

# How Deep, How Long, and Why: S&P 500 Drawdowns, Recovery Times, and the Role of Measurement Conventions\*

Vincent Wang<sup>†</sup>

July 2026 — working paper v1.0

## Abstract

This paper measures S&P 500 drawdown risk reproducibly. The core daily sample is Yahoo! ^GSPC from 1927-12-30 to 2026-07-02 (24,742 trading days), yielding 73 ATH-anchored underwater episodes of 5%+, of which 26 reach 10%+ and 12 reach 20%+. Beyond frequency, depth, and recovery time, the paper adds four elements rarely treated together: (i) sensitivity of event counts to the counting convention (the same data contain 73 declines of 5%+ when anchored at all-time highs but 339 under the practitioner local-peak convention); (ii) sampling uncertainty of recovery times — the median 20%+ bear-market recovery is 764 days, but its bootstrap 95% confidence interval spans [666, 2310] days — together with recovery milestones (the median time to retrace half of a 20%+ loss is 220 days from the trough); (iii) a Kaplan–Meier survival view of time under water; and (iv) robustness across four measurement conventions (nominal/real  $\times$  price/total-return). Episodes of 10%+ that overlap NBER recessions (10 of 26) run far deeper and longer (median -35.0%, 988 days) than non-overlapping ones (16; -14.3%, 216 days). With dividends reinvested, the median 20%+ underwater spell shortens from 5.4 to 2.7 years; the 1929 crash recovers in 7.2 years in real total-return terms versus 25.0 in nominal price terms, while in real terms 2000–2013 is one continuous underwater spell that absorbs the 2007 crisis entirely.

**Keywords:** drawdown; recovery time; time under water; bear market; survival analysis; total return; S&P 500.

## 1 Introduction

A long-run upward-trending asset is not exempt from drawdown analysis. For a long-horizon investor the lived experience of risk is three questions: how deep, how long, and why. Maximum drawdown answers only the first; this paper treats all three in one reproducible framework and measures how sensitive the answers are to the statistical conventions used to produce them.

Four questions organize the paper. First, how common are drawdowns at each depth threshold, and how much does the answer depend on the counting convention (Section 5)? Second,

---

\*Research use only; not investment advice. All results are descriptive statistics of historical data; past drawdowns do not predict future outcomes. Data come from third-party public sources with licensing limits; public releases exclude raw and processed Yahoo-derived data files. Build d10c558-dirty; input data SHA256 9da0f7ebd1ed; every number in this paper is programmatically injected from the repository's pipeline outputs.

<sup>†</sup>Contact: vincentwang.research@outlook.com. The full pipeline (download scripts, drawdown engine, statistics, figures, tables, and this document) is script-generated and unit-tested; see Section 12.2.

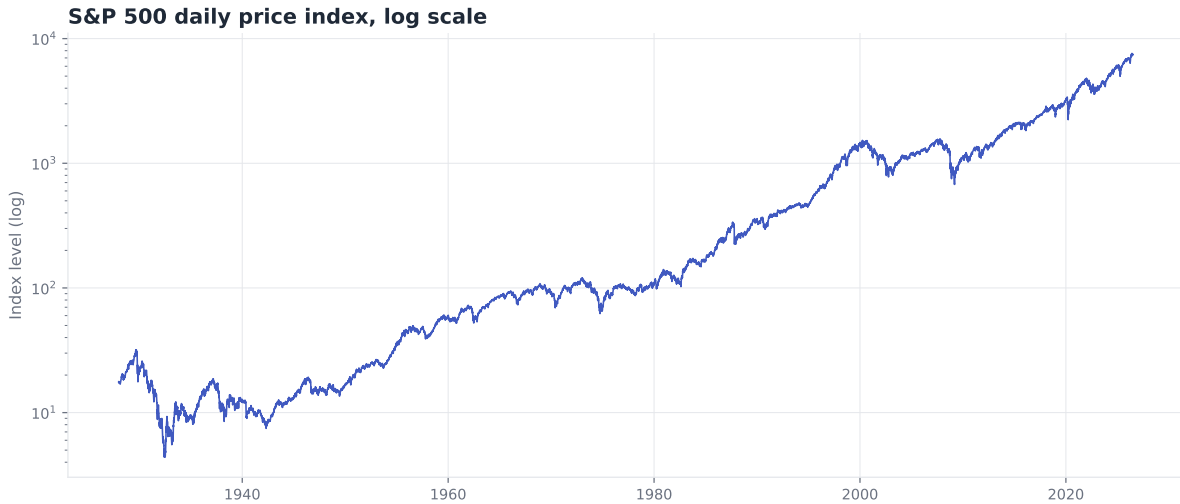


Figure 1: S&P 500 daily price index on a log scale, 1927–2026. Data: Yahoo ^GSPC; values before the index launch in 1957 are the backfilled S&P 90 predecessor.

how long does recovery take — including the sampling uncertainty of the point estimates, the milestones an investor passes on the way back, and the full survival curve of time under water (Sections 6–7)? Third, how do deep drawdowns overlap with macroeconomic recessions (Section 8)? Fourth, how much do the historical conclusions change when returns are measured in real terms or with dividends reinvested (Section 9)?

The paper is deliberately descriptive. It does not forecast the next crisis; it builds the historical baseline against which defensive strategies — trend filters, volatility control, protective options — should be evaluated, and it attaches to every headline number the convention and the uncertainty that produced it.

## 2 Related Work and Positioning

In the academic literature drawdown appears mainly as a risk measure to be optimized or characterized. Chekhlov et al. (2005) bring conditional drawdown (CDaR) into portfolio optimization; Magdon-Ismail and Atiya (2004) derive the expected maximum drawdown of a Brownian motion; Goldberg and Mahmoud (2017) develop the measure’s theoretical properties and its connection to investor preferences. This paper is complementary and descriptive: an episode-level factbook of frequency, depth, recovery paths, and historical attribution, treating the choice of measurement convention itself as an object of study.

Methodologically, the censored nature of recovery times borrows the standard survival-analysis estimator of Kaplan and Meier (1958), and the uncertainty of medians uses the bootstrap of Efron (1979). The long history relies on the monthly composite series maintained by Shiller (2015), which incorporates the early reconstruction of Cowles and Associates (1939).

