



AI's Silicon Backbone

TALES FROM THE EMERGING WORLD | EMERGING MARKETS EQUITY TEAM | January 2026

Every major innovation has its cheerleaders insisting that "this time is different." In the case of artificial intelligence (AI), that could well be true as its development represents a break from past technological cycles. AI does not fit neatly into the familiar arcs of personal computers (PCs), smartphones or even the dotcom era. Some technologies genuinely do break the mold, and AI appears to be one of them. Treating it as just another garden-variety tech boom risks misreading both the durability of demand and where the true risks lie. Increasingly, AI is behaving more like foundational infrastructure, a distinction that fundamentally alters how this cycle evolves.

Past technology cycles were demand-led and largely consumer-driven. PCs, mobile phones and consumer electronics all followed a familiar rhythm: rapid adoption, falling prices, margin compression, overcapacity and capital rotation. Emerging market's (EM) role was primarily to manufacture more units at lower costs.

AI breaks that template. It is not a discretionary upgrade or a consumer gadget cycle. It is infrastructure, embedding itself directly into the productive capacity of the economy in a manner closer to electricity than consumer hardware.

Growth in AI is driven not by unit shipments, but by expanding processing power, memory, energy and system-level integration needed to support increasingly complex workloads.

This shift is already visible in semiconductors (Display 1). Historically, the average selling prices of chips declined steadily, while revenue growth depended solely on unit volume. Since 2022, that relationship has flipped. Despite sub-trend unit growth, revenues have surged, as chips have become more complex, more powerful and more valuable. The engine of value creation has changed dramatically.

AUTHORS



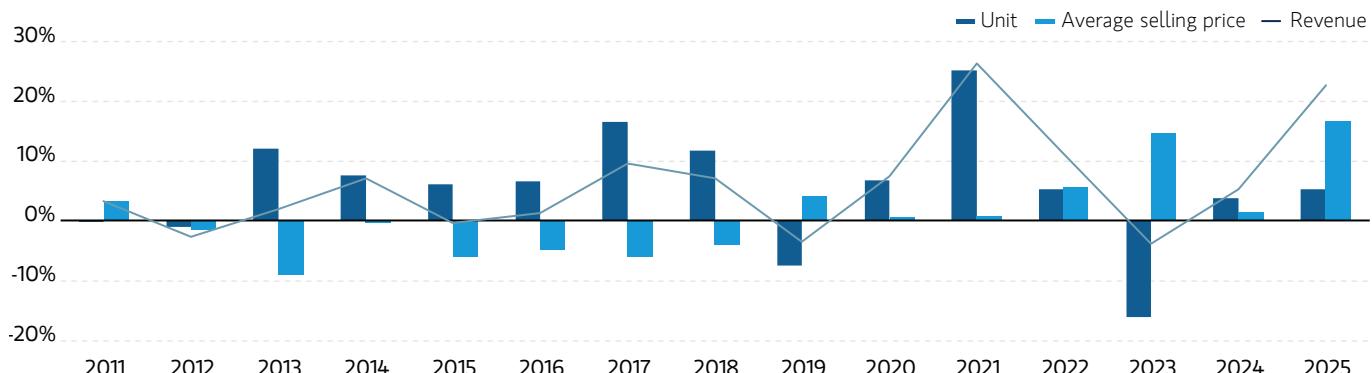
AMAY HATTANGADI
Portfolio Manager
Emerging Markets
Equity Team



SAMSON HUNG
Vice President
Emerging Markets
Equity Team

DISPLAY 1**As Chips Have Evolved, Revenue Has Significantly Increased**

Global semiconductors (ex. memory) year-over-year % change



Source: Semiconductor Industry Association, MSIM. As of Dec. 31, 2025.

Bubble Anxiety

Much of the focus in AI has been on U.S. dominance, creating a widening disconnect between the unfolding AI cycle and how EM tech exposure is perceived.

No discussion of AI is complete without the inevitable bubble question. Hyperscalers are committing unprecedented capital to data centers, semiconductors and power infrastructure, while revenue remains relatively modest. Last year, U.S. tech firms poured more than \$400 billion into data centers, while AI revenues are a paltry \$50 billion to date (Display 2).

