



PERSPECTIVES Viewpoint Equity

Artificial Intelligence – Bubble or Boom?

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Key takeaways

- AI-related stocks have surged, raising bubble concerns due to rapid investment, market concentration, and signs of speculative behaviour.
- Unlike past bubbles, current AI valuations are supported by strong earnings, robust cash flows, and healthier balance sheets.
- Risks remain – overinvestment, monetisation challenges, and concentrated exposure could threaten sustainability if fundamentals weaken.

Bubble concerns on the rise

Over the past months, the question of whether a bubble is forming in AI-related equities has become a central topic for investors and market observers (Figure 1). This debate is driven by a convergence of factors that have set the AI sector apart from the broader market. Most notably, stocks tied to artificial intelligence have demonstrated exceptional resilience and momentum, appreciating sharply despite high political uncertainty and a challenging macroeconomic environment. This divergence has not only drawn capital into the sector but has also heightened scrutiny of its underlying fundamentals.

The scale of investment in AI is unprecedented. In just the first quarter of 2025, global data center capital expenditures (capex) surged by more than 50% YoY, with Q2 sustaining over 40% annual growth. For 2024, total data centre capex approached USD500bn, and forward estimates suggest this could grow at a compound annual rate of 21% through 2029, potentially exceeding USD1.2tn globally. These figures underscore the magnitude of the current AI infrastructure wave, which is reshaping the entire IT landscape. Naturally, the scale

and pace of this investment boom evoke memories of past speculative frenzies – from the UK's canal mania of the 1790s and the railway bubble of the 1840s to the dotcom bubble of the late 1990s – where infrastructure buildouts failed to deliver the anticipated returns.

Bubble concerns are fuelled by some signs of speculative behaviour in today's financial markets. Retail investor participation has surged, and anecdotal evidence points to increased speculative trading in AI-linked stocks and derivatives. Furthermore, the pace of initial public offerings (IPOs) has picked up, with first-day IPO premiums in the US reaching up to 30%. Finally, in the US margin debt has increased over 32% between April and September. Such a steep increase has only been seen in early 2000 and in 2020.

Perhaps most striking is the degree of market concentration that has emerged. The US technology sector now accounts for around 35% of total US market capitalisation and the largest ten US companies make up more than 20% of the global equity market value – a level of dominance that is extraordinary by historical standards. This concentration has been driven by the outperformance of a handful of technology mega-cap firms, whose business models are increasingly intertwined with the development and deployment of AI technologies. As a result, investors and commentators are increasingly asking whether the current AI boom is a sustainable, earnings-driven expansion, or whether it is laying the groundwork for a future correction akin to past technology bubbles.

With these principal headline concerns in mind, it is instructive to examine how the current AI cycle compares to previous episodes of technological exuberance, and to identify both the parallels and the critical differences that may shape its trajectory.



Parallels: AI vs. past technology bubbles

The current AI-driven rally exhibits some features that echo the dynamics of earlier technology booms. Historically, transformative innovations have required massive upfront investment. In each case, the ultimate value creation was uncertain at the outset, leading to periods of intense speculation by investors seeking to position themselves for future growth. The AI sector today is no exception. Companies are committing vast sums to build out infrastructure, develop proprietary models, and secure access to scarce resources such as advanced semiconductors and high-performance computing capacity.

This wave of capital expenditure is reminiscent of previous cycles where infrastructure buildouts led to periods of overcapacity and, in some cases, disappointing returns for investors. For example, the late-1990s saw a frenzy of investment in telecommunications and internet infrastructure, much of which ultimately proved excessive relative to near-term demand. Similarly, the current surge in AI-related capex – spanning data centres, power distribution, cooling systems, and fibre-optic networks – raises questions about the risk of overbuilding, especially as some projects are being undertaken without firm long-term customer commitments.

The semiconductor sector, in particular, has become a focal point of this investment boom. The global semiconductor market has grown strongly in recent years, with AI accelerators – optimized chips for training and running AI models – accounting for a rapidly increasing share of revenue. The market for these specialized chips is nearly doubling in volume YoY, driven by the soaring demand for AI compute. This has led to a wave of semiconductor mergers and acquisitions worth tens of billions, aimed at consolidating capabilities and strengthening supply chains.