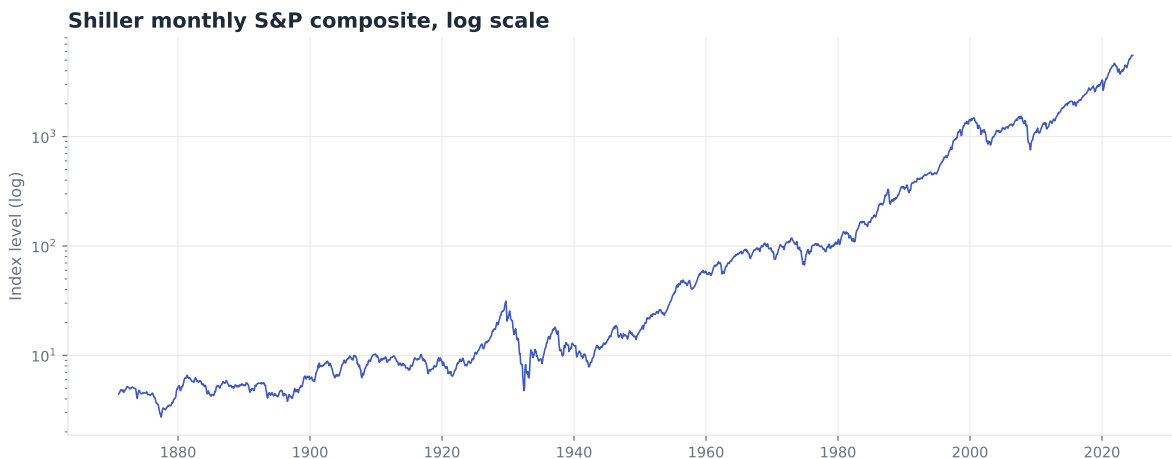


Figure 2: Shiller monthly S&P composite on a log scale, from 1871.

### 3 Data

**Daily core sample.** Yahoo `^GSPC` closing prices, 1927-12-30 to 2026-07-02 (24,742 trading days, 98.5 years). The S&P 500 launched on 1957-03-04; earlier daily values are the backfilled S&P 90 predecessor index as distributed by the source. All episode statistics in this paper use daily closes; intraday extremes are excluded.

**Monthly long history.** The Shiller composite, 1871-01-01 to 2024-09-01; values before 1926 derive from the Cowles reconstruction. The monthly price is the intra-month *average* of daily closes and therefore smooths extremes: the 1929–32 collapse measures -84.8% monthly versus -86.2% daily. The source publishes as a lagging snapshot, so its endpoint trails the daily sample.

**Measurement variants.** From Shiller’s price, dividend, and CPI columns we build four monthly series — nominal/real price and nominal/real total return — from 1871-01 to 2024-06-01 (truncated at the last month with dividend data). Monthly total return uses the standard construction  $R_t = (P_t + D_t/12) / P_{t-1}$ .

**Macro data.** NBER recession months (FRED USREC, from 1900) and the Fed funds rate (from 1954); inflation is the year-over-year change of Shiller’s CPI, covering the full sample.

**Cross-asset panel.** Daily dividend-adjusted closes for SPY, QQQ, IWM, XLK, XLF, XLE, XLU, TLT, and GLD, used in Section 10. Each asset enters at its inception; the panel is total-return flavored, unlike the price-index S&P series.

**Validation.** All inputs pass an automated data-quality gate: unique ascending dates, positive prices, and calendar gaps or single-period moves inside verified historical bounds (the March 1933 bank holiday and 1987-10-19 are the audited extremes).

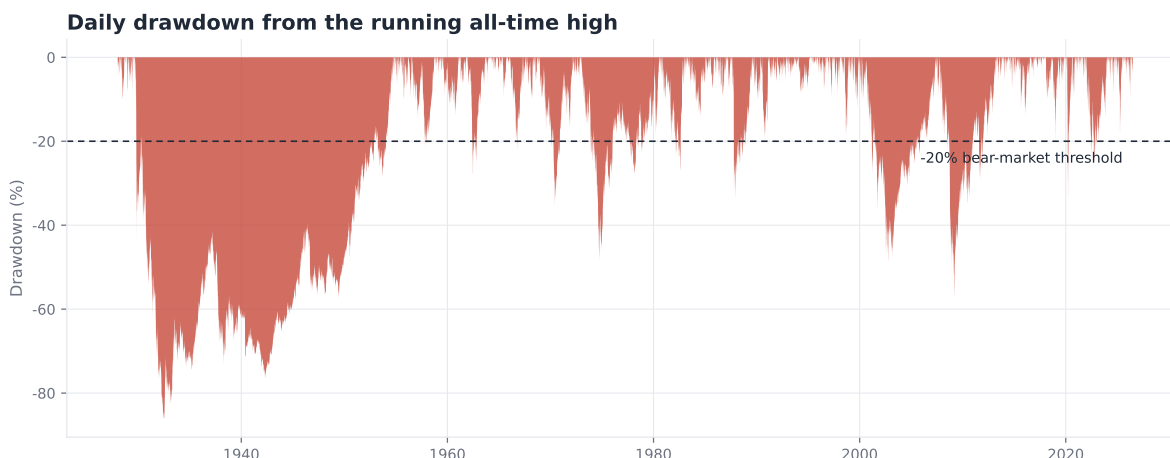


Figure 3: The daily drawdown curve  $D_t$  with the  $-20\%$  bear-market threshold.

## 4 Methodology: Underwater Episodes

Let  $P_t$  be the closing price and  $M_t = \max_{s \leq t} P_s$  the running maximum; the drawdown is  $D_t = P_t/M_t - 1 \leq 0$ . An *ATH-anchored underwater episode* starts at the prior all-time high, passes through the lowest close (the trough), and ends when the close first returns to or above that prior high. Episode depth is  $\min_t D_t$  over the window; episodes join the 5%/10%/15%/20% threshold sets by maximum depth, so a  $-30\%$  bear market is counted once rather than once per threshold crossed.

- All statistics use daily closes. The famous 1990, 2018, and 2025 near-bears stop just short of  $-20\%$  on closes while breaching it intraday.
- Durations are calendar days between close dates, not trading-session counts.
- Open episodes are censored at the sample end and excluded from recovery-time medians; the survival analysis of Section 7.2 handles censoring explicitly. The number of open 5%+ episodes at the current sample end is 0.
- The sample start is treated as the initial peak; any earlier high is invisible (left-edge censoring), negligible for this sample.

## 5 Counting Conventions: ATH-Anchored vs Local-Peak

Practitioner statements like “about three 5% dips a year” use the *local-peak* convention: any decline of the threshold size from the latest local high counts as an event, and an equal-size rally confirms the next leg (zigzag alternation). The same daily data differ enormously across conventions: 73 vs 339 declines at 5%+ (about 3.4 per year), 26 vs 103 at 10%+, and 12 vs 27 at 20%+ (Table 1). Episode counts in this paper are therefore *lower bounds* and must not be compared with local-peak pullback statistics.

