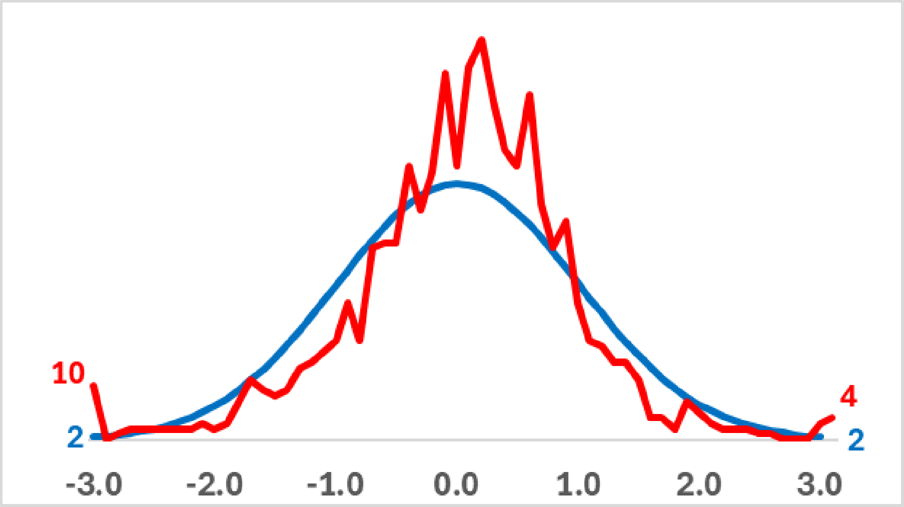
Frequency Distribution of Monthly Returns as Standard Deviations Since 1928

S&P 500 vs. Normal Distribution

1/31/28 - 6/30/25

Monthly	Since 1928	
Standard Deviations	Number	As %
3.0 or more	4	0.3%
2.0 up to 3.0	14	1.2%
1.0 up to 2.0	96	8.2%
0.0 up to 1.0	512	43.8%
0.0 down to - 1.0	408	34.9%
-1.0 down to -2.0	108	9.2%
-2.0 down to -3.0	18	1.5%
-3.0 or less	10	0.9%
Total	1,170	100.0%