The imbalance is not new. Technologies like railways, electricity grids, enterprise computing and the internet all followed a similar pattern: infrastructure came well before productivity and profits. Firms needed time to reorganize

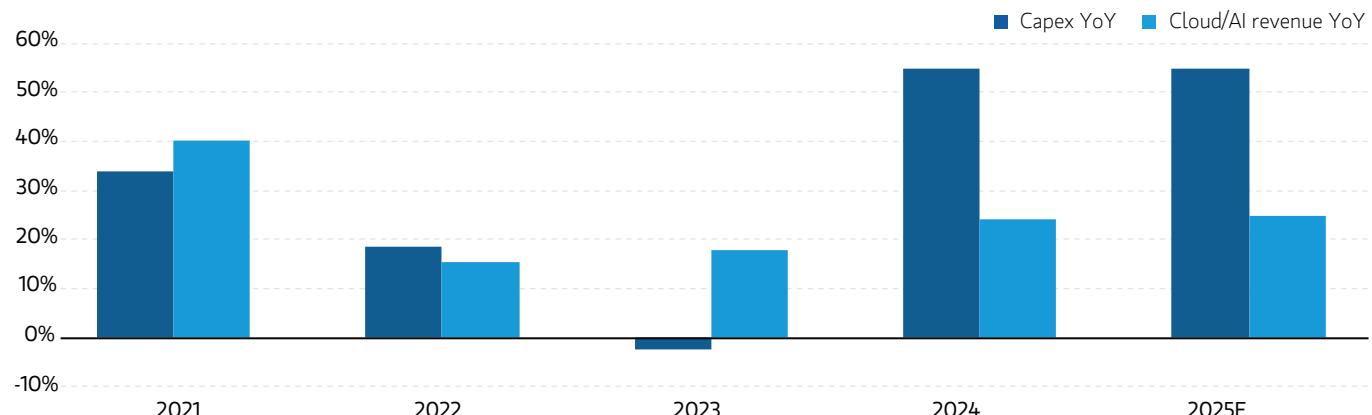
workflows, redesign processes and retrain workers to use the technology effectively. Early returns were often disappointing. Long-term returns were not.

AI adoption has in fact proceeded at an unusually rapid pace. A large share of the working population in advanced economies is already using AI tools. Microsoft estimates AI reached 1.2 billion users in under three years, a rate unmatched by previous technologies. Enterprise usage has expanded beyond experimentation into recurring tasks: software development, customer support, logistics, design and research.

The gap between investment and revenue reflects timing rather than saturation. Infrastructure is built first and monetization will follow once firms restructure around AI-native workflows.

DISPLAY 2**Signs of a Bubble?**

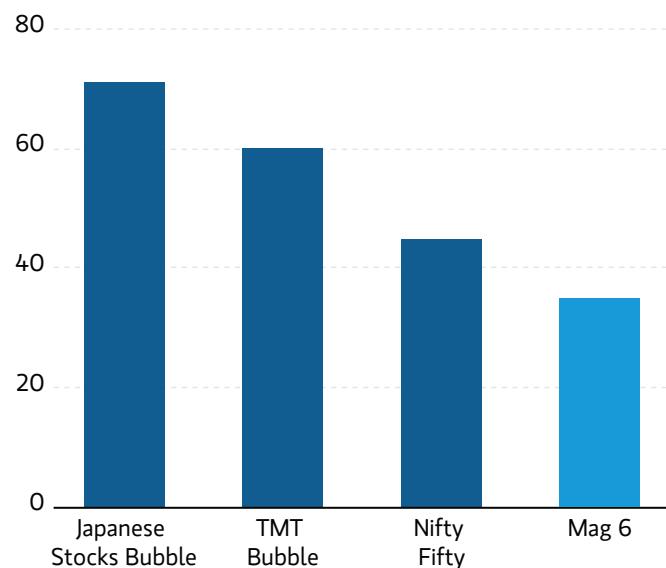
AI capital expenditure is outpacing revenue (year-over-year %)



Source: Company data, MSIM. As of Jan. 2026.

