

2024 Outlook Series: Greater China Equities



In 2023, mainland China navigated from economic reopening to recovery, and markets rebounded before new challenges emerged. As mainland China's economy rebalances, the central government has launched a series of pro-growth policies to mitigate the deflationary impact of a lacklustre

property market. In this 2024 outlook, the Greater China Equities team helps investors identify megatrends against a backdrop of macro and geopolitical headwinds. The team also believes that investors will need to be highly selective in an increasingly diversified investment universe.

Identifying megatrends with structural opportunities

Mainland China remains the world's second largest economy. Despite slower-than-expected consumption growth, the concerted rollout of fiscal, monetary, and property-related policies may improve mainland China's economy further in 2024.

During mainland China's Politburo meeting in December 2023, its leadership pledged to "effectively promote the economic recovery and achieve reasonable quality growth". Policymakers also emphasised "strengthening counter-cyclical and cross-cyclical adjustments."¹ Throughout 2023, mainland China's economy has improved, especially the service-oriented sectors, which has offset weaknesses in manufacturing PMI data and pressure from the property sector. With a positive, pro-growth stance, we think it's supportive of economic growth in 2024.

We believe mainland China and Hong Kong company earnings have now stabilised and therefore expect the earnings growth for MSCI China index to rise by 12%-15% year-on-year.

For the Taiwan Region, we remain positive on the tech sector, given its strong competitive advantages regardless of whichever party wins the election. If the

more mainland-China-friendly opposition party takes office, we believe non-tech sectors could benefit.

Four megatrends and our expectations for the Greater China market going into 2024

We have identified several growth drivers (we call them the "4As") to help investors navigate the evolving Greater China investment landscape.

1) Acceleration: Consumption may further improve with mainland China's pro-growth policy stance.

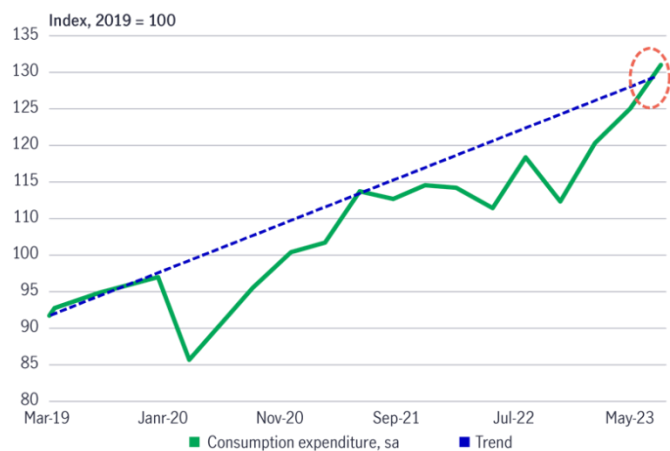
Throughout 2023, mainland China's household consumption recovered to slightly above pre-pandemic levels (Chart 1). Notably, the service-oriented sector recovery is very apparent after the country's reopening.

Meanwhile, household incomes rebounded in 2023 vs. 2022 (i.e., people are growing wealthier). However, the recovery is slightly below trend (Chart 2) due to (1) weaker-than-expected income growth and (2) the weaknesses from a deflating property market. As a result, softer-than-anticipated consumer confidence has held back consumer spending. Since July 2023, mainland China has stepped up its efforts to support the property sector with policies ranging from reducing downpayment ratios, removing home-purchase restrictions, and

¹ Cross-cyclical approach means government taking actions sooner and in small steps and with a longer time frame in mind or across multiple cycles.

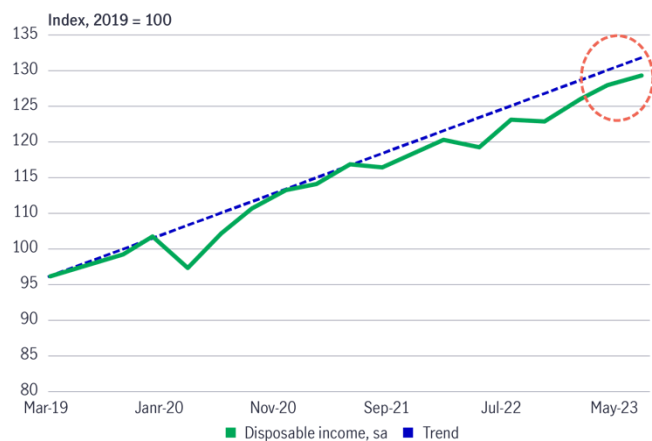
lowering mortgage rates. We believe more targeted measures will be required in 2024 to continue supporting the property market.

Chart 1: Mainland China's household consumption



Source: HSBC report, as of 8 December 2023

Chart 2: Mainland China's household income



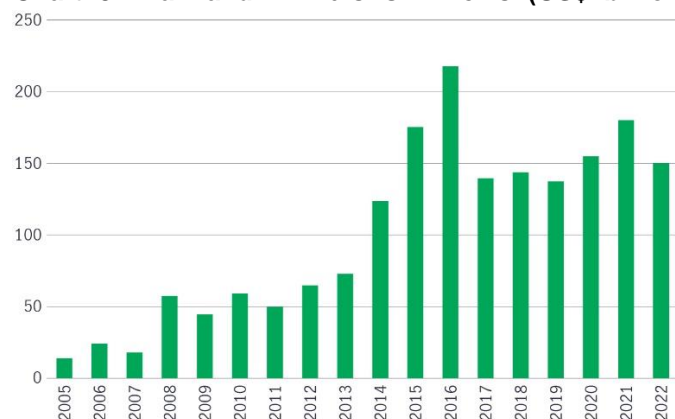
Source: HSBC report, as of 8 December 2023

2) Abroad: Leading mainland Chinese companies are going abroad – another growth engine!

Leading mainland Chinese companies are going abroad in recent years, which will be another new growth engine. Over the past decade, mainland China's outbound direct investment (ODI) has more than doubled. During 2016 to 2017, the regulators tightened the supervision of capital flows and private companies' overseas investment transactions. The impact of the pandemic, coupled with geopolitical tensions, also weakened ODI in 2022 (Chart 3). However, ODI has significantly improved since Q1 2023, and we expect the trend to continue (Chart 4), especially with Chinese companies' desire to go abroad and capture overseas market share to

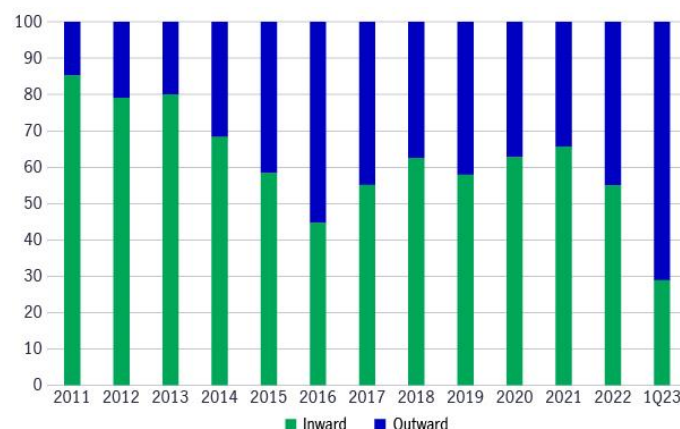
achieve further growth potential. In addition, we believe ODI flows will further improve, led by private enterprises and a greater focus on strategic industries that support mainland China's broader policy initiatives.

Chart 3: Mainland China's ODI flows (US\$ billion)



Source: HSBC report, as of 29 November 2023

Chart 4: Mainland China's inward and outward direct investment, % share of total cross-border direct investment



Source: HSBC report, as of 29 November 2023

Mainland Chinese companies are strongly incentivised to go abroad and expand their foreign market share through direct investment. These are the major reasons:

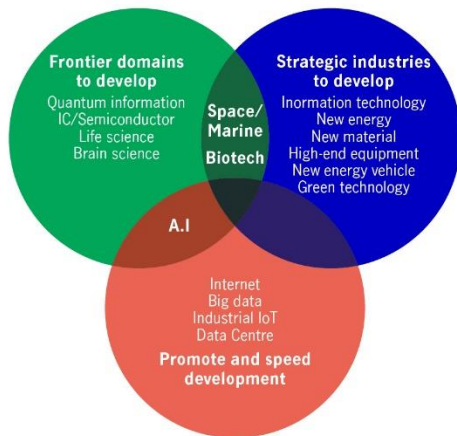
- (1) To gain access to critical materials (e.g., lithium, copper, nickel, cobalt and rare earth metals) through direct investment rather than imports, providing greater autonomy over management and operations.
- (2) To achieve revenue diversification in overseas markets.
- (3) To leverage better cost structures (e.g., cheaper labour costs, local manufacturing benefits) in overseas markets.

