



TRINITY SMF

STUDENT MANAGED FUND

Technology Software Sector Report 2023-2024

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Table of Contents

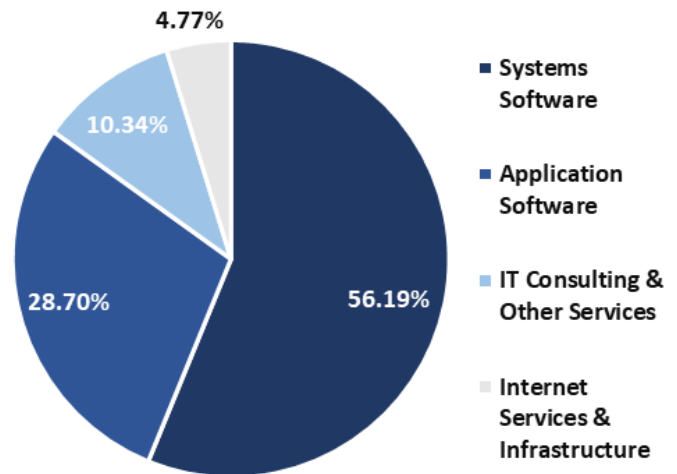
| | |
|--|----|
| Sector Overview | 3 |
| Key Players & Subsectors | 4 |
| IT Consulting | 4 |
| Systems Software | 4 |
| Internet Services & Infrastructure | 4 |
| Application Software | 4 |
| Current Climate | 5 |
| Investment Themes | 6 |
| Move to the Cloud | 6 |
| Cybersecurity | 6 |
| Quantum Computing | 6 |
| Priced in Sector Drivers | 7 |
| Generative AI | 7 |
| Role of Tech | 7 |
| Current Holdings | 8 |
| Microsoft | 8 |
| Crowdstrike | 8 |
| Cadence | 9 |
| Case Study | 10 |
| Risks | 11 |
| Data Security & Privacy | 11 |
| ESG | 11 |
| Regulation & Consumer Confidence | 11 |
| Strategy for the Year Ahead | 12 |

Sector Overview

The Technology Software Sector refers to the development, distribution, and maintenance of software. It can be broadly classified into subindustries including systems software, application software, IT consulting, and internet services and infrastructure. The global software market size is projected to reach \$659B by the end of 2023 and is forecasted to grow at a CAGR of 5.42% between now and 2028.

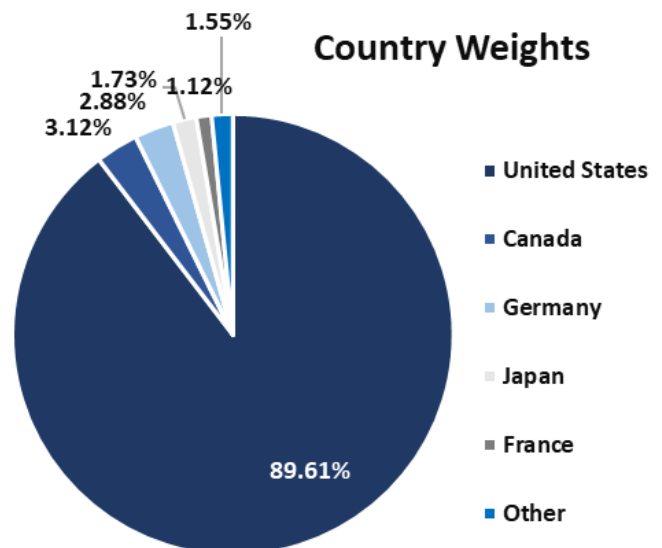
Most software stocks are particularly susceptible to cyclicalities in the macro environment. Individuals and businesses are less inclined to spend money on the latest technologies and electronic devices during recessions, and vice versa. However, certain players in the sector have business models that support steady earnings and are therefore less responsive to broader economic trends. For example, global end-user spending on cloud infrastructure is forecasted to grow 21.7% in 2023 as it is considered an essential component of businesses' digital strategies. Software companies that provide subscription-based services also tend to have more predictable earnings. For SaaS (Software as a Service) users especially, the cost and time required to switch to different software offerings is often more expensive than maintaining the current subscription.