1,170 Months
Avg/Max/Min = 1.0%/42.6%/-29.7%

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
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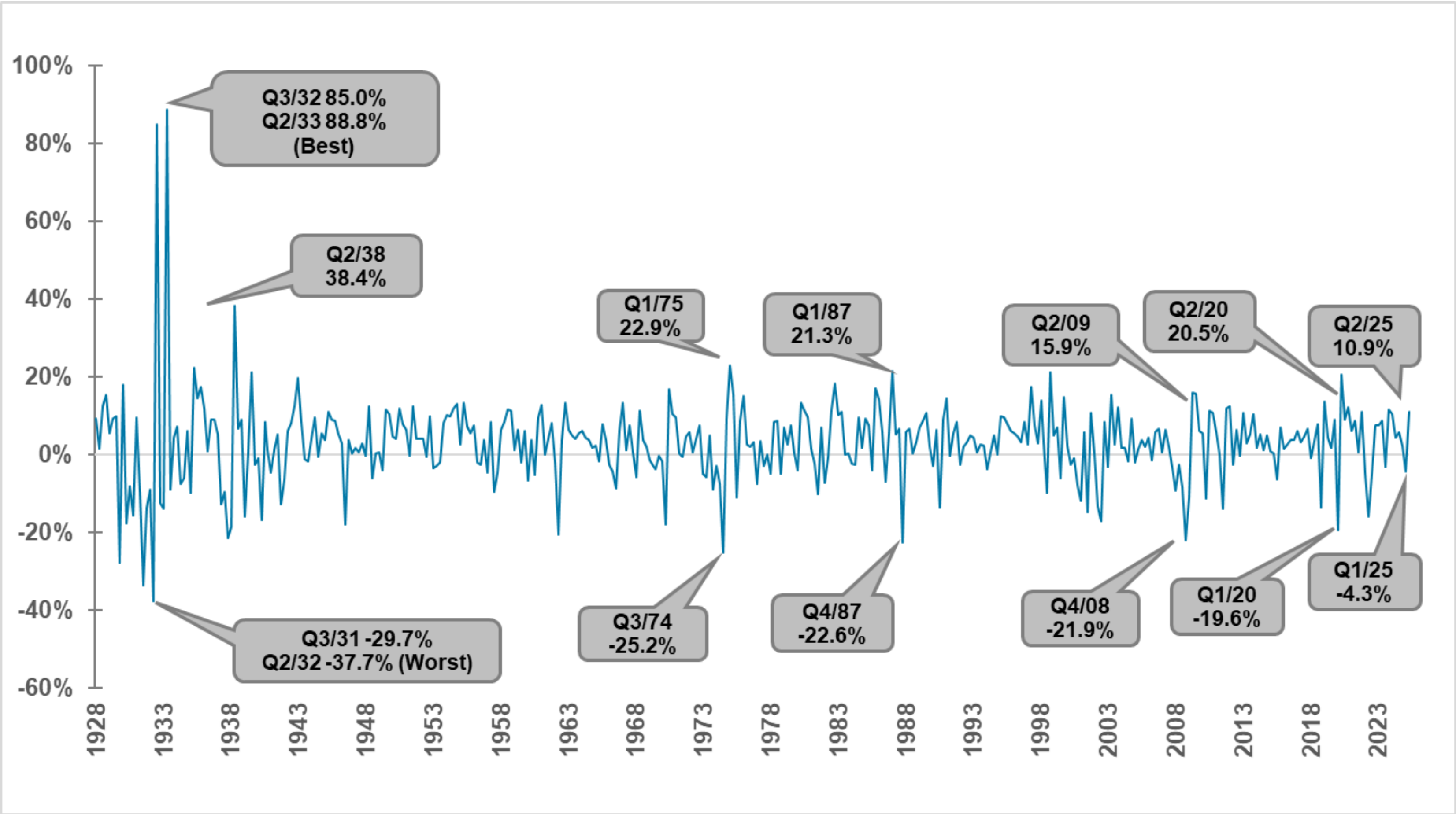
Quarterly Fluctuations Since 1928

390 Quarters – Avg/Max/Min = 3.0%/88.8%/-37.7%



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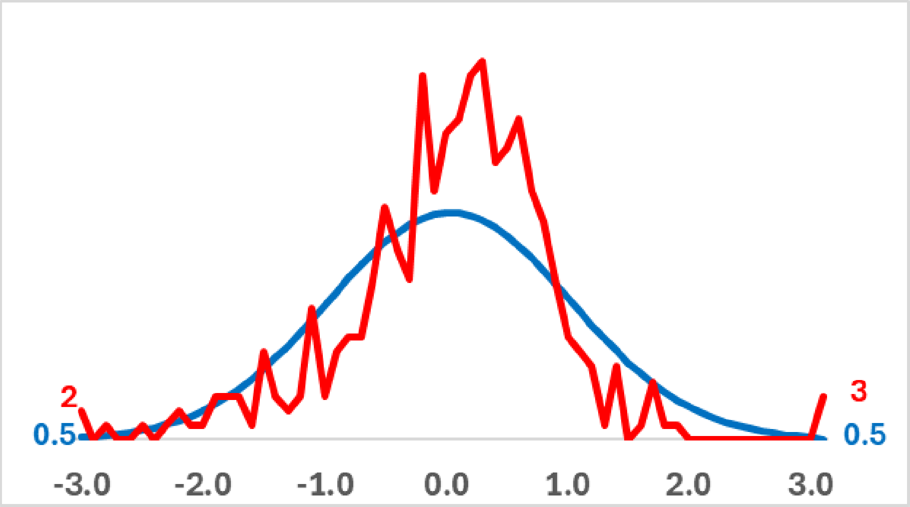
Frequency Distribution of Quarterly Returns as Standard Deviations Since 1928
S&P 500 vs. Normal Distribution

3/31/28 - 6/30/25

Quarterly	Since 1928	
Standard Deviations	Number	As %
3.0 or more	3	0.8%
2.0 up to 3.0	0	0.0%
1.0 up to 2.0	24	6.2%
0.0 up to 1.0	184	47.2%
0.0 down to - 1.0	134	34.4%
-1.0 down to -2.0	36	9.2%
-2.0 down to -3.0	7	1.8%
-3.0 or less	2	0.5%
Total	390	100.0%



