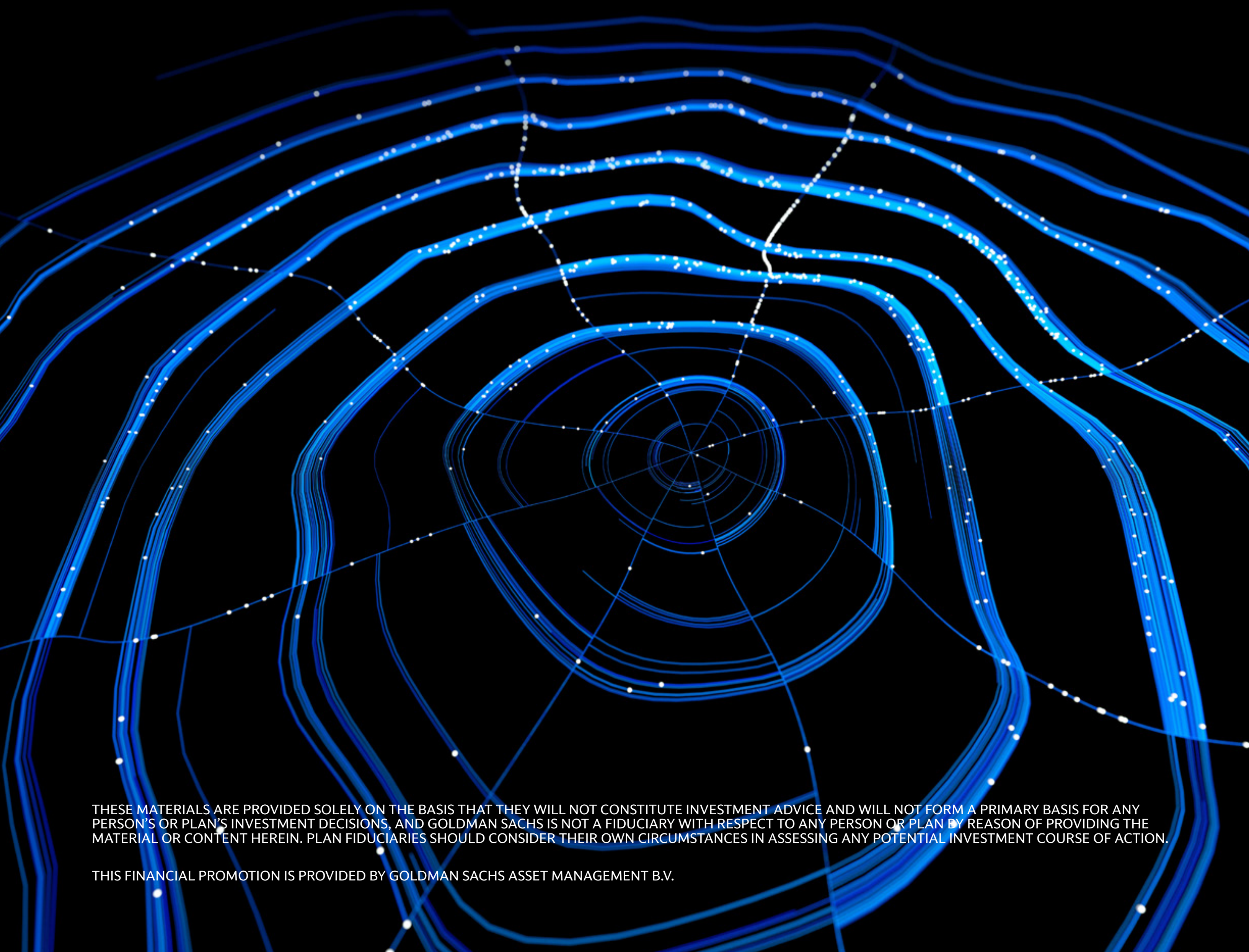
Goldman Sachs Asset Management

QUANTITATIVE INVESTMENT STRATEGIES

Quant Investing: Why It Matters and Our Approach



As we celebrate over 35 years of Quantitative Investment Strategies (QIS) at Goldman Sachs Asset Management, we find ourselves in a new era marked by significant AI advancements, exponential growth in data, and increasingly complex markets.