Subsector Weights



Source: MSCI World Software & Services Index

Country Weights



Source: MSCI World Software & Services Index

Key Players & Subsectors



Big Tech

The “Big-5“, “Big Tech”, or “Tech Giants” in the tech sector are Apple, Google, Microsoft, Meta and Amazon, which control most of the Western operating systems, cloud computing infrastructure, search, and social media. For software development, key software companies are also referred to as FAANG, swapping Microsoft for Netflix. Low interest rates prior to 2022 coupled by strong government stimulus enabled software companies to easily invest in R&D and overhiring which ultimately drove rapid growth, especially during the pandemic. Meanwhile, the current high interest rates and lack of quantitative easing makes survival increasingly difficult for unprofitable start-ups, causing gains in the tech industry to become more and more concentrated in Big Tech. Large tech companies have also engaged in major layoffs both in combat of previous overhiring as well as a desire to streamline operations and cut operational expenses.

Software companies can often be categorised into several overlapping subsectors, however there are 4 general classifications:

IT Consulting:

IT Consulting is a service where companies help plan, arrange and maintain IT infrastructure for their clients. This can range from small internal IT systems to planning server infrastructure for multinational corporations.

Key Players: Accenture, IBM, Tata Consultancy Services

Internet Services & Infrastructure:

Internet Services & Infrastructure companies provide the actual infrastructure that powers most of today’s web services. These include low level enterprise cloud providers like Azure, AWS, Google Cloud and consumer-centric platforms like Dropbox and Google Drive. Also includes Companies that provide traffic analysis, load balancing and other network services.

Key Players: Microsoft (via Azure), Amazon (via AWS), Alphabet (via Google Cloud), Cloudflare

Systems Software:

Systems Software are low-level programs that form the basis for other software. This includes Operating Systems, Server-side software such as Virtualization Controllers, and integrated hardware-software systems such as cash-registers and robotics.

Key Players: Microsoft, Oracle

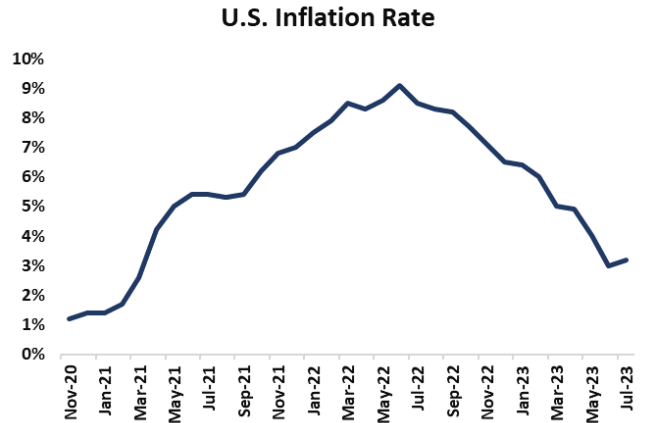
Application Software:

Application Software are high-level programs that run on top of existing operating systems and are usually directly interacted with by consumers. This increasingly includes SaaS (Software as a Service) and web-based SaaS applications.

Key Players: Adobe, Salesforce, Intuit

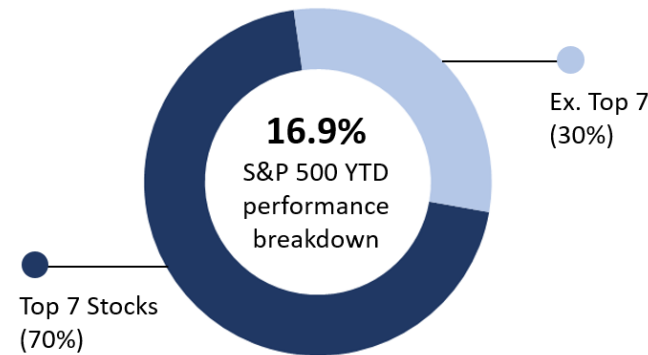
Current Climate

Although inflation has fallen significantly from its peak of 9.1% (June 2022), it currently sits at 3.2%, still well-above the Fed’s 2% target. Inflation remains persistent primarily due to three ongoing knock-off effects – an increase in household demand and supply-chain shortages due to the pandemic, Russia’s ongoing invasion of Ukraine, and the presence of a strong labour market. Expectations vary amongst economists and banks – over 40% of academic economists surveyed by the Financial Times expect that the Fed will raise interest rates further, while in sharp contrast, the management of J.P. Morgan and Goldman Sachs expect no further rate hikes, provided inflation continues to gradually improve.



After a tumultuous 2022 for investment in the software sector, the first half of 2023 has seen a resurgence of enthusiasm about tech’s potential to catalyse progress in business and society. Strong performance in U.S. stock indices have been concentrated in 7 mega-cap technology stocks. Optimism surrounding breakthroughs in generative AI (artificial intelligence) deserves much of the credit for ushering in this revival. Despite the looming economic slowdown, enterprise tech spending is expected to remain strong, with its projection to total \$4.5 trillion in 2023, an increase of 2.4% from 2022.