390 Quarters
Avg/Max/Min = 3.0%/88.8%/-37.7%

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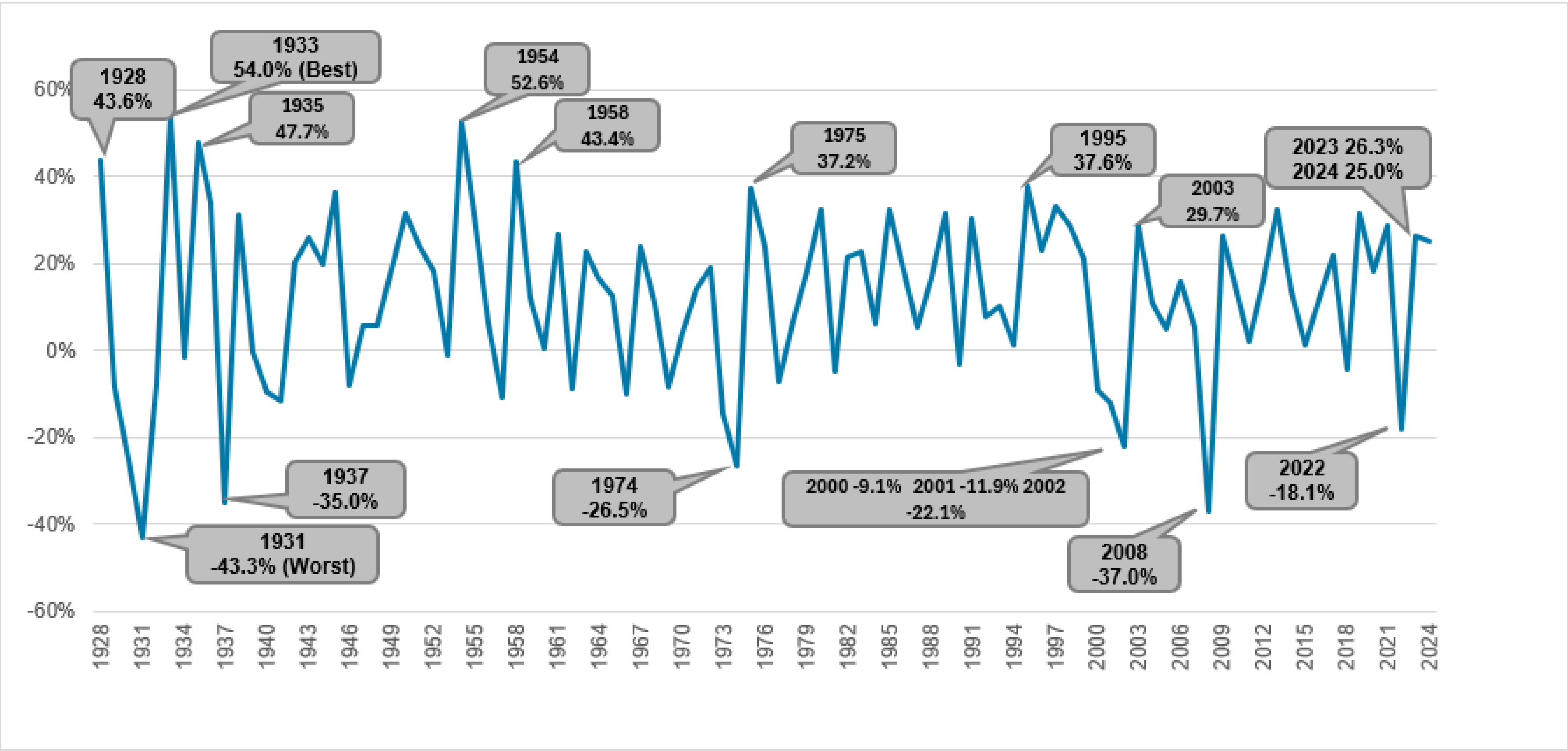
Annual Fluctuations Since 1928