The stock market's response has also followed a familiar pattern. AI-related equities have rallied sharply, with market leadership becoming highly concentrated among a small group of technology giants. The degree of concentration is striking and has often preceded corrections in previous cycles, as seen during the DotCom bubble and other episodes of sectoral exuberance.

Differences: AI vs. past technology bubbles

Despite these similarities, several important differences distinguish the current AI cycle from past bubbles. Most notably, the rise in AI stock valuations has been accompanied by robust earnings growth and strong profitability (Figure 2). Unlike previous bubbles, where prices often soared on the back of unrealistic expectations and unproven business models, today's valuations are more firmly anchored in actual financial performance. Leading AI companies are delivering substantial revenue and earnings growth, supported by high margins, operational leverage, and strong free cash flow generation.

Earnings in 2025 have broadly confirmed AI's role as a growth catalyst. AI-related companies have beaten earnings expectations in the past quarters leading consensus analysts to raise earnings growth expectations for the S&P 500 IT sector to +20.3% for the full year 2025 and +18% for 2026. Sales per share are projected to grow 14.2% and 13.5% respectively. This compares to earnings per share (EPS) growth estimates of 11.5% and 14% for the S&P 500 in 2025 and 2026 as a whole (sales growth: 5.8% and 6.4%).

Across compute hardware, semiconductors, and AI-enabled software, revenue trends have surprised to the upside. In many infrastructure-linked segments, gross margins have expanded to 55%-65%, supported by improved pricing, a favourable product mix, and operational leverage. Consensus forecasts suggest that EPS growth in the 15%-25% range annually is plausible across large portions of the AI hardware and infrastructure universe. In comparable high-growth sectors, especially within dominant intellectual-property heavy players in the AI hardware stack, operating margins are also climbing – in some cases surpassing 30%-35%, particularly where firms benefit from multi-year capacity bookings and long-term contracts.

Valuation metrics, while elevated, remain below the extremes witnessed during the dotcom era. For instance, forward price-to-earnings (P/E) ratios for the largest technology firms range from 25x to 40x – high by historical standards, but well below the levels seen at the peak of the dotcom bubble, when some market leaders traded at multiples exceeding 80x. For the broader US IT sector, the NTM P/E currently stands at 25x while it was twice as high during the dotcom bubble (Figure 3). Similarly, enterprise value-to-sales (EV/sales) ratios, while elevated, do not approach the unsustainable heights of previous cycles.



The IT sector's return on equity (RoE) is also higher today, reflecting improved capital discipline and operational efficiency. The average NTM RoE for the Magnificent 7 is 46%, while it was only 28% for the largest IT companies in the late 1990s. The PEG ratio for technology stocks is not elevated and has been higher in recent years, further supporting the argument that current valuations are justified by high earnings growth (Figure 4).

Another key distinction lies in the funding of capital expenditure. While the scale of current investment is enormous, much of it is financed by free cash flow rather than debt. Capex-to-sales ratios are rising, but capex-to-free cash flow ratios remain stable and less extreme than in past cycles (Figure 5). This reduces the risk of financial strain if returns on investment take longer to materialise. In contrast, previous bubbles often saw companies take on significant leverage to fund expansion, leaving them vulnerable to downturns when expectations failed to materialise.

The current market environment is characterised by stronger balance sheets and lower leverage among leading technology firms. The largest AI companies maintain substantial cash reserves (Mag 7 hold more than 3% of market cap in cash) and low net debt-to-equity ratios, providing a cushion against potential shocks and reducing the risk of systemic spillover in the event of a correction.

Finally, the demand base for AI infrastructure and applications is also broader and more diversified than in previous cycles. Adoption is being driven by a wide range of sectors – including cloud computing, enterprise IT, public infrastructure, and consumer applications – reducing the risk of a single-point failure that could trigger a sector-wide downturn. This diversification is further supported by the integration of AI into physical industries such as energy, power, and construction, creating second-order beneficiaries and spreading the benefits of technological innovation more widely across the economy.

As we move from this comparative analysis, it is important to consider the specific risks that could challenge the sustainability of the current AI boom, even if it does not yet meet the classic definition of a bubble.

Not a bubble – yet: risks to monitor

While the evidence suggests that the current AI rally is not a bubble in the traditional sense, several factors warrant close monitoring as the cycle evolves. These risks, if left unchecked, could undermine the sector's long-term prospects and increase the likelihood of a future correction.

