Is AI a Bubble?: Methods, Data, and Sources

Supplementary technical note to "Is AI a Bubble?"

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Summary. This note documents the sources, definitions, formulas, and caveats behind every quantitative figure in *Is AI a Bubble?* (November 25, 2026). It is written to stand on its own so that a reader or reviewer can distinguish primary filings and live market data from model estimates and scenario assumptions. The evidence falls into three categories:

1. **Primary filings and market data.** SEC filings (10-K, 10-Q, Form S-1, Form 8-K), quarterly earnings releases, credit-rating actions, equity closes, and 5-year credit default swap (CDS) spreads verified through **November 25, 2026**.
2. **Model estimates and base scenario.** The 2019–2030 AI/cloud capex-to-revenue pool series, backward-looking return ranges, forward break-even growth rates, and the pre-depreciation cash-return hurdle (anchored to an October 2026 filings-based analysis).
3. **Quoted reporting and historical benchmarks.** Secondary financial reporting on privately held OpenAI (*Financial Times*), supply-chain disclosures (SK hynix, GPU rental indices), and historical dot-com reference points (2002 lit fiber, March 2000 Cisco P/E).

Contents. Table S1 Master Index · S1 CapEx vs. Revenue Pool · S2 Returns & the 21¢ Test · S3 Hyperscaler Cash Flow & Bonds · S4 Credit Stress (Oracle & CoreWeave) · S5 Demand, Valuations & Depreciation · S6 Circular Financing & AI Labs · S7 Concentration & Limitations · S8 Sources

Table S1 — Master index of empirical figures and claims in the essay.

Claim / Figure in the Essay	Value Reported	Evidence Type	Section
Nasdaq deviation from 55-year trend (Nov 2026)	~+30% (+30.5% at 23,734)	Market / Prev.	Prev. post
2026 AI & cloud revenue pool (ads, cloud, AI labs)	~$1.06 trillion	Model / Filings	S1
2026 AI & cloud capital spending	~$910 billion (86% of revenue)	Model / Filings	S1
Historical capex-to-revenue ratio (2019–2023)	~25% (annual range 22%–27%)	Primary Filings	S1
2022–2026 CAGR: capex vs. served revenue pool	~64%/yr vs. ~21%/yr	Model Estimate	S1
Base-scenario capex/revenue peak (2027) & 2030	94% (2027); 71% (2030: ~$1.9T / ~$2.7T)	Base Scenario	S1
2022–2026 operating profit gain & implied returns	+$202B; 13–27% (full); 10.5–29% (central above-trend); 2–6% (GenAI)	Model Estimate	S2
Required 2026–2030 revenue growth (9% hurdle)	≥22%/yr; coverage cushion 2.5× → 1.1×	Model / Scenario	S2

Claim / Figure in the Essay	Value Reported	Evidence Type	Section
Narrow test: GenAI revenue vs. 2026 AI capex	$150–190B vs. ~$950B (2026); ~5–7¢ vs. ~21¢ EBITDA	Two-Asset CRF	S2
Top-5 hyperscalers 2024 OCF vs. CapEx	$478B OCF vs. $239B CapEx	Primary Filings	S3
Top-5 hyperscalers Q3 2026 CapEx vs. OCF	~$230.4B CapEx vs. ~$198–199B OCF	Primary Filings	S3
Microsoft Q3 2026 (Q1 FY27) free cash flow	+$18.6B (sole FCF-positive outlier)	Primary Filing	S3
Bond sales (AMZN, GOOGL, META, ORCL) by mid-Oct	>$228B (>2× 2025 pace); +Nov deals	Credit Market	S3
Meta Hyperion financing vehicle (Louisiana)	$27B SPV (80% Blue Owl-led); campus >$50B	Deal Disclosure	S3
Oracle drawdown, credit rating & 5-yr CDS	Down ~70% from Sep 2025; BBB−; record 356 bps	Market / S&P	S4
CoreWeave drawdown & 5-yr CDS default odds	Down ~75–80% from Jun 2025; 1,314 bps (~68% PD)	Market / CDS	S4
OpenAI + Anthropic combined annualized revenue	~$120–130B (Anthropic ~$81B 28d×13; OpenAI net)	S-1 / Reporting	S5, S6
Hyperscaler forward P/E & Nvidia trailing P/E	~15–25× fwd; NVDA 16.0× GAAP / 17.8× non-GAAP	Market / Filing	S5
Dot-com benchmarks: 2002 lit fiber & Cisco P/E	~2.7% lit fiber; ~196× trailing P/E (Mar 2000)	Historical	S5
Useful-life cut (6 yr → 4 yr) earnings impact	~9–10% off hyperscaler earnings	Sensitivity	S5
Cloud backlog (RPO) & OpenAI/Anthropic share	$2.0–2.5T total; about 40%	Filings / Est.	S6
Anthropic IPO (Nov 19), Q2/Q3 OpInc & commitments	$83 IPO ($81.3B + $26B Class N); +$974M / −$567M; ~$895B	SEC S-1 / Nasdaq	S6
OpenAI IPO timing & projected 2026–2030 cash burn	Pushed toward 2027; ~$278B cumulative neg. FCF	Quoted (FT)	S6
S&P 500 top-10 concentration (late Nov 2026)	~38% (range 37%–39%)	Index Data	S7