DISPLAY 3**The Multiples of AI Leaders Are Not Extreme**

P/E ratios of past bubbles



Source: Morgan Stanley, Haver, Bloomberg. As of Jan 20, 2026.
The Mag 6 are Amazon, Apple, Google, Meta, Microsoft and Nvidia

Dotcom Comparisons

Comparisons with the dotcom bubble are seductive, but misleading. Today's AI leaders trade at elevated price-to-earnings (PE) multiples, but far below the extremes of 2000. More importantly, they generate substantial cash flow, maintain strong balance sheets and fund investment largely through operating income (Display 3).

The progress in AI is constrained by hardware in a way that prior digital cycles were not. Meaningful leaps in capability depend on deploying new generations of chips, high bandwidth memory (HBM), advanced servers, networking and power systems. Software alone does not move the frontier. Physical bottlenecks matter.

Advanced semiconductors, HBM, system integration capacity and electricity availability are all binding constraints across the value chain. In parts of the market, demand still exceeds supply. These are not the hallmarks of a speculative bubble, but the characteristics of an industry still scaling.

In the dotcom era, Cisco operated in a world of abundant capacity and collapsing prices. Today, Nvidia operates in a world of constrained supply and increasingly specialized hardware.

Nvidia trades at roughly 25-30x forward earnings, compared with Cisco's near 140x at the peak of the

internet bubble. Treating the two as equivalents misses the point.

Higher Productivity

Large capex is often seen as a peak cycle signal. History suggests otherwise. Electricity, computing and the internet all followed a productivity J-curve, where early investment preceded visible economy-wide benefits by years.

AI appears to be following a similar path.

The shift toward agentic tasks, solutions and eventually into physical world applications, such as autonomous driving and robotics, should support higher productivity growth. This helps explain why AI infrastructure investment remains aggressive even as near-term benefits appear modest.

Importantly, AI workloads are also shifting from training toward inference and deployment. Real world usage increasingly involves multistep, agentic workflows where models orchestrate tasks, reason across steps and interact with external tools. These are processing intensive workloads that reinforce demand for physical infrastructure.

This does not eliminate risk. Vulnerabilities remain, particularly in private credit markets and leveraged or circular financing structures. A disruption in funding flows could still trigger volatility, even if the broader industry remains fundamentally sound.

Builders of AI Backbone

AI may be written in code, but it runs on metal, silicon and electricity. Much of that infrastructure is produced in emerging markets. Investors still see EM companies through a cost-cutting lens and believe cyclical is the key driver for their stocks. We think otherwise, a view that AI brought a structural shift, where EM companies are now the irreplaceable builders of AI infrastructure. Without these EM companies, there might not be an AI revolution.

For example, Taiwan dominates advanced semiconductor fabrication and AI server integration. Korea is a major supplier of HBM and critical power-related equipment. China remains central to optical components and the printed circuit boards that are indispensable to keeping the AI cycle rolling. Meanwhile, EMs are also providing a solid talent pool.

As AI systems scale, their physical requirements become more specialized. Efficiency gains in software do not eliminate the need for hardware, but expand the range of economically viable applications. EM technology exposure should be viewed less as a cyclical trade and more as participation in a long-term infrastructure investment.

China's AI ecosystem illustrates this point. Despite restrictions on access to the most advanced semiconductors, Beijing has focused on system-level optimization and application deployment across its vast domestic market. Rapid progress has been made in areas where scale and iteration matter most, such as autonomous driving, robotics and consumer platforms. The result is not technological parity with the U.S., but a resilient landscape that rewards selectivity and deep understanding of the local ecosystem.

AI's Middle Innings

The AI cycle appears to be in its middle innings. Rapid adoption, expansionary capital expenditure supply constraints and defensible valuations all point to a cycle that is ongoing rather than exhausted.

Shifts in sentiment, reassessment of returns or macroeconomic shocks could slow capital spending and negatively ripple through the supply chains.

