

# In Focus: AI after DeepSeek

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Invesco's Global Market Strategy Office

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## In Focus: AI after DeepSeek

On Monday, 27 January, markets woke up to a panic in a seemingly consensus investment narrative. A little-known Chinese start-up by the name of DeepSeek published a model (named R1) on 20 January that showed cutting edge performance alongside significant efficiency gains. These impressive results challenged the assumption that AI would require ever-greater investment in computing capabilities to power improvements.

AI promises to revolutionize our lives across work and home with the potential for greater economic outcomes. To power this, large technology companies have invested billions of dollars into R&D and infrastructure to support the development of better AI capabilities. Equities of large tech companies, semiconductors designers, and even utilities have benefitted substantially on this theme. So what's next in AI after DeepSeek?

R1 is reported to have required 50% less in computing costs versus OpenAI's GPT-4o model while achieving virtually the same performance.\* The directionality of incremental improvements in AI is no longer defined by a linear relationship between cost and performance. Recent model advancements have maintained or improved performance while significantly reducing costs.

We think the AI competitive landscape is changing, with a renewed focus on efficiency and with more entrants into the market. Value capture from the IP of models may be shifting as open source models become more powerful. Yet, with cheaper models, we expect adoption to accelerate, which should maintain demand for computing power and the enablers of AI that have so far benefitted from the boom in the technology.

\* Compute comparison based on floating point operations (FLOPs) reported by OpenAI and DeepSeek. Performance based on elo ranking across all tasks reported by LMSys Chatbot Arena.

Sources: Bloomberg, OpenAI, DeepSeek, Epoch AI, and Invesco, as of 14 February 2025.