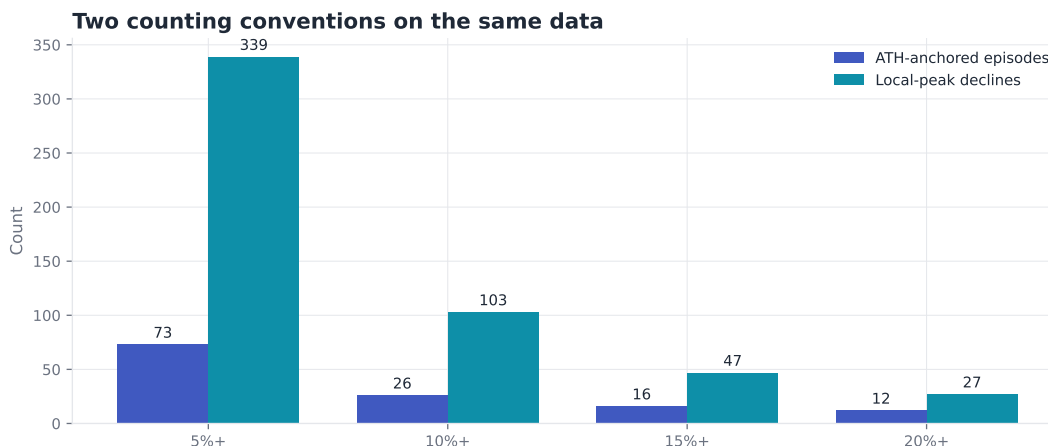


Figure 4: Event counts under the two counting conventions.

Table 1: Convention comparison: counts and average spacing in years.

Threshold	ATH episodes	Local-peak declines	Yrs/episode	Yrs/decline
5%+	73	339	1.3	0.3
10%+	26	103	3.8	1.0
15%+	16	47	6.2	2.1
20%+	12	27	8.2	3.6

Famous declines absorbed by the ATH convention include the 1937–38 collapse ( $-54.5\%$ , inside the 1929–1954 episode) and the 2011 correction ( $-19.4\%$ , inside the 2007–2013 episode). Table 2 lists every absorbed local-peak decline of 20%+.

## 6 Frequency, Uncertainty, and the Shape of Depth

### 6.1 Threshold frequency and sampling uncertainty

Deep-threshold buckets are small (12 episodes at 20%+), so point-estimate medians overstate precision. Table 4 reports bootstrap 95% confidence intervals (10,000 resamples, fixed seed) for the duration and depth medians: the median 20%+ recovery is 764 days, with a confidence interval of [666, 2310] days — a near threefold span. Planning anchored on “the historical median” should carry this uncertainty explicitly.

### 6.2 Distribution across decades

Episodes cluster strongly in time (Figure 6, Table 5). Zero-episode decades (1930s, 1940s) are not calm markets but a counting artifact: those years sit entirely inside a longer underwater episode that began earlier, with no fresh all-time high to breach.

Table 2: Local-peak declines of 20%+ absorbed into longer underwater episodes (complete list).

Peak	Trough	Decline (%)
1937-03-10	1938-03-31	-54.5
1930-04-10	1930-12-16	-44.3
1931-06-26	1931-10-05	-42.5
1932-09-07	1933-02-27	-40.6
1940-11-07	1942-04-28	-34.4
1931-02-24	1931-06-02	-32.9
2002-01-04	2002-07-23	-32.0
1939-10-25	1940-06-10	-31.9
1934-02-06	1935-03-14	-31.8
1933-07-18	1933-10-19	-29.4
1946-05-29	1947-05-19	-28.5
1938-10-10	1939-04-11	-25.1
1948-06-15	1949-06-13	-20.6

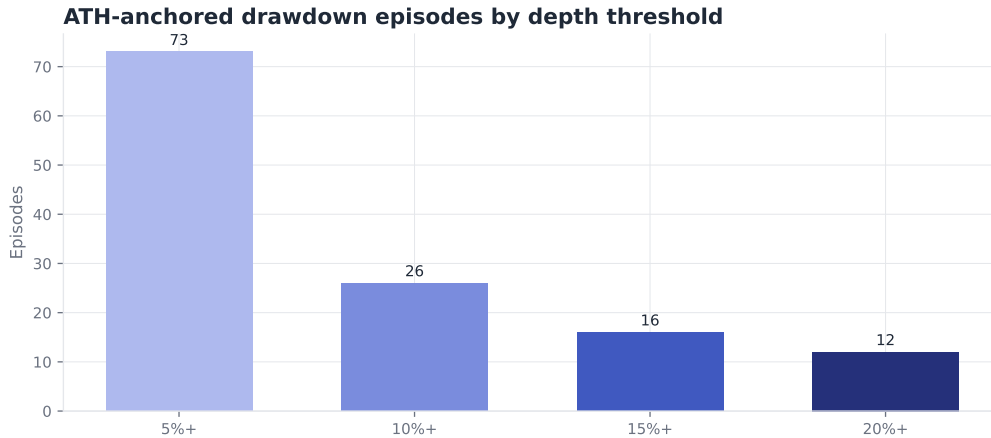


Figure 5: ATH-anchored episode counts by depth threshold.

### 6.3 Depth distribution

The depth distribution is heavy-tailed (Figure 7): 5–10% pullbacks form the majority of episodes, while a handful of systemic bears in the left tail set the risk-budget requirements for long-horizon investors.

## 7 Recovery: Milestones, Survival, and the Depth–Time Link

### 7.1 Recovery milestones

Full recovery is not when an investor’s experience starts improving. For 20%+ bears the median time from the trough to retracing *half* of the loss is 220 days, to 90% of the loss 383 days, and to full recovery 532 days (Table 6) — portfolio pain eases long before the recovery completes. Milestones therefore suit cash-flow and communication planning better than the single “back to the peak” date.

Table 3: Threshold summary. Duration statistics use recovered episodes only.

Threshold	Episodes	Open	Median depth (%)	Worst (%)	Median underwater (d)	Longest (d)
5%+	73	0	-8.2	-86.2	84.0	9,137
10%+	26	0	-19.8	-86.2	433.0	9,137
15%+	16	0	-27.5	-86.2	703.0	9,137
20%+	12	0	-33.7	-86.2	764.0	9,137

Table 4: Bootstrap 95% confidence intervals for the medians.

Threshold	n	Median underwater (d)	CI95 lo (d)	CI95 hi (d)	Median depth (%)	CI95 lo (%)	CI95 hi (%)
5%+	73	84.0	72.0	117.0	-8.2	-9.6	-7.1
10%+	26	433.0	212.0	701.0	-19.8	-27.1	-14.2
15%+	16	703.0	215.0	1371.5	-27.5	-40.9	-21.5
20%+	12	764.0	665.5	2310.0	-33.7	-48.7	-26.3

## 7.2 A survival-analysis view

Treating “still underwater” as survival, the Kaplan–Meier estimator (Kaplan and Meier, 1958) gives the probability of remaining unrecovered  $t$  days after the peak while handling end-of-sample censoring naturally (Figure 10). The curves shift right systematically as thresholds deepen, and the 20%+ tail is driven by the four systemic bears of 1929, 1973, 2000, and 2007.

## 7.3 Depth versus time under water

Depth and recovery correlate but are far from one-to-one (Figure 11): episodes of similar depth differ in recovery by multiples (contrast 2020 with 1973). This is why time under water deserves reporting independent of maximum drawdown.