Risk of overinvestment: A major concern in the current AI boom is the risk of overinvestment in AI infrastructure. Companies appear to be engaged in an arms race, feeling compelled to invest heavily simply because their competitors are doing the same. The fear of losing market share if they fall behind is driving spending to potentially excessive levels. This dynamic could lead to an escalation in investments that surpass actual future needs. Compounding the issue is the limited visibility into long-term capacity requirements, with projections varying widely: for instance, an industry leader estimates that USD3-4tn will be spent on AI infrastructure by 2030, while McKinsey forecasts data center capital expenditures reaching USD5.2tn by 2030. Historical precedent shows that large-scale infrastructure buildouts often result in overcapacity, which can compress returns if demand fails to meet expectations.

Monetisation challenges: While user adoption of AI applications is high, the number of paying subscribers is still relatively low. Some studies estimate the share at only 3%-5% of all users. Many AI services are currently offered for free or at subsidized rates to drive adoption, and it is unclear how quickly or effectively providers will be able to convert users into paying customers. If users remain reluctant to pay for AI services, revenue growth could fall short of expectations, putting pressure on valuations and investment returns.

Adoption risks: Corporate AI adoption is still in its early stages. In a February metastudy, the Fed summarized 16 surveys from late 2023 to mid-2024 and found that reported AI use among companies ranges widely – from 5%-40% – but narrows to about 20%-40% after adjusting for weighting differences between surveys. Studies also suggest that a large proportion of AI projects have yet to deliver positive returns on investment. An MIT report recently found that up to 95% of enterprise AI projects have not delivered measurable financial returns. If adoption stalls or fails to scale, AI companies may be forced to reassess their investment plans, potentially leading to a slowdown in sector growth.

Circular and vendor financing: The AI ecosystem is increasingly characterised by complex, circular relationships. Suppliers are funding customers, revenue-sharing agreements are proliferating, and vendor



financing is becoming more common. For example, hyperscalers' (companies that operate large-scale data centers and offer cloud services like computing power, storage, and networking) purchase and lease commitments have surged, with much of this activity concentrated around a few major AI firms. These intertwined relationships can obscure the true level of demand and increase systemic risk, especially if disclosure is limited. The concentration of contractual obligations among a small number of counterparties further amplifies these risks, as the financial health of the entire ecosystem may hinge on the success of a few key players.

Revenue models and volatility: The shift in AI software and platform services toward usage-based pricing – billing per compute cycle, token, or API call – can drive higher top-line growth during periods of usage surges but also introduces revenue volatility. For investors, this makes metrics like net revenue retention (NRR), contract duration, and deferred revenue more important in evaluating the quality of growth. It is crucial to distinguish between durable usage embedded in workflows and sporadic experimentation that flatters near-term metrics but can fade quickly.

As we consider these risks, it is essential to recognise that the current AI-driven rally is underpinned by strong fundamentals, but that continued vigilance and disciplined investment are required to navigate the evolving landscape.

Conclusion: AI Is not a bubble – but stay mindful

In conclusion, the current AI-driven rally exhibits some features reminiscent of past bubbles – rapid price appreciation, high valuations, and low visibility. However, it is also underpinned by strong earnings, robust cash flows, and genuine technological progress. The balance sheets of leading companies are solid, and much of the investment is funded by internal cash generation rather than debt. This combination of factors distinguishes the current cycle from previous episodes of speculative excess and suggests that the sector is experiencing a structural boom rather than a classic bubble.

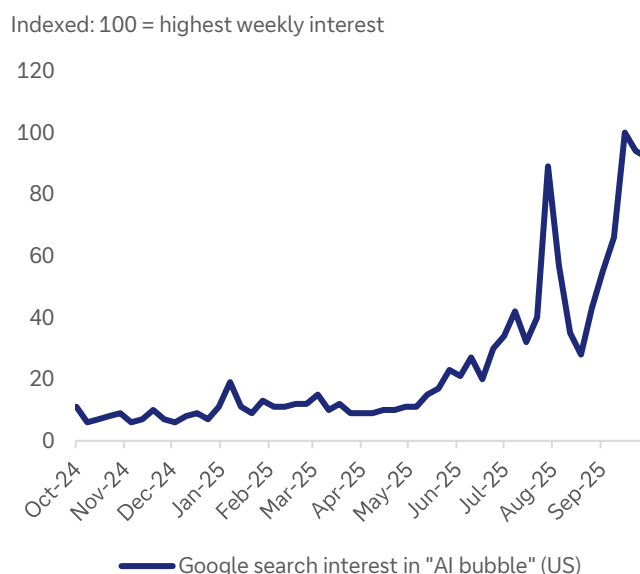
Nevertheless, investors should remain vigilant. Concentration risks in portfolios are elevated, as technology stocks have an outsized weighting in US and global indices. Seemingly diversified portfolios may be more exposed than they appear, particularly if they are heavily weighted toward a small number of mega-cap technology firms. It is essential to focus on fundamentals