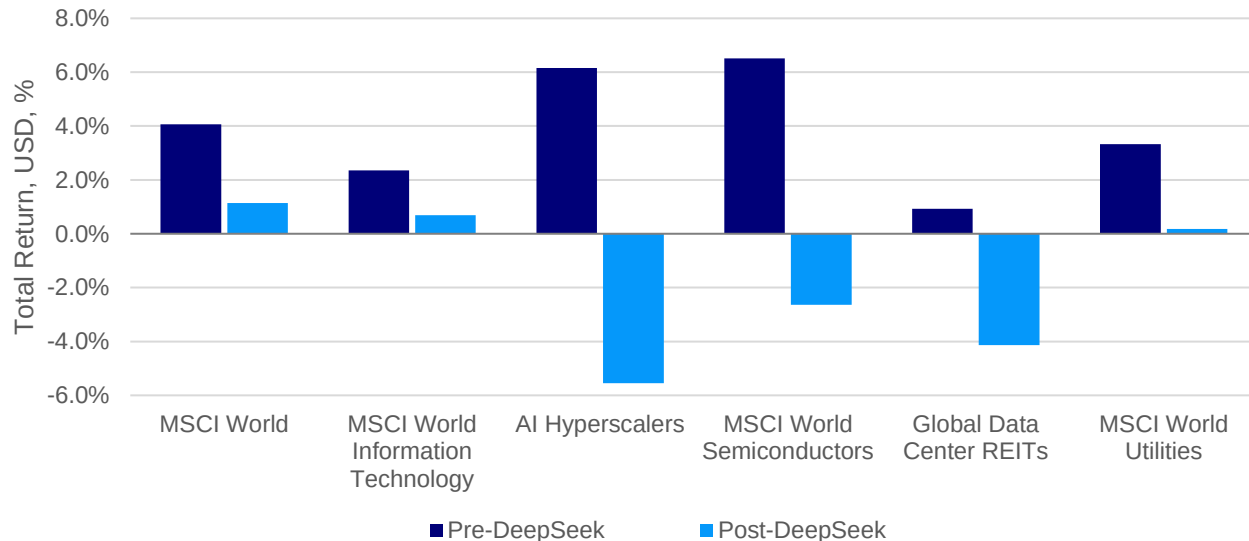
## In Focus

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## 1

# The AI theme takes a pause: Big tech underperforms after DeepSeek makes a splash

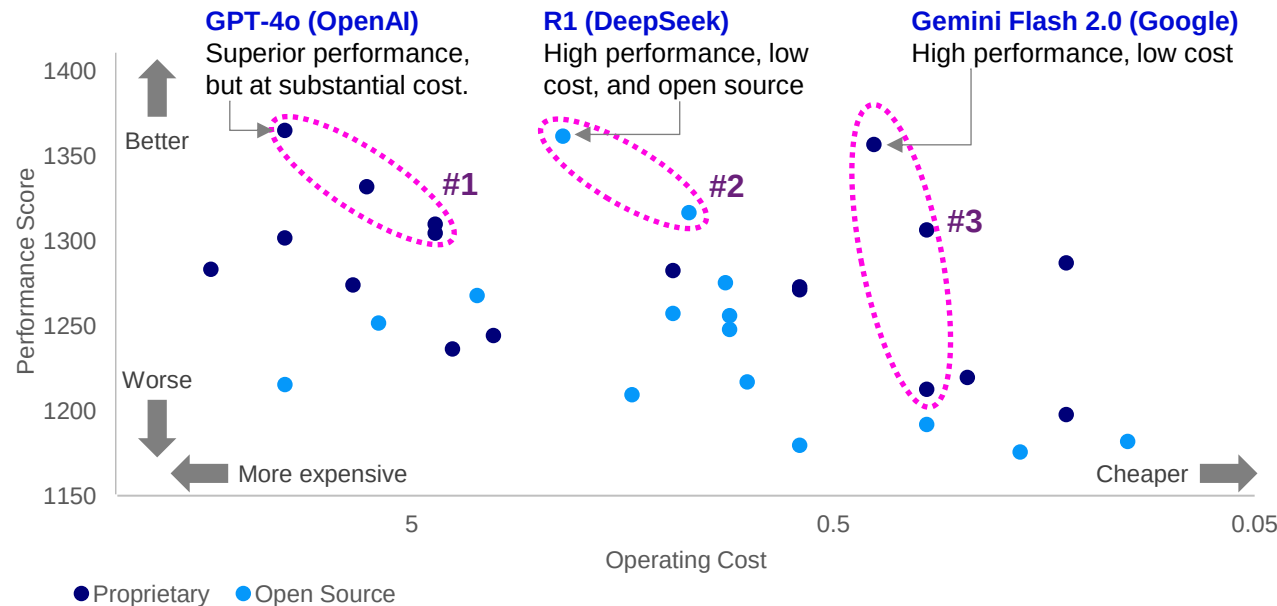
## 2025 returns before and after DeepSeek



Note: Pre-DeepSeek includes year-to-date returns through 24 January 2025. Post-DeepSeek includes performance from 24 January 2025 to 14 February 2025. "AI Hyperscalers" is a market capitalization-weighted composite of Oracle, Microsoft, Alphabet, IBM, and Amazon. Global Data Center REITs = FTSE EPRA Nareit Developed Data Center Index. **Past performance does not guarantee future results.** An investment cannot be made directly in an index.

- DeepSeek's model performance has sent shockwaves through AI-related stocks. Over the past two years, investors have piled into the so-called "picks and shovels" approach to AI, which has included hyperscalers (tech companies with large cloud computing operations), semiconductors, data centers, and utilities. All but utilities have suffered since news of DeepSeek rattled markets.
- Investors are questioning whether the AI narrative is permanently changed. We think there are new wrinkles, but that many of yesterday's winners remain well-placed to benefit from the theme.
- In particular, we believe that AI adopters should begin to stand out as beneficiaries of this theme as costs fall while capabilities improve.