We are positive about companies that can compete in foreign markets with competitive products, cost leadership and a global economy of scale. Besides, we favour leading mainland Chinese companies that could boost domestic substitution by gaining local market share from global brands.

3) Advancement: The A.I supply chain in Greater China (especially the Taiwan Region) should continue to see robust growth in 2024.

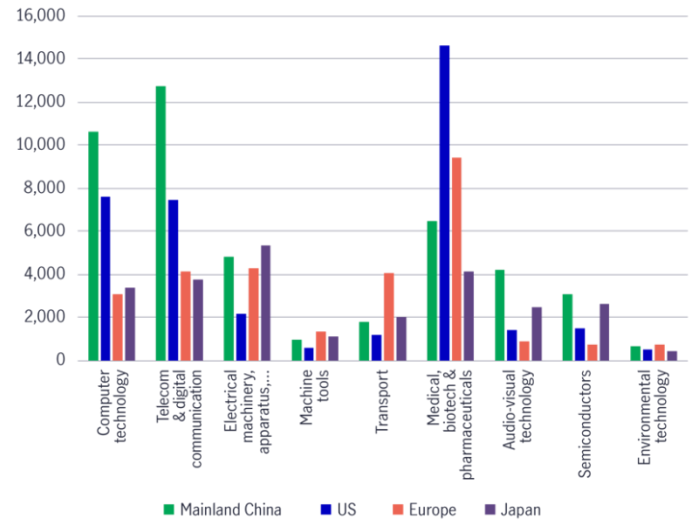
Mainland China strives to accelerate the technology roadmap (Chart 5). We believe we are currently in the early stages of the A.I era, and Greater China (especially the Taiwan Region) still has ample opportunity to grow. Also, mainland China owns many intellectual property (IP) patents in computer technology compared to the rest of the world (Chart 6).

Chart 5: Mainland China standards 2035 – key strategic target areas



Source: State Council, Morgan Stanley Research

Chart 6: Mainland China owns more IP patents in computer technology



Source: HSBC, as of December 2023

Furthermore, the Taiwan Region benefits from a proliferation of A.I development as it possesses strong semiconductor fabrication capabilities, with world-leading foundry processes (ranked first ahead of South Korea and the U.S (Chart 7).

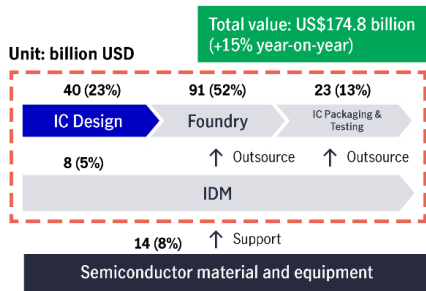
In addition, the Taiwan Region has a comprehensive global tech supply chain. Taiwan's one-stop supply chain ranges from (1) foundry, (2) integrated circuit (IC) design, (3) IC packaging and testing, (4) integrated device manufacturing (IDM), and (5) semiconductor material and equipment (Chart 8). With a vertically integrated supply chain, the Taiwan Region leads its global peers in terms of manufacturing, cost, and efficiency.

Chart 7: The Taiwan Region's leading-edge foundry process roadmap

CY	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023e	2024ea	2025e	2026e
A US based company		22nm FinFET		14nm FinFET					10nm FinFET		Intel7 FinFET		Intel4 (EUV)	Intel3	Intel20A GAA	Intel18A GAA
A Taiwan region based company	28nm			20nm	16nm FinFET	16nm+ FinFET	10nm FinFET	7nm	7nm Pro	5nm	5nm Pro	3nm FinFET	7nm			2nm GAA
A South Korea based company	32nm	28nm		14nm FinFET			10nm FinFET	8nm	7nm (EUV)	5nm		4nm	3nm GAA			
						28FDS		14nm LPU	28FDS-RF							
										28FDS-eMRAM	18FDS					

Source: Morgan Stanley Research, as of October 2023

Chart 8: The Taiwan Region's technology supply chain by major sub-sectors (by revenue and % shares)



Source: DIGITIMES Research, January 2023

4) Automation: Mainland China's aged population² should present higher demand for automation.

The Chinese government has continued to support niche areas in advanced manufacturing. In early November 2023, the Ministry of Industry and Information Technology (MIIT) issued a guidance opinion on the development of humanoid robots, with the key goals to be achieved by 2025 and 2027. By 2025, mainland China aims to establish an initial humanoid robot innovative system and achieve technological breakthroughs in key components such as robot brains, cerebellum and limbs to ensure that the components are supplied safely and efficiently. The humanoid robots are expected to reach international standards and achieve mass production. Mainland China also aims to cultivate two or three globally influential ecological enterprises and several sophisticated and innovated small and medium-sized enterprises (SMEs), with two to three industry development clusters by 2025³.

By 2027, the technological innovation capability of humanoid robots is expected to improve significantly³, creating a safe and reliable supply chain system.

We believe the humanoid robot industry may expand further with broader applications.

To sum up, Greater China's economic growth path has arrived at an inflection point. The "4As" discussed above could guide investors to seek structural opportunities in specific sectors. We will provide more details in the next section.

² 14.9% of mainland China's population comprises people aged 65 and above.

³ [Global Times](#), 3 November 2023

⁴ Edge A.I is the deployment of AI applications in devices throughout the physical world. It's called Edge A.I because the A.I computation occurs

What are the next big things for mainland China going into 2024?

Going into 2024, we believe that mainland China should benefit from the following key areas despite macro and geopolitical headwinds:

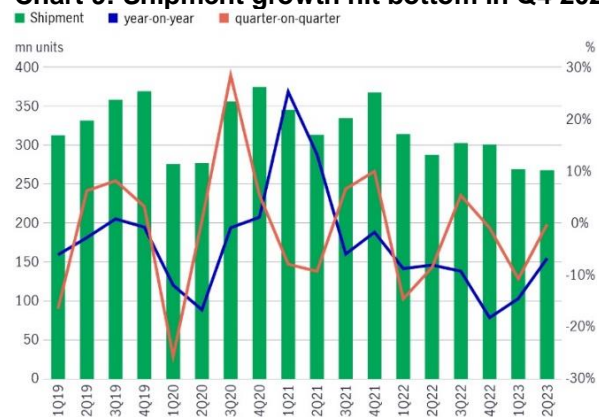
- 1) Traditional tech
- 2) A.I
- 3) Advanced manufacturing
- 4) Electric vehicle (EV)
- 5) Healthcare

1) Traditional tech: The global smartphone market is expected to recover in 2024.

We believe the global smartphone market has passed its worst point, and the current recovery trend will continue in 2024, with several sector catalysts:

- I. Smartphone inventory destocking has occurred since Q2 2022, and the cycle is largely complete. (Charts 9 and 10).
- II. Early signs of recovery were seen, with a rush of orders in Q3 2023 on the back of lean inventory. These orders showed a pick-up in demand.
- III. More A.I applications and use cases for mobile applications will emerge over the next few years (Chart 11). Edge A. I⁴ and related components are required, given that edge A.I requires a new-generation system-on-a-chip (SoC) with custom A.I modules (Chart 12).

