



A Franklin Templeton Company

# The Physical Limits of AI: Where Scarcity Is Creating Opportunity

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## Key Takeaways

- ▶ AI demand is turning supply constraints across chips, memory, wafers, networking and optical infrastructure into pricing power for key suppliers.
- ▶ The AI opportunity extends beyond hyperscalers to global companies solving bottlenecks across the semiconductor, data center and connectivity supply chains.
- ▶ In a narrow, momentum-driven AI market, we believe disciplined active management is needed to capture durable winners while managing valuation and volatility risk.

Generative artificial intelligence is no longer just about the most visible technology platforms — it is becoming a global supply chain bottleneck story. The scale of AI capital spending is overwhelming the existing manufacturing base for advanced computing, creating constraints across multiple IT product categories including GPUs, CPUs, memory, wafers, advanced packaging, storage, networking and optical infrastructure as well as fab (manufacturing) capacity. These constraints are giving pricing power to companies that historically had little of it, while transforming these once-cyclical industries into structural growth beneficiaries.

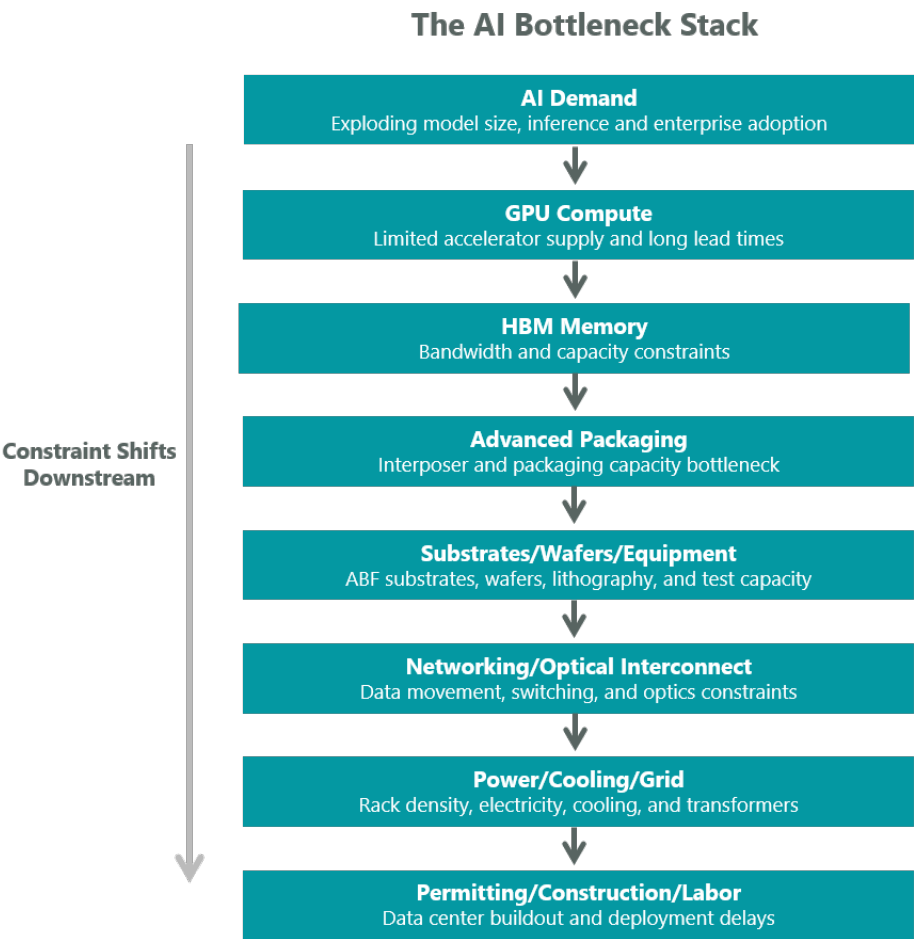
Such supply and capacity shortages are also creating a broader global opportunity set for active investors with the research capabilities and industry knowledge to navigate the rapid business model shifts created by AI and identify companies addressing an expanding range of supply chain bottlenecks. Our premise for navigating this environment is to identify businesses best positioned to gain or maintain pricing power or otherwise benefit from newfound demand.