# 8 Causes and Macro Regimes

## 8.1 The largest bears and their curated causes

Cause labels are confidence-rated curated attributions, not causal tests. 26 of 73 episodes carry labels, covering all 26 episodes of 10%+; the unlabeled remainder are sub-10% pullbacks grouped as “market correction/unclear”. Financial crises and recessions dominate deep drawdowns; purely technical or liquidity-driven events (1987, February 2018) are deep but fast.

## 8.2 Recession overlap as the watershed

Mapping each 10%+ episode’s underwater window onto monthly NBER recession indicators: 10 episodes overlap a recession and 16 do not. The two groups differ sharply (Table 9) — recession-overlapping episodes run a median -35.0% deep and 988 days underwater, versus -14.3% and 216 days otherwise. The allocation implication is direct: judging whether a drawdown comes with a recession has more leverage than forecasting the drawdown itself. Overlap is association, not causal identification.

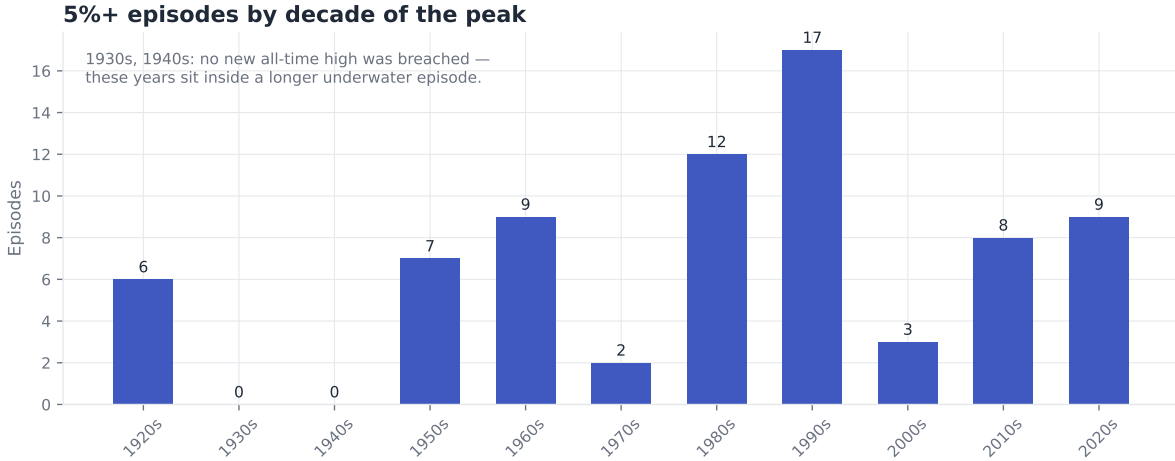


Figure 6: 5%+ episodes by decade of the peak.

Table 5: By-decade summary (duration medians use recovered episodes only).

Decade	Episodes	Worst (%)	Median underwater (d)
1920s	6	-86.2	46.5
1930s	0		
1940s	0		
1950s	7	-21.5	116.0
1960s	9	-36.1	198.0
1970s	2	-48.2	1411.5
1980s	12	-33.5	99.5
1990s	17	-19.9	76.0
2000s	3	-56.8	1997.0
2010s	8	-19.8	72.5
2020s	9	-33.9	72.0

## 9 Robustness: Nominal/Real $\times$ Price/Total-Return

The measurement convention materially changes the recovery narrative. With dividends reinvested, the median 20%+ underwater spell falls from 5.4 years (nominal price) to 2.7 years (nominal total return); the 1929 crash shortens from 25.0 years to 7.2 years in real total-return terms. In the other direction, inflation adjustment makes the 1970s markedly worse: the 1973 crisis takes 12.0 years to recover in real total-return terms versus 7.5 nominal-price years.

The blank cells of Table 11 are themselves findings: in real terms the 2007 crisis has no standalone entry because the market had never regained its 2000 real peak — 2000–2013 is one continuous real-terms underwater spell that swallowed both crashes; likewise 1973 sits inside the long underwater spell measured from the 1968 real peak.

## 10 Cross-Asset Stress Transmission: The ETF Panel

Using each S&P 10%+ underwater window since 1999 as the event window, we measure every asset’s own maximum drawdown inside it (dividend-adjusted closes; Figure 16; the full matrix

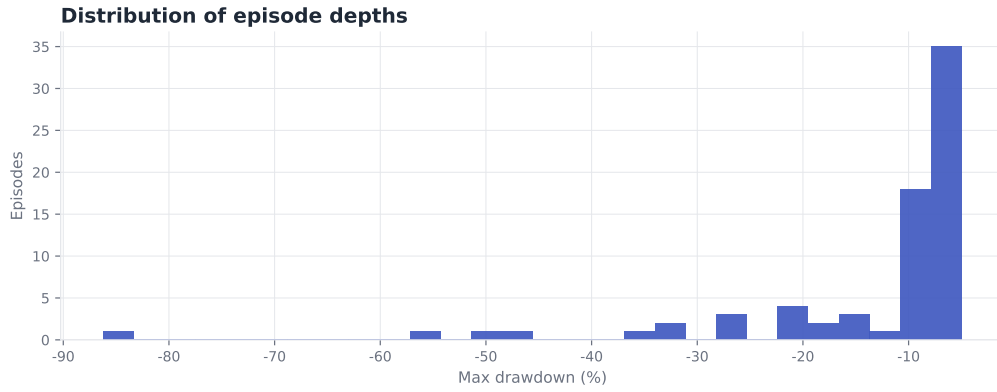


Figure 7: Distribution of maximum drawdowns across 5%+ episodes.

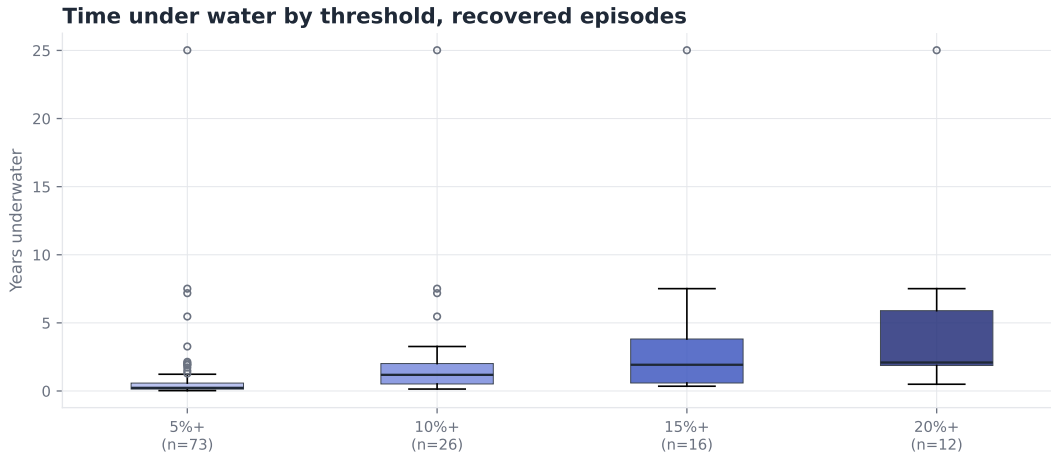


Figure 8: Time under water by threshold, recovered episodes (sample sizes in the tick labels).

is tabulated in Appendix B). The pattern is stable: technology and small caps amplify equity stress (QQQ  $-83\%$  in 2000), and the crisis source picks the epicenter (XLF  $-82\%$  in 2008); utilities decline systematically less than the index; long-duration Treasuries hedge most equity crises but fell alongside equities in the inflation bear of 2022 (TLT  $-40\%$ ) — the hedge is regime-dependent; gold sits in between.