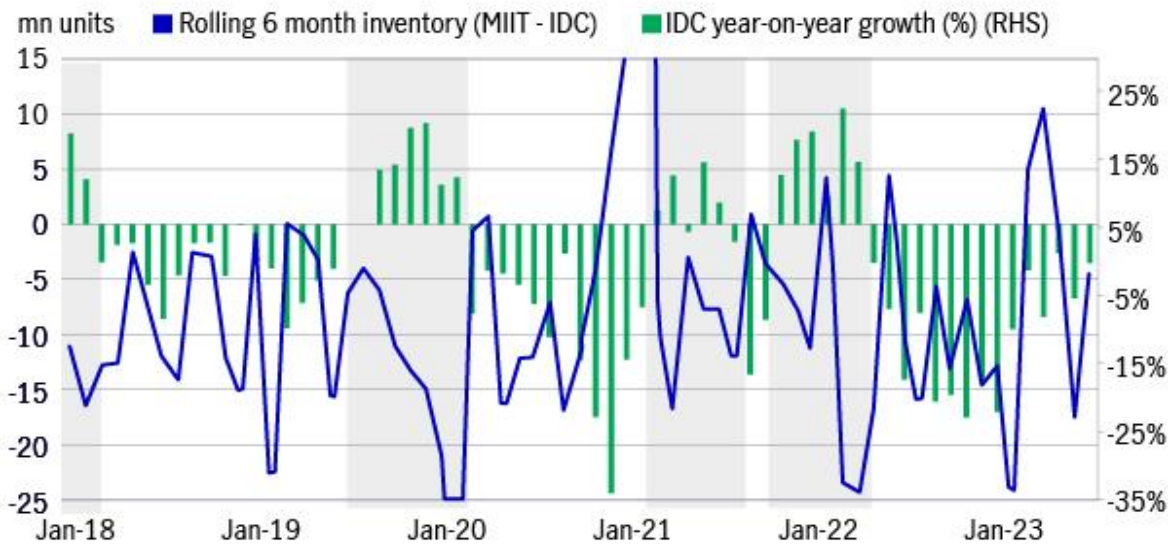
Chart 9: Shipment growth hit bottom in Q4 2022



Source: Morgan Stanley report, as of 9 November 2023

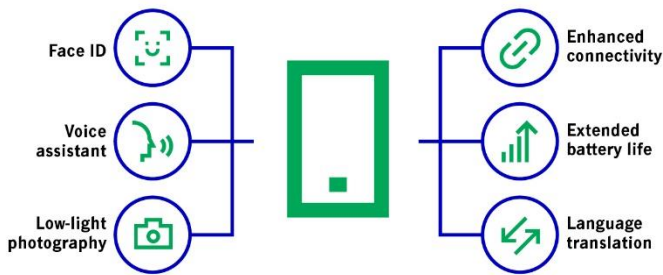
near the user at the edge of the network, close to where the data is located, rather than centrally in a cloud computing facility or private data centre. February 17, 2022. Nvidia.

Chart 10: Global smartphone market: Destocking of inventory is largely complete



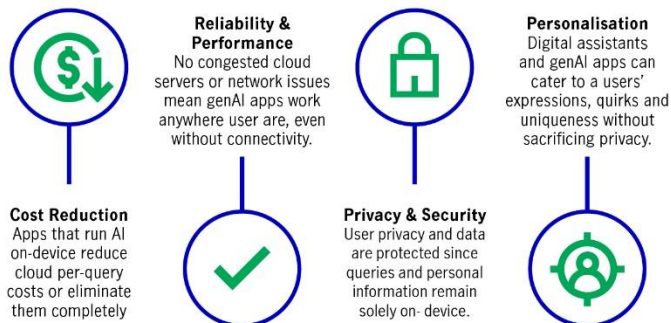
Source: Morgan Stanley, as of 9 November 2023. IDC refers to International Data Corporation.

Chart 11 How smartphones use A.I



Source: Morgan Stanley report, as of 9 November 2023

Chart 12: Why Edge A.I? Edge A.I has four key advantages

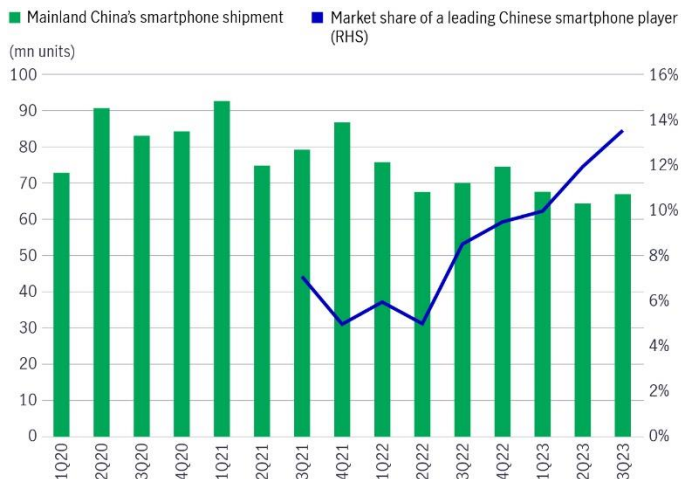


Source: Morgan Stanley report, as of 9 November 2023

Smartphone original equipment manufacturers (OEMs), memory manufacturers, and SoC component makers will be the key beneficiaries of the adoption of edge A.I expected by 2025. Memory manufacturers benefit from the memory upgrade as large language models (LLMs) are used in A.I, which require higher data processing capabilities. Camera-related component companies, for example, lens, complementary metal oxide semiconductor (CMOS) will also benefit from specification upgrades.

Furthermore, we have seen leading Chinese smartphone players advancing their roadmaps on technology innovation. A major Chinese smartphone giant has consistently gained market share over the past four to five quarters with technology breakthroughs in hardware specifications (Chart 13). Also, another Chinese smartphone leader invested in the research and development (R&D) of an on-device LLM, which has enabled the company to enjoy a first-mover advantage when edge A.I takes off.

Chart 13: A leading Chinese smartphone player has gained market share



Source: Morgan Stanley report, as of 9 November 2023

2) A.I

Looking at the landscape, mainland China's internet platform companies remain active with computing technology and A.I investments despite headwinds from the U.S, such as export controls on A.I, quantum computing and semiconductor-related products to mainland China that target data centres and military applications (Table 1).

As for the semiconductor industry, we believe A.I developments will continue, especially as the Chinese government remains supportive of semiconductor initiatives. For example, the China Integrated Circuit Industry Investment Fund, known as the Big Fund, is set to launch a US\$40 billion

Table 1: Q2 2023 cloud capex comments

Q2 2023 cloud capex comments	
China TMT Company 1	<ul style="list-style-type: none"> - A leading China TMT player continues to actively invest in A.I and believes that "the technology brought by A.I is not a short-term opportunity but the beginning of a new era." - The company provides the training and service needs of LLM start-ups. - The company's cloud business is expected to benefit from the trend.
China TMT Company 2	<ul style="list-style-type: none"> - A.I has played an important role in driving innovation and improving search results. - Its A.I-enabled cloud business also provides a training platform and serves as a foundation model.
China TMT Company 3	<ul style="list-style-type: none"> - Capex spending is up by more than 40% year on year, driven by increased investment in graphic processing units (GPUs) and servers. - The company is building its own foundation model, which it is testing it with its own products. - The company's management believe that A.I can enhance the efficiency and quality of its services and improve the targeting of advertising content.

Source: Companies' statements

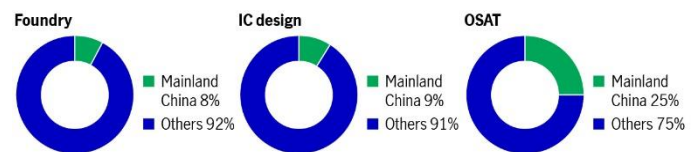
⁵ HSBC Qianhai report, 7 September 2023

investment fund backed by the Chinese government to support the manufacturing strategies of domestic semiconductor companies.

With technology self-sufficiency, we believe China's domestic semiconductor supply chain has various opportunities for future growth, ranging from upstream to downstream.

Mainland China is well positioned to capture the packaging and testing market in the supply chain for back-end semiconductor equipment (Chart 14).

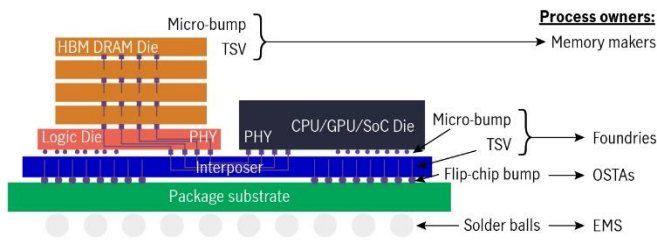
Chart 14: Global market share of mainland Chinese companies in the semiconductor supply chain (2022)



Source: TrendForce. Note: OSAT refers to Outsourced Semiconductor Assembly and Test.

