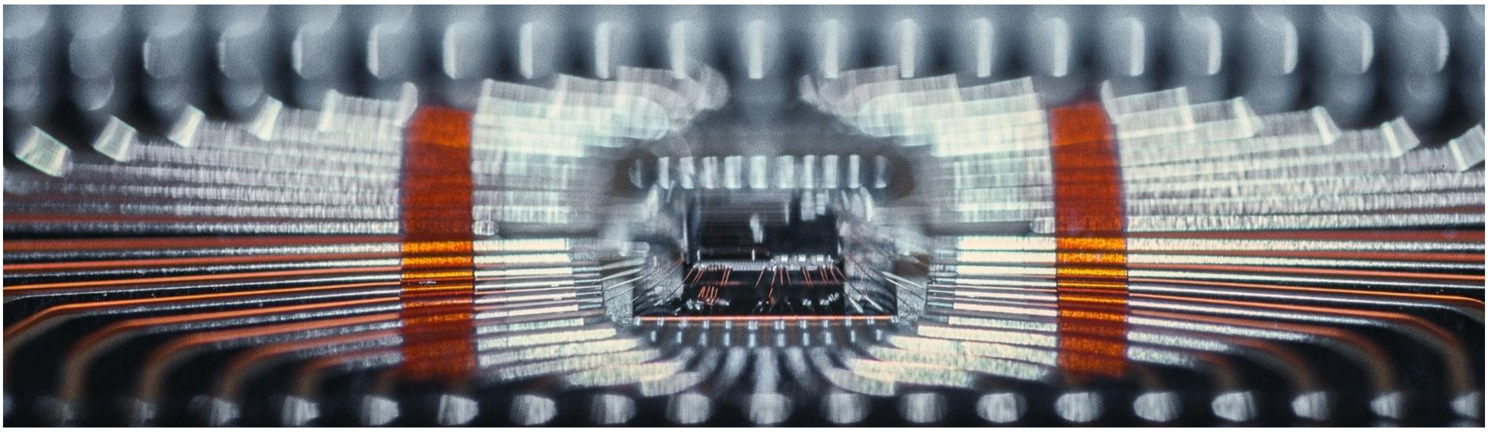
CIO Academy

The World's Aye to AI: Impact and Opportunities in 2025 & Beyond

February 2025



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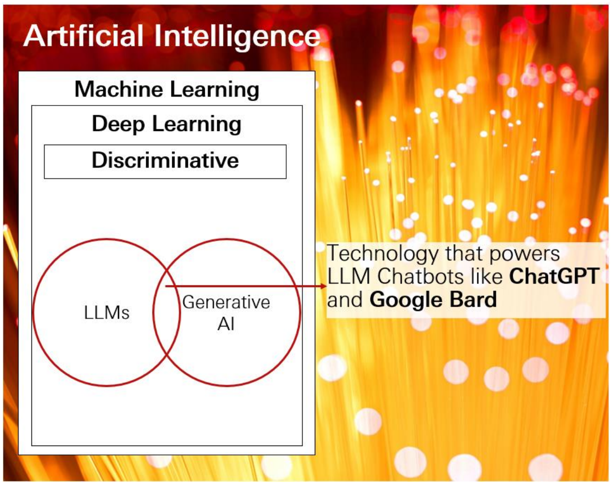
- **The global AI race has entered a new competitive landscape.** The emergence of a Chinese startup - DeepSeek's R1 AI model - that was apparently developed on a shoestring budget in comparison to OpenAI's ChatGPT hit some big chip manufacturers like an unanticipated asteroid, piercing a hole in their sky-high valuations and triggering a huge tech sell-off. This incident, almost overnight, upended a common assumption in the Silicon Valley that having access to advanced chips and building large clusters of GPUs was at the heart of the AI revolution. While questions over the accuracy of DeepSeek's R1 model have emerged since, and some of the most affected stocks have recovered slightly, the incident has indeed created questions in investors' mind over the need and viability of tech mega caps' high capex and multiples. Could US AI spending be optimised and monetised better? How should investors navigate this treacherous investment landscape?
- **We think that the emergence of competition is good. It kicks out complacency.** If indeed, the cost of AI training and inferencing can go down, more low-cost AI models will emerge, triggering the **Javon's paradox** i.e. lower costs accelerating widespread adoption. As such, lower AI costs will democratise its deployment and will make applications for different use cases cheaper. AI's adoption will grow from **AI enablers** (Big Tech) to **AI adopters** (other sectors). This is also a direct positive for software companies and tech platforms that have AI embedded in their P&L. With lower implementation costs and better efficiency, they would be able to monetise their AI models faster, for example, by using AI to target advertisements to customers. Wider AI adoption will reshape corporate operations and boost productivity through time and cost efficiencies delivered by automation, and implementation of smart unified processes - driving real and broader economic impact. This is when winners will emerge from beyond just the tech sector, in other sectors like financials, industrials, and healthcare. As broad productivity gains materialise and transform existing business models at scale, new business models and industries should also emerge. At this stage, AI almost becomes like **a fifth factor of production** - aiding and enhancing the output of the four conventional factors of production in economics – land, labour, capital, and organisation. Such AI adoption also means continued demand for GPUs**.**
- **Furthermore, with America's AI leadership emerging as one of the key policy priorities**, the focus remains firmly on establishing an AI infrastructure, which may now be done much more efficiently. More datacenters will be built. They need GPU chips, power, cybersecurity, HVAC cooling systems and a lot more. As such, the need for adequate infrastructure preparedness calls for a fit for purpose energy infrastructure, especially as the US grid remains underinvested and unfit to meet future power needs coming from both reshoring of manufacturing and AI adoption. This will create structural opportunities in investment themes like **Digital Infrastructure** & **Energy Transition**. And here, both **public** and **private markets** present attractive investment opportunities. Lastly, while 2024 saw the adoption of Generative AI - a small subset of machine learning, 2025 should see a transformative phase of AI 'agentification' – which is AI's evolution from task specific tools like chatbots to specialised interconnected virtual **AI agents** that are capable of logical reasoning and decision making. Such AI advancements will continue to deliver incremental productivity gains.