## 11 Implications for Investment and Risk Management

First, manage 5%, 10%, and 20%+ separately. A 5% dip is portfolio noise (about 3.4 per year under the local-peak convention); a 10%+ correction should trigger pre-agreed communication and rebalancing discipline; a 20%+ bear is a distinct capital-preservation problem whose recovery-time confidence interval spans years and must not be planned around a single median.

Second, plan around milestones rather than a single recovery date: the median half-way recovery takes roughly forty percent of the time of full recovery, and withdrawals, refinancing, and behavior management all happen inside that window. Third, recession overlap is the watershed for depth (Section 8.2); macro judgment should answer “recession or not” before “drawdown or

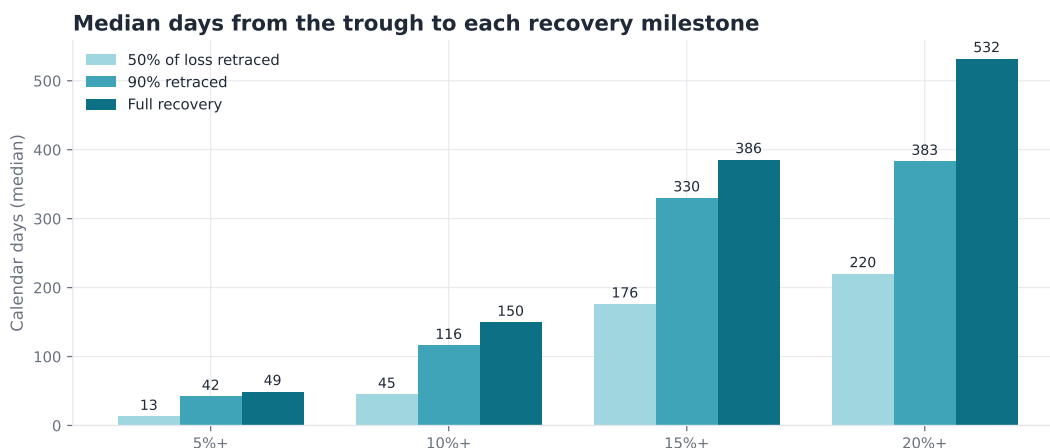


Figure 9: Median days from the trough to 50%/90% retracement and full recovery.

Table 6: Recovery-milestone summary (median calendar days from the trough).

Threshold	Episodes	50% retraced (d)	90% retraced (d)	Full recovery (d)
5%+	73	13	42	49
10%+	26	45	116	150
15%+	16	176	330	386
20%+	12	220	383	532

not”. Fourth, match the reporting convention to the liability: for real spending liabilities (pensions, endowments) the real total-return view shows 2000–2013 as one thirteen-year underwater spell that a nominal price view misreports as two separate events.

The study is a strategy-evaluation baseline, not a timing signal: any trend filter, volatility-control rule, or options program should report what it improves across these historical episodes — depth, time under water, or milestone times — and by how much.

## 12 Limitations and Reproducibility

### 12.1 Limitations

- The core daily series is a price index; the total-return and real robustness checks use monthly Shiller data, whose intra-month averaging smooths extremes.
- Monthly total return spreads the annualized dividend evenly ( $D/12$ ), ignoring intra-month timing; real-terms results inherit the historical quality of CPI.
- Cause labels are narrative attributions; recession overlap is association, not causal identification.
- The ETF panel uses adjusted closes (total-return flavored), not fully homogeneous with the price-index S&P reference row; inception dates differ, so early windows have gaps.

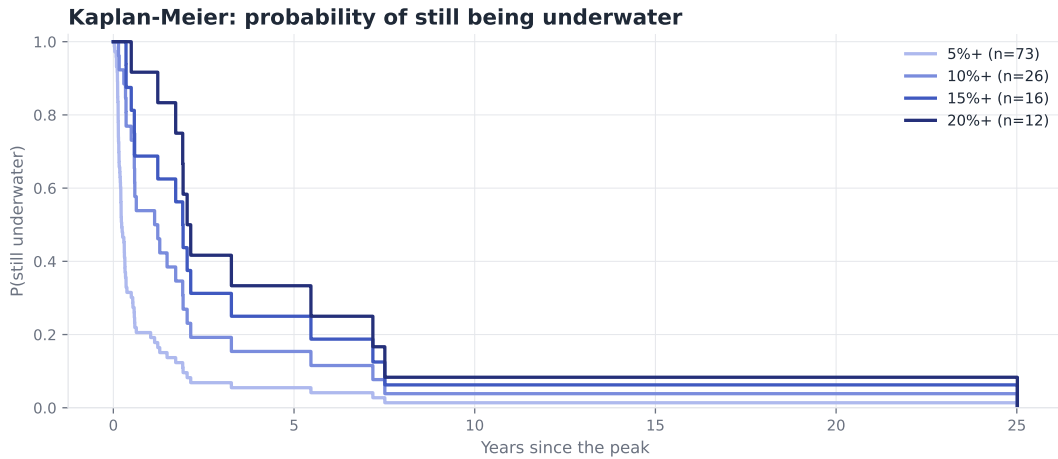


Figure 10: Kaplan–Meier survival curves: probability of remaining underwater after the peak.

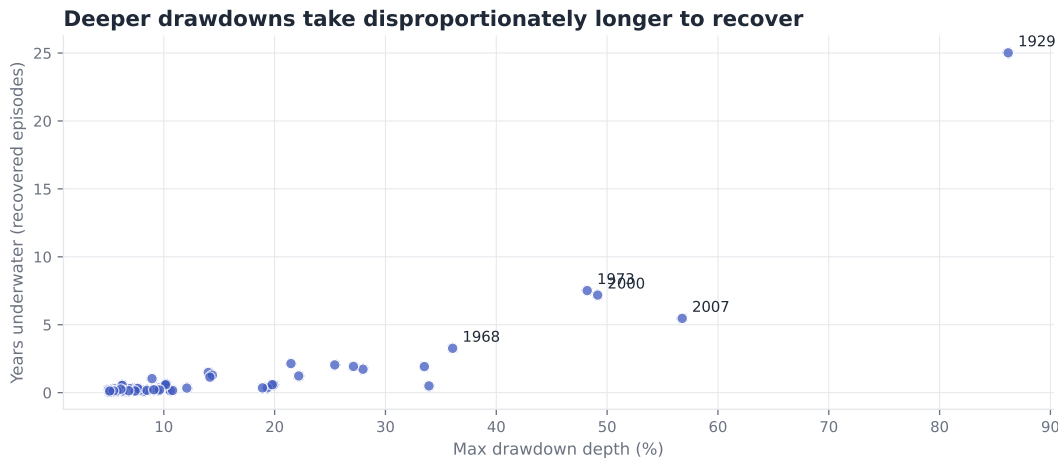


Figure 11: Depth versus years underwater (recovered episodes; the five deepest labeled by peak year).