## Selected Model Performance and Cost



Note: #1 = OpenAI models GPT-4o, o3-mini, 01-mini; #2 = DeepSeek models R1 and V3; #3 = Google models Gemini 2.0 Flash, Gemini 2.0 Flash-Lite, Gemini 1.5 Flash-8B. Plotted performance and cost based on available data as of 14 February 2025. Sources: OpenAI, DeepSeek, Google, and various sources via LMSys and *Chatbot Arena: An Open Platform for Evaluating LLMs by Human Preference*, Chiang et al. Reported Operating Cost = Cost per million tokens, based on output tokens only. Performance Score = elo scores from Chatbot Arena across all modalities and tasks. "Open Source" = Freely accessible to download model for personal or commercial use.

- The AI competitive landscape has been turned on its head with the release of DeepSeek and a step up in offerings from Google. Our key observations:

**#1** – OpenAI has focused on a premium approach to AI, with superior performance but at a cost. Their mass market approach may focus on managing costs moving forward.

**#2** – DeepSeek has achieved excellent performance, affordable cost, and is from a non-US competitor.

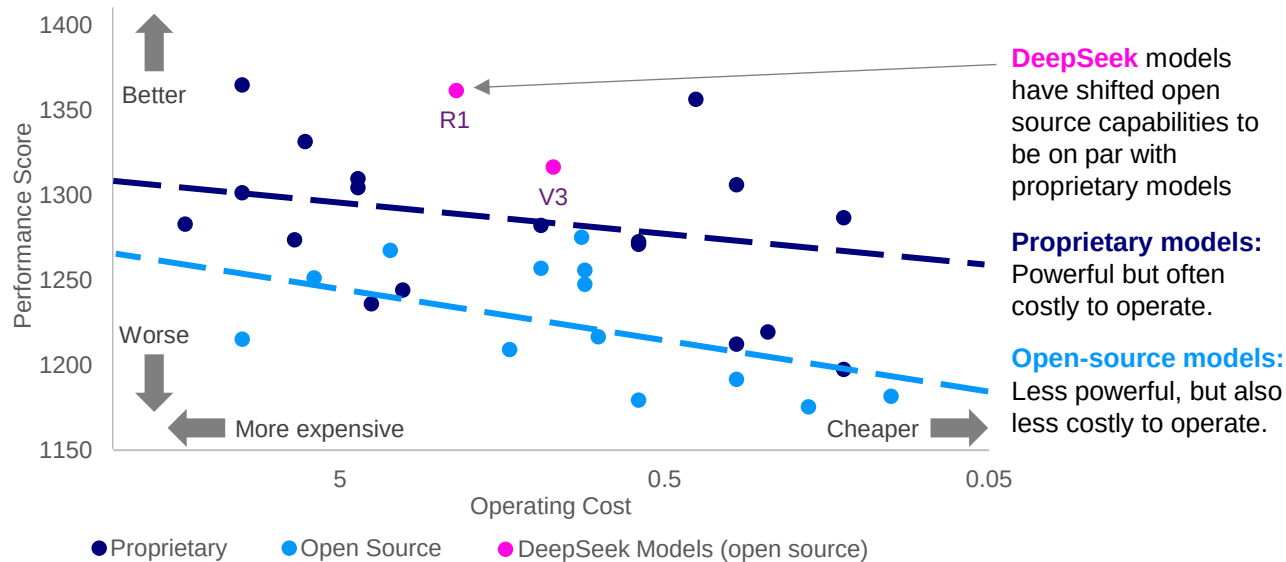
**#3** – Google's models have quickly stepped up performance while managing computing costs. Their latest model, made public in early February, has set a high bar for low cost and performance.

- Recent model releases highlight that the rapid growth of AI computing requirements is slowing. 2023 and 2024 focused on improving capabilities no matter the cost. Now we're seeing a step-up in efficiency gains—a good thing for future AI adoption.