## Bottlenecks Across the Semiconductor Industry

One of the most apparent areas where [supply/demand imbalance is enabling companies to raise prices is semiconductors](#). Memory manufacturers like South Korea's Samsung Electronics are seeing higher margins for both commodity memory as well as high-bandwidth memory (HBM), which powers AI workloads. HBM requires more silicon wafers on which semiconductor circuits are etched, while chips designed for AI inference functions require more space per wafer, driving demand for wafer suppliers like Japan's Shin-Etsu Chemical. These companies have rapidly moved from a supply glut to shortages, dramatically improving margins. Analog chip makers such as Infineon are also benefiting from AI-driven demand for power management circuits to regulate voltage for specific server workloads, enabling the German company to push through two price hikes in the second quarter alone.

While Nvidia remains the dominant supplier of GPUs that provide the processing power for large language models, GPU supply remains constrained, creating opportunities for new entrants like Taiwan’s MediaTek. The system-on-chip maker has expanded beyond its traditional smartphone and broadband business to develop AI accelerator chips, known as tensor processing units (TPUs), for customers including Alphabet.

Exhibit 1: Where AI Infrastructure Demand Runs Into Supply Constraints



Source: ClearBridge Investments. Interposer is a layer that connects multiple chips together to enable faster connectivity while reducing overheating and power consumption. ABF substrates connect advanced semiconductor chips to printed circuit boards.

Meanwhile, the rise of agentic AI has jumpstarted the need for CPUs, which have traditionally powered PCs and servers but are increasingly becoming a critical piece that complements the functions of GPUs to orchestrate AI workloads and coordinate complex tasks. U.S. chip maker Advanced Micro Devices has been able to gain new customers and raise prices for its CPUs as supply bottlenecks continue to tighten.

Bottlenecks are also occurring at the foundry level where Taiwan Semiconductor (TSMC) maintains a near monopoly on leading-edge semiconductor manufacturing. This has strengthened TSMC’s pricing power while also creating opportunities for Samsung, which has been investing in advanced manufacturing technologies to win new customers such as Tesla and Apple.

## Networking Key to Optimal Data Center Operations

Often overlooked in the GPU-enabled focus on AI computation is the networking infrastructure that amplifies that processing power by connecting GPUs within data centers and AI clusters across multiple facilities. Within the data center, integrated high-speed switch and proprietary software packages from U.S.-based Arista Networks enable low-latency, high-bandwidth communication across GPUs. Arista is seeing strong demand from enterprise customers and counts hyperscalers like Microsoft and Meta Platforms among its clients. By contrast, Canada's Celestica manufactures "white box" switches that can be paired with chips and software from other vendors. These systems offer lower hardware costs and greater flexibility, enabling hyperscalers to customize their AI networking infrastructure and use it as a competitive differentiator.

Optical networking companies enable high-speed data connectivity over longer distances by converting electrical signals into light for transmission through fiber optic cables, a higher bandwidth and more efficient alternative to traditional copper wiring. Finland's Nokia has transformed itself over the last decade from primarily a wireless and telecom provider into a leading supplier of long-haul optical and lasers. With key rival Ciena at capacity, Nokia is expanding its town production capabilities fivefold to meet accelerating demand for connecting multiple data centers into AI clusters. U.K.-based technology conglomerate Halma also has a rapidly growing optical photonics business that allows hyperscalers to enhance the connectivity of AI chips and servers within and across data centers. The company's design and installation business has doubled in revenue over the last two years and is projected to grow approximately 30% annually going forward. Italian fiber optic cable manufacturer Prysmian is also benefiting from industry supply constraints, allowing the company to raise prices as demand continues to outpace supply.

## Managing in a Momentum Market

As diversified investors, we manage the ClearBridge Global Growth Strategy to target companies at various stages of growth across U.S., developed and emerging markets. While AI rapidly emerged as a powerful secular growth trend, we are careful to monitor our exposures across what, at times, has been a narrow, momentum-driven cohort of leaders. As earnings for AI-related companies have accelerated and share prices have risen, we have become accustomed to navigating heightened market volatility. By establishing price targets for all of our portfolio holdings prior to purchase, and then continuously refining them as fundamentals evolve, we remain disciplined in adjusting position sizes based on valuation and portfolio construction factors. While we seek to maintain our positions as long as we see upside to our investment thesis, we are also willing to exit a name earlier than some of our peers and will often revisit that name should the risk reward improve.

Global AI development has unleashed an unprecedented wave of capital expenditure that continues to exceed expectations. While the tailwinds of these outlays seem readily apparent today, we recognize that investor sentiment and market momentum can reverse quickly. By targeting growth companies that provide products and services addressing critical AI bottlenecks, and whose competitive positioning is backed by pricing power, we have confidence in our technology exposure.

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