- Pre-1957 daily data are the S&P 90 backfill and pre-1926 monthly data the Cowles reconstruction; early market structure differs from today, so the long history is risk context rather than an extrapolation model.

## 12.2 Reproducibility

Every table, figure, and document is script-generated from committed processed data; the draw-down engine, event labeling, statistics, and data validation carry a unit-test suite, and build-time assertions fail the build if any hardcoded narrative example drifts from the data. Every number in this paper is injected from `generated/numbers.tex`; hand-typed figures are forbidden by construction. This document was built from commit `d10c558-dirty` on `2026-07-07` with input data `SHA256 9da0f7ebd1ed` (data through `2026-07-02`).

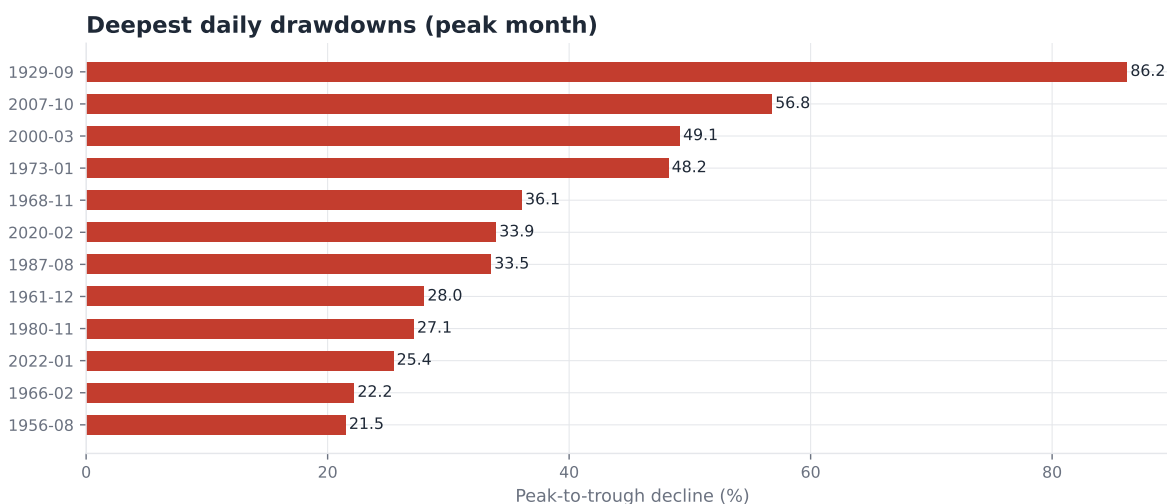


Figure 12: The twelve deepest daily drawdowns, by peak month.

Table 7: The fifteen deepest episodes with curated cause labels.

Peak	Trough	Recovery	Max DD (%)	Underwater (d)	Primary cause	Conf.
1929-09-16	1932-06-01	1954-09-22	-86.2	9,137	1929 crash and Great Depression	high
2007-10-09	2009-03-09	2013-03-28	-56.8	1,997	Global Financial Crisis	high
2000-03-24	2002-10-09	2007-05-30	-49.1	2,623	Dot-com bust and 2001 recession	high
1973-01-11	1974-10-03	1980-07-17	-48.2	2,744	Oil embargo inflation and recession	high
1968-11-29	1970-05-26	1972-03-06	-36.1	1,193	Inflation Vietnam and 1969-70 recession	high
2020-02-19	2020-03-23	2020-08-18	-33.9	181	COVID-19 pandemic shock	high
1987-08-25	1987-12-04	1989-07-26	-33.5	701	Black Monday crash	high
1961-12-12	1962-06-26	1963-09-03	-28.0	630	Kennedy Slide / growth scare	medium
1980-11-28	1982-08-12	1982-11-03	-27.1	705	Volcker tightening and double-dip recession	high
2022-01-03	2022-10-12	2024-01-19	-25.4	746	Inflation shock and Fed tightening	high
1966-02-09	1966-10-07	1967-05-04	-22.2	449	1966 credit crunch and Fed tightening	high
1956-08-03	1957-10-22	1958-09-24	-21.5	782	1957 recession with Suez and Sputnik shocks	medium
1990-07-16	1990-10-11	1991-02-13	-19.9	212	Gulf War oil shock and recession	high
2018-09-20	2018-12-24	2019-04-23	-19.8	215	Fed tightening and growth scare	high
1998-07-17	1998-08-31	1998-11-23	-19.3	129	Russia default and LTCM crisis	high

## 13 Conclusion

Long-run S&P 500 returns are earned by bearing and surviving drawdowns. What history offers is not prediction but material for expectation-setting: how deep (heavy-tailed), how long (convention-sensitive, with wide sampling uncertainty), and why (recession overlap is the watershed). The same history also warns against quoting any drawdown number without its convention: the same century of data contains 73 or 339 declines of 5%+ depending on the counting rule, and the 1929 recovery took 25.0 years or 7.2 years depending on the measurement. Writing these facts — with their uncertainty — into investment discipline beats improvising explanations mid-crisis.

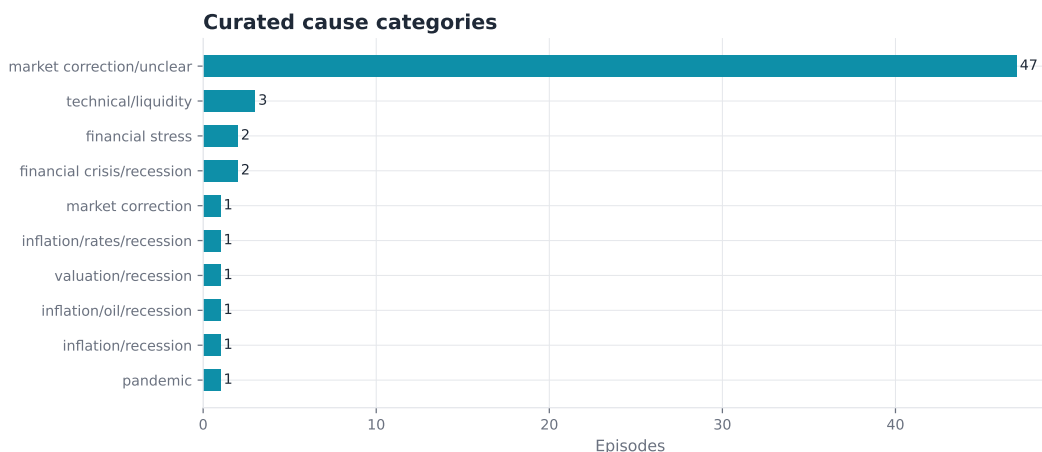


Figure 13: Episode counts by cause category (top 10).