97 Years – Avg/Max/Min = 10.2%/54.0%/-43.3%



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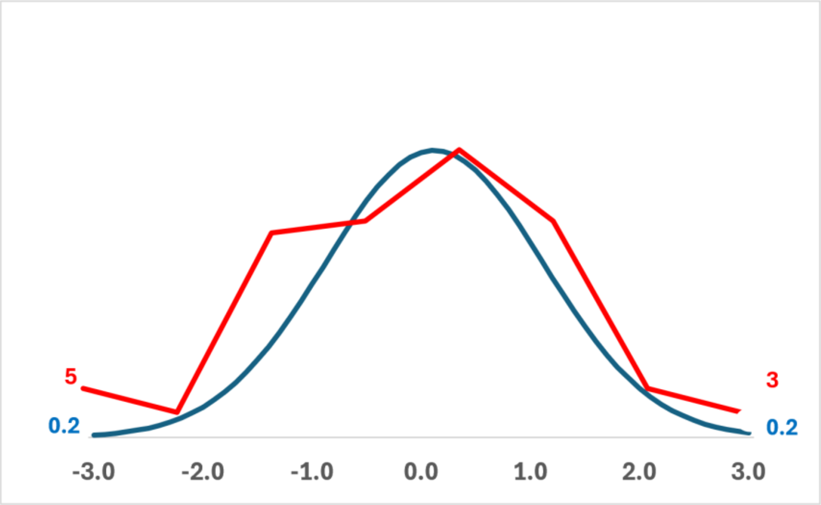
Frequency Distribution of Annual Returns as Standard Deviations Since 1928

S&P 500 vs. Normal Distribution

1928 - 2024

Annual	Since 1928	
Standard Deviations	Number	As %
3.0 or more	3	3.1%
2.0 up to 3.0	5	5.2%
1.0 up to 2.0	19	19.6%
0.0 up to 1.0	25	25.8%
0.0 down to - 1.0	19	19.6%
-1.0 down to -2.0	18	18.6%
-2.0 down to -3.0	3	3.1%
-3.0 or less	5	5.2%
Total	97	100.0%