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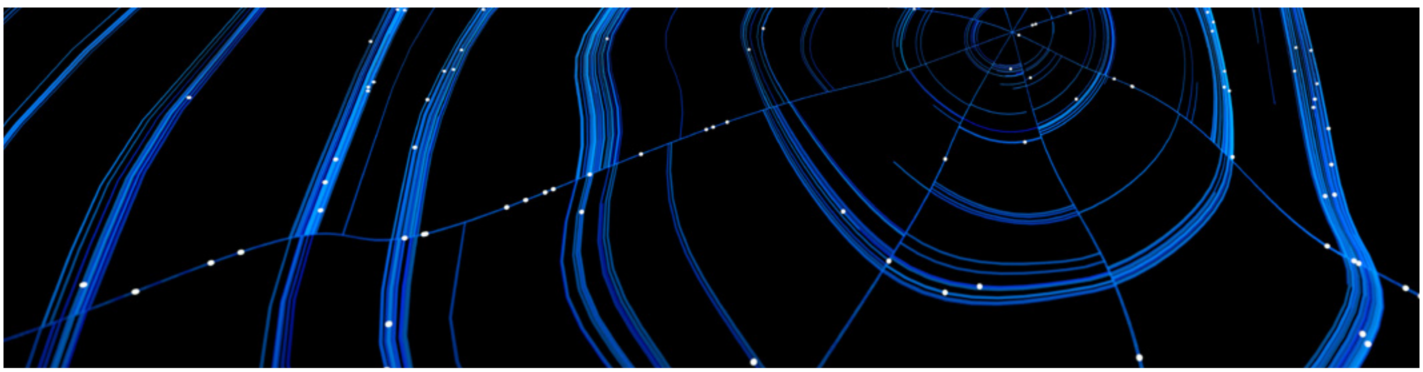

AI and Big Data Bring New Frontiers for Quant Investing

In recent years, the sophistication of artificial intelligence (AI) models has been remarkable. While it may seem that AI is a recent phenomenon, its foundations have been built over decades. Today's AI tools, such as large language models, are therefore both new and an evolution of older techniques, providing opportunities to invest in and also with AI.

Just as AI has advanced and become more prevalent, the volume of large, complex, and unstructured datasets is experiencing exponential growth. As data continues to grow, quantitative methods become increasingly valuable for identifying patterns, correlations, and anomalies that might otherwise be missed by traditional investment approaches.

In today's dynamic markets, we believe quantitative investing also offers critical advantages for investors seeking a competitive edge and differentiated return streams. Its objective, data-driven approach provides transparent outcome explanations, while its ability to rapidly process big data allows for the swift exploitation of market inefficiencies and price dislocations.