2024 – The year of AI buildout...

If 'manifest' was the Cambridge Dictionary's word of the year for 2024, Artificial Intelligence was most certainly the word of the year for global businesses and markets in the same year.

Why? Because in 2024, US market's performance was primarily driven by big tech. The initial AI enablers – some well-known semiconductor chip manufacturers, who's GPUs offered the computation capacity needed for training AI's Large Language Models, reaped some of the most notable sales gains in 2024.

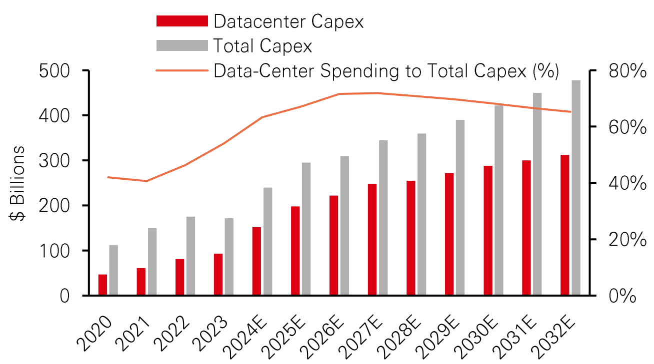
The AI Tech Stack



Source: Google AI basics; HSBC Global Private Banking, February 2025.

The need for 'training' AI models led US big tech to invest heavily in building their AI capabilities, including data centers. As the below chart shows, investments in data center expansion were likely behind more than 50% hyper-scalers' capex rise in 2024. Overall, big tech companies spent billions, in not just building datacentres, but also installing AI chips & servers, and powering them.

Data center capex by hyperscalers has been high and is likely to remain robust in 2025



Source: Bloomberg, HSBC Global Private Banking, February 2025.