S1. AI & Cloud Capital Spending vs. Revenue Pool (2019–2030)

Definitions and scope. Figure 1 compares aggregate AI and cloud infrastructure capital spending against the revenue pool those data centers and accelerators directly serve. **Capital spending** aggregates annual infrastructure outlays across **Microsoft, Alphabet, Amazon (AWS capital spending only—excluding retail/e-commerce warehouses), Meta, and Oracle**, plus newer AI-cloud and frontier builders including **CoreWeave, Nebius, and xAI**. For 2019–2025, totals come from annual company filings; 2026 combines reported January–September results with Q4 guidance as of end-October 2026. The **revenue pool** sums three businesses running on the same hardware: (1) Google and Meta advertising (whose ranking and recommendation systems rely directly on AI clusters), (2) cloud computing *net of AI labs* (excluding cloud compute resold to OpenAI and Anthropic to prevent double-counting), and (3) end-customer AI-lab revenue.

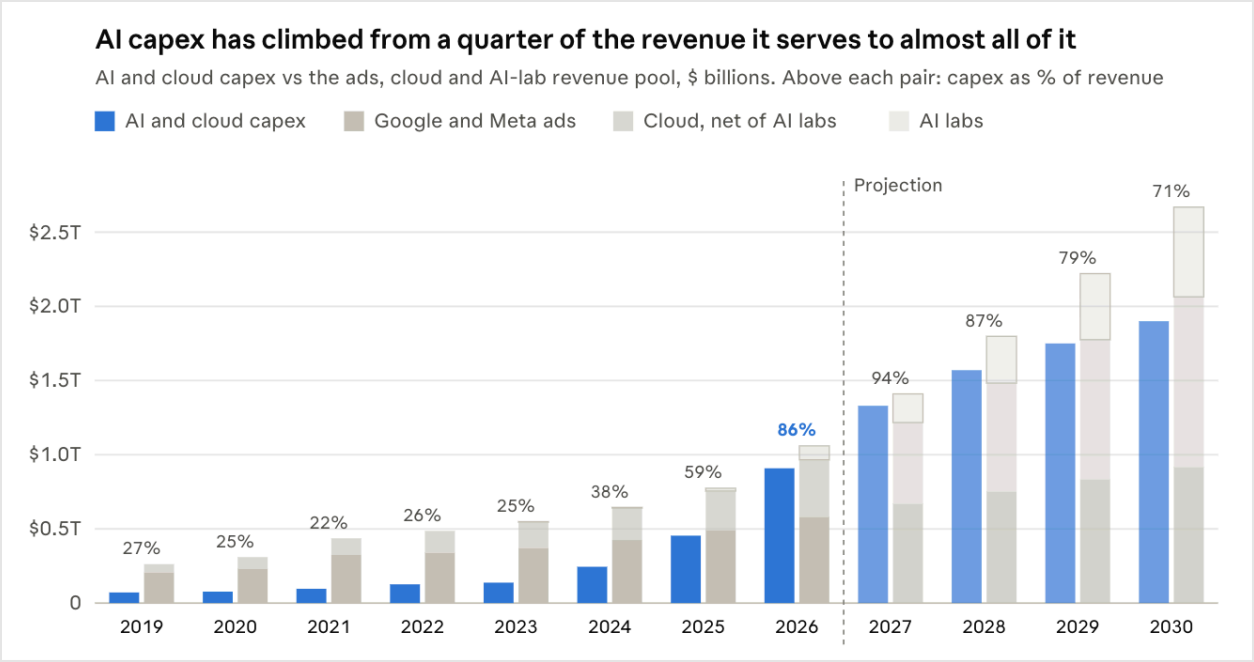

Figure 1. *AI and cloud infrastructure capital spending against the advertising, cloud (net of AI labs), and AI-lab revenue pool, 2019–2030. Labels above each paired bar show capex as a share of revenue. Company filings for 2019–2025; 2026 from Q1–Q3 results and guidance; 2027–2030 author's base scenario (not a forecast).*

Table S2 — CapEx-to-revenue trajectory and growth rates, 2019–2030.

Period	Basis	CapEx / Revenue	Key Figures & Notes
2019–2023	Annual SEC filings	22%–27% (~25% avg.)	2019: 27%, 2020: 25%, 2021: 22%, 2022: 26%, 2023: 25%
2024	Annual SEC filings	38%	First major step-up in generative AI cluster outlays
2025	Annual SEC filings	59%	Hyperscaler infrastructure build-out accelerates sharply
2026E	**Q1–Q3 + guidance**	**86%**	**~$910B CapEx vs. ~$1.06T revenue pool (2022–26 CAGRs: ~64% vs. ~21%)**
2027	Base scenario	94%	Projected peak ratio (~$1.33T CapEx vs. ~$1.41T revenue)