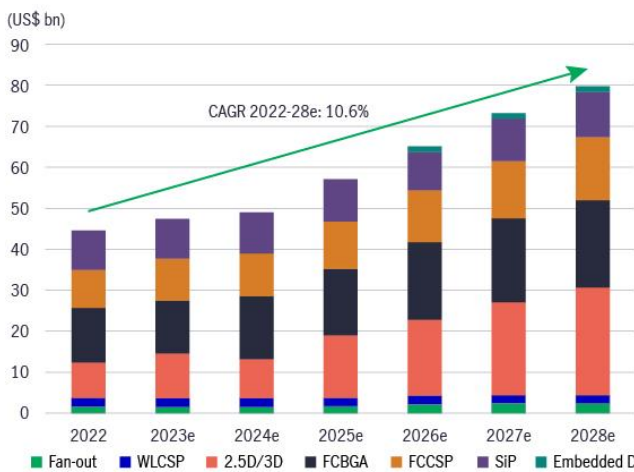
Currently, most chip packaging (73%) uses traditional wire bonding, even though this technology is older and less efficient. Advanced packaging (AP) involves packaging micro-bumps, redistribution layers and through-silicon via (TSV, which uses a vertical electrical connection that passes through a silicon die or wafer) or wafer-level technologies. AP enables more transistors and memories to be integrated on a die using 2.5D/3D packaging (Chart 15), which vertically stacks components. AP market could grow at a CAGR of 10.6% from 2022-2028, driven by demand for high A.I chips (Chart 16)⁵.

Chart 15: Through-silicon via (TSV) in 2.5D/3D packaging



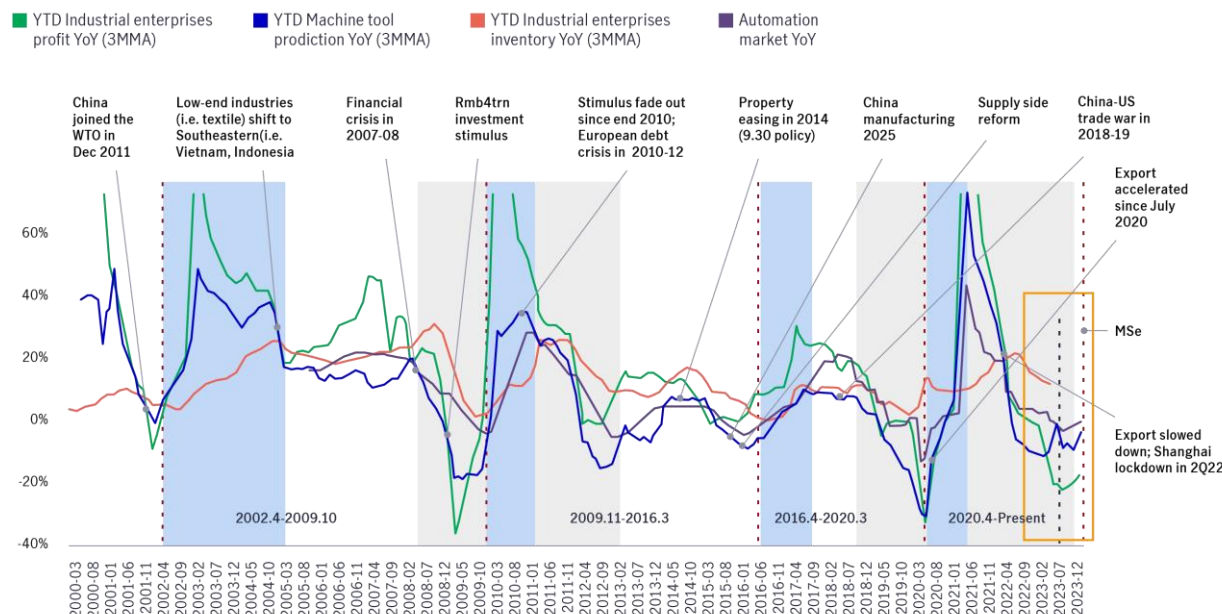
Source: HSBC Qianhai report, as of 7 September 2023. HBM refers to high-bandwidth memory, DRAM refers to dynamic random-access memory, PHY refers to port physical layer, and EMS refers to electronics manufacturing services.

Chart 16: AP sales by technologies



Source: HSBC Qianhai report, as of 7 September 2023. WLCSP refers to wafer level chip scale package, FC-BGA refers to flip chip-ball grid array, FCCSP refers to flip chip chip scale package, SiP refers to system-in-package.

Chart 17 Capital expenditure for industrial general equipment cycles bottomed out in late 2023, but the recovery has been delayed into early 2024



Source: Morgan Stanley Research, August 2023. Projections or other forward-looking statements regarding future events, targets, management discipline or other expectations are only current as of the date indicated. There is no assurance that such events will occur, and if they were to occur, the result may be significantly different than that shown here.

3) Advanced manufacturing

Three trends for mainland China industrial

- I. Capital expenditure for industrial general equipment cycles bottomed out in late 2023, but the recovery has been delayed into early 2024 (Chart 17).

We believe the demand for generic industrial equipment has bottomed out and is improving on the back of stabilising macro conditions, as inventory destocking is mainly complete. We also think the capex cycle bottomed out in 2023, but the recovery has been delayed into 2024 (although it is sector-specific).

- II. Domestic substitution continues as mainland China's leading players gain market share through stronger price-to-performance propositions vs. foreign imports.

We see bright spots in auto-related segments, and supply chain companies are actively adding new capacity to cater for demand from auto customers in mainland China. The addressable market for China's advanced manufacturing is broad, with products ranging from automation, industrial robotics, and rotary vector (RV) reducers to X-ray machines. With higher value-add and more sophistication built into products, mainland China's industrial manufacturers are rapidly expanding their capacities with robust

revenue growth. We believe localisation rates across many industrial sub-sectors could grow by 50-100% by 2030 (Table 2).

Table 2: Mainland China's domestic substitution of industrial advanced manufacturing

	China TAM (Rmb bn)		Localisation rate	
	TAM in 2022e, 2017-22 CAGR	TAM in 2030e, 2022-30 CAGR	2022e	2030e
Automation*	190bn, 7% CAGR	260bn, 4% CAGR	35%	55-60%
Industrial robotics	55bn, 14% CAGR	75bn, 6% CAGR	35%	50-55%
RV reducers	3.2bn, 27% CAGR	5.0bn, 9% CAGR	15%	35-40%
Harmonic reducers	1.7bn, 22% CAGR	4.3bn, 8% CAGR	33%	55-60%
Fiber laser source	12bn, 11% CAGR	29bn, 14% CAGR	64%	80-85%
Hydraulics	43bn, 5% CAGR	71bn, 7% CAGR	23%	45-50%
Construction machinery	470bn, 3% CAGR	580bn, 3% CAGR	81%	85-90%
X-ray machines	30bn, 9% CAGR	53bn, 7% CAGR	40%	70%
LiB equipment	62bn, 23% CAGR	100bn, 6% CAGR	95%	100%
Solar equipment	110bn, 30% CAGR	245bn, 10% CAGR	97%	100%

Source: Morgan Stanley Research, as of June 2023. Projections or other forward-looking statements regarding future events, targets, management discipline or other expectations are only current as of the date indicated. There is no assurance that such events will occur, and if they were to occur, the result may be significantly different than that shown here. * Automation excludes industrial software.

III. Mainland China's industrial component companies continue their robust growth with overseas expansions.

Another growth driver that mainland China's industrial companies are pursuing is globalisation strategies. Following the expansion footprints of Chinese new energy vehicles (NEVs), OEMs and EV component manufacturers are also building manufacturing plants in Europe and LATAM (i.e., following their customers).

