



# Investing in the Age of Artificial Intelligence

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*AI is rapidly modernising almost all sectors at breakneck speed – including asset management, with revolutionary tools that can improve decision-making, boost portfolio performance, and refine asset allocation. In this paper, our Research, Investments, and ESG teams delve into how AI is transforming their processes, as well as where they see investment risks and opportunities.*

Large Language Models (LLMs) like ChatGPT have turbocharged global AI adoption. Like the steam engine, electricity, and the computer, AI is the new General-Purpose Technology (GPT), promising to revolutionize daily life and business by boosting productivity. Early AI adopters are already sharpening their competitive edge by cutting costs and boosting sales, thanks to faster coding and innovation.

However, while market and public adoption of GPT is building fast, the economic impact may arrive substantially later. As Nobel Prize winning economist Robert Solow quipped in 1987, “you can see the computer age everywhere but in the productivity statistics.” And just as the computer age took time to be reflected in productivity statistics, AI’s full potential may not show up until later this decade. Geopolitical tensions and aging populations could slow us down, but persistent labour shortages are compelling firms to embrace AI.

Initially, big IT companies will reap the biggest gains from fast demand for AI applications, thanks to their resources and data access. Still, the cost of AI model training is plummeting (by 50% annually according to reasonable estimates), levelling the playing field for smaller competitors.

Overall, the biggest beneficiaries of AI will be knowledge-intensive service sectors like information, professional and business services, finance, and healthcare. The US, with its innovation capabilities and flexible regulations, is poised to gain the most from the AI revolution, which will likely widen the productivity gap with Europe and the rest of the world.

## In Short

**Artificial intelligence and machine learning is rapidly transforming businesses and their processes, including our very own. While markets may rush to define the winners and losers of the AI race, the full economic impacts of the new technology will take longer to materialize. As long-term investors and responsible stewards of capital, we therefore aim to strike a balance of using AI to maximize performance and mitigate risks, both in our investment process and the practices of our investee companies.**

## Machine learning in forecasting and asset allocation at GIAM

At Generali Insurance Asset Management (GIAM), our research teams are increasingly harnessing the potential of machine learning (ML) to support forecasting and allocation recommendations. Here are some examples of how.

- **In tactical asset allocation**

We incorporate machine learning to optimize our tactical asset allocation. By analyzing historical macroeconomic data, we aim to forecast the performance of ‘risk-free’ bonds and equities. This guides our asset allocation decisions on, helping to ensure our positions are well-balanced.

- **In regression model selection**

We have enhanced our traditional econometric model selection with Genetic Algorithm (GA).

This efficient search-based method reduces model development time while improving predictive power. It mimics 'survival of the fittest' to refine investment models, aiding our equity sector and style selection process.

- **In sovereign ratings assessments**

We've revamped our proprietary sovereign rating model with machine learning as a second pillar to the 'classical' regression-based approach. By using a clustering algorithm on economic indicators, we assign rating categories to countries. Our data-driven approach ensures it's not tied to predefined thresholds that split countries into groups or specific indicators (like agency ratings), but by the data itself, making it a fully independent measure.

## **Fixed Income: Deep learning is transforming the investment process**

In fixed income, AI and ML techniques, including deep learning neural networks and ensemble methods like gradient boosting, are driving innovation. Deep learning models emulate human decision-making with interconnected layers of artificial neurons, while ensemble techniques combine predictions from multiple weaker models – typically decision trees – to create a strong, accurate final model.

At GIAM, we're actively integrating these advanced technologies into fixed income investing. They help us optimize portfolio construction, using historical pricing data, bond attributes, and market volatility to assess performance probabilities at the individual security level.

In the ever-evolving financial landscape, GIAM is exploring innovative approaches to enhance Tactical Asset Allocation (TAA) by using advanced signal processing and machine learning techniques. In recent years, these technologies have empowered investors to analyze vast amounts of data, leading to refined Capital Market Assumptions (CMAs) at the heart of portfolio optimization.