## 3

## DeepSeek disrupts the AI competitive landscape: Open source catches up

### Selected Model Performance and Cost



- DeepSeek's impressive results are also notable because the company chose to publish its model open source. In other words, it is free to access and anyone can download and run it on their computer.
- This may indicate a potential shift in value capture in the development of AI models. To date, proprietary models have led the cutting-edge in AI technology, but these models typically require licensing agreements and are more costly (though they come with extra bells and whistles, such as offering dedicated support and often top-of-the-line capabilities).
- However, AI adopters may wish to apply and fine-tune models from the open-source community which are generally less costly and free of licensing and exclusivity agreements. In other words, DeepSeek may be eroding some of the value of AI intellectual property.

Note: Based on a limited set of models released since 2023. Plotted performance and cost based on available data as of 14 February 2025. Sources: OpenAI, DeepSeek, Google, and various sources via LMSys and *Chatbot Arena: An Open Platform for Evaluating LLMs by Human Preference*, Chiang et al. Reported Operating Cost = Cost per million tokens, based on output tokens only. Performance Score = elo scores from Chatbot Arena across all modalities and tasks.

## 4

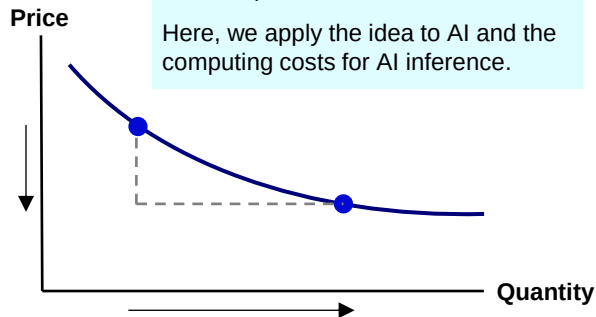
# The AI investment story isn't in trouble, in our view—but it has changed

## Jevon's paradox: Cheaper AI means more AI

DeepSeek efficiency may increase demand for AI

**Jevon's paradox** describes the idea that increased efficiency in using an input results in increased consumption of that input.

Here, we apply the idea to AI and the computing costs for AI inference.

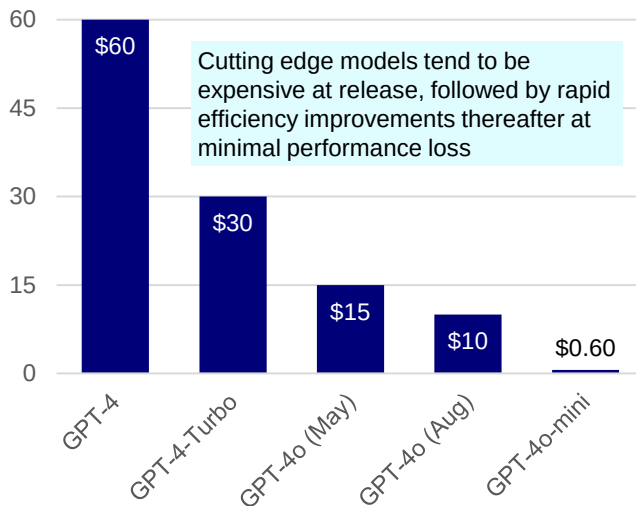


Jevon's paradox was coined in 1865 by UK economist William Jevons in describing the increased use of coal resulting from improvements in steam engine technology and its efficiency in burning coal.

Source: OpenAI and Invesco, as of 31 January 2025.