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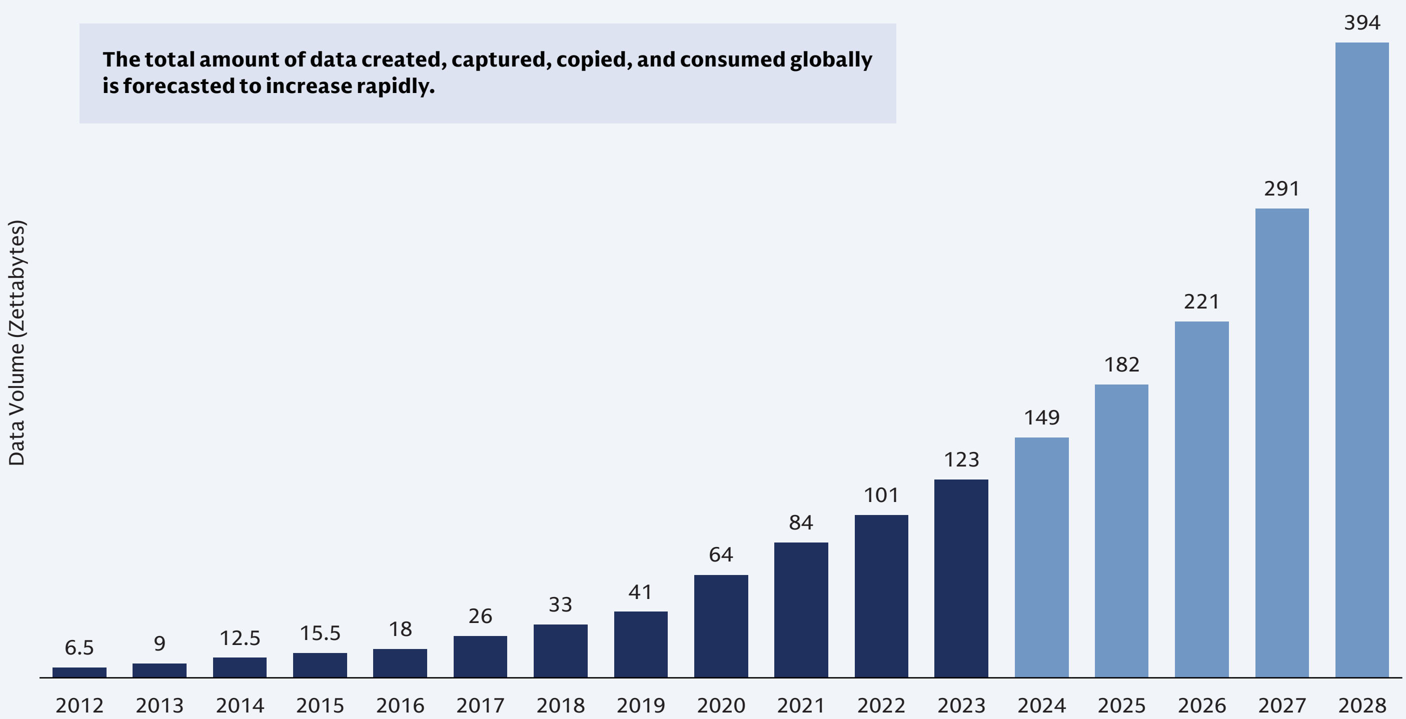
Why Quant Matters

Explainable and Explicit: A systematic, data-driven approach provides investors with objectivity and clear explanations of outcomes across different asset classes and market environments. The explicit, rules-based nature of quantitative strategies helps reduce human biases and the risk associated with key personnel changes. Because the process is clearly defined and transparent, portfolio managers can easily understand and explain the outputs, making it ideal for a team-based approach. This transparency also allows managers to be more agile and quickly adapt to new market conditions, ensuring that the investment strategy remains effective and responsive.

Tailored to Purpose: Active managers need to continuously evolve to stay ahead in dynamic equity markets. Quantitative managers are particularly well-equipped to adapt their models to changing conditions due to their ability to analyze large amounts of data quickly and integrate changes into their structured processes. Market evolution includes both long-term structural changes and short-term transient dynamics. Structural changes, such as the rise of index investing, increased basket trading, shorter holding periods, and shifts in market participant composition (like the growth of retail investing), have reshaped the landscape. Transient dynamics, like the global pandemic and recent tariff implications, have also presented challenges and opportunities. For active managers, these developments offer chances to exploit market inefficiencies and capitalize on price dislocations. With the right data, infrastructure, and expertise, quantitative managers can quickly analyze these nuances and react effectively.

Leveraging Big Data at Speed: Data availability has exploded over the past decades, growing more than 10 times in the last 10 years and projected to continue rising rapidly. Quantitative investors use this massive data to systematically find market inefficiencies and investment opportunities. The ability to quickly analyze and incorporate new data is a key advantage, allowing them to adapt to changing market conditions. Experienced quantitative managers can extract valuable insights from this data, generating more potential alpha and staying ahead in dynamic markets.

The Explosive Growth of Data



Source: Statista, as of 21 November 2024. *Partially or fully Forecasted by Statista. A zettabyte (ZB) is a massive unit of digital storage, equivalent to one trillion gigabytes. The economic and market forecasts presented herein are for informational purposes as of the date of this publication. There can be no assurance that the forecasts will be achieved. Please see additional disclosures at the end. For Illustrative purposes.