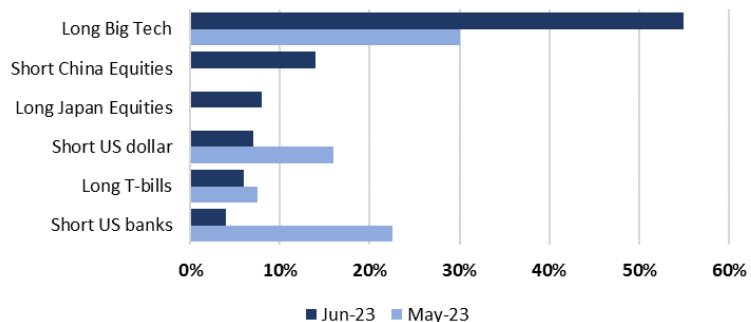
Highly Concentrated Stock Performance in 2023



Top 7 ranked by performance contribution: APPL, MSFT, NVDA, AMZN, TSLA, META, GOOGL

Source: Bloomberg

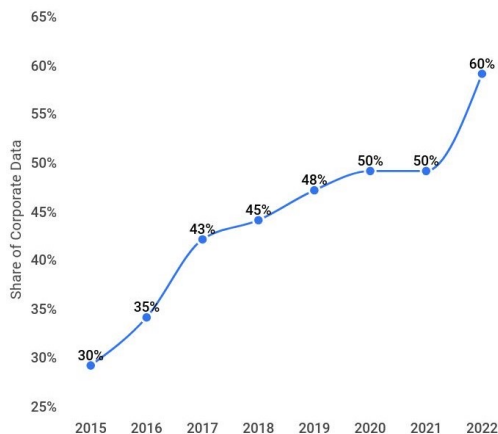
Long Big Tech remains the most crowded trade for 5 consecutive months



Source: BofA Global Fund Manager Survey

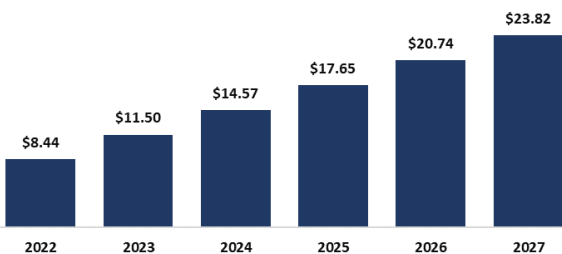
Investment Themes

SHARE OF CORPORATE DATA STORED IN THE CLOUD OVER TIME



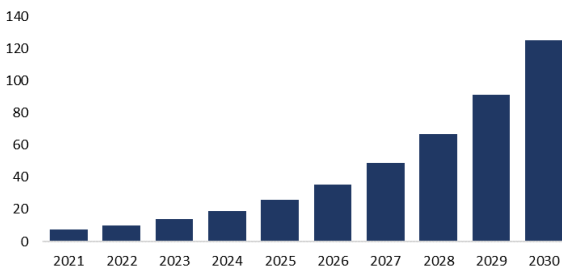
Source: Zippia

Cybercrime Expected to Skyrocket
(in trillions)



Source: Statista

Quantum Computing Market Size
(in billions)



Source: Precedence Research

Move to the Cloud

Cloud Computing provides a wide array of advantages over traditional computing and targets many industries. Most importantly, cloud software eliminates the substantial upfront investment required for traditional on-site infrastructure, allowing companies and individuals to cut costs by opting for a pay-as-you-go model. The global cloud computing market size is projected to grow from USD \$677.95B in 2023 to \$2,432.87B by 2030, exhibiting a 20% CAGR.

Cybersecurity

Cybersecurity is a vital investment for any business that wants to mitigate reputational and financial risk. It is an opportune time to invest in cybersecurity companies that serve small-to-medium sized businesses (SMEs) as 43% of cyber-attacks target SMEs, 60% of which go out of business within 6 months. AI is a double-edged sword in the cybersecurity space – while cybersecurity providers may use it for enhanced threat detection, improved incident response, and advanced malware detection, there is also potential for attackers to use adversarial machine learning to enhance their attacks.

Quantum Computing

Quantum computers harness quantum mechanical phenomena to solve problems too complex for classical computers. The global quantum computing market is expected to grow at a 22% CAGR between 2023 and 2030, with commercial quantum computing likely to begin in 2027. Many investors view an opportunity to invest in quantum early on prior to its future uses, such as pharmaceutical and AI development. However, there is significant risk that sentiment will die if significant progress and commercialisation isn't made in a reasonable time frame.

