

Brief number 7: How big is the NVIDIA story? **By Pei Xin, GIOAS Research Associate**

Anyone who follows the stock market is aware that Nvidia took around ten months to reach USD 1 trillion market cap after its Hopper graphics processing unit (GPU) was launched in September 2022. GPU was originally an artistic muscle of a computer designed to bring visual images to life on screen more quickly, important for visual arts and gaming applications. Then, the deep learning era (2010-19) saw a surge in demand for computational power where the GPUs non-graphic processing capabilities now become the powerhouse of the current generative artificial intelligence (GAI) boom. Nvidia emerged as the dominant winner in this AI race since the appearance of ChatGPT software, now the world's leading GPU designer.

Nvidia's market cap stayed largely flat since it went public in 1999 until Hopper's release in September 2022 which catapulted the market cap from \$300 billion to \$2.2 trillion, which is bigger than the Canadian economy of \$2.1 trillion. Nvidia has become the third mega-cap technology company, helping to lift the NASDAQ index to a 52-week high of 16,539, breaking the 2021 record close at 16,057.

GAI is now mainstream, after new AI models from ChatGPT to Google Gemini have become our everyday go-to "person" to handle complex tasks, all rely on Nvidia GPUs to run. They are currently viewed as the best chips for training AI models. "Hopper is the new engine of AI factories, processing and refining mountains of data to train models with trillions of parameters that are used to drive advances in language-based AI, robotics, healthcare and life sciences," said Jensen Huang, founder and CEO of Nvidia.

Enthusiasm for this new commodity is so great that demand overwhelmed supply, boosting Nvidia's revenue and providing a pipeline of growing customers. Before the pandemic, gaming graphics cards were the core sales until AI business boosted not only demand for GPUs but also demand for data center processing units. Data center revenue shot up by 68% from \$47 billion while gaming revenue had flat growth, rose \$1 billion to \$10 billion for fiscal 2024¹. The huge demand for GAI processing units enabled Nvidia to dictate premium Hopper prices, around \$30,000, to generate fat margins.

Nvidia is a full stack company with tightly integrated hardware and software. AI developers need to buy its hardware together with the software in order to develop AI models intelligence and make inferences. AI models added \$31 billion to data center services in 2023, and revenue grew twofold to overtake even the annual revenue of Intel pushed the market value and revenue rose more than twofold². At the end of 2023, Nvidia's price-to-earnings (PE) ratio was 115, which is higher than the technology industry average PE of 45. If Nvidia continues to monetize its technology, revenue could reach a trillion which pushes PE ratio even higher. On the back of the AI mania, Nvidia's stock price ballooned more than 200% in 2023, but its PE ratio is still well below its competitor Advanced Micro Devices (AMD) which trades at 337 PE. Fast growth industry like this has dazzled investors willing to pay for dream price rises.

¹https://s201.q4cdn.com/141608511/files/doc_financials/2024/Q4FY24/Rev_by_Mkt_Qtrly_Trend_Q424.pdf

² <https://www.statista.com/statistics/1425087/data-center-segment-revenue-nvidia-amd-intel/>

Nvidia's cash flow shows its potential for always investing in the future. On March 5, 2024, Nvidia declared a quarterly dividend payment of \$0.04, at the same levels since 2019. The modest dividend payouts enable earnings to be plowed back into capital investment and maintained a strong cash position. Nvidia's cash position consistently exceeds two billion dollars except in 2020, when a staggering 5,485% increase in research and development reduced cash reserves. Much of Nvidia's annual capital expenditure of \$2 billion has been allocated to computer software and equipment.

Big money is expected to continue flowing into AI. Nvidia controls an estimated 80% of the AI GPU market. "Four million developers were using the CUDA architecture," said Jensen Huang at the company's 2023 Computex keynote. CUDA is the Nvidia "Compute Unified Device Architecture" platform that is a software framework that enables software developers to process data faster than using traditional CPUs. As there are currently no comparable GPUs to replace Hopper, most AI developers are locked into using Nvidia's ecosystem. Nvidia's largest customers such as Amazon, Google, Meta, Microsoft and Tesla spent almost 460% more in 2023 than \$4.4 billion they spent a year ago on buying things like GPUs and data center services to increase AI learning capacity. The combined market cap of the Magnificent Seven was \$13.2 trillion, which is bigger than the EU equity market of \$12 trillion.

Just as US tech giants like Nvidia showed that they are only going to get bigger, no such trend is evident in the Chinese market, at least in the short-term. After the US expanded export restrictions in October 2022, GPU and high tech chip sales to China declined significantly. Even though China hosts more than 5,000 AI companies, their future will be constrained if they do not have access to topline fast GPUs which hampers their ability to construct large learning models for their AI services.

If the GPU business growth and momentum keeps rising at its current rate, Nvidia has upgraded its Hopper to a new Blackwell platform which promises up to 30 times greater inference performance and consume 25 times less energy. More important, major equipment makers like Cisco, Dell and Hewlett-Packard would be producing Blackwell-based server systems, thus locking in data centers and large users to this proprietary technology.

Under the visionary leadership of Jensen Huang, if Nvidia continues to stay ahead of the AI revolution, it will be bigger than many large economies in size but also powerful enough to disregard individual national regulatory control.

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