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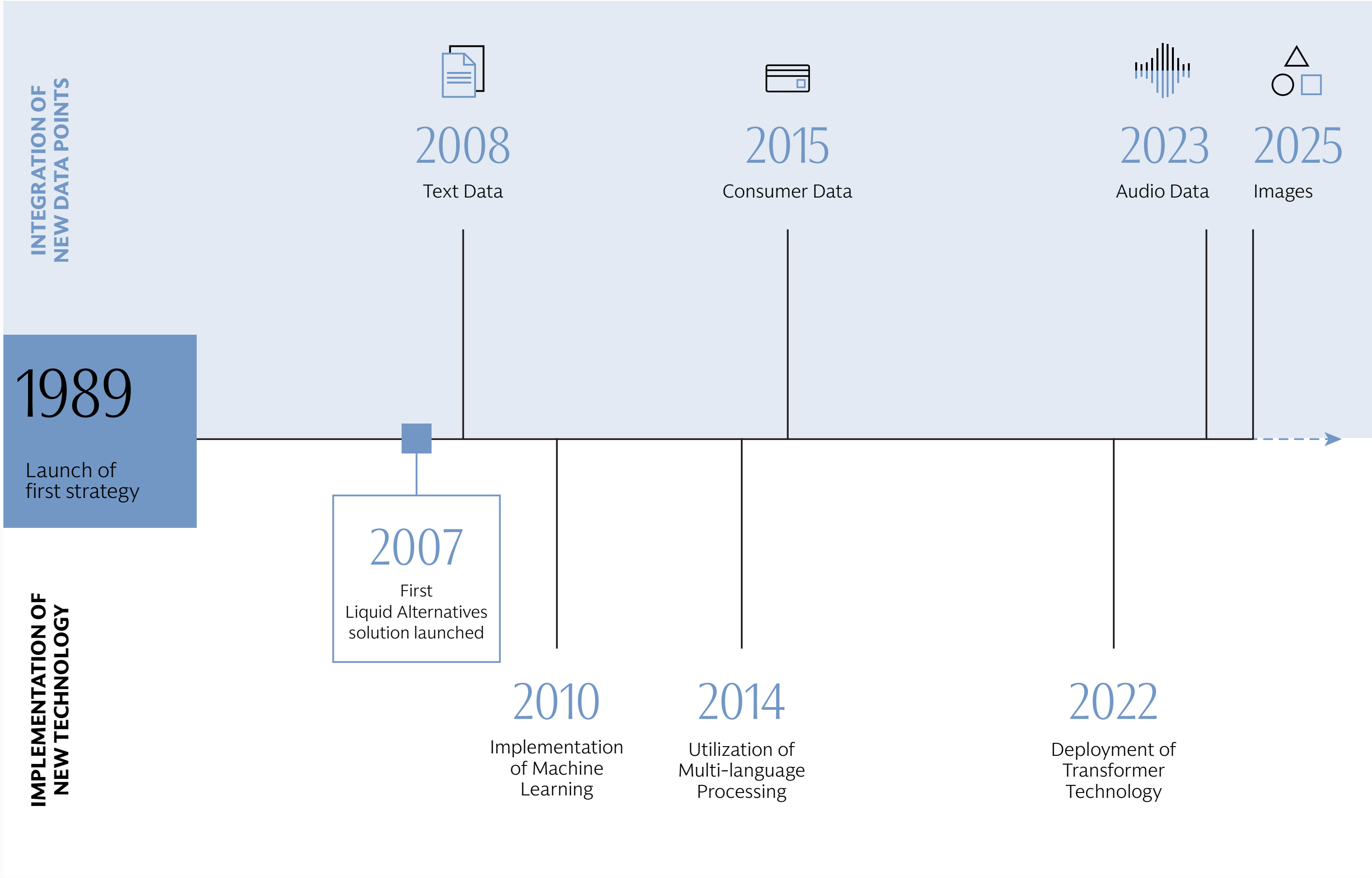
Not All Quantitative Managers Are the Same

Despite common traits, quantitative teams differ in their size, access to resources, level of experience, and overall investment philosophy. Since QIS was founded in 1989, we have continuously leveraged our unique combination of extensive scale, deep expertise, collaborative culture, and robust risk management to maintain our edge in the evolving investment landscape.