Table 8: Cause-category summary (top 10 of 23 categories; full data in the repository tables).

Cause category	Episodes	Worst (%)	Median underwater (d)
market correction/unclear	47	-9.8	65.0
technical/liquidity	3	-33.5	232.0
financial crisis/recession	2	-86.2	5567.0
financial stress	2	-19.3	94.0
valuation/recession	1	-49.1	2623.0
inflation/oil/recession	1	-48.2	2744.0
inflation/recession	1	-36.1	1193.0
pandemic	1	-33.9	181.0
market correction	1	-28.0	630.0
inflation/rates/recession	1	-27.1	705.0

## References

- Alexei Chekhlov, Stanislav Uryasev, and Michael Zabarankin. Drawdown measure in portfolio optimization. *International Journal of Theoretical and Applied Finance*, 8(1):13–58, 2005.
- Alfred Cowles and Associates. *Common-Stock Indexes*. Principia Press, 2nd edition, 1939.
- Bradley Efron. Bootstrap methods: Another look at the jackknife. *The Annals of Statistics*, 7(1):1–26, 1979.
- Lisa R. Goldberg and Ola Mahmoud. Drawdown: From practice to theory and back again. *Mathematics and Financial Economics*, 11(3):275–297, 2017.
- Edward L. Kaplan and Paul Meier. Nonparametric estimation from incomplete observations. *Journal of the American Statistical Association*, 53(282):457–481, 1958.
- Malik Magdon-Ismail and Amir F. Atiya. Maximum drawdown. *Risk Magazine*, 17(10):99–102, 2004.
- Robert J. Shiller. *Irrational Exuberance*. Princeton University Press, 3rd edition, 2015.

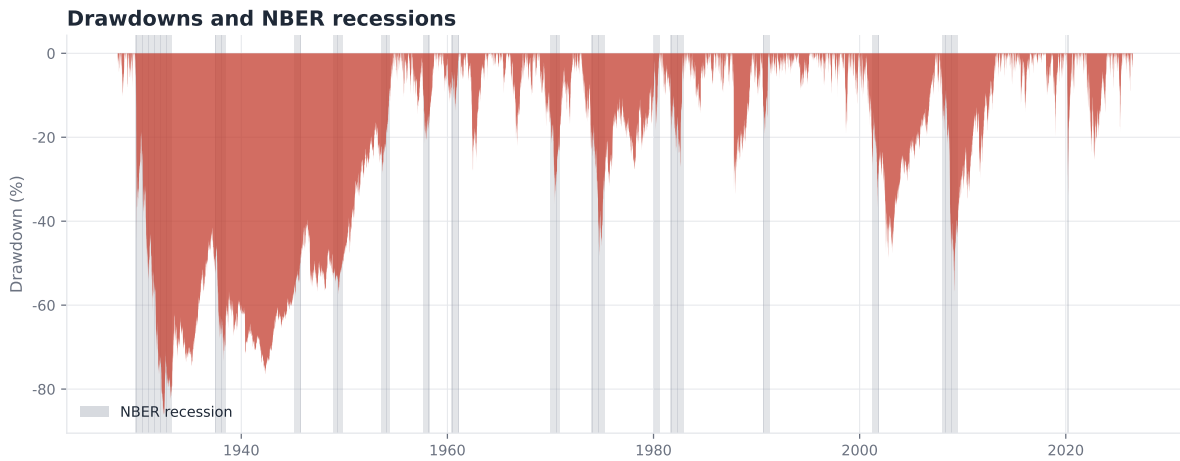


Figure 14: The drawdown curve with NBER recessions shaded.

Table 9: Recession-overlapping vs non-overlapping 10%+ episodes (duration medians use recovered episodes only).

Group	Episodes	Median depth (%)	Worst (%)	Median underwater (d)
recession-overlapping	10	-35.0	-86.2	987.5
no recession overlap	16	-14.3	-33.5	216.0

## A All 10%+ Episodes

## B ETF Stress Matrix

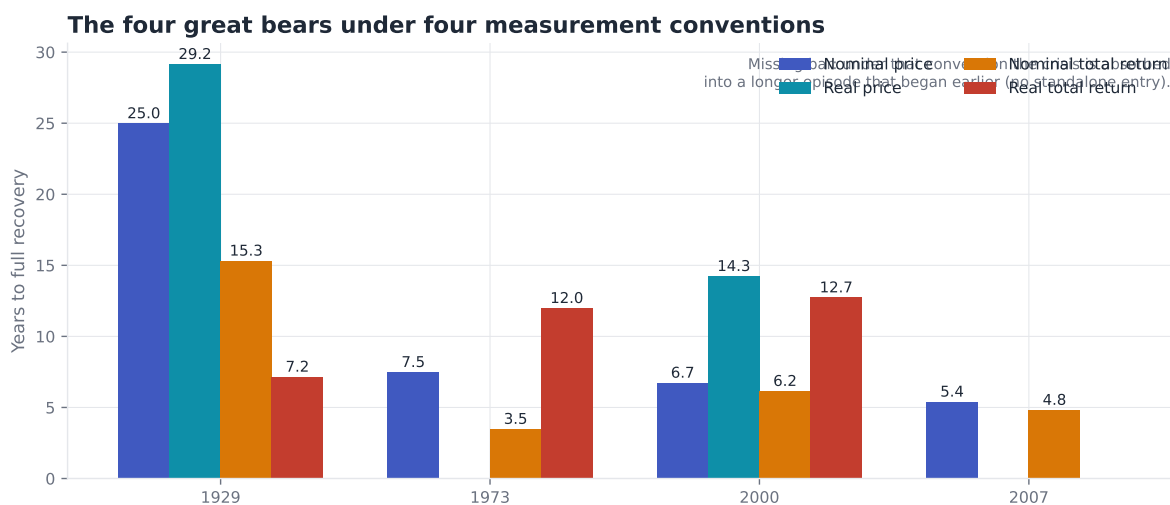


Figure 15: Years to full recovery for the four great bears under four measurement conventions (missing bar = absorbed into a longer episode).

Table 10: 20%+ bear markets under each convention (monthly series, 1871–2024-06-01).

Convention	Bears (20%+)	Open	Median depth (%)	Worst (%)	Median underwater (y)	Max (y)
Nominal price	13	0	-37.7	-84.8	5.4	25.0
Real price	12	0	-29.7	-80.6	5.1	29.2
Nominal total return	14	0	-26.9	-81.8	2.7	15.3
Real total return	15	0	-31.7	-76.8	3.9	12.7

Table 11: The four majors across conventions (blank = no standalone episode under that convention).