## Costs were falling before DeepSeek

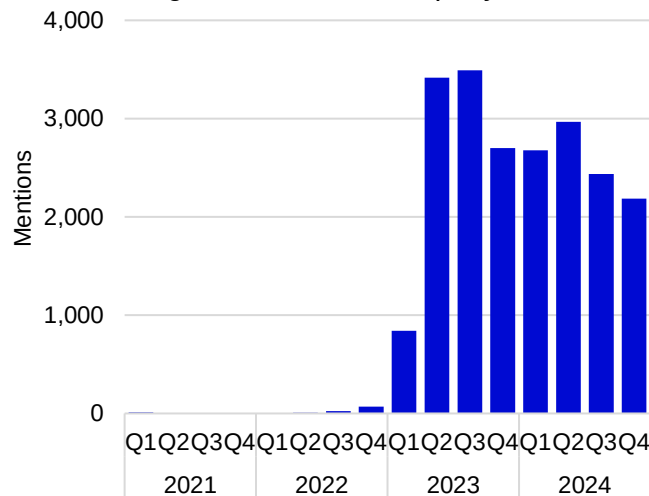
Price (\$) per million output tokens, OpenAI models



- Falling costs are most likely a good thing for the AI narrative, in our view. We've argued previously that technology tends to exert a deflationary impulse by both enabling expanded productivity while costs of the technology itself fall alongside increasing adoption.
- An assumption baked into many AI hypotheses is that ever-larger models power ever-greater capabilities. We disagree. We think narrower, more specialized models are more likely to see integrations and use cases in industry.
- Moreover, costs have already been falling before the DeepSeek news. Iterations of OpenAI's GPT-4 model enabled comparable performance at lower costs to access. We suspect further refinement is likely in more specialized use cases.

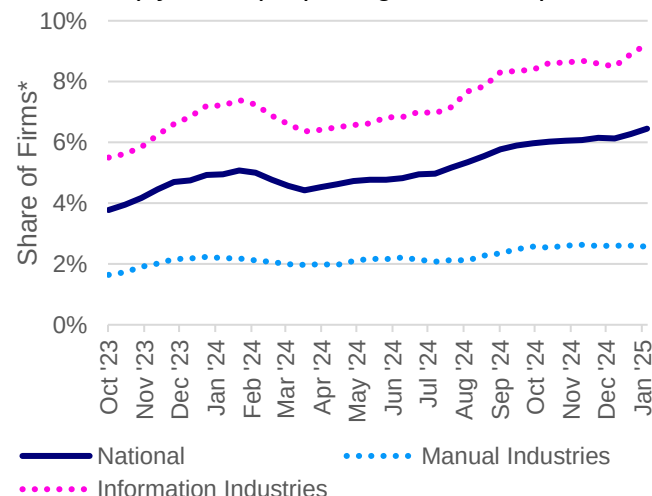
## Recent AI advancements are still fresh

Mentions of generative AI in company events



## Just 6.5% of US firms have adopted AI so far

US firms (by sector) reporting AI use in operations



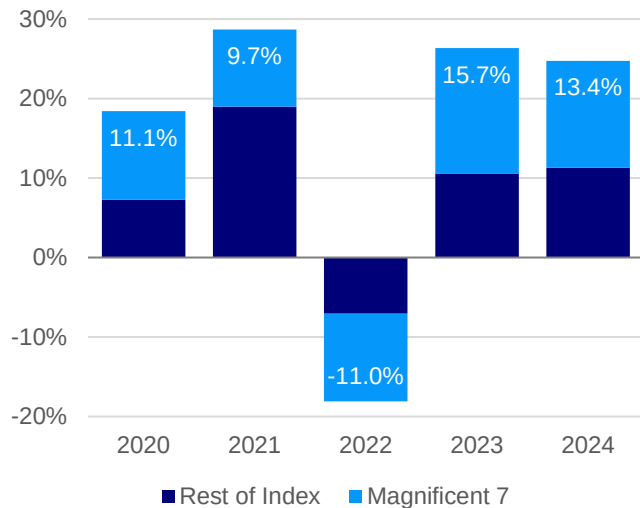
- We believe the climb up the AI adoption curve—and the fact that we remain at the early innings—represents a long-term bull case for the theme. AI capabilities are impressive, but the onus is on developers and businesses alike to deliver tangible results from the technology. Today, just 6.5% of US firms are reported to use AI in their business model.
- As use cases are identified and we climb the adoption curve, demand for AI specialists, products, and supporting infrastructure should continue to benefit.
- In our view, AI is a multi-year story that is likely to see twists and turns in the short-term but is likely to play a key role in future economic growth, especially in information-focused industries.