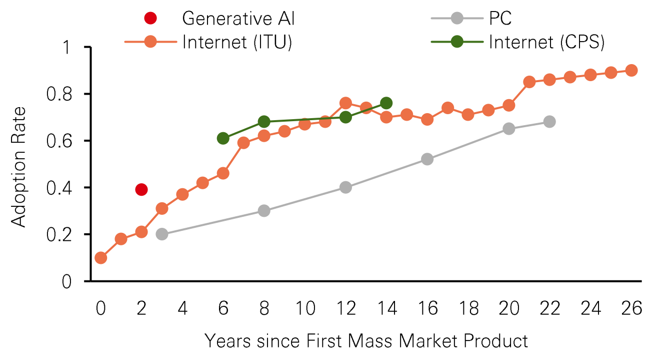
...And the year of LLMs & Generative AI

In Artificial Intelligence, Large Language Model (LLMs) are a type of machine learning program which are 'trained' on large sets of data, so they develop the 'intelligence' to analyse data, recognise patterns and make predictions when similar data is fed into the model for analysis. LLMs are also used for information retrieval and encompass a wide selection of models designed for different tasks in natural language processing (NLP), generally in text format. Broadly, LLMs provide context and memory capabilities. **Generative AI**, on the other hand helps create various forms of innovative content and engaging responses. Since information gathering, document creation and presenting are a big part knowledge workers' job globally, Gen AI has fast emerged as the most transformative workplace tech. Unsurprisingly, **75% of knowledge workers around the world now use generative AI at work** (Source: Work Trend Index Annual Report, 2024).

As per another study done by the St Louis Fed in August 2024, two years after its mass introduction, **Gen AI has been adopted at a faster pace than PCs or the internet**. The red dot in the chart below shows a notable 39.4% adoption rate for generative AI. Its adoption rate already exceeds that of the PC and internet at comparable points in time. Adoption of the PC three years after its mass introduction was only at 20%, about the same value as for adoption of the internet after two years.

As such, Gen AI tools like OpenAI's ChatGPT, Microsoft's Copilot and Google's Bard are widely used for collating information, summarising large reports, and producing content in different formats. For example, the service industry has benefitted from using AI chatbots to manage their booking systems or to service their client queries. In the financial services industry, **banks are using Gen AI** for fraud detection, recognising patterns in transactions, trading, and credit scoring and in developing new client features. That means better customer experience and eventually higher revenue. The benefits of Gen AI are therefore already being leveraged by some sectors and its adoption is fast paced.

Adoption of Gen AI adoption rate vs other tech



Source: St Louis Fed data as at August 2024. HSBC Global Private Banking, February 2025.

Where does AI go from here?

Until January 2025, a common assumption in the Silicon Valley was that having access to the most advanced AI chips and building large clusters of these GPUs was at the heart of the AI revolution. But this underlying assumption was upended almost overnight by the emergence of DeepSeek's R1 AI model which was reportedly built at a fraction of the cost of western AI models and with the help of some not-so-advanced version of AI chips.

We think that the emergence of competition is good. It kicks out complacency, especially as disrupters are demonstrating that more can be achieved with less and that the costs of AI training and inferencing can be brought down. Plus, a focus on cost discipline is eventually better for big tech's margins and profitability. Given the constant evolution of the AI technology itself and the emergence of new competitive forces, here's how we think the AI landscape should shape up in 2025 and beyond:

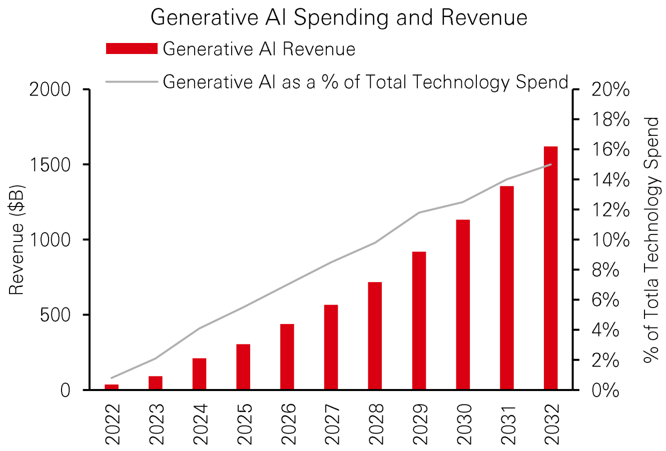
- **Lower costs should broaden AI adoption**: As AI models mature, get 'trained' enough, and become cheaper, AI's adoption should grow beyond the big tech hyperscale providers - the **AI enablers** and will accelerate across other industries – i.e. the **AI adopters**. We expect to see lots of companies across various sectors to invest in AI to reshape their operations and drive efficiencies through smart unified processes. As the scope of AI applications widens and deepens - real AI adoption will **drive total factor productivity growth** and real economic impact – and this is when winners emerge from beyond just the tech sector – in other sectors like financials, healthcare, communication services and industrials.