Nominal peak	Nom. price depth (%)	Nom. price rec. (y)	Real price depth (%)	Real price rec. (y)	Nom. TR depth (%)	Nom. TR rec. (y)	Real TR depth (%)	Real TR rec. (y)
1929-09-01	-84.8	25.0	-80.6	29.2	-81.8	15.3	-76.8	7.2
1973-01-01	-43.4	7.5			-39.2	3.5	-50.1	12.0
2000-08-01	-43.7	6.7	-58.6	14.3	-41.6	6.2	-51.8	12.7
2007-10-01	-50.8	5.4			-49.0	4.8		

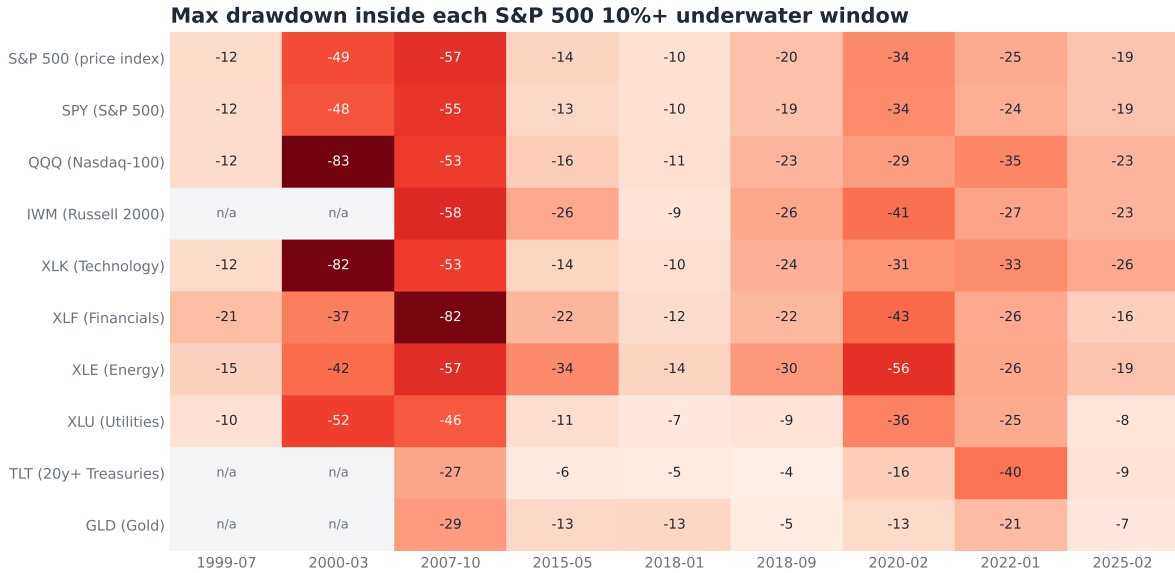


Figure 16: Max drawdown (%) of each asset inside every S&P 10%+ underwater window; n/a = before the asset's inception.

Table 12: All 26 episodes of 10%+ ordered by peak date.

Peak	Trough	Recovery	Max DD (%)	Underwater (d)	Primary cause	Conf.
1928-05-14	1928-06-12	1928-08-28	-10.3	106	1928 monetary tightening amid speculation boom	low
1929-09-16	1932-06-01	1954-09-22	-86.2	9,137	1929 crash and Great Depression	high
1955-09-23	1955-10-11	1955-11-14	-10.6	52	Eisenhower heart attack scare	high
1956-08-03	1957-10-22	1958-09-24	-21.5	782	1957 recession with Suez and Sputnik shocks	medium
1959-08-03	1960-10-25	1961-01-27	-14.0	543	Tight money and 1960-61 recession	medium
1961-12-12	1962-06-26	1963-09-03	-28.0	630	Kennedy Slide / growth scare	medium
1966-02-09	1966-10-07	1967-05-04	-22.2	449	1966 credit crunch and Fed tightening	high
1967-09-25	1968-03-05	1968-04-29	-10.1	217	Vietnam escalation and gold crisis	medium
1968-11-29	1970-05-26	1972-03-06	-36.1	1,193	Inflation Vietnam and 1969-70 recession	high
1973-01-11	1974-10-03	1980-07-17	-48.2	2,744	Oil embargo inflation and recession	high
1980-11-28	1982-08-12	1982-11-03	-27.1	705	Volcker tightening and double-dip recession	high
1983-10-10	1984-07-24	1985-01-21	-14.4	469	1984 Fed tightening and Continental Illinois failure	medium
1987-08-25	1987-12-04	1989-07-26	-33.5	701	Black Monday crash	high
1989-10-09	1990-01-30	1990-05-29	-10.2	232	1989 UAL buyout collapse mini-crash	medium
1990-07-16	1990-10-11	1991-02-13	-19.9	212	Gulf War oil shock and recession	high
1997-10-07	1997-10-27	1997-12-05	-10.8	59	Asian financial crisis contagion	high
1998-07-17	1998-08-31	1998-11-23	-19.3	129	Russia default and LTCM crisis	high
1999-07-16	1999-10-15	1999-11-16	-12.1	123	1999 Fed rate hikes and rising yields	medium
2000-03-24	2002-10-09	2007-05-30	-49.1	2,623	Dot-com bust and 2001 recession	high
2007-10-09	2009-03-09	2013-03-28	-56.8	1,997	Global Financial Crisis	high
2015-05-21	2016-02-11	2016-07-11	-14.2	417	China growth scare and oil collapse	medium
2018-01-26	2018-02-08	2018-08-24	-10.2	210	February 2018 volatility shock	high
2018-09-20	2018-12-24	2019-04-23	-19.8	215	Fed tightening and growth scare	high
2020-02-19	2020-03-23	2020-08-18	-33.9	181	COVID-19 pandemic shock	high
2022-01-03	2022-10-12	2024-01-19	-25.4	746	Inflation shock and Fed tightening	high
2025-02-19	2025-04-08	2025-06-27	-18.9	128	2025 tariff shock and trade-war escalation	high

Table 13: Max drawdown (%) of each asset inside every S&P 10%+ underwater window since 1999 (dividend-adjusted closes; blank = before inception).

Asset	1999-07	2000-03	2007-10	2015-05	2018-01	2018-09	2020-02	2022-01	2025-02
S&P 500 (price index)	-12	-49	-57	-14	-10	-20	-34	-25	-19
SPY (S&P 500)	-12	-48	-55	-13	-10	-19	-34	-24	-19
QQQ (Nasdaq-100)	-12	-83	-53	-16	-11	-23	-29	-35	-23
IWM (Russell 2000)			-58	-26	-9	-26	-41	-27	-23
XLK (Technology)	-12	-82	-53	-14	-10	-24	-31	-33	-26
XLF (Financials)	-21	-37	-82	-22	-12	-22	-43	-26	-16
XLE (Energy)	-15	-42	-57	-34	-14	-30	-56	-26	-19
XLU (Utilities)	-10	-52	-46	-11	-7	-9	-36	-25	-8
TLT (20y+ Treasuries)			-27	-6	-5	-4	-16	-40	-9
GLD (Gold)			-29	-13	-13	-5	-13	-21	-7