Priced in Sector Drivers

Generative Artificial Intelligence

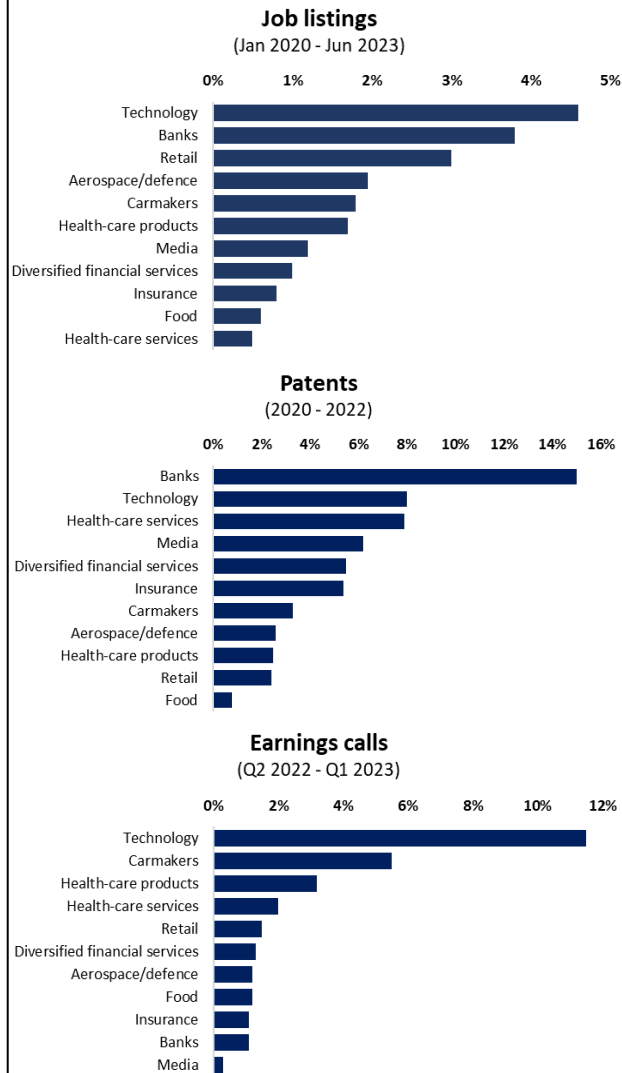
The release of ChatGPT (November 2022) inspired a rush of interest in AI, which fuelled a \$4T rally in tech stocks this year. AI winners, such as Nvidia and Microsoft, have seen share price increases of 34% and over 240% YTD, respectively.

Generative AI is proving to be a disruptive technology across the board, sometimes compared in impact to digitalization and the adoption of the internet. It has the potential to drive efficiency and automation across all industries such as healthcare, finance, entertainment, hardware, etc. Through investment in infrastructure, marketing, and striking partnerships, big tech companies have gone to great lengths to establish themselves as future beneficiaries of the AI craze. Although it remains important to focus on fundamentals, the continuous rally in tech stocks is primarily attributed to a wave of interest in AI's contribution to potential value.

Role of Tech in Efficiency & Core Operations

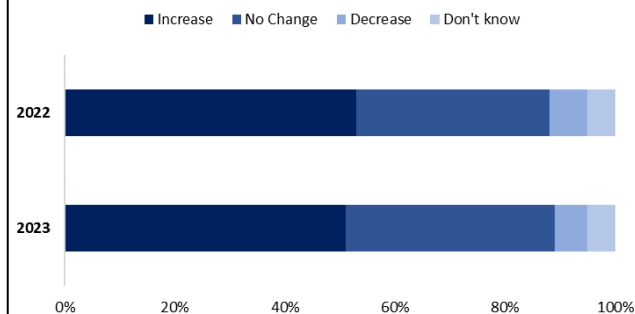
Global IT (Information Technology) spending is projected to reach \$4.6T in 2023, up 5.5% from 2022. There currently exists a shortage of talent in the tech industry, primarily due to training issues or a lack thereof. Consequently, companies have shifted spending to tech that enables automation and efficiency to drive growth at scale in the absence of tech expertise. Although businesses may face software price increases of up to 24% in the next year, most enterprise resource planning and customer relationship management applications are essential to business's core operations and operate on subscription-based models, resulting in customer resilience.