Since its founding in 1989, QIS has been at the forefront of researching and deploying the latest quantitative techniques.

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Why QIS

We Are One of the Longest Tenured Data-Driven Investors on the Street

Scale and Resources with Human Oversight: QIS leverages the firm's extensive scale and resources to capitalize on the growing volume of data. We operate with the agility of a boutique team leveraging Goldman Sachs' substantial investments in infrastructure and technology, enabling us to process vast amounts of data and extract valuable insights. This access to high-quality data and computational power provides a distinct informational advantage, helping us identify market inefficiencies and generate alpha. We recognize data itself is not sufficient. A human-driven economic rationale combined with advanced computational skills are essential to unlock the full potential of data and to generate maximum value.

Experience and Expertise: The QIS team manages $125+ billion across various asset classes and geographies.[1] Over decades, we have developed a strong investment culture rooted in collaboration and innovation. Many senior practitioners, pioneers in quantitative investing, have spent significant portions of their careers at Goldman Sachs, transferring their expertise to our proprietary models. This rich history and accumulated knowledge allow us to thoughtfully integrate new technologies and techniques, enhancing our well-established framework.

Investment Culture: Our investment culture is defined by a blend of strong economic intuition, data-driven analysis, and collaborative teamwork. We foster a rigorous, team-based environment where ideas are debated and tested.

Our research and portfolio management teams work closely to identify and implement differentiated sources of alpha. This combination of quantitative rigor and qualitative insight enables us to adapt to changing market dynamics and deliver consistent, all-weather investment experiences.

Our long-standing core philosophy and culture have allowed us to navigate market cycles and deliver value. We continually enhance our process, adapting to market changes while staying true to our core beliefs. We've built a robust repository of tested investment signals, constantly refined through research to capture valuable insights. Each year, we incrementally add new data to our model to reflect current market dynamics, as illustrated below. This research-driven culture, combined with industry knowledge and technology, helps us find diversified returns. We address both short-term shifts and long-term structural changes through ongoing research.

Risk Management: Our quantitative approach is also robust in managing risk. We take a large number of small, diversified bets, which typically results in lower tracking error and minimizes the impact of any single investment on the portfolio. This risk management framework ensures that we optimize risk-adjusted returns and provide confidence and clarity to our clients in an increasingly complex world.