4) EV

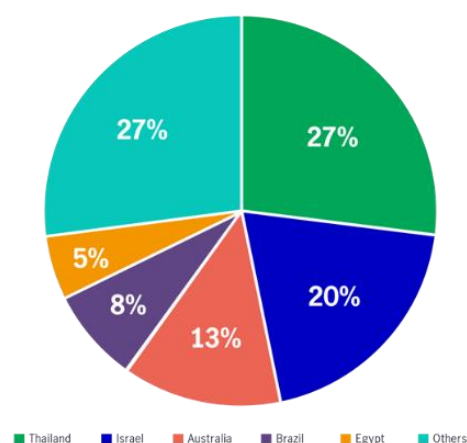
Export growth is a bright spot

Export growth has been a bright spot for mainland China's EV sector. According to the China Passenger Car Association (CPCA), 740,000 units of NEVs were exported to Europe in the first nine months of 2023, vs. fewer than 10,000 units in 2019 (more than 70 times growth). Also, more than half of mainland China's shipments of EVs go to Europe vs. less than 10% before 2020.

Despite the recent EU investigation of mainland China EVs, it's worth noting that Chinese brands make up only 3.7% of all electric cars sold in Europe (this is still a significant level of growth vs. 0.4% three years ago).

One leading EV company focuses on building a vertical supply chain by producing 70% of its own auto parts, including major components such as batteries, motors controllers and semiconductors. This gives the company an edge as it can compete on cost globally. By building out manufacturing plants worldwide, the company can maintain supply chain resilience while efficiently and effectively managing production and product delivery logistics (Chart 18).

Chart 18: A leading mainland Chinese EV player's overseas sales by countries



Source: CPCA, Macquarie Research, December 2023

EV component manufacturers are also side beneficiaries

In addition, many mainland Chinese auto brands bring their "technical know-how" and EV supply chain experience to European markets (Table 3). The current gap between mainland China and Europe exists in upstream, e.g., in raw material processing and battery manufacturing.

Table 3: Many mainland Chinese auto makers have built manufacturing plants globally to expand their supply chains

Auto brands	Factory locations
Company 1	South Africa, Iran, Russia, Türkiye, Pakistan
Company 2	Thailand, India, Brazil, Chile (planning), Vietnam (planning)
Company 3	Thailand, Indonesia, India, Pakistan
Company 4	Thailand, Pakistan, Malaysia, Vietnam, Iran Mexico
Company 5	Thailand
Company 6	Russia, Thailand, Brazil, Uzbekistan
Company 7	Hungary
Company 8	Iran, Brazil, Ukraine, Frankfurt
Company 9	Poland, Mexico, US
Company 10	Thailand
Company 11	Iran

Source: Company statements

Globally, mainland China commands more than 75% of global battery-making capacity, whereas Europe only has around 8% of capacity (Table 4). Therefore, European auto manufacturers still rely on batteries procured from mainland China for their EV production.

Table 4: Lithium-ion battery manufacturing capacity

	2022		2025		2030	
	TWh	% world	TWh	% world	TWh	% world
China	1.2	76.4	2.93	73.8	4.65	68.5
Europe	0.13	8.3	0.33	8.3	0.77	11.3
US	0.11	7.0	0.44	11.1	1.03	15.2
Rest to the World	0.13	8.3	0.27	6.8	0.34	5.0

Source: IEA, HBSC report, as of 29 November 2023

The EU aims to completely phase out fossil fuel cars by 2035. Also, the EU has been pushing for the localisation of battery production since 2017, and the rollout of its Net Zero Industry Act in March 2023 aims for around 90% of the EU's annual battery demand to be met by EU battery manufacturers with a capacity of at least 550GWh by 2030. Therefore, with a significant demand gap to fill, mainland Chinese battery manufacturers are a clear beneficiary riding on the global EV boom.

5) Healthcare

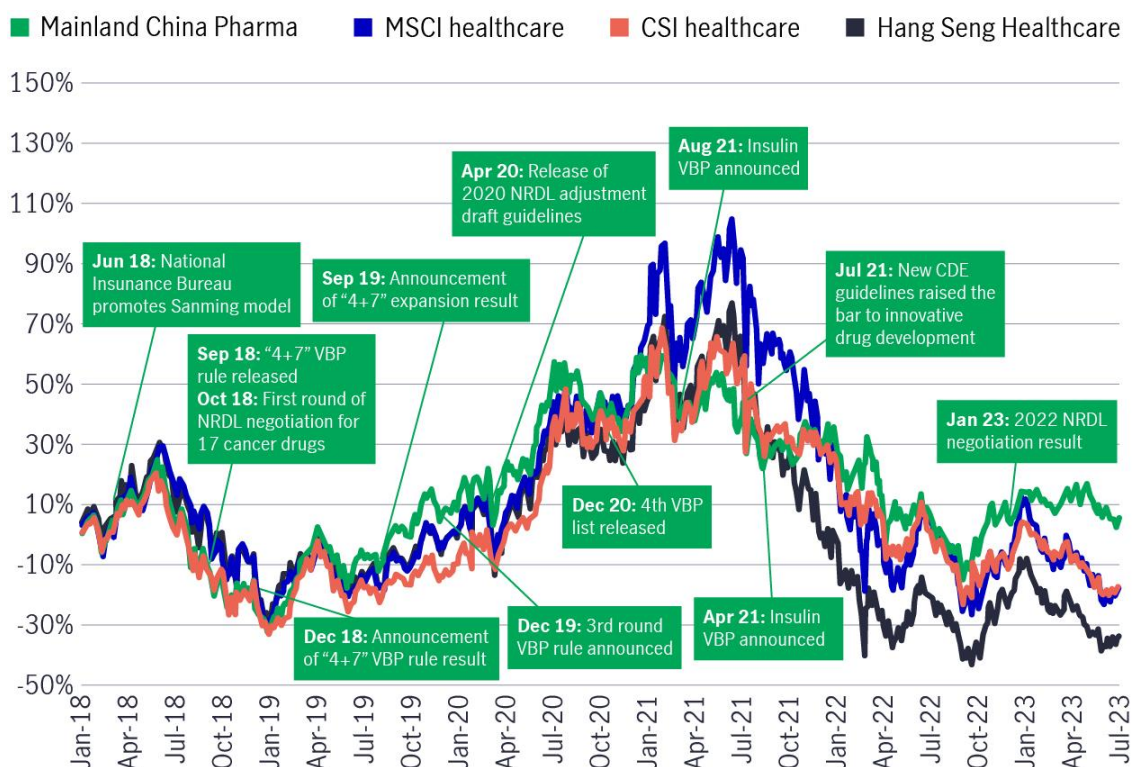
The mainland China's pharma sector was affected by the anti-corruption campaign in July 2023, although many negative factors have now been priced in (Chart 19). The Chinese government has recently emphasised the promotion of innovative drug development and healthcare system reform. The National Healthcare Security Administration (NHSA) is currently exploring a phased pricing mechanism for innovative drugs across different life stages – e.g., emphasising drug accessibility during the early stages of the cycle and affordability in the latter stages. This helps promote innovation in the innovative drug industry, especially for pharma companies with rich pipelines.

For 2024, we believe the sector should see a brighter upside on the back of several factors: (1) mainland China's pursuit of innovation ranging from high-tech to healthcare, (2) strong innovative pipelines of mainland China's biotech companies and (3) potential recovery in global biotech investments as interest rates decline.

Pharma companies with strong future pipelines and global footprints

We favour pharma companies with (1) strong future pipelines and (2) global opportunities. Several

Chart 19: Mainland China pharma sector



Source: Morgan Stanley Research, as of 30 July 2023

mainland Chinese pharma companies have invested heavily in R&D with robust, innovative pipelines and broad portfolio exposure.

Also, we prefer pharma companies with in-licensing opportunities with global players. Some of the companies we favour have R&D centres across mainland China, U.S and Europe, with over 100 innovative drug projects and more than 900 authorised IPs, as well as 15+ oncology candidates in the pipeline. Some leaders are also exposed to antibody-drug conjugates (ADCs), an area of focus for the next stage of development.

The Taiwan Region: What are the next big things in 2024?

We believe major driving forces for the global tech industry going into 2024 include (1) continued growth of A.I development, (2) recovery of the global smartphone market and (3) recovery of the PC market.