S&P 500 Companies Median mentions of AI, by sector



Source: Bloomberg; PredictLeads; GlobalData; Amit Seru, Stanford University; *The Economist*

Expected IT Budget Change (over prior year)



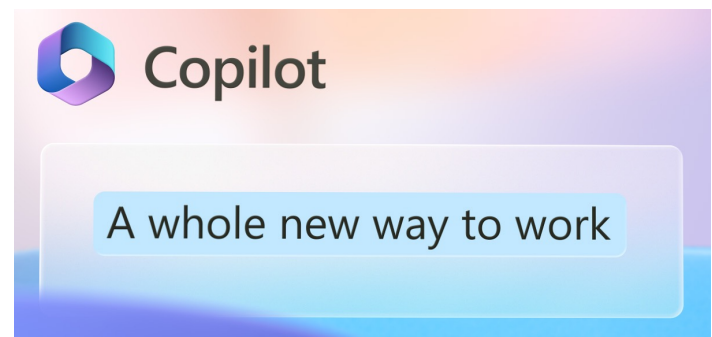
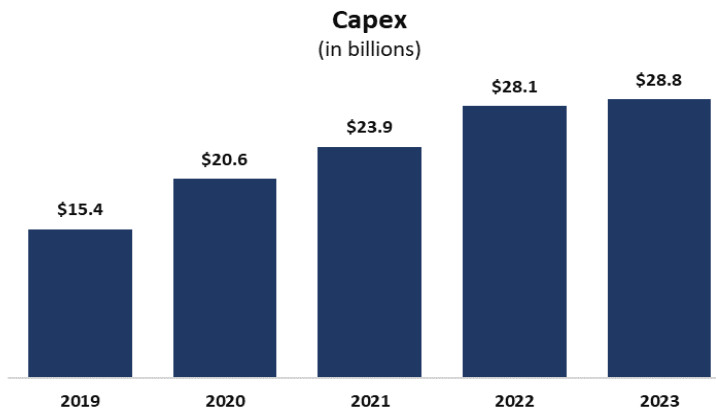
Source: Spiceworks

Current Holdings – MSFT (Long)



MSFT's performance has been impressive this year with total revenue up 8.34% YoY and Cloud revenue up 21% YoY. Apple and Microsoft alone have added more than \$1T in combined market value in 2023, nearly half of the gains for the entire S&P 500. MSFT 365 Copilot pricing for commercial users was announced July \$30/month per user. MSFT expects this to boost its 2025 fiscal revenue by \$9B. Despite the steep pricing, optimism remains strong as Early Access Copilot users (e.g., KPMG, Lumen, Emirates NBD) provide positive feedback. MSFT increased capex by \$10.7B last quarter and will likely continue to increase as an expansion of its data centres and hardware infrastructure will be required to meet rising demand for Azure cloud-based services.

Risk: MSFT's position at the forefront of Big Tech leaves it vulnerable to legal and regulatory scrutinization. The European Commission opened a formal investigation (July 2023) to assess whether the bundling of Teams to its 365 packages are an antitrust violation. MSFT announced (August 2023) that it would unbundle Teams which would allow for competing products to work with its software. It will be revealed in the coming months if this is enough action for MSFT to avoid an EU antitrust fine.



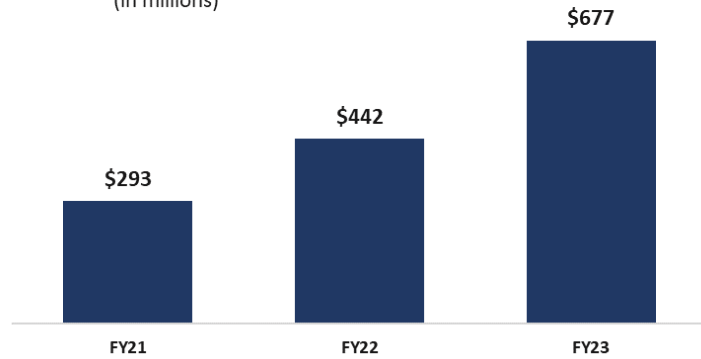
Current Holdings – CRWD (Hold)



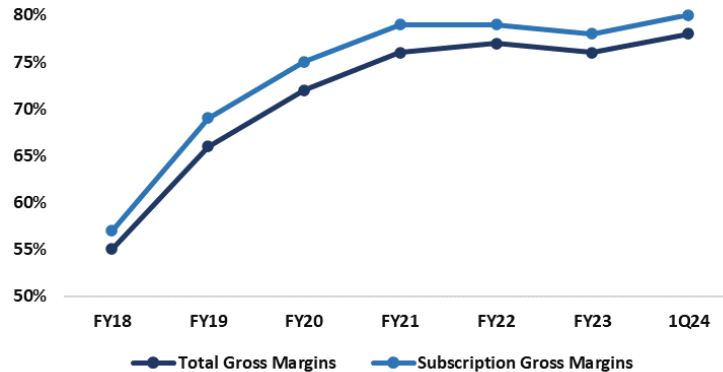
CRWD is a market leader in endpoint security as well as other cybersecurity verticals. In the 2023 fiscal year, its customer base grew 41% with the average customer spending 25% more than in the year prior. CRWD's comprehensive platform allows customers to streamline their security infrastructure with only one vendor. More than 60% of customers use 5 or more of its cybersecurity modules. CRWD is also able to crowdsource data from the many endpoint devices it serves, providing it a competitive advantage in the development and application of machine learning. In other words, CRWD's access to data allows them to detect and prevent threats more effectively than its peers. CRWD is overall well-positioned to maintain momentum as the second-fastest-growing software vendor in history, behind Zoom.