- **Investments in AI Infrastructure and ecosystem**: While big semiconductor manufacturing equipment firms – (the so called 'picks and shovels' providers) and large GPU manufacturers have contributed to creating the basic building blocks of AI in 2024, there's still a need for establishing a broad AI infrastructure that involves creating more data centers, increasing the supply of advanced chips, building adequate power supply and meeting cybersecurity needs – especially as security of enterprise data/consumer data used in AI models' training and inferencing is imperative. President Trump's recent announcement of up to $500bn investment in the **Stargate project**, for building an AI infrastructure supports the USA's continuous innovation and dominance in AI. It cements the fact that **investing in AI remains a key US policy priority**.

- **Continuous innovation will broaden AI's efficiency and its use cases**: While Gen AI has and will keep boosting growth across the tech spectrum, the scope of AI isn't just limited to Gen AI. Further innovation means new use cases are emerging fast.

In 2025, we expect Gen AI to drive more announcements related to **copilots** and **chatbots** from new and existing providers. This should bolster the moats of hyperscale providers across the tech stack. As discussed in the following section, with continuous improvements in AI reasoning and inferencing power, AI is fast moving towards '**agentification**'.

As technology evolves, the revenue from Gen AI should outpace the spend, boosting margins



Source: eMarketer, IDC, Bloomberg, HSBC Global Private Banking, January 2025.

2025: The year of the rise of virtual AI Agents?

Gen AI is essentially a task specific tech tool. It produces various forms of content and is meant to enhance process efficiency. But it can't take actions on your behalf and can't mimic human-like reasoning. But as AI evolves, it is fast entering a transformative phase of '**agentification**'.

What is an AI agent? AI is fast evolving from task specific tools to specialised interconnected agents – who can reason, decide, plan and execute. AI agents use a technique called "tool calling" in the backend to find latest information, **optimise workflows** and autonomously develop subtasks to deliver complex outcomes. These AI agents also adapt to user expectations, storing past interactions in their memory to improve future results. As such, a rise in agent frameworks and multi agent collaboration - with their human like intelligence – will aid creation of **new business models and revenue streams**. The global AI agent market is projected to grow from $5.29 billion in 2024 to $216.8 billion by 2035 at an annual growth rate of 40.15% (Source: Roots Analysis, Financial Times, January 2025).

The opportunities

- **Continued demand for GPUs**: As per a recent Bloomberg estimate, Gen AI's market could reach a whopping $1.6 trillion by 2032. In 2024, Gen AI cloud and semiconductor suppliers offering GPU capacity for training LLMs continued to reap some of the most notable sales gains. Hyperscale providers' demand for the training of LLMs should drive demand for AI servers and storage units at data centers in 2025. Generative AI also should accelerate the shift toward digital ads, while adding incremental revenue to established markets like cybersecurity and gaming. This demand for LLM training should continue to drive a boom in cloud and IT Infrastructure and is broadening the opportunity set for investors in the tech sector, beyond just the Mag-7. As more AI applications emerge, demand for GPUs will grow too.

- **Opportunities in the AI adopters**: GPUs are the primary vehicles for AI inferencing. Therefore, so far, only AI chip suppliers and equipment manufacturers have been the major beneficiaries of rising sales/revenue. But the emergence of DeepSeek's AI model has shown that greater efficiencies can be achieved with lower costs, which is great news for wider adoption. As the cost of AI training and inferencing goes down, the use of AI will go up. Lower costs will make AI adoption much more broad-based (Jevon's paradox). It will make applications for different use cases cheaper and that's a direct positive for software companies and tech platforms that have AI embedded in their P&L. They could monetise their AI models fairly quickly, for example, by using AI to target advertisements to customers.

  Other beneficiaries will be the adopters like financials, industrials, and communication services. Several companies within these sectors would invest in AI to reshape their operations and drive efficiencies through smart unified processes. The rise of **AI agents** will improve both efficiency (operational and costs-wise) and corporate innovation. Such **Automation & AI** adoption will ultimately be a game changer for the total factor productivity.

  AI is also proving to be revolutionary for the **healthcare sector**, especially in **new drug discovery**. A good example to demonstrate this would be how AI was used by three scientists last year to predict the structures of almost all known proteins and for the creation of a breakthrough tool called Alphafold2 – used for all 200 million proteins known to exist. Proteins – the basic building blocks of which are amino acids - each fold in a unique way. Scientists had long struggled to predict the shape of each of the millions of proteins, but their individual structure decides what each does in the body. Understanding this structure is crucial in developing targeted medication. Without the use of AI, understanding the folding pattern of 200 million known proteins would have taken over 200 years (Source: Demis Hassabis, CEO - Google DeepMind and one of the three scientists who received a Nobel Peace Prize in October 2024 for developing AlphaFold2 tool, Financial Times, January 2025). But now that AI has helped in revealing the 'fold' of each of these protiens, targetted drugs can be developed to cure illnesses that their discrepecy causes in the human body.