But exiting the cycle prematurely carries its own risk. Many emerging market AI enablers are already priced with skepticism, despite their growing strategic importance. With discipline and selectivity, investors can look through near-term volatility and participate in the structural growth ahead.

In summary, the physical backbone of AI is still being built, and emerging markets are supplying much of it.

RISK CONSIDERATIONS

Investing in companies in anticipation of a catalyst event, such as Artificial Intelligence (AI) adoption, carries the risk that such catalysts may not happen, or the market may react differently than expected. Companies focused on AI may have limited product lines, markets, or financial resources, and the management of such companies may be more dependent upon one or a few people. A Portfolio may be particularly impacted by events that adversely affect AI adoption, such as rapid changes in technology product cycles, product obsolescence, government regulation, and competition, and may fluctuate more than that of a portfolio that does not invest significantly in companies adopting AI. Investments in **foreign markets** entail special risks such as currency, political, economic, market and liquidity risks. The risks of investing in **emerging market countries** are greater than the risks generally associated with investments in foreign developed countries.

Charts and graphs provided herein are for illustrative purposes only.
Past performance is no guarantee of future results.

There is no guarantee that any investment strategy will work under all market conditions, and each investor should evaluate their ability to invest for the long-term, especially during periods of downturn in the market.

A separately managed account may not be appropriate for all investors. Separate accounts managed according to the particular Strategy may include securities that may not necessarily track the performance of a particular index. Please consider the investment objectives, risks and fees of the Strategy carefully before investing. A minimum asset level is required.

For important information about the investment managers, please refer to Form ADV Part 2.

The views and opinions and/or analysis expressed are those of the author or the investment team as of the date of preparation of this material and are subject to change at any time without notice due to market or economic conditions and may not necessarily come to pass. Furthermore, the views will not be updated or otherwise revised to reflect information that subsequently becomes available or circumstances existing, or changes occurring, after the date of publication. The views expressed do not reflect the opinions of all investment personnel at Morgan Stanley Investment Management (MSIM) and its subsidiaries and affiliates (collectively "the Firm"), and may not be reflected in all the strategies and products that the Firm offers.

Forecasts and/or estimates provided herein are subject to change and may not actually come to pass. Information regarding expected market returns and market outlooks is based on the research, analysis and opinions of the authors or the investment team. These conclusions are speculative in nature, may not come to pass and are not intended to predict the future performance of any specific strategy or product the Firm offers. Future results may differ significantly depending on factors such as changes in securities or financial markets or general economic conditions.

This material has been prepared on the basis of publicly available information, internally developed data and other third-party sources believed to be reliable. However, no assurances are provided regarding the reliability of such information and the Firm has not sought to independently verify information taken from public and third-party sources.

This material is a general communication, which is not impartial and all information provided has been prepared solely for informational and educational purposes and does not constitute an offer or a recommendation to buy or sell any particular security or to adopt any specific investment strategy. The information herein has not been based on a consideration of any individual investor circumstances and is not investment advice, nor should it be construed in any way as tax, accounting, legal or regulatory advice. To that end, investors should seek independent legal and financial advice, including advice as to tax consequences, before making any investment decision.

The indexes are unmanaged and do not include any expenses, fees or sales charges. It is not possible to invest directly in an index. Any index referred to herein is the intellectual property (including registered trademarks) of the applicable licensor. Any product based on an index is in no way sponsored, endorsed, sold or promoted by the applicable licensor and it shall not have any liability with respect thereto.

This material is not a product of Morgan Stanley's Research Department and should not be regarded as a research material or a recommendation.

The Firm has not authorised financial intermediaries to use and to distribute this material, unless such use and distribution is made in accordance with applicable law and regulation. Additionally, financial intermediaries are required to satisfy themselves that the information in this material is appropriate for any person to whom they provide this material in view of that person's circumstances and purpose. The Firm shall not be liable for, and accepts no liability for, the use or misuse of this material by any such financial intermediary.

This material may be translated into other languages. Where such a translation is made this English version remains definitive. If there are any discrepancies between the English version and any version of this material in another language, the English version shall prevail.