Risk: Many analysts raise concerns that MSFT, a main competitor of CRWD, bundles its security tools into 365 software applications, which may be appealing to cost-conscious customers. However, MSFT has had many recent security failures, including the breach of cloud emails belonging to U.S. government agencies (June 2023).

Annual Free Cash Flow
(in millions)



Strong Gross Margins



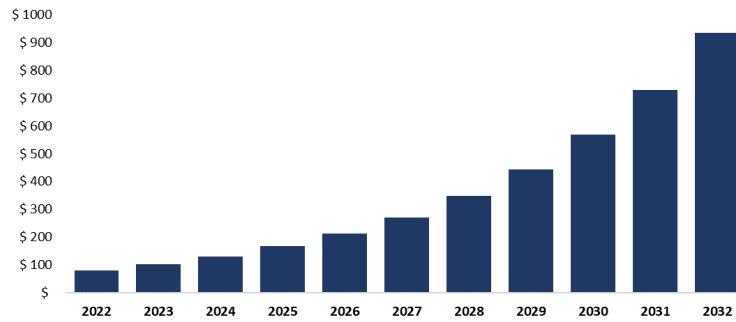


CDNS, the most recent addition to the sector, produces software, hardware, and silicon structures for designing integrated circuits, systems on chips (SoCs), and printed circuit boards. The company has advantage over its competitors such as Synopsys because of its key partnerships with TSMC, NVDA, and MSFT, all of which are leading semiconductor producers.

CDNS is expected to benefit from secular trends such as 5G, rising hyperscale computer consumption at the enterprise level, and emerging AI/ML technologies, all of which are fuelling digital transformation across various end markets and accelerating demand for advanced semiconductor chips. Strong performance has been seen in 2023 as revenue grew 16% YoY while operating profit margin remained at 29%.

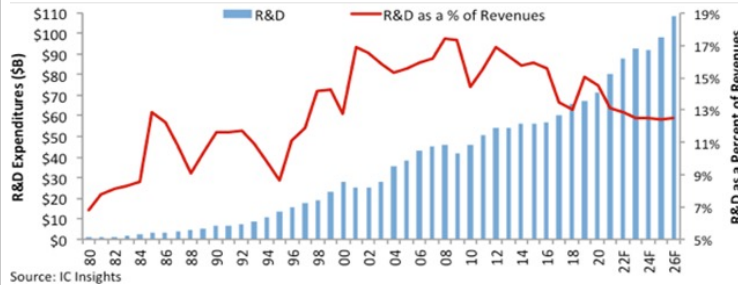
Risk: CDNS's core customers include highly cyclical chip designers and fabricators, computing system manufacturers, and data centre constructors and operators. However, CDNS focuses on subscription-based software and the semiconductor industry tends to keep its research and development (R&D) budgets at least fixed, if not steadily rising.

Hyperscale Data Centre Market Size (in billions)