- **Digital infrastructure**: As AI deployments rise across the world, infrastructure preparedness is key. America's recently anounced Stargate project which entails up to $500bn investment in data centres and other projects to support the US leadership in AI is big plus for the whole ecosystem around AI. Our Digital Infrastructure high conviction investment theme captures attractive investment opportunities for investors in this sphere.

- **Opportunities in Energy Transition and America's 'Energy Emergency'**: Despite challenges from the new US administration to the Biden era energy policy, the Energy Transition theme is likely to prevail in our view. Why? Because, while the motivations may have changed, the overall direction of travel remains intact. The US grid remains outdated and underinvested. With the ever-increasing reshoring of US manufacturing and AI's power intensity, President Trump considers energy production as a national emergency/ key priority which calls for investment in the energy infrastructure. Plus, Energy Transition is more advanced now than it was during President Trump's first term and the need to generate affordable, sustainable and secure sources of electricity fits in seamlessly with the smart, technologically innovative, policy-supportive and economically viable solutions that green sources of energy offer.

  With AI and reshoring of manufacturing driving significant growth of power demand, corporates' focus on energy efficiency should also become a strategic priority in the coming years. The need for most companies across various sectors to address escalating demand for energy will be driven by both cost management imperative and operational scalability concerns. As such, several US tech companies are looking into investing in nuclear power as a sustainable source of energy.

- **Private markets** have a huge role to play in the creation of the AI ecosystem, especially as Stargate is to be funded via a private partnership between Microsoft's OpenAI, Softbank and Oracle. Investors with appropriate risk tolerance can find attractive opportunities in Private Equity, Private Debt and also Hedge Funds, who can benefit from any market volatility created by AI related headlines.

Risks and challenges

- **The global AI race has entered a new competitive landscape**. Recent events depict that the pace of innovation in tech is so fast that disrupters could get disrupted if they get complacent. The emergence of DeepSeek's AI chatbot has created questions and concerns over the need for optimisation of big tech's AI spending and monetisation. This may drive-up **near-term volatility**.

  However, it is noteworthy that when big global GPU providers' stock prices were getting hammered, a.) some software names and platform providers who are part of the Mag-7 cohort displayed resilience. That's because lower costs of AI application would speed up the monetisation of their AI spend and help them develop more use cases that boost revenue generation. b.) Several other sectors in the S&500 were up on the day, demonstrating that the AI trade is widening due to broader adoption and productivity gains.

  It is therefore imperative for investors to adopt **global diversification** in their investment portfolios. Stock selection will assume greater significance in 2025, especially as we should see greater differentiation of business models within the tech sector and because AI adopters need to be separated from laggards.

- If AI developers are able to build and run models on less sophisticated hardware/chips, there is a small risk that demand for the latest high-tech GPUs may slow in the near term. But that's not our base case. Over the medium-to-long run, wider AI adoption and the demand for AI inferencing devices like autonomous cars, AI PCs and laptops should lead to higher demand for GPU computation. Therefore, the demand for semiconductors should be more, not less.

- **Quality of data used is key to get quality output from AI**. Otherwise, it could be 'garbage in, garbage out'. AI can produce inaccurate results, which can include false assumptions and biased outcomes. Adequate human oversight and controls to cross-check with other data sources is imperative. Development of and adherence to data governance standards is therefore important.

- **Privacy, safety, security and ethics** around AI are some of its key challenges. Regulatory frameworks are essential to set the right standards around these issues.

To summarise

The AI revolution and the AI investment cycle are still in their early innings. Irrespective of recent market events (and the possibility of developing more efficient AI techniques, there should be no dearth of demand for AI hardware and the power to fuel it, especially as AI applications widen.

Innovation finds a way to manifest itself in unexpected ways and creates widespread benefits. The emergence of DeepSeek's AI model has shown that when it comes to monetising AI, significantly more than thought can be done with even less advanced chips, which increases their marginal value.

Combining this increase in marginal value of chips with the deepening and widening of AI use cases and adoption, on a global scale, we believe that the potential total factor productivity is about to pop to an extent that **AI will almost become a fifth factor of production**.