We see Taiwanese companies benefitting the most in the following areas:

- 1) Foundries
- 2) IC design services
- 3) Server hardware supply chain
- 4) Networking switches

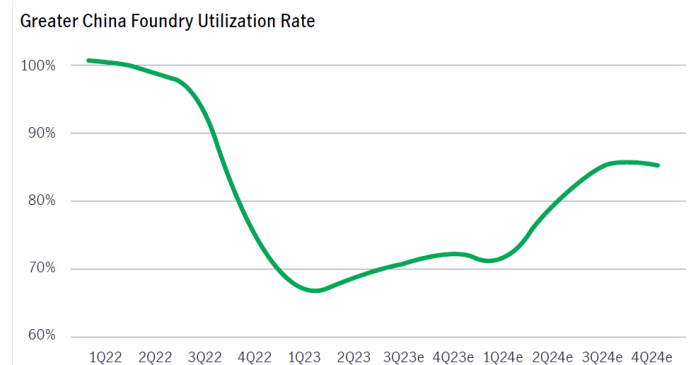
1) Foundries: At the bottom of a U-shaped cycle

We believe that the growth of foundries could ride on the recovery of consumer electronics market and A.I development.

We believe the semiconductor cycle has exited the deep contraction phase of the past four quarters (Chart 20). Going into 2024, foundries may benefit from (1) the growing localisation trend and increased demand from domestic suppliers and (2) A.I demand as more advanced node capacity is required. Revenue upside will likely come from (1) the A.I-

related semi-supply chain, and (2) server market recovery.

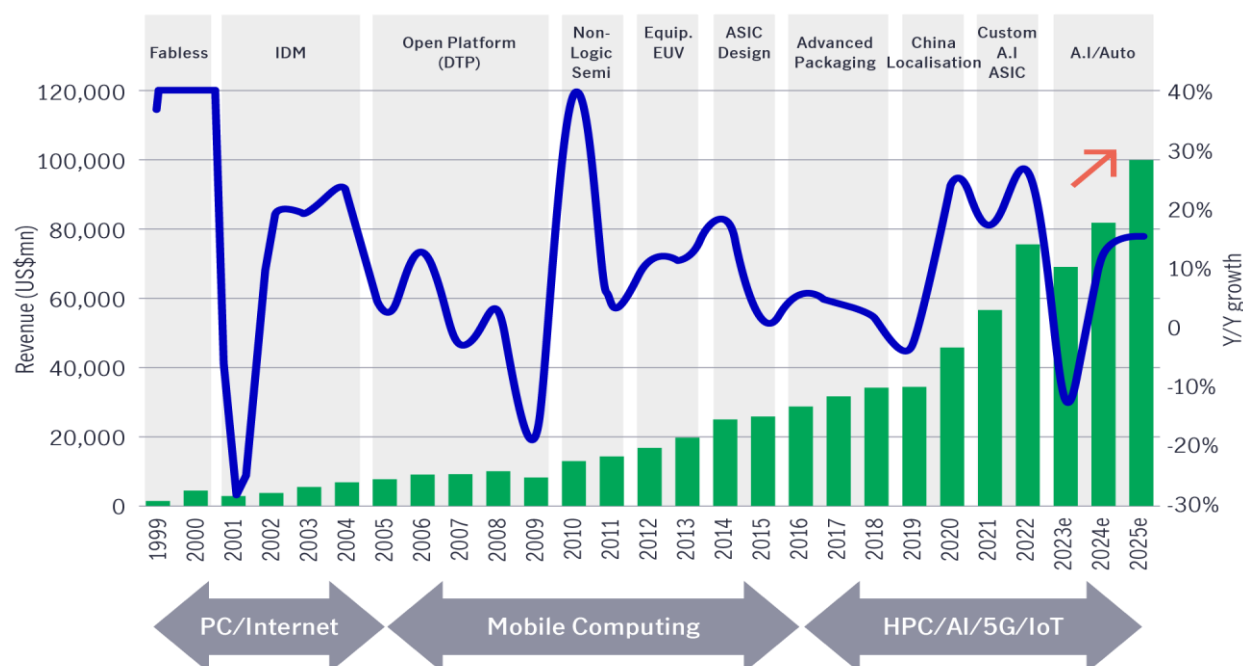
Chart 20: Foundry utilisation shows a U-shaped recovery heading into 2024



Source: Morgan Stanley report, as of 11 October 2023

If we look at the historical global technology cycle, PC/Internet growth led the technology boom from 2001 to 2005. This was followed by mobile computing from 2006 to 2016 and high-performance computing (HPC)/A.I./5G/internet of things (IoT) from 2016 to the present day (Chart 21). As the Taiwan Region commands a unique position in the Asian upstream semiconductor industry, A.I semiconductor growth could be a significant growth catalyst for leading Taiwanese semiconductor companies.

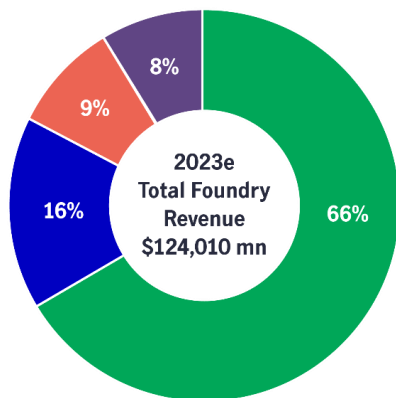
Chart 21: Historical growth trajectory of a major Taiwanese foundry player



Source: Morgan Stanley report, as of 11 October 2023. Note: "Equip. EUV" refers to Equipment extreme ultraviolet (EUV) from a Netherland based company. "ASIC Design" refers to the services for a global leading smartphone player based in U.S.

Taiwanese companies commanded 66% of global market share for foundries as of the end of May 2023 (Chart 22). Going into 2024, leading Taiwanese foundry players should lead the demand recovery of semiconductor up-cycles, driven by robust demand from A.I logic semiconductors, e.g., graphics processing units (GPUs) and application-specific integrated circuits (ASICs), rush orders from Android smartphone SoC, and central processing units (CPUs) demand on the back of recovering global PC market.

Chart 22: The Taiwan Region commanded 66% of global market share



Legend: Taiwan Region (Green), South Korea (Blue), Mainland China (Red), Others (Purple)

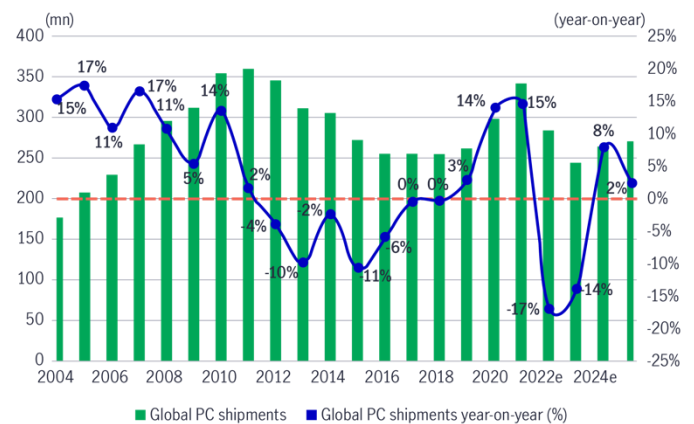
Source: Trendforce, as of 30 May 2023

Furthermore, we are currently at the trough of the logic semiconductor down cycle and believe inventory issues should be largely resolved by Q4 2023. Logic semiconductor revenue is expected to grow by 10%-15% year on year in 2024.

The global PC market is expected to recover in 2024

For the global PC market, PC shipments are expected to pick up again, driven by replacement demand and the “Windows 11” refresh going into 2024 (Chart 23). With the end of life of “Windows 7” in 2023 and “Windows 10” by 2025, corporates will likely upgrade their PCs over the next two years.