Source: Precedence Research

Semiconductor Industry R&D Cost History and Forecast



Source: IC Insights

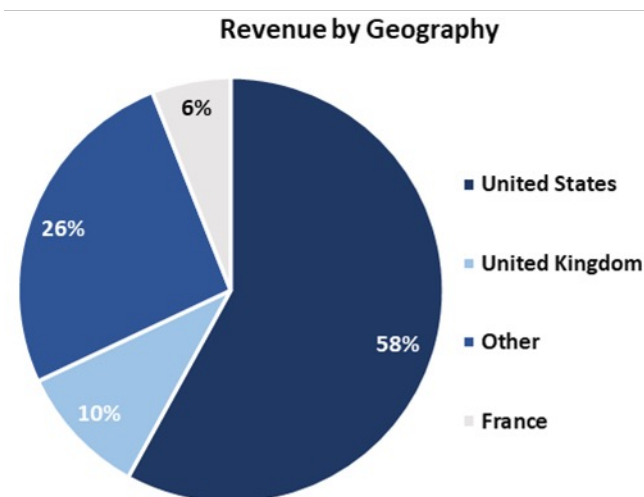
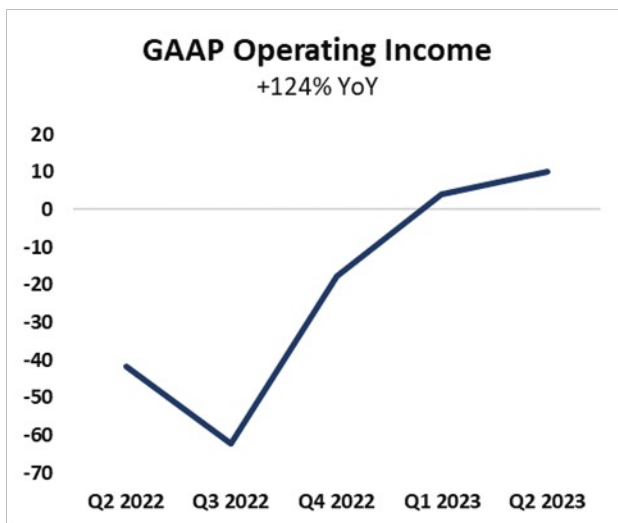
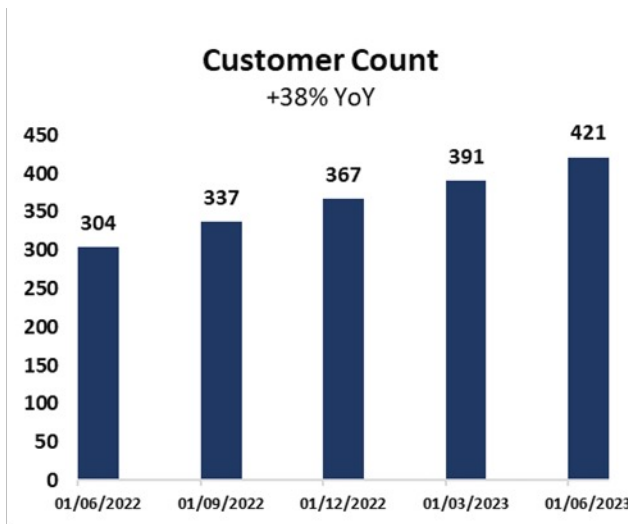
Case Study - Palantir Technologies Inc. (PLTR)



PLTR offers a suite of software applications for integrating, visualising, and analysing large quantities of data. The company has two operating segments – government and commercial, which account for 55% and 45% of revenue respectively. PLTR's advanced AI capabilities, strong revenue growth, and cash-rich balance sheet make it a strong buy. For the 6 months ending August 2023, customer count increased 38% YoY, revenue 13% YoY, and GAAP operating income 124% YoY.

PLTR launched their Artificial Intelligence Platform in May 2023 which operates as an extension of its existing defence and business products. Since, PLTR announced it was awarded a five-year contract worth up to \$463 million from the U.S. Special Operations Command and is engaging with 300+ enterprises to deploy AIP.

Management maintains a very positive outlook and expects the company to remain profitable on both a quarterly and annual basis throughout the next year. It is also anticipated that PLTR may be eligible for inclusion in the S&P 500 after Q3 2023 financial results are reported this coming November, which may drive the share price. In early August the firm authorised a stock repurchase program of up to \$1B, further reinforcing high conviction in the trajectory of the business.



Risks

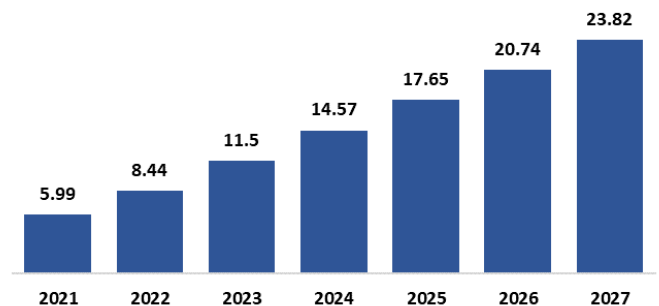
Data Security & Privacy

It is costly for a firm to protect themselves from a cyber-attack or data breach. Various outlays may be necessary – cybersecurity expertise and public relations support, notifying affected parties, and higher insurance premiums. Indirect costs, such as an interruption to operations, may also result in lost revenue. Firms that fall victim to larger attacks may experience significant reputational consequences. Individuals and businesses may be reluctant to store their personal and private data on IT infrastructure that has been breached once before. Research suggests that the share prices of compromised companies fall an average of 3.5% and underperform the Nasdaq by 3.5% following a cyber-attack. It is crucial to scrutinise a software company’s cybersecurity provisions and history, especially if its business model is heavily reliant on storing and handling user data.