2028–2029	Base scenario	87% → 79%	CapEx growth moderates as AI-lab and cloud revenues scale
2030	Base scenario	71%	~$1.90T CapEx vs. ~$2.68T revenue pool

S2. Return on Capital, Hurdle Rates, and the 21-Cent Test

Benchmark hurdle rate (~9%). In corporate finance, an infrastructure investment creates value only if its return clears its Weighted Average Cost of Capital (WACC)—or, for equity holders, the CAPM cost of equity ($k_e = r_f + \beta \cdot \text{ERP}$). Using November 2026 benchmarks—the 10-year US Treasury yield at **~4.85%** (4.84%–4.92% in late November) and Prof. Aswath Damodaran's NYU Stern **4.41%** implied US equity risk premium (Nov 1, 2026 TTM adjusted-payout series; normalized/cash-yield variants span 3.39%–3.79%)—a market-beta equity ($\beta = 1.0$) requires **~9.26%** (8.2%–9.3% across ERP definitions), matching the S&P 500's ~9%–10% long-run nominal return. For mega-cap hyperscalers ($\beta \approx 1.0$–1.2), equity cost runs ~9.3%–10.1%; blending in low-cost investment-grade debt (~4.0%–4.5% after-tax) puts blended WACC squarely in the **~8.8%–9.6%** band. The essay uses **9% per year** as a clean, conservative floor (leveraged AI builders like CoreWeave face a substantially higher hurdle).

Backward-looking returns (2022–2026). Combined operating profit across advertising, cloud, and AI labs rose by roughly **$202 billion** between 2022 and 2026. Crediting 100% of that gain to the AI build-out yields **13%–27%**, where the range comes from **investment timing**—measuring against **$632 billion** of lagged invested capital versus **$1,291 billion** of unlagged invested capital. Subtracting a pre-AI trend baseline still produces **10.5%–29%** in the October analysis's central above-trend case; returns dip **below 9%** only under tougher counterfactual assumptions. Isolating standalone generative AI products yields roughly **2%–6%** today, reflecting the lag of measuring newly installed infrastructure before utilization matures.