Our newly developed Risk Factor Model, combined with time-series clustering, offers a deeper understanding of market behavior, providing nuanced insights into risk and return dynamics. The synergy of advanced signal processing, machine learning, and enhanced CMAs is transforming our investment process, ushering in an era of more strategic and responsive portfolio management.

The integration of natural language processing (NLP) technology in finance opens further doors to transformation. GIAM now leverages proprietary NLP models to extract thematic sentiment trends from the immense corpus of financial news, offering valuable insights into market sentiment. NLP efficiently processes other vast textual data, saving time and distilling or extracting key information for better decision-making. It can also facilitate the automation of report generation by intelligently querying documents and contextualizing data, reducing the workload for analysts. These innovations highlight the pivotal role NLP plays in modernizing the financial industry and optimizing operations.

In portfolio construction, asset allocation models, and financial sentiment analysis, the significance of data quantity and the split between training and test sets cannot be overstated. A strong training dataset helps models grasp complex patterns and relationships within financial markets, while a well-defined test set validates their ability to generalize.

## **Equities: AI as a long-term investment theme**

In the equities team at GIAM, our focus on AI is primarily as an investment opportunity rather than a tool to aid in stock selection. Indeed, we've started to explore AI as a long-term investment theme, initially taking a top-down approach to identify industries with the most potential to benefit from AI. As a second phase, we combine this with bottom-up analysis to gauge the benefits or threats of AI.

From a broader perspective, quantifying the potential impact of AI on various industries remains challenging due to early adoption and uncertainties surrounding its widespread use. Nevertheless, a recent McKinsey study suggests that Gen AI could generate between \$2.6 and \$4.4 trillion in value across industries, equivalent to up to 4.4% of global GDP. Some sectors, such as high tech, retail, banking, travel, and logistics, are expected to achieve substantial productivity gains, possibly up to 0.6% over a 20-year period.

From a more bottom-up approach, while it's challenging to quantify AI's direct impact on company revenues or margins yet, investors are already taking clear positions. Industries like advertising agencies and education publishers, considered 'losers' in the AI wave, have seen fluctuating market performance since May, only recently showing signs of recovery.

Within GIAM's equity team, during investee company meetings and conferences, we question management to understand their approach to AI investing and the returns they expect. This is crucial in helping us assess whether their equity valuations align with the opportunities or threats stemming from AI.

In Europe, our primary region of expertise, only in the semiconductor space is there a clear positive effect on revenues arising from increased investments in AI, given the sector directly or indirectly produces components. However, the winners of the AI race may not be born yet.

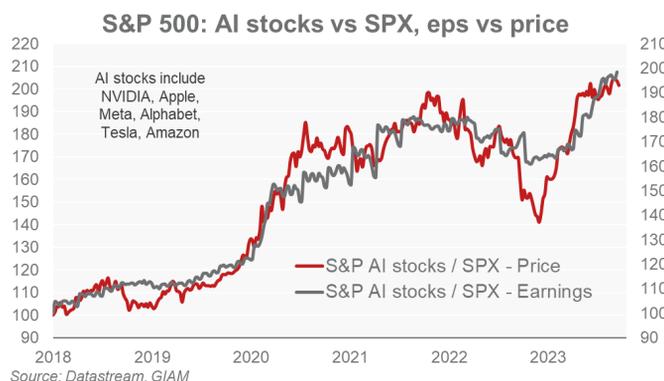
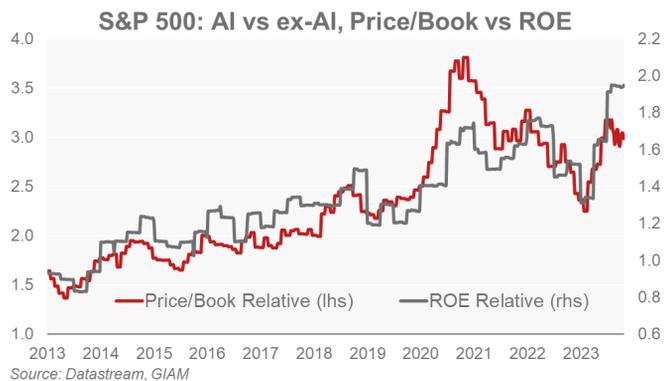
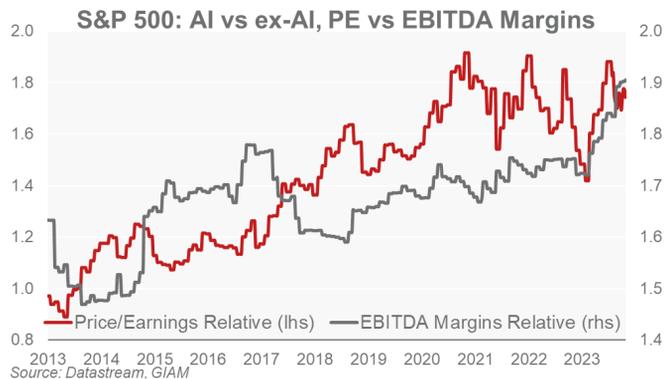
In comparison, US AI stocks stand out as major data aggregators and tech enablers. These stocks command higher valuations due to stronger Return on Equity (ROE) and higher margins (EBITDA/Sales). Since 2013, AI stocks have nearly doubled their ROE compared to the rest of the S&P 500, explaining their premium valuation, especially given the robust expected earnings growth in the next 3-5 years.