The whole or any part of this material may not be directly or indirectly reproduced, copied, modified, used to create a derivative work, performed, displayed, published, posted, licensed, framed, distributed or transmitted or any of its contents disclosed to third parties without the Firm's express written consent. This material may not be linked to unless such hyperlink is for personal and non-commercial use. All

information contained herein is proprietary and is protected under copyright and other applicable law.

Eaton Vance is part of Morgan Stanley Investment Management. Morgan Stanley Investment Management is the asset management division of Morgan Stanley.

DISTRIBUTION

This material is only intended for and will only be distributed to persons resident in jurisdictions where such distribution or availability would not be contrary to local laws or regulations.

MSIM, the asset management division of Morgan Stanley (NYSE: MS), and its affiliates have arrangements in place to market each other's products and services. Each MSIM affiliate is regulated as appropriate in the jurisdiction it operates. MSIM's affiliates are: Calvert Research and Management, Eaton Vance Management, Parametric Portfolio Associates LLC, Parametric SAS, and Atlanta Capital Management LLC.

This material has been issued by any one or more of the following entities:

EMEA:

This material is for Professional Clients/Accredited Investors only.

In the EU, MSIM materials are issued by MSIM Fund Management (Ireland) Limited ("FMIL"). FMIL is regulated by the Central Bank of Ireland and is incorporated in Ireland as a private company limited by shares with company registration number 616661 and has its registered address at 24- 26 City Quay, Dublin 2, D02 NY19, Ireland.

Outside the EU, MSIM materials are issued by Morgan Stanley Investment Management Limited (MSIM Ltd) is authorised and regulated by the Financial Conduct Authority. Registered in England. Registered No. 1981121. Registered Office: 25 Cabot Square, Canary Wharf, London E14 4QA.

In Switzerland, MSIM materials are issued by Morgan Stanley & Co. International plc, London (Zurich Branch) Authorised and regulated by the Eidgenössische Finanzmarktaufsicht ("FINMA"). Registered Office: Beethovenstrasse 33, 8002 Zurich, Switzerland.

Italy: MSIM FMIL (Milan Branch), (Sede Secondaria di Milano) Palazzo Serbelloni Corso Venezia, 16 20121 Milano, Italy. **The Netherlands:**

MSIM FMIL (Amsterdam Branch), Rembrandt Tower, 11th Floor

Amstelplein 11096HA, Netherlands. **France:** MSIM FMIL (Paris Branch),

61 rue de Monceau 75008 Paris, France. **Spain:** MSIM FMIL (Madrid Branch), Calle Serrano 55, 28006, Madrid, Spain. **Germany:** MSIM

FMIL, Frankfurt Branch, Grosse Gallusstrasse 18, 60312 Frankfurt am Main, Germany (Gattung: Zweigniederlassung (FDI) gem. § 53b KWG).

Denmark: MSIM FMIL (Copenhagen Branch), Gorrisen Federspiel, Axel Towers, Axeltorv2, 1609 Copenhagen V, Denmark.

MIDDLE EAST:

Dubai International Financial Centre: This information does not constitute or form part of any offer to issue or sell, or any solicitation of any offer to subscribe for or purchase, any securities or investment products in the UAE (including the Dubai International Financial Centre and the Abu Dhabi Global Market) and accordingly should not be construed as such. Furthermore, this information is being made available on the basis that the recipient acknowledges and understands that the entities and securities to which it may relate have not been approved, licensed by or registered with the UAE Central Bank, the Dubai Financial Services Authority, the UAE Securities and Commodities Authority, the Financial Services Regulatory Authority or any other relevant licensing authority or government agency in the UAE. The content of this report has not been approved by or filed with the UAE Central Bank, the Dubai Financial Services Authority, the UAE Securities and Commodities Authority or the Financial Services Regulatory Authority.

Abu Dhabi Global Market ("ADGM"): This material is sent strictly within the context of, and constitutes, an Exempt Communication. This material relates to content which is not subject to any form of regulation or approval by the Financial Services Regulatory Authority of the Abu Dhabi Global Market (the "FSRA").