\* Note: "Manual Industries" and "Information Industries" figures are based on a simple average of share of respondents and is not weighted by sector size. Industries based on NAICS codes. Sources: LEFT: Census Bureau Business Trends and Outlook Survey and Invesco, survey data ends 26 January 2025. Based on the following: "In the last two weeks, did this business use Artificial Intelligence (AI) in producing goods or services? (Examples of AI: machine learning, natural language processing, virtual agents, voice recognition, etc.)" RIGHT: Bloomberg, as of 30 September 2024. Quarterly data from 1 January 2021 to 31 December 2024. Document search covers transcripts of earnings calls, shareholder meetings, guidance calls, investor days, and similar calls. Mentions are defined as the number of documents that contain the specified search terms. Search terms used were "generative AI", "generative artificial intelligence", "genai", "gpt", "openai", "LLM", and "large language model." Charts provided for illustrative purposes only and do not constitute a recommendation.

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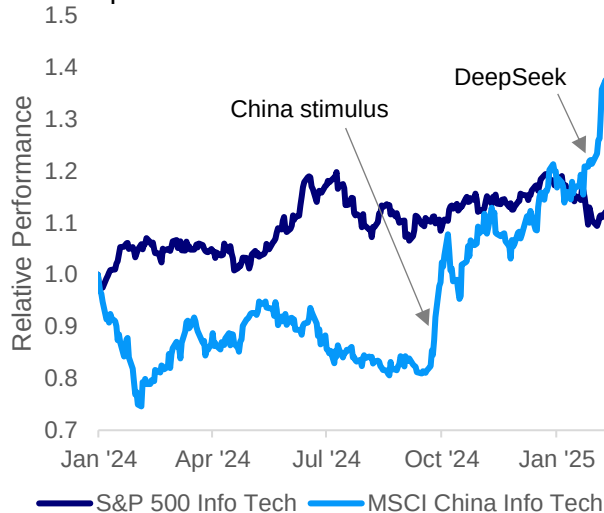
## Is concentration set to ease? Enthusiasm shifts toward Chinese tech

### AI darlings have powered US equity returns Magnificent 7 contribution to S&P 500 returns



Note: Magnificent 7 includes Amazon, Alphabet, Microsoft, Meta, Nvidia, and Tesla. Note that Tesla only was added to the S&P 500 in December 2020. It does not represent a recommendation to buy/hold/sell the securities. It must not be seen as investment advice. **Past performance is not a guide to future returns.** An investor cannot invest directly in an index.  
Sources: Bloomberg and Invesco, as of 14 February 2025.