Forward-looking break-even growth and cushion. For all equipment installed since 2019 to clear a 9% return by 2030, the combined revenue pool must compound at **≥22% per year** through 2030—roughly matching its ~21% pace over 2022–2026. However, because capex continues surging through 2027, revenue coverage of required earnings shrinks from roughly **2.5× in 2026** to **~1.1× in 2030** under the base scenario. That shrinking buffer explains Signpost #2: if capex climbs toward 94% of revenue in 2027, revenue needs to run well ahead of ~21% in 2027 (ideally ~30%) so the larger capital base stays comfortably above break-even as growth moderates later in the decade.

The narrow test: 21 cents required vs. 5–7 cents earned before depreciation (EBITDA). Standalone generative AI customer revenue is tracking roughly **$150–190 billion** in 2026 against roughly **$950 billion** of AI-specific infrastructure spending in **2026 alone** (a single-year figure counted on a different AI-specific boundary than the $910B AI+cloud series in S1, *not* cumulative spend). Crucially, both the **5–7 cents** earned today and the **21 cents** required per dollar of AI capacity are measured as **annual cash earnings before depreciation (EBITDA)**—setting after-depreciation operating profit against a depreciation-inclusive hurdle would double-count depreciation. The ~21¢ hurdle comes directly from the October model's **two-asset mix—5-year chips/servers** and **20-year buildings**—using the capital recovery factor $\text{CRF}(r, n) = r \,/\, [1 - (1 + r)^{-n}]$ at $r = 9\%$:

$$\text{CRF}(9\%, 5 \text{ yrs chips}) = \mathbf{25.71\%} \;\mid\; \text{CRF}(9\%, 20 \text{ yrs buildings}) = \mathbf{10.95\%}$$

Blended (~68% chips/IT + ~32% buildings/power): $0.68 \times 25.71\% + 0.32 \times 10.95\% =$ **20.99% ≈ 21¢ / dollar / yr**

Against that ~21¢ pre-depreciation requirement, standalone generative AI capacity currently earns roughly **5–7 cents a year before depreciation** per dollar of capacity—a gap heavily shaped by early-stage monetization and recent capacity still ramping up.

S3. From Cash to Credit: Hyperscaler Cash Flow, Bonds, and SPVs

In fiscal 2024, the five largest spenders generated **$478 billion** of operating cash flow (OCF) against **$239 billion** of capital expenditures (50% CapEx/OCF). By **calendar Q3 2026**, combined quarterly CapEx reached roughly **$230.4 billion**, slightly exceeding combined quarterly OCF of roughly **$198–199 billion** for the first time. Microsoft remained the sole clear exception with **+$18.6 billion** in positive free cash flow.

Table S3 — Calendar Q3 2026 cash flow breakdown across the five largest AI infrastructure spenders.

Company	Fiscal Period	Qtr Revenue	Qtr OCF	Qtr CapEx	Free Cash Flow	Filing Notes
Alphabet	Q3 2026 (Sep 30)	$127.58B	$42.29B	$51.36B	**−$9.07B**	+25% YoY rev; TTM FCF +$19.75B
Meta	Q3 2026 (Sep 30)	$64.60B	$32.79B	$34.91B	**−$2.12B**	+26% YoY rev; CapEx incl. finance leases
Microsoft	Q1 FY27 (Sep 30)	Oct 28 release	$58.00B	$39.40B	**+$18.60B**	Total CapEx incl. finance leases: $45.2B
Oracle	Q1 FY27 (Aug 31)	Sep 10 release	$23.10B	$28.50B	**−$5.40B**	OCF incl. $11.4B prepayments ($11.7B org.)
Amazon	Q3 2026 (Sep 30)	$201.94B	~$42B*	~$76.2B	**−$42.4B (TTM)**	*TTM OCF $168.3B; FY26 CapEx guide ~$220B
Top 5 Total	**Cal. Q3 2026**	**—**	**~$198–199B**	**~$230.4B**	**Negative (agg.)**	**First quarter CapEx > OCF in aggregate**

Corporate bond issuance and off-balance-sheet vehicles. Through mid-October 2026, Amazon, Alphabet, Meta, and Oracle issued more than **$228 billion** of corporate bonds (>2× 2025 issuance), followed by additional November deals including Oracle's **$20 billion** combined stock and senior-notes raise. Off balance sheet, Meta's **Hyperion** data-center campus in Richland Parish, Louisiana uses a **$27 billion financing vehicle** 80% owned and financed by outside investors led by Blue Owl Capital (alongside PIMCO and BlackRock) and 20% by Meta; the overall campus has since grown **past $50 billion**.