– free cash flow, earnings growth, and balance sheet strength – rather than sentiment or hype.

Opportunities may also exist in sectors that stand to benefit from AI adoption, such as financials, healthcare, utilities, and infrastructure. These areas could offer more resilient returns as the AI ecosystem matures and the benefits of technological innovation spread more broadly across the economy.

While the current environment does not yet meet the classic definition of a bubble, the risk could rise if investment outpaces demand, monetisation disappoints, or speculative excesses build. Disciplined, selective investing and ongoing monitoring of key risk factors will be essential to navigating the next phase of the AI cycle. By maintaining a focus on fundamentals and remaining alert to emerging risks, investors can position themselves to benefit from the opportunities presented by the AI revolution while mitigating the potential downsides of a rapidly evolving market.

Figure 1: AI bubble concerns are trending



Source: Google Trends, Deutsche Bank AG. Data as of October 23, 2025.



Figure 2: IT EPS failed to keep up with performance in dotcom era – But they have over the last decade



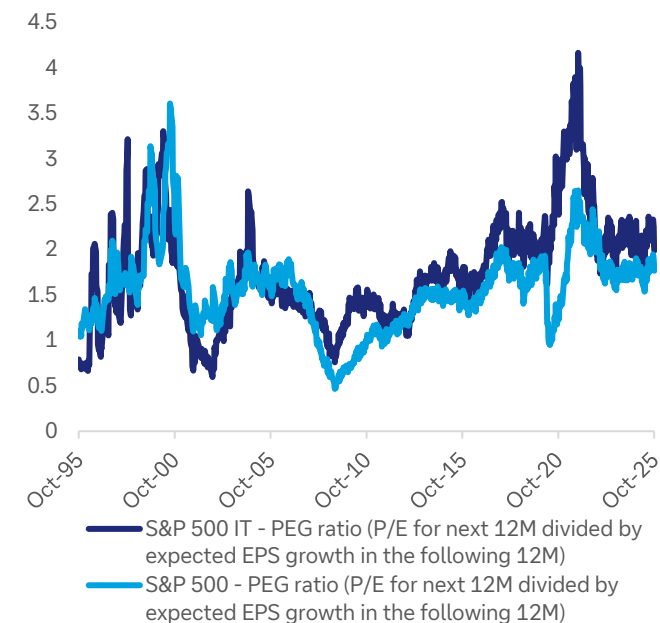
Source: LSEG Datastream, Deutsche Bank AG. Data as of October 23, 2025.

Figure 3: IT valuations still well below the levels of the late 1990s



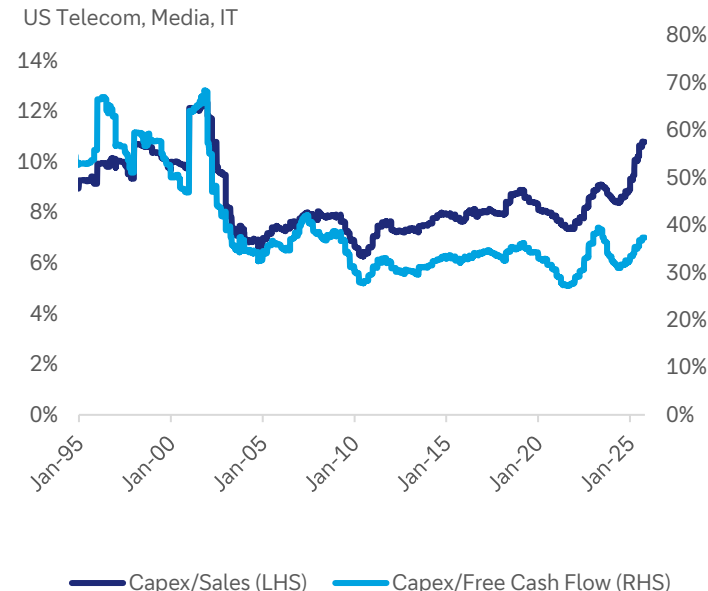
Source: LSEG Datastream, Deutsche Bank AG. Data as of October 23, 2025.