Environmental, Social, & Governance

Companies and investors that fail to manage ESG risks may face legal action and penalties from regulators, reputational damage, and acute physical risk both directly and in their supply chains. The five-year CAGR for sustainably marketed products is 9.48%, almost double that of conventionally marketed goods, further reinforcing the role of ESG in consumer choice. As the world transitions to a lower-carbon economy, companies that adapt may gain a competitive and access-to-capital advantage in the long-term.

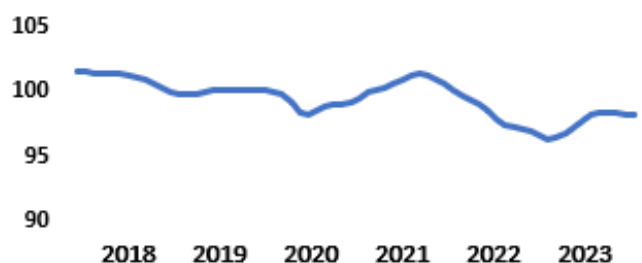
Estimated Cost of Global Cybercrime
(in trillion USD)



Consumer Confidence & Regulation

Public trust in business has generally increased over the last decade, however the long-term perception of the technology sector has suffered. Public trust plays a vital role in consumer sentiment and the overall success of tech companies, arguably now more than ever due to the doubts and suspicions surrounding AI. Tech firms may not gain consumer trust and realise the full potential of AI if there is a lack of transparency or ethics. Companies that focus on driving growth primarily through AI must also be mindful of regulation that may follow, although the U.S. remains far behind Europe in policymaking.

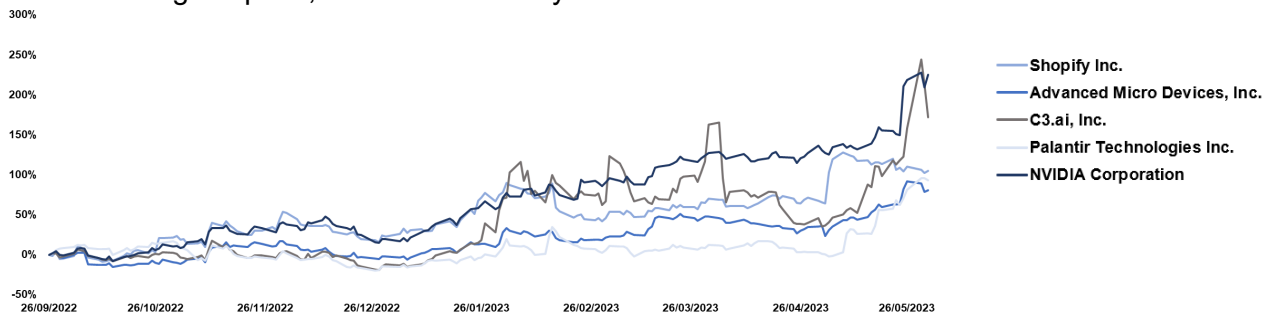
OECD Consumer Confidence Index



Strategy for the Year Ahead

Although the sustainability of the tech rally and overall outlook for software may seem uncertain, there exist areas of growth when investing on strong fundamentals. It is increasingly important to analyse software growth prospects using a holistic approach rather than focusing on short-term hype. Inflated expectations regarding exposure to generative AI may be followed by disillusionment as there is very limited operational traction within enterprises to date.

AI-themed stocks have rocketed since ChatGPT's launch last November
Change in price, rebased to 25 May 2022



Source: Refinitvi Datastream

Excellent opportunities are emerging in the sector as there is a substantial amount of fiscal stimulus from governments that will be met by long-term private investment. The €43B EU Chips Act, adopted in July 2023, aims to address semiconductor shortages and strengthen Europe's technological leadership. The EU currently has a 10% share of the global microchip market which is expected to reach 20% by 2030 under the new policy. The \$53B US Chips and Science Act, adopted in August 2022, also aims to revive the domestic semiconductor market, which may consequently simplify supply chain vulnerabilities in the long run. There exist hidden champions that stand to gain, particularly software companies that are partnered with leading semiconductor manufacturers, such as Cadence.

September Watchlist

PLTR (+97.69% YTD)

Palantir Technologies Inc. specialises in big data analytics.
Strategy: short term play, buy prior to Q3 2023 earnings

SPLK (+27.81% YTD)

Splunk Inc. provides software for analysing log data at a massive scale and cybersecurity tools. The firm is currently transitioning to cloud.
Strategy: hold long-term

NOW (+32.51% YTD)

ServiceNow provides cloud infrastructure that automates and streamlines business operations.
Strategy: hold for 1-2 years