Manulife Investment Management

Investment Note

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Semiconductors belong to one of the most specialised yet globally integrated industry chains. From design, equipment, and materials to manufacturing and commercialisation, the production of a smartphone chip alone spans many countries across continents, creating tremendous opportunities for companies, consumers, and investors. With semiconductors increasingly becoming the backbone of an artificial intelligence (AI) race few are prepared for, understanding this sector is key to unlocking where the next wave of technology competition is heading.

The engine behind AI: Semiconductors are fuelling the next era of technology

Key points:

- AI is already reshaping everyday life, from retail analytics to gaming hardware and industrial products.
- Semiconductor demand points to a US$1.6 trillion industry by 2030.
- Hyperscalers are spending aggressively on AI to serve billions of users, making demand likely more durable than past cycles.
- AI and data centre build-out are driving near-term demand, while robotics and power management may appear to be the value chain's longer-term opportunities.
- Semiconductor valuations appear broadly in line with historical averages[1], which may indicate the market is not fully pricing in the sector’s longer-term growth drivers.

AI beyond chatbots

Many of us are familiar with how chatbots like ChatGPT and DeepSeek work. Beyond these simple uses, however, few are aware of how AI is already being embedded into everyday life. Some examples of early-stage enterprise AI use cases include:

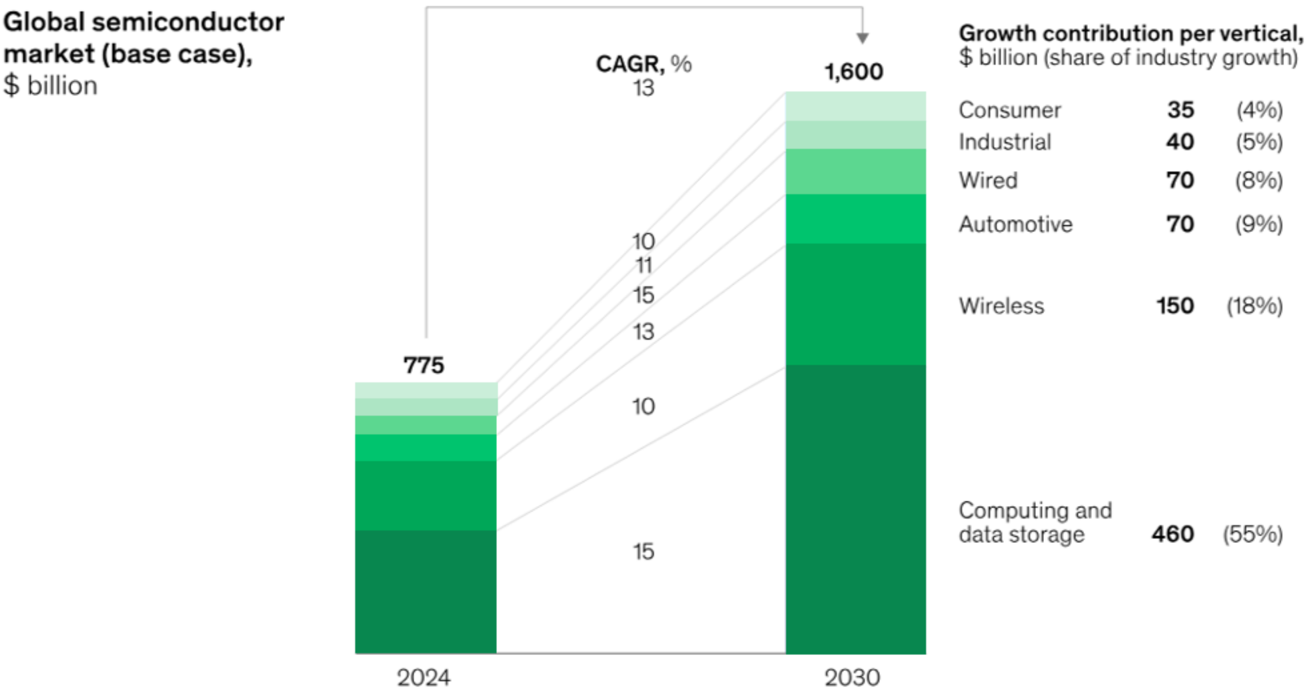
- A Norwegian Bluetooth chipmaker is training its wireless gaming keyboards on keystroke data to anticipate actions and increase click speed recognition.
- A US-based multinational coffee chain store is using surveillance cameras containing image inspection chips to track in-store customer behaviour and purchase patterns so that winning setups can be replicated across store layouts, staffing needs, and customer satisfaction.
- A Japanese pharmaceutical company is creating its own large language model (LLM) based on global data to improve the efficiency of its drug exploration, development, testing, and research.

These examples demonstrate that AI adoption is still in its infancy. The runway for growth looks potentially long, and the opportunities that lie ahead are substantial.

Global semiconductor market: A trillion-dollar runway

The historical demand drivers of semiconductors have shifted over time: Personal computers (PCs) dominated in the 1990s, followed by handsets in the 2000s. Today, AI is emerging as a pivotal driver of future growth of semiconductors (represented by computing and data storage in the next figure), alongside automotive, consumer, and industrial demand. Valued at nearly US$800 billion in 2024, the semiconductor industry is now projected to reach US$1.6 trillion by 2030.