S4. Credit Stress at the Leveraged Edges (Oracle & CoreWeave)

Table S4 — Equity drawdowns, credit ratings, and 5-year CDS stress indicators (as of November 25, 2026).

Indicator	Oracle (ORCL)	CoreWeave (CRWV)
2025 Peak → Nov 25, 2026	>$340/sh (Sep 2025 peak) → $99.34 intraday low (**down ~70%**)	$183.58 (Jun 20, 2025) → $38.23 morning of Nov 25 (**down ~79%**; essay cites ~75–80%)
Credit Rating / Leverage	S&P cut to **BBB−** (one notch above junk) on Jul 9, 2026; Moody's Baa2 (neg.); ~$56B FY26 CapEx	High-yield / heavily leveraged (~$51–66B total debt financing Nvidia GPU clusters)
5-Year CDS Spread	Record **356 bps** (up >4× from <80 bps a year prior)	Record **1,314 bps** on Nov 25 (surpassing Oct 15 peak near ~1,195–1,233 bps)
Implied 5-Yr Default Prob.	~26% (at 356 bps, 40% recovery)	**~66.5%–68%** (S&P / credit desks cite ~68%; essay cites ~65–70%)
Recent Financing Action	Early-Nov 2026 $20B raise (stock at $116 + senior notes with 7.0%–8.65% coupons)	Intense bond & equity sell-off on debt-servicing and refinancing risk

CDS-implied default probability formula. Under a standard constant-hazard-rate credit model with par 5-year CDS spread s (decimal) and senior unsecured recovery rate $R = 40\%$ (loss given default $1 - R = 0.60$), the approximate risk-neutral cumulative default probability over $T = 5$ years is:

$$\mathrm{PD}_{5y} \approx 1 - \exp(-[s/(1-R)] \cdot T)$$

For CoreWeave on Nov 25: $s = 1{,}314$ bps $\rightarrow \lambda = 0.219 \rightarrow$ **PD_{5y} = 66.5%** (S&P / ISDA curve bootstrapping: **~68%**)

Caveat: Risk-neutral default probabilities backed out of CDS spreads embed both actuarial default risk and a credit/liquidity risk premium, so physical default probabilities are typically lower than CDS-implied probabilities.

S5. Physical Demand, Public Valuations vs. 2000, and Depreciation

Demand and supply indicators. Unlike 2002—when a widely cited FCC/industry estimate placed active US fiber utilization at roughly **2.7%**—late-2026 AI hardware remains supply-constrained. **SK hynix** reported its DRAM and HBM capacity is effectively sold out through **2029** via long-term agreements (though analysts note rival fab expansions could ease tightness late in the decade). **Microsoft** trimmed its calendar 2026 CapEx outlook slightly (from ~$175B to ~$170B) due to third-party GPU delivery delays rather than softer demand, and rental rates for prior-generation **Nvidia H100** chips stayed well above late-2025 lows despite Blackwell and Vera Rubin ramps.

Table S5 — Public valuation multiples as of November 25, 2026 versus dot-com Cisco (March 2000).

Company	Valuation Metric	Multiple	Primary Verification / Earnings Basis
Nvidia (NVDA)	Trailing P/E (GAAP / Non-GAAP)	**16.0× / 17.8×**	Nov 25 close $149.30 ÷ TTM GAAP EPS $9.31 (Q4 FY26 $1.76 + Q1 $2.39 + Q2 $2.46 + Q3 $2.70); Non-GAAP TTM $8.39. Q3 FY27 rev $115.8B (+103% YoY; Q4 guide ~$130B).
Alphabet (GOOGL)	Forward P/E (consensus)	~15–19×	Compressed on CapEx/FCF concerns despite +25% YoY Q3 revenue
Amazon (AMZN)	Forward P/E (consensus)	~19–20×	AWS re-acceleration offset by ~$220B FY26 CapEx trajectory
Meta (META)	Forward P/E (consensus)	~19–21×	Strong ad monetization (+26% YoY Q3) vs. infrastructure intensity
Microsoft (MSFT)	Forward P/E (consensus)	~21–25×	Top multiple among core hyperscalers; +$18.6B Q3 FCF
Cisco (Mar 2000)	**Trailing P/E at dot-com peak**	**~196×**	**Historical benchmark: Nvidia trades at <1/10th Cisco's 2000 peak multiple**