Chart 23: Global PC shipment growth

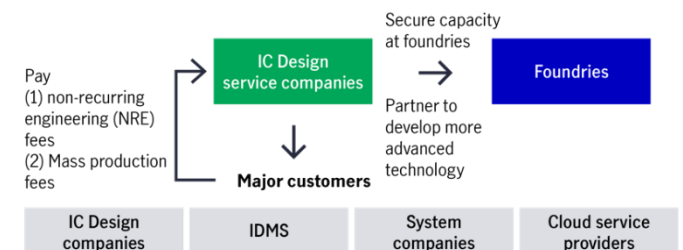


Source: Morgan Stanley report, as of November 10, 2023

2) IC design services⁶

Another area of significant potential growth for the Taiwan Region is the IC design services industry. IC design service providers are third-party, one-stop-shop design “consultants” who assist with front-end/back-end design and manage the fabrication process on the foundry side (Chart 24).

Chart 24: Overview of the IC design services industry



Source: Manulife Investment Management, as of December 2023

On one hand, system houses/fabless companies may outsource their chip design and production tasks to IC design services providers. On the other hand, IC design service providers receive (1) non-recurring engineering (NRE) fees, and (2) mass production fees.

Major customers prefer to outsource more IC design and fabrication integrations to IC design services companies as outsourcing helps, (1) lower operating costs, (2) gain access to new technologies, e.g., advanced chip packaging and chiplets, (3) reduce development costs for IC development with rising demand for IP blocks.

⁶ HSBC Report, November 2023

In the past, IC design services companies focused on ASICs for consumer electronic markets. Over time, these companies have expanded their product portfolios to include A.I, HPC, industrial applications, servers, automotive, etc.

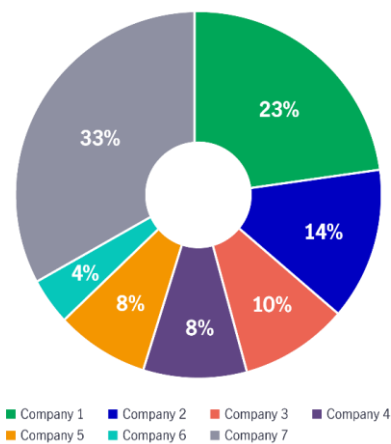
Within the logic processor market, there are different types of logic chips: (1) standard logic and (2) specific-purpose logic. Within specific-purpose logic chip sets, there are a few major types, including:

- ASICs are customised IC designed for specialised applications focusing on one task.
- Application-specific standard products (ASSPs) that cover multi-tasking chip categories such as CPUs and GPUs.
- Field programmable gate arrays (FPGAs)

While multi-tasking GPUs currently dominate the A.I chip market, demand for ASIC is expected to grow at a faster rate than the overall market for A.I semiconductor market, as ASICs perform a single task but in the quickest and most efficient way, which is useful for handling data-intensive tasks.

In terms of the competitive landscape, Taiwanese companies play a significant role in the IC designer services provider market, given that three out of the top five players are from the Taiwan Region (Chart 25).

Chart 25: Three out of top five players are Taiwanese companies

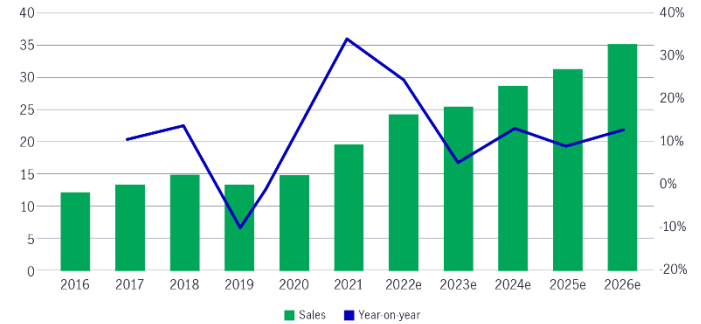


Source: Company statement, Omdia, HSBC estimates

According to HSBC research, the global ASIC market is expected to grow at a 12.4% CAGR from 2021 to 2026 (Chart 26). Of these, the A.I ASIC market is expected to grow at a CAGR of 69.2% (Chart 27 and 28), much faster than the total A.I

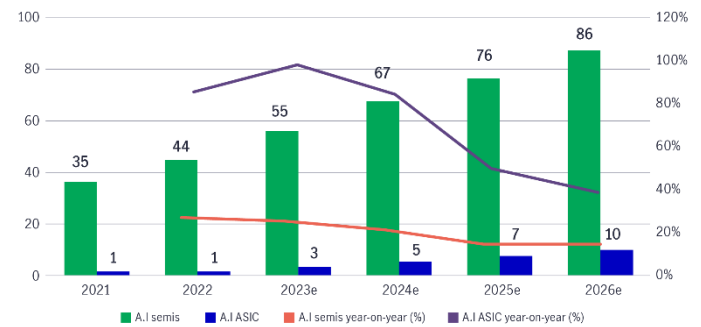
semiconductor market due to the abovementioned reasons. To summarise, the proliferation of A.I presents growth opportunities for Taiwanese IC design service companies, especially those in the custom IC market.

Chart 26: Global ASIC market is expected to grow at a 12.4% CAGR over 2021-2026



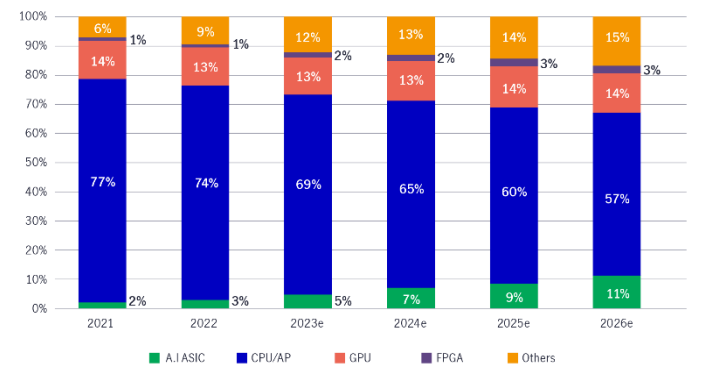
Source: HSBC estimates

Chart 27: A.I ASIC is expected to grow at a 69.2% CAGR over 2021-2026



Source: Gartner, HSBC estimates

Chart 28: A.I ASIC to account for 11% of total A.I semis by 2026, vs. 3% in 2022



Source: Gartner, HSBC

3) Server hardware supply chain

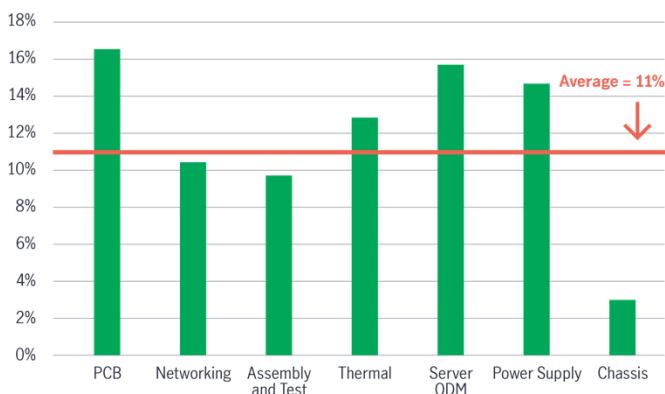
In addition to foundries and IC design service companies, the server hardware supply chain is another growth area for the Taiwan Region going into 2024.

The Taiwan Region has major hardware companies exposed to various parts of the server hardware supply chain, for example, server original design manufacturers (ODMs), switch companies, and hardware component companies.

We believe that server market growth will further improve in 2024, driven by the growth recovery of normal servers and the ongoing strength of A.I servers, both of which are significant catalysts for Taiwanese ODMs. Global cloud service providers and enterprises are collaborating with Taiwanese ODMs, which possess strong R&D and engineering capabilities, with high customisation abilities and quality. As a result, Taiwanese ODMs have gained rising market share from server motherboard manufacturing, server rack/system solutions, and final assembly over the years.

Over the longer term, the various sub-sectors of the A.I server market should see the fastest growth among all components, e.g., printed circuit boards (PCBs), server ODMs, networking, etc. Also, the estimated A.I spend as a percentage of the total data-centre capex of U.S and mainland China's cloud service providers (CSPs) remains high going into 2024 (Chart 29).