The semiconductors industry could reach $1.6 trillion by 2030



Source: Omdia, McKinsey Analysis, as of January 2026.
The above information may contain projections or other forward-looking statements regarding future events, targets, management discipline or other expectations. There is no assurance that such events will occur, and the future course may be significantly different from that shown here.

Are we in a bubble?

In recent years, we have seen a surge in spending by AI model firms and hyperscalers (i.e., large cloud service providers running data centre networks), which has led to an obvious concern: is there risk of a bubble? We don't believe so; AI infrastructure investment remains foundational rather than late-cycle.

AI spending is concentrated among a handful of hyperscalers, but they are investing on behalf of billions of consumers. Given this combination of concentrated spending and broad-based beneficiaries, we think the current spending cycle is more sustainable than the historically more cyclical semiconductor booms.

Opportunities across the value chain

In our view, the sustainability of AI expenditure and the growing range of AI use cases provide tailwinds across the semiconductors and AI value chain. AI and data centres lead the pack, with strength expected to continue into 2027 as a multi-year buildout plays out. Clusters of graphics processing units (GPUs) are driving near-term demand across data centre connectivity, compute, and semiconductor equipment broadly. The outlook looks similarly promising for Industrials and Internet of Things (IoT), while other markets remain more selective.

Looking ahead, humanoid robots are emerging as a longer-term opportunity, with decades of manufacturing and product data now being used to train machines capable of performing tasks autonomously. Meanwhile, power management is fast becoming a critical constraint, as AI's energy appetite increasingly outpaces available grid capacity.

Outlook by end market

End market	Outlook	Our view
AI and Data Centers		Strength continuing into 2027, as multi-year arms race plays out.
Automotive		End markets stabilized, with growth driven by content opportunities.
Industrials and IoT		At trough levels, with emerging opportunities in robotics and satellites.
Mobile and PC		Selective within broader category, but CPU demand remains robust.
Semicap Equipment		Broad based demand across all end markets due to capacity expansions.

Source : Manulife Investment Management, as of June 2026.

Investment opportunities

Semiconductors – near term

- Data center connectivity
- Data center compute
- Equipment

Semiconductors – mid-to-long term

- Humanoid robots
- Power management

AI beneficiaries

- Data Management & Analytics
- Power Supply

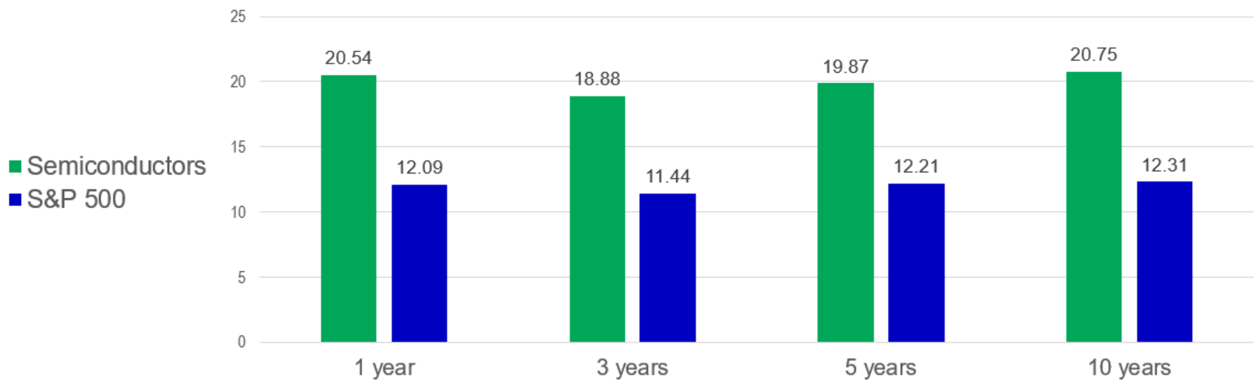
Appealing opportunities to invest

Semiconductors are historically volatile. Although annual corrections of 10-15% are typical, we see these as buying opportunities. Despite the AI narrative, we believe current valuations remain in line with historical averages[1], while the earnings of the PHLX Semiconductor Sector Index (SOX) and the index itself have moved closely in tandem over the past 20 years.

The pattern is evident: semiconductor content has been expanding into many areas of daily life and may remain a long-running trend, with AI potentially acting as an accelerator.

Semiconductor outperformed S&P 500 over most investment horizons

Annualized gross rolling returns for past 20 years (%)



	1 year	3 years	5 years	10 years
% of periods semiconductors outperformed	59%	78%	79%	98%
# of periods	*228*	*204*	*180*	*120*

Source: Morningstar Direct. Results displayed in US Dollar. As of March 31, 2026. Past performance is not indicative of future results.
Table shows annualized rolling returns, shown monthly with indicated time periods beginning April 2006 through periods ending March 2026.
SOX ETF returns from 2006 through 2009; SOX Index returns used from 2010 through 2026.

[1] Source: Bloomberg, as of 15 June 2026. Semiconductors represented by Philadelphia Semiconductor Index.

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