Depreciation sensitivity (Michael Burry critique). Extending server and GPU useful lives to 5–6 years lowers annual GAAP depreciation expense. Shortening straight-line useful lives from 6 years to 4 years raises annual depreciation on affected hardware cohorts by **50%** $((1/4 - 1/6) \div (1/6) = +50\%$; Amazon has already shortened part of its server schedule from 6 years back to 5). Across diversified hyperscalers, applying a 4-year life trims consolidated operating earnings by roughly **9%–10%**; for pure-play, debt-leveraged GPU-rental companies, the same step-up can wipe out equity.

S6. Circular Financing, Cloud Backlogs, and Frontier AI Labs

Vendor-customer capital flows and backlog concentration. Nvidia has invested roughly **$50 billion** across AI labs and ecosystem partners, including **$30 billion** in OpenAI's February/March 2026 funding round ($110–122B committed alongside Amazon's $50B and SoftBank's $30B). Anthropic's November 2026 IPO included a **$26.0 billion** concurrent private placement of 313,253,007 non-voting Class N shares at $83.00 (Google $10B, Nvidia $10B, AMD $2.5B, Broadcom/Micron/Microsoft $1B each, TSMC $0.5B). Across Microsoft Azure, AWS, Google Cloud, and Oracle, combined cloud Remaining Performance Obligations (RPO) reached **$2.0–2.5 trillion**, with **about 40%** owed by OpenAI and Anthropic (separate Google Cloud disclosures also showed Anthropic accounting for >40% of *newly added* AI backlog).

Table S6 — Anthropic vs. OpenAI financial snapshot as of November 25, 2026.

Dimension	Anthropic (`ANT` , Nasdaq)	OpenAI (Private)
IPO Status & Pricing	**Public Nov 19, 2026:** S-1 filed Oct 26 (amended Nov 2); priced Nov 18 at **$83.00** (~$1.5T fully diluted); raised $81.3B primary ($93.5B w/ greenshoe) + $26.0B Class N placement. Opened $111.50, Day-1 $97.17; **Nov 25 close: $82.79**.	**Pushed toward 2027:** Confidential S-1 filed earlier in 2026; leadership and advisers shifted public-debut plans toward 2027 (*WSJ*, *Bloomberg*, *Reuters*, *NYT*).
Annualized Revenue & Measurement	FY23: $41M → FY24: $386M → FY25: $4.58B → **9M 2026: $33.2B** (Q2 $11.5–11.6B; Q3 $16.96B). Run-rate reached **~$81B** as of Oct 31 — *measured as trailing 28-day revenue × 13*.	FY26 projected revenue **~$36B**; annualized revenue passed **$40–50B** in late Q3 2026 — *reported on a net basis*. Internal model targets $350B by 2030.
Profitability & Cash Burn	**Q2 2026:** +$974M GAAP operating profit. **Q3 2026** (Nov 2 amended S-1): −$567M operating loss (driven by $5.0B short-term spot compute + $2.0B non-cash Class N donation-matching; −$23.3B GAAP net loss mainly non-cash convertible-note/RSU markups).	Substantial ongoing operating losses; leaked *Financial Times* internal model projects **~$278B** cumulative negative free cash flow across 2026–2030.
Compute Commitments	**~$895.4B** in long-term compute & lease commitments (amended S-1) vs. >$140B pro forma liquidity.	**~$856B** projected total compute & infrastructure spend through 2030 (*FT*).

S7. Market Concentration, Limitations, and Epistemic Caveats

Index concentration. As of late November 2026, the ten largest companies represent approximately **37%–39% (~38%)** of total S&P 500 market capitalization (near 35-year highs), with the top five (Apple ~7.9%, Microsoft ~5.6%, Nvidia ~5.5%, Alphabet ~5.1%, Amazon ~4.1%) accounting for ~29%.