Chart 29: A.I Server: growth estimates (2023-2030): PCBs and server ODMs see the fastest growth among all components



Source: Morgan Stanley report, as of November 10, 2023

For A.I servers, ODMs' value-add comes from higher customisation to cope with each CSP's strategy/strength. The design fee for an A.I server is

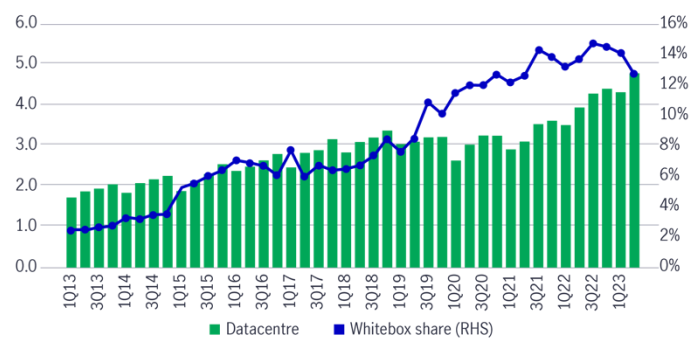
2x-3x higher than the regular server rack, according to the top server ODMs. Server ODM players are also the PC/notebook ODMs. Meanwhile, motherboard makers have also entered the server market, given partial product overlaps and long relationships with major US customers.

4) Networking switches: the migration from 100G to 400G continues

As demand for computational power and networking bandwidth at data centres increases, demand for networking switches also increases. Of note, the whitebox switch market share has grown steadily due to continued component supply improvements and lower enterprise market pricing (Chart 30). We expect 400G switch demand to pick up, and the whitebox switch share should continue to grow globally in the coming years as cloud customers look to reduce costs. Whitebox server shares were 38.4% of the total server market as of Q2 2023.

Globally, there are only a handful of whitebox switch vendors. A Taiwanese whitebox switch firm leads in terms of market share (53%), followed by a U.S company (40%), and other Taiwanese ODM+ switch manufacturers (5%).

Chart 30: Global datacom switch value vs. white box switch value share



Source: Morgan Stanley report, as of September 12, 2023

Conclusion

As we move into 2024, mainland China has reiterated its pro-growth stance for the economy. More policy support on the fiscal, monetary, and property fronts should enable the economy to stabilise and, in turn, boost household income and consumption growth further.

Furthermore, we believe the four megatrends (the “4As”) should continue to drive growth for the Greater China region:

1. **Acceleration:** Consumption may further improve with mainland China’s pro-growth policy stance.
2. **Abroad:** Leading mainland Chinese companies are going abroad – another growth engine!
3. **Advancement:** The A.I supply chain in Greater China (especially the Taiwan Region) should continue to see robust growth in 2024.
4. **Automation:** Mainland China’s aged population⁷ should present higher demand for automation.

Going into 2024, we favour the following Chinese growth sectors: (1) traditional tech, (2) A.I, (3) advanced manufacturing, (4) EV, and (5) healthcare. For the Taiwan Region, we continue to favour the technology sector, driven by A.I beneficiaries. We prefer the below technology sub-sectors going into 2024: (1) foundries, (2) IC design services, (3) server hardware supply chain, and (4) networking switches.

In summary, the investment opportunity sets will be more diversified and selective for the Greater China region in 2024.

⁷ 14.9% of mainland China’s population comprises people aged 65 and above.

Important Note

Investing involves risks, including the potential loss of principal. Financial markets are volatile and can fluctuate significantly in response to company, industry, political, regulatory, market, or economic developments. These risks are magnified for investments made in emerging markets. Currency risk is the risk that fluctuations in exchange rates may adversely affect the value of a portfolio's investments.

The information provided does not take into account the suitability, investment objectives, financial situation, or particular needs of any specific person. You should consider the suitability of any type of investment for your circumstances and, if necessary, seek professional advice.

This material is intended for the exclusive use of recipients in jurisdictions who are allowed to receive the material under their applicable law. The opinions expressed are those of the author(s) and are subject to change without notice. Our investment teams may hold different views and make different investment decisions. These opinions may not necessarily reflect the views of Manulife Investment Management or its affiliates. The information and/or analysis contained in this material has been compiled or arrived at from sources believed to be reliable, but Manulife Investment Management does not make any representation as to their accuracy, correctness, usefulness, or completeness and does not accept liability for any loss arising from the use of the information and/or analysis contained. The information in this material may contain projections or other forward-looking statements regarding future events, targets, management discipline, or other expectations, and is only current as of the date indicated. The information in this document, including statements concerning financial market trends, are based on current market conditions, which will fluctuate and may be superseded by subsequent market events or for other reasons. Manulife Investment Management disclaims any responsibility to update such information.

Neither Manulife Investment Management or its affiliates, nor any of their directors, officers or employees shall assume any liability or responsibility for any direct or indirect loss or damage or any other consequence of any person acting or not acting in reliance on the information contained here. All overviews and commentary are intended to be general in nature and for current interest. While helpful, these overviews are no substitute for professional tax, investment or legal advice. Clients should seek professional advice for their particular situation. Neither Manulife, Manulife Investment Management, nor any of their affiliates or representatives is providing tax, investment or legal advice. This material was prepared solely for informational purposes, does not constitute a recommendation, professional advice, an offer or an invitation by or on behalf of Manulife Investment Management to any person to buy or sell any security or adopt any investment strategy, and is no indication of trading intent in any fund or account managed by Manulife Investment Management. No investment strategy or risk management technique can guarantee returns or eliminate risk in any market environment. Diversification or asset allocation does not guarantee a profit or protect against the risk of loss in any market. Unless otherwise specified, all data is sourced from Manulife Investment Management. Past performance does not guarantee future results.

Manulife Investment Management

Manulife Investment Management is the brand for the global wealth and asset management segment of Manulife Financial Corporation. Our mission is to make decisions easier and lives better by empowering investors for a better tomorrow. Serving more than 17 million individuals, institutions, and retirement plan members, we believe our global reach, complementary businesses, and the strength of our parent company position us to help investors capitalize on today's emerging global trends. We provide our clients access to public and private investment solutions across equities, fixed income, multi-asset, alternative, and sustainability-linked strategies, such as natural capital, to help them make more informed financial decisions and achieve their investment objectives. Not all offerings are available in all jurisdictions. For additional information, please visit manulifeim.com.

This material has not been reviewed by, is not registered with any securities or other regulatory authority, and may, where appropriate, be

distributed by the following Manulife entities in their respective jurisdictions. Additional information about Manulife Investment Management may be found at manulifeim.com/institutional

Australia: Manulife Investment Management Timberland and Agriculture (Australasia) Pty Ltd, Manulife Investment Management (Hong Kong) Limited. **Canada:** Manulife Investment Management Limited, Manulife Investment Management Distributors Inc., Manulife Investment Management (North America) Limited, Manulife Investment Management Private Markets (Canada) Corp. **Mainland China:** Manulife Overseas Investment Fund Management (Shanghai) Limited Company. **European Economic Area** Manulife Investment Management (Ireland) Ltd. which is authorised and regulated by the Central Bank of Ireland **Hong Kong:** Manulife Investment Management (Hong Kong) Limited. **Indonesia:** PT Manulife Aset Manajemen Indonesia. **Japan:** Manulife Investment Management (Japan) Limited. **Malaysia:** Manulife Investment Management (M) Berhad 200801033087 (834424-U) **Philippines:** Manulife Investment Management and Trust Corporation. **Singapore:** Manulife Investment Management (Singapore) Pte. Ltd. (Company Registration No. 200709952G) **South Korea:** Manulife Investment Management (Hong Kong) Limited. **Switzerland:** Manulife IM (Switzerland) LLC. **Taiwan:** Manulife Investment Management (Taiwan) Co. Ltd. **United Kingdom:** Manulife Investment Management (Europe) Ltd. which is authorised and regulated by the Financial Conduct Authority **United States:** John Hancock Investment Management LLC, Manulife Investment Management (US) LLC, Manulife Investment Management Private Markets (US) LLC and Manulife Investment Management Timberland and Agriculture Inc. **Vietnam:** Manulife Investment Fund Management (Vietnam) Company Limited.

Manulife, Manulife Investment Management, Stylized M Design, and Manulife Investment Management & Stylized M Design are trademarks of The Manufacturers Life Insurance Company and are used by it, and by its affiliates under license.

3287899