Also, with wider adoption**, AI is no longer just a US big tech only horse race**. Its innovation and impact can and will be seen throughout the US equities' market cap – large, medium and small.

Astute investors will pick the right spots and stocks throughout the market cap continuum. Hence, **diversification of exposure is key**, as is to seek opportunities in the second derivative beneficiaries i.e. the AI adopters in sectors like financials, industrials and healthcare.

To benefit from the AI trade, it's also vital to adopt a geographically diverse, **active multi-asset investment approach** - one that embraces differentiation and has stock level selectivity at its heart. **Private markets** also offer attractive risk-reward opportunities in the entire AI ecosystem.

A tactical, multi-asset investment approach that encompasses all of the above key takeaways can finally be overlayed with our structural investment themes like **Automation & AI**, **Digital Infrastructure** and **Energy Transition** to maximise investment returns.

Risk Disclosures

Risks of investment in fixed income

There are several key issues that one should consider before making an investment into fixed income. The risk specific to this type of investment may include, but are not limited to:

Credit risk

Investor is subject to the credit risk of the issuer. Investor is also subject to the credit risk of the government and/or the appointed trustee for debts that are guaranteed by the government.

Risks associated with high yield fixed income instruments

High yield fixed income instruments are typically rated below investment grade or are unrated and as such are often subject to a higher risk of issuer default. The net asset value of a high-yield bond fund may decline or be negatively affected if there is a default of any of the high yield bonds that it invests in or if interest rates change. The special features and risks of high-yield bond funds may also include the following:

- Capital growth risk - some high-yield bond funds may have fees and/ or dividends paid out of capital. As a result, the capital that the fund has available for investment in the future and capital growth may be reduced; and
- Dividend distributions - some high-yield bond funds may not distribute dividends, but instead reinvest the dividends into the fund or alternatively, the investment manager may have discretion on whether or not to make any distribution out of income and/ or capital of the fund. Also, a high distribution yield does not imply a positive or high return on the total investment.
- Vulnerability to economic cycles - during economic downturns such instruments may typically fall more in value than investment grade bonds as (i) investors become more risk averse and (ii) default risk rises.

Risks associated with subordinated debentures, perpetual debentures, and contingent convertible or bail-in debentures

- Subordinated debentures - subordinated debentures will bear higher risks than holders of senior debentures of the issuer due to a lower priority of claim in the event of the issuer's liquidation.
- Perpetual debentures - perpetual debentures often are callable, do not have maturity dates and are subordinated. Investors may incur reinvestment and subordination risks. Investors may lose all their invested principal in certain circumstances. Interest payments may be variable, deferred or cancelled. Investors may face uncertainties over when and how much they can receive such payments.
- Contingent convertible or bail-in debentures - Contingent convertible and bail-in debentures are hybrid debt-equity instruments that may be written off or converted to common stock on the occurrence of a trigger event. Contingent convertible debentures refer to debentures that contain a clause requiring them to be written off or converted to common stock on the occurrence of a trigger event. These debentures generally absorb losses while the issuer remains a going concern (i.e. in advance of the point of non-viability). "Bail-in" generally refers to (a) contractual mechanisms (i.e. cotractual bail-in) under which debentures contain a clause requiring them to be written off or converted to common stock on the occurrence of a trigger event, or (b) statutory mechanisms (i.e. statutory bail-in) whereby a national resolution authority writes down or converts debentures under specified conditions to common stock. Bail-in debentures generally absorb losses at the point of non viability. These features can introduce notable risks to investors who may lose all their invested principal.

Contingent convertible securities (CoCos) or bail-in debentures are highly complex, high risk hybrid capital instruments with unusual loss-absorbency features written into their contractual terms.

Investors should note that their capital is at risk and they may lose some or all of their capital.

Changes in legislation and/or regulation

Changes in legislation and/or regulation could affect the performance, prices and mark-to-market valuation on the investment.

Nationalisation risk

The uncertainty as to the coupons and principal will be paid on schedule and/or that the risk on the ranking of the bond seniority would be compromised following nationalisation.

Reinvestment risk

A decline in interest rate would affect investors as coupons received and any return of principal may be reinvested at a lower rate. Changes in interest rate, volatility, credit spread, rating agencies actions, liquidity and market conditions may have a negative effect on the prices, mark-to-market valuations and your overall investment.