Similarly, the relative 12-month forward Price/Earnings ratio for AI stocks is almost twice as

high as for non-AI stocks, driven by their superior profitability. AI stocks currently boast 30% EBITDA margins, compared to 21% for the broader S&P 500 and 18% for S&P 500 stocks outside of AI.

Moreover, AI companies are generating substantial cash, with their cash holdings relative to market cap doubling since 2000. During the Q2 reporting season, CEOs from various sectors in the US highlighted AI investments and adoption as a focal point, indicating sustainable high earnings growth on the horizon – the hallmark of a General-Purpose Technology.

*Figure 1: The high valuations of US AI stocks appear justified*



## AI under the ESG lens

Finally, while AI is revolutionizing business and society, it also comes with complex and significant ESG risks. At GIAM, we prioritize companies and issuers that use AI not only to maximize financial performance but also to contribute positively to society and the environment. Here we identify the key AI risks and opportunities for each pillar of E, S and G.

### ▪ Environmental impacts

AI models increase resource consumption in energy-intensive data centers. While contributing to already-rising emissions and water consumption, the positive impacts of AI can be counterbalanced by energy savings, increased renewable energy production, enhanced water quality assessment, and timely detection of hazardous pollution. AI can also be an invaluable aid in improving climate change mitigation and adaptation strategies.

### ▪ Social impacts

AI-related risks primarily concern social issues. Data privacy and security, while enhanced by AI, can also become more vulnerable. Risks include data usage without consent, copyright infringement, and biased results due to inaccurate databases. AI's widespread adoption will also lead to significant job losses, particularly in sectors dominated by 'manual-skilled' jobs such as media, supply chain, financial and

customer services, and transportation. On the positive side, AI can make services more accessible, personalized, and customized, benefiting education, healthcare, and inclusiveness in society. However, if not implemented in an orderly way, AI may exacerbate social and income disparities, especially for economically disadvantaged or elderly communities. For emerging economies, AI may lead to investment outflows, increasing unemployment and adding pressure to existing social and governance challenges.<sup>1</sup>

### ▪ Governance impacts

AI's ability to analyze complex data sources should accelerate and strengthen organizational compliance processes and enhance ethics monitoring. For multi-subsidiary organizations, AI offers timely monitoring and precise notification of potential ethical issues. At the national level, AI can streamline public services through digital identification, enabling responsive and predictive actions for natural hazards or medical crises. However, the use of AI as a surveillance tool needs to be carefully analyzed to protect employee and citizen privacy and uphold the principles of social democracy.

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<sup>1</sup> <https://www.imf.org/en/Blogs/Articles/2020/12/02/blog-how-artificial-intelligence-could-widen-the-gap-between-rich-and-poor-nations>

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