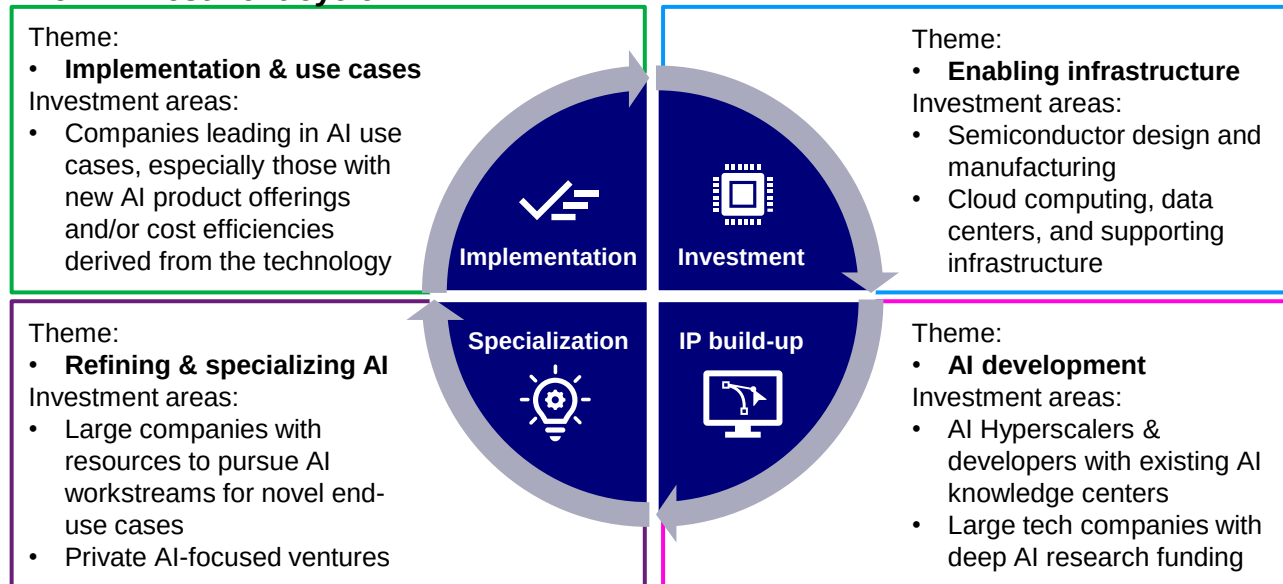
### A sea-change in views on China tech? Relative performance vs. MSCI ACWI



- So far, the AI theme has largely been a US phenomenon. This has been captured by the Magnificent 7, which in 2024 made up nearly a third of the S&P 500 by market capitalization and contributed more than half of the year's gains.
- Elevated valuations in mega cap US tech stocks have left little room for error. Since the release of DeepSeek, Magnificent 7 stocks as a group have underperformed.
- Meanwhile, Chinese technology stocks have jumped higher with investors placing renewed focus on AI projects that were in-motion before DeepSeek. If anything, it appears that sentiment towards Chinese investment has seen a leg higher.
- Our takeaway: Competition is increasing, but the need for supporting infrastructure for AI adoption remains.



### The AI investment cycle



- Cheaper models should help accelerate adoption of AI, begetting an ongoing investment cycle as the technology is scaled up.
- In our view, the current build-up in computing power and growing number of powerful models set the stage for specialization and refinement of the technology for their ultimate use cases and implementation.
- High-profile models like GPT-4o and DeepSeek's R1 have demonstrated the capabilities of recent AI advancements. We expect private enterprise to carry the torch on delivering AI-powered tools and services and promoting the adoption of these technologies.

Note: IP = intellectual property. Sources: Invesco and Stanford University's *AI Index Report 2024* published on 15 April 2024. Latest available data as at 30 September 2024.

# The Path Ahead: Cheaper AI should help accelerate adoption

## 1 Lower costs & increased competition should help accelerate AI adoption.

However, many businesses lack the human capital or organizational agility to integrate AI, likely meaning adoption of the technology will take place over a relatively prolonged period.

## 2 Open-source AI offerings are increasingly competitive with proprietary developers.

Previously, open source offerings lagged the capabilities of proprietary models by 12-18 months. However, DeepSeek and others\* appear to have closed this gap significantly.

## 3 The US pole position remains in semiconductors, but IP may see challenges.

We expect computing demand to continue to surge, benefitting semiconductor designers and manufacturers. Meanwhile, AI adopters may prefer open-source models over some proprietary offerings.

## 4 Recent questioning of the AI theme in the US has benefitted Chinese tech stocks.

Elevated valuations in mega cap US tech stocks have left them exposed to shifts in sentiment around the AI investment theme. Meanwhile, Chinese tech stocks have received a boost in sentiment since the DeepSeek news.

\* Others includes particularly include Llama from Meta and some models from Mistral, which are offered open source.  
Source: Invesco, as of 14 February 2025. For illustrative purposes only.

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