Risk disclosure on Dim Sum Bonds

Although sovereign bonds may be guaranteed by the China Central Government, investors should note that unless otherwise specified, other renminbi bonds will not be guaranteed by the China Central Government.

Renminbi bonds are settled in renminbi, changes in exchange rates may have an adverse effect on the value of that investment. You may not get back the same amount of Hong Kong Dollars upon maturity of the bond.

There may not be active secondary market available even if a renminbi bond is listed. Therefore, you need to face a certain degree of liquidity risk.

Renminbi is subject to foreign exchange control. Renminbi is not freely convertible in Hong Kong. Should the China Central Government tighten the control, the liquidity of renminbi or even renminbi bonds in Hong Kong will be affected and you may be exposed to higher liquidity risks. Investors should be prepared that you may need to hold a renminbi bond until maturity.

Alternative Investments

Hedge Fund - Please note Hedge Funds often engage in leveraging and other speculative investment practices that may increase the risk of investment loss. They can also be highly illiquid, are not required to provide periodic pricing or valuation information to investors, and may involve complex tax structures and delays in distributing important information. Alternative investments are often not subject to the same regulatory requirements as, say, mutual funds, and often charge high fees that may potentially offset trading profits when they occur.

Private Equity - Please note Private Equity is generally illiquid, involving long term investments that do not display the liquid or transparency characteristics often found in other investments (e.g. Listed securities). It can take time for money to be invested (cash drag) and for investments to produce returns after initial losses.

Risk disclosure on Emerging Markets

Investment in emerging markets may involve certain, additional risks which may not be typically associated with investing in more established economies and/or securities markets. Such risks include (a) the risk of nationalisation or expropriation of assets; (b) economic and political uncertainty; (c) less liquidity in so far of securities markets; (d) fluctuations in currency exchange rate; (c) higher rates of inflation; (f) less oversight by a regulator of local securities market; (g) longer settlement periods in so far as securities transactions and (h) less stringent laws in so far the duties of company officers and protection of Investors.

Risk disclosure on FX Margin

The price fluctuation of FX could be substantial under certain market conditions and/or occurrence of certain events, news or developments and this could pose significant risk to the Customer.

Leveraged FX trading carry a high degree of risk and the Customer may suffer losses exceeding their initial margin funds. Market conditions may make it impossible to square/close-out FX contracts/options. Customers could face substantial margin calls and therefore liquidity problems if the relevant price of the currency goes against them.

The leverage of a product can work against you and losses can exceed those of a direct investment. If the market value of a portfolio falls by a certain amount, this could result in a situation where the value of collateral no longer covers all outstanding loan amounts. This means that investors might have to respond promptly to margin calls. If a portfolio's return is lower than its financing cost then leverage would reduce a portfolio's overall performance and even generate a negative return.

Currency risk – where product relates to other currencies

When an investment is denominated in a currency other than your local or reporting currency, changes in exchange rates may have a negative effect on your investment.

Chinese Yuan ("CNY") risks

There is a liquidity risk associated with CNY products, especially if such investments do not have an active secondary market and their prices have large bid/offer spreads.

CNY is currently not freely convertible and conversion of CNY through banks in Hong Kong and Singapore is subject to certain restrictions. CNY products are denominated and settled in CNY deliverable in Hong Kong and Singapore, which represents a market which is different from that of CNY deliverable in Mainland China.

There is a possibility of not receiving the full amount in CNY upon settlement, if the Bank is not able to obtain sufficient amount of CNY in a timely manner due to the exchange controls and restrictions applicable to the currency.

Illiquid markets/products

In the case of investments for which there is no recognised market,

it may be difficult for investors to sell their investments or to obtain reliable information about their value or the extent of the risk to which they are exposed.

Environmental, Social and Governance ("ESG") Customer Disclosure

In broad terms "ESG and sustainable investing" products include investment approaches or instruments which consider environmental, social, governance and/or other sustainability factors to varying degrees. Certain instruments we classify as ESG or sustainable investing products may be in the process of changing to deliver sustainability outcomes. There is no guarantee that ESG and Sustainable investing products will produce returns similar to those which don't have any ESG or sustainable characteristics. ESG and Sustainable investing products may diverge from traditional market benchmarks. In addition, there is no standard definition of, or measurement criteria for, ESG and Sustainable investing or the effect of ESG and Sustainable investing products. ESG and Sustainable investing and related measurement criteria are (a) highly subjective and (b) may vary significantly across and within sectors.

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