Figure 4: PEG ratio is lower than during the dotcom bubble



Source: LSEG Datastream, Deutsche Bank AG. Data as of October 23, 2025.

Figure 5: Capex-to-free cash flow ratio is still relatively low



Source: LSEG Datastream, Deutsche Bank AG. Data as of October 23, 2025.



Appendix

Glossary

API (Application Programming Interface) is a set of rules that allows software applications to communicate with each other. APIs enable integration and automation

Asset class **bubbles** are spikes in prices for an asset class, liable to burst.

Capex-to-sales (Capital Expenditures to Sales ratio) measures how much a company invests in capital assets relative to its revenue. A higher ratio may indicate aggressive expansion or reinvestment.

Capex-to-free cash flow (Capital Expenditures to FCF ratio) measures how much a company invests in capital assets relative to its cash a company generates after accounting for capital expenditures.

Circular financing / Vendor financing is a practice where a company lends money to customers or partners to buy its products—can artificially boost sales and pose financial risks.

The **debt-to-equity ratio (D/E)** is a ratio that indicates how much debt a company uses to finance its assets compared to the value of its shareholders' equity.

Dotcom bubble is a period in the late 1990s when excessive speculation in internet-related companies led to a market crash in 2000.

Earnings per share (EPS) are calculated as a companies' net income minus dividends of preferred stock all divided by the total number of shares outstanding.

The **enterprise value-to-sales (EV/S)** ratio compares company's total value (including debt) to its revenue.

The **Federal Reserve (Fed)** is the central bank of the United States. Its **Federal Open Market Committee (FOMC)** meets to determine interest rate policy.

Free cash flow is the cash a company generates after accounting for capital expenditures. It reflects the money available for dividends, debt repayment, or reinvestment.

Hyperscaler is a company that provides massive cloud computing infrastructure and services at scale.

IPO / IPOs (Initial Public Offering) refers to the first time a company sells its shares to the public. It marks the transition from private to public ownership.

"**Magnificent 7**" is a term for the most dominant tech companies. The group is made up of mega-cap stocks Apple, Alphabet, Microsoft, Amazon.com, Meta Platforms, Tesla and Nvidia.

Market concentration indicates how much of a market is controlled by a few firms. High concentration can reduce competition and increase pricing power.

Margin debt is the money borrowed to invest in stocks. High levels can signal speculative behavior and increase market risk.

The **Massachusetts Institute of Technology (MIT)** is a private research university in United States.

Net revenue retention (NRR) measures total revenue (including expansion revenue) minus revenue churn.

NTM stands for next twelve months in the context of earnings and thus price/earnings ratios.

Operational leverage describes how a company's fixed costs impact its profitability. High operational leverage means profits can grow quickly with increased sales—but losses can also deepen if sales fall.

PEG ratio (Price/Earnings to Growth ratio) evaluates a stock's valuation by comparing its P/E ratio to its expected earnings growth. A lower PEG may suggest undervaluation.

The **S&P 500** Index includes 500 leading U.S. companies capturing approximately 80% coverage of available U.S. market capitalization.

Return on equity (ROE) measures company's financial performance by dividing net income by shareholders' equity.

USD is the currency code for the U.S. Dollar.



Appendix

Historical performance

	27.10.2020 - 27.10.2021	27.10.2021 - 27.10.2022	27.10.2022 - 27.10.2023	27.10.2023 - 27.10.2024	27.10.2024 - 27.10.2025
S&P 500	36.2%	-15.0%	10.0%	43.1%	18.5%
Magnificent 7	54.6%	-37.5%	66.7%	73.0%	33.5%
S&P 500 Information Technology	37.7%	-21.5%	32.6%	60.1%	28.4%

Source: LSEG Datastream, Deutsche Bank AG. Data as of October 27, 2025.

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