Saudi Arabia: This financial promotion was issued and approved for use in Saudi Arabia by Morgan Stanley Saudi Arabia, Al Rashid Tower, Kings Sand Street, Riyadh, Saudi Arabia, authorized and regulated by the Capital Market Authority license number 06044-37.

U.S.: NOT FDIC INSURED | OFFER NO BANK GUARANTEE | MAY LOSE VALUE | NOT INSURED BY ANY FEDERAL GOVERNMENT AGENCY | NOT A DEPOSIT

Latin America (Brazil, Chile, Colombia, Mexico, Peru, and Uruguay)

This material is for use with an institutional investor or a qualified investor only. All information contained herein is confidential and is for the exclusive use and review of the intended addressee, and may not be passed on to any third party. This material is provided for informational purposes only and does not constitute a public offering, solicitation or recommendation to buy or sell for any product, service, security and/or strategy. A decision to invest should only be made after reading the strategy documentation and conducting in-depth and independent due diligence.

ASIA PACIFIC

Hong Kong: This material is disseminated by Morgan Stanley Asia Limited for use in Hong Kong and shall only be made available to "professional investors" as defined under the Securities and Futures Ordinance of Hong Kong (Cap 571). The contents of this material have not been reviewed nor approved by any regulatory authority including the Securities and Futures Commission in Hong Kong. Accordingly, save where an exemption is available under the relevant law, this material shall not be issued, circulated, distributed, directed at, or made available to, the public in Hong Kong. **Singapore:** This material is disseminated by Morgan Stanley Investment Management Company and should not be considered to be the subject of an invitation for subscription or purchase, whether directly or indirectly, to the public or any member of the public in Singapore other than (i) to an institutional investor under section 304 of the Securities and Futures Act, Chapter 289 of Singapore ("SFA"); (ii) to a "relevant person" (which includes an accredited investor) pursuant to section 305 of the SFA, and such distribution is in accordance with the conditions specified in section 305 of the SFA; or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA. This publication has not been reviewed by the Monetary Authority of Singapore. **Australia:** This material is provided by Morgan Stanley Investment Management (Australia) Pty Ltd ABN 22122040037, AFSL No. 314182 and its affiliates and does not constitute an offer of interests. Morgan Stanley Investment Management (Australia) Pty Limited arranges for MSIM

affiliates to provide financial services to Australian wholesale clients. This material will not be lodged with the Australian Securities and Investments Commission.

Japan: For professional investors, this material is circulated or distributed for informational purposes only. For those who are not professional investors, this material is provided in relation to Morgan Stanley Investment Management (Japan) Co., Ltd. ("MSIMJ")'s business with respect to discretionary investment management agreements ("IMA") and investment advisory agreements ("IAA"). This is not for the purpose of a recommendation or solicitation of transactions or offers any particular financial instruments. Under an IMA, with respect to management of assets of a client, the client prescribes basic management policies in advance and commissions MSIMJ to make all investment decisions based on an analysis of the value, etc. of the securities, and MSIMJ accepts such commission. The client shall delegate to MSIMJ the authorities necessary for making investment. MSIMJ exercises the delegated authorities based on investment decisions of MSIMJ, and the client shall not make individual instructions. All investment profits and losses belong to the clients; principal is not guaranteed. Please consider the investment objectives and nature of risks before investing. As an investment advisory fee for an IAA or an IMA, the amount of assets subject to the contract multiplied by a certain rate (the upper limit is 2.20% per annum (including tax)) shall be incurred in proportion to the contract period. For some strategies, a contingency fee may be incurred in addition to the fee mentioned above. Indirect charges also may be incurred, such as brokerage commissions for incorporated securities. Since these charges and expenses are different depending on a contract and other factors, MSIMJ cannot present the rates, upper limits, etc. in advance. All clients should read the Documents Provided Prior to the Conclusion of a Contract carefully before executing an agreement. This material is disseminated in Japan by MSIMJ, Registered No. 410 (Director of Kanto Local Finance Bureau (Financial Instruments Firms)), Membership: the Japan Securities Dealers Association, The Investment Trusts Association, Japan, the Japan Investment Advisers Association and the Type II Financial Instruments Firms Association.