Five methodological limits to keep in mind when reading these figures:

1. **Real-time epistemic uncertainty.** Heavy capital spending is only a bubble in hindsight if 2027–2030 revenue fails to clear the hurdle; today's ratios measure the size of the bet, not its outcome.
2. **Fiscal-calendar, scope, and lease conventions.** Microsoft (June FY) and Oracle (May FY) have offset calendars; Amazon reports OCF/FCF primarily on a TTM basis; cash PP&E differs from total CapEx including finance leases; and the $910B (AI+cloud) vs. $950B (AI-specific) single-year 2026 figures use different boundaries.
3. **ARR comparability.** Anthropic's trailing-28-day × 13 run-rate and OpenAI's net annualized revenue are not strictly apples-to-apples and exceed trailing GAAP revenue during rapid growth.
4. **Private-company opacity.** Unlike Anthropic (SEC Form S-1), OpenAI's 2026–2030 cash-burn and compute projections rely on leaked internal presentations reported by the *Financial Times*.
5. **Snapshot volatility.** Equity prices, multiples, and CDS spreads reflect market conditions through November 25, 2026 and fluctuate daily.

S8. Primary Sources, References, and Build Note

- **SEC Filings & Earnings Releases (2026):** Anthropic PBC Form S-1 & amended filings (Oct 26 & Nov 2, 2026, SEC EDGAR `0002130357`) and IPO Pricing Release (Nov 18, 2026, `anthropic.com`); NVIDIA Corp. Q3 FY27 Form 8-K / Earnings Release (Nov 17, 2026, SEC EDGAR `0001045810`); Alphabet Q3 2026 Form 10-Q; Amazon Q3 2026 Form 10-Q (Oct 29); Meta Q3 2026 Form 10-Q; Microsoft Q1 FY27 Form 10-Q (Oct 28); Oracle Q1 FY27 Release (Sep 10).
- **Credit & Fixed Income:** S&P Global Ratings (Oracle downgrade to BBB−, Jul 9, 2026); Moody's (Baa2, neg.); Oracle record 356 bps 5-yr CDS (Blockonomi, Nov 2026); CoreWeave record 1,314 bps 5-yr CDS / ~68% default odds (GuruFocus Nov 25, 2026; Bloomberg Oct 15, 2026); J.P. Morgan / Reuters / S&P Global Market Intelligence 2026 bond trackers; Meta–Blue Owl Hyperion financing vehicle ($27B SPV; campus >$50B).
- **Market Data & Cost of Capital Benchmarks:** Nasdaq/NYSE closes through Nov 25, 2026 (NVDA $149.30, ANT $82.79, ORCL $99.34 low, CRWV $38.23 morning); 10-year US Treasury yield (~4.85%, late Nov 2026); Aswath Damodaran (NYU Stern), *Implied Equity Risk Premiums* (Nov 1, 2026: 4.41% TTM adjusted-payout ERP; `pages.stern.nyu.edu/~adamodar`); consensus forward P/Es (FactSet, TradingView, Trefis); S&P 500 top-10 weights (Schwab, Invesco, MacroMicro, Nov 2026); March 2000 Cisco trailing P/E (~196×); FCC 2002 US lit fiber (~2.7%).
- **Financial Press & Industry Reporting:** *Financial Times* (and Tech Times / Parameter) on OpenAI's $278B negative FCF, $856B compute, and $350B 2030 revenue target; *WSJ*, *Bloomberg*, *Reuters*, and *NYT* on OpenAI's shift toward a 2027 IPO; SK hynix HBM/DRAM supply disclosures; Michael Burry depreciation commentary.
- **Companion Essay & Build Note:** Gökhan Mergen, *"What Is a Bubble? (And Why Panic Often Wears Its Mask)"*, Nov 25, 2026 (gokhanmergen.com/blog-what-is-a-bubble.html). This PDF is rendered from HTML/CSS via headless Chrome (`--headless=new --no-pdf-header-footer --print-to-pdf`).