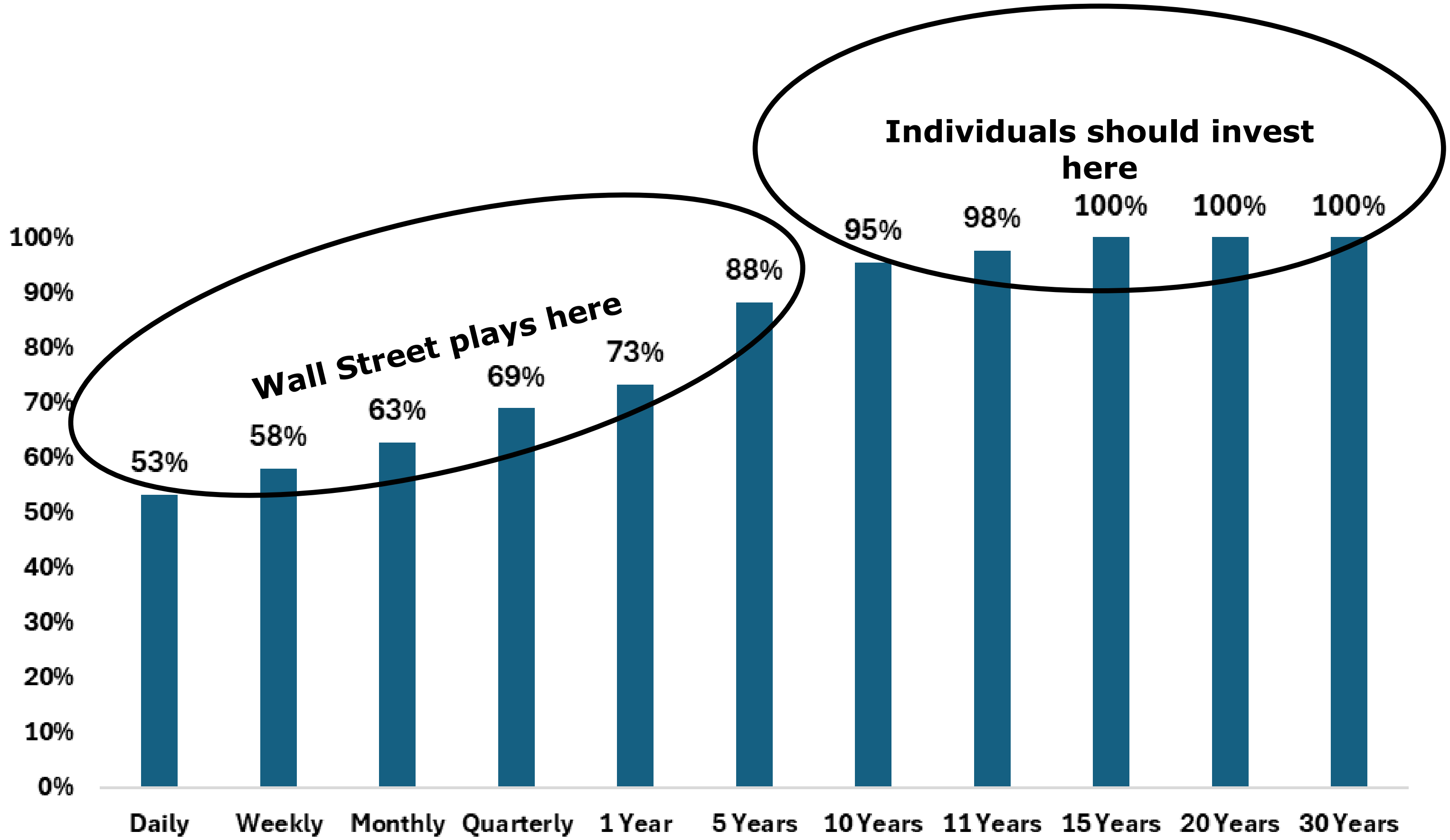


97 Years
Avg/Max/Min = 10.2%/54.0%/-43.3%
(Avg. within +-3SD = 11.1%)

The data for the S&P 500 through 6/30/2025 exclusive of fees, trading costs, and taxes.
See Data Disclosures.

Percentage of Positive Returns of the S&P 500 Since 1928 for Various Time Spans (Not referenced in original article.)

Daily Returns - How Often Positive? 1928-2024



Data Disclosures

RISK DISCLOSURES

The performance exhibits are generic and educational in nature, and do not pertain to your actual portfolio. The exhibits were designed to illustrate the relationship between risk and return, and the uncertainty of stocks relative to bonds.

Market risk is the risk that the value of an investment will decrease due to moves in market factors. Securities of small companies are often less liquid than those of large companies. As a result, small company stocks may fluctuate relatively more in price. Foreign securities prices may decline or fluctuate because of: (a) economic or political actions of foreign governments, and/or (b) less regulated or liquid securities markets. Investors holding these securities are also exposed to foreign currency risk (the possibility that foreign currency will fluctuate in value against the U.S. dollar).

ANALYSIS METHODOLOGY

Back-tested performance is provided for informational purposes only and does not represent actual performance. It is strictly hypothetical. Actual performance may have been materially lower and future performance may be materially lower. Results also do not reflect actual trading and market factors that could have impacted a client's or Asset Dedication's decision-making process.

No matter how positive historical audits have been over any time period, the potential for loss is always present due to factors which may not be accounted for in the historical audit. The nature of a back-tested audit creates the potential for a financial professional to select superior performance results in order to get the desired audit results.

INDEX DEFINITION

An index is list of stocks provided by an index provider that tracks a given segment of the investment universe s and serves as a benchmark against which performance and characteristics are measured. Indices are not available for direct investment; its performance does not reflect the expenses associated with the management of an actual portfolio.

The S&P data are provided by Standard & Poor's Index Services Group. The S& P 500 is an index consisting of 500 stocks, which are weighted by market value. The index includes 500 leading companies and covers approximately 80% of available market capitalization of the U.S. equity market. Its performance is thought to be representative of the stock market as a whole and provides a broad snapshot of the overall U.S. equity market.

S&P 500 data prior to 1957 provided by Center for Research in Security Prices (CRSP) and Professor Robert Shiller.

Disclosures

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