35+ years

Veteran in systematic, data driven investing

10+ years

In Artificial Intelligence

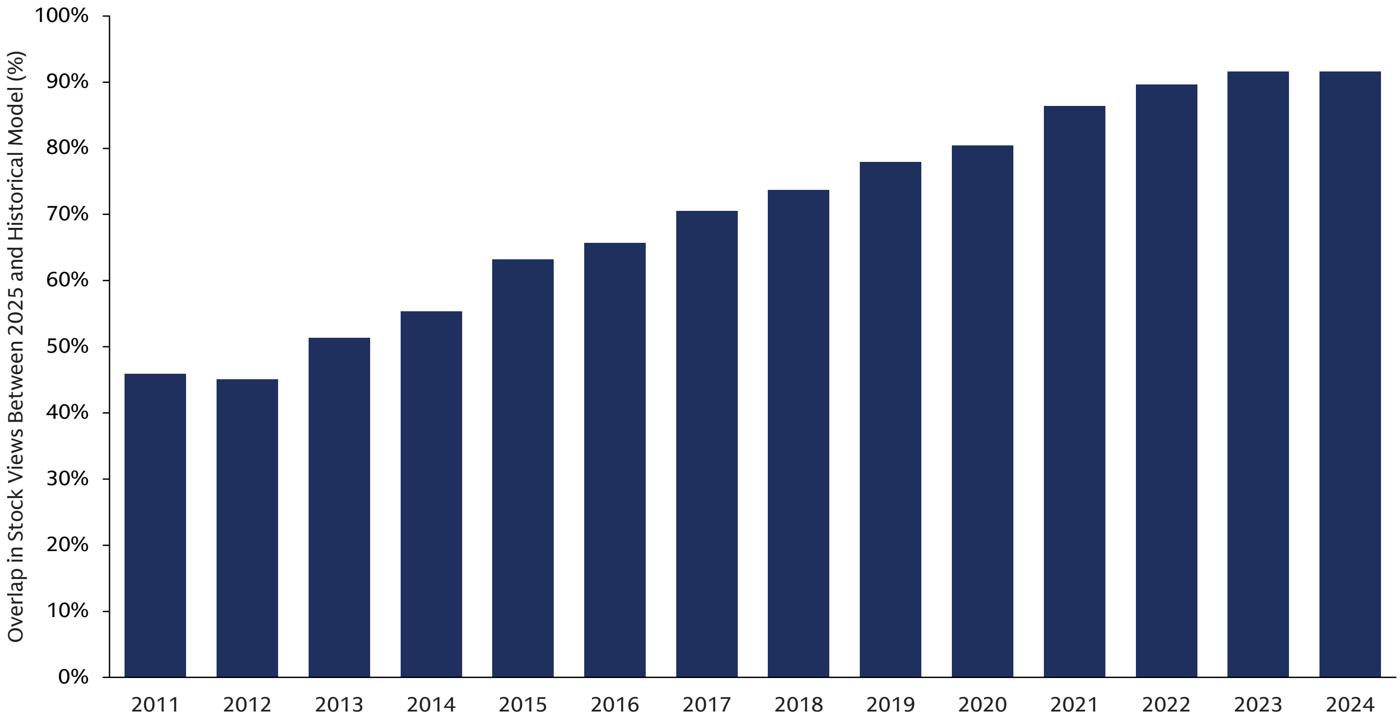
$125+bn

AUS spanning active equities, smart beta, and liquid alternatives

1. Goldman Sachs Asset Management as of March 31, 2025. Assets Under Supervision (AUS) includes assets under management and other client assets for which Goldman Sachs does not have full discretion.

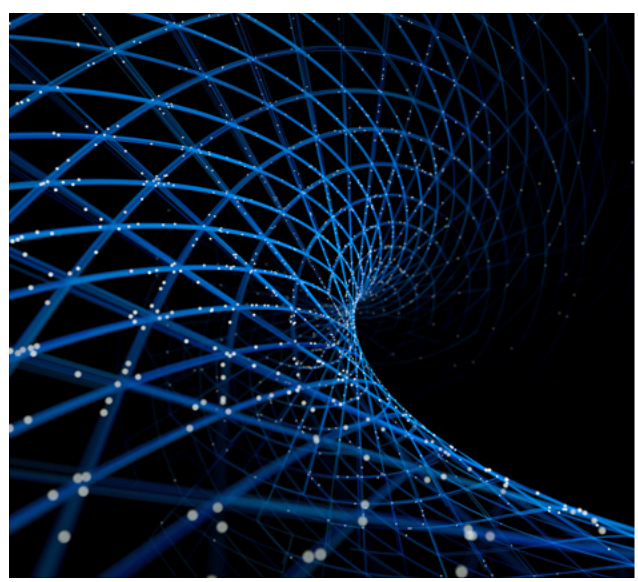
An Expanding Library of Signals

Over 35 years, we've built a robust repository of tested investment signals, constantly refined through research to capture valuable insights.



Source: Goldman Sachs Asset Management, as of December 31, 2024. For Illustrative purposes

Looking Ahead



Built and refined over three and a half decades, our process is continuously adapted through our research culture to stay ahead of market shifts. Our experience and ongoing innovation enable us to implement advanced methods and evolve our capabilities. We aim to maintain a competitive advantage by seeking consistent and differentiated returns in a risk-aware manner across asset classes. Our longevity is a testament to our ability to adapt and anticipate market changes.

As we look to the future, we stand at the intersection of data, technology, and human ingenuity. Our commitment to research and innovation, driven by strong economic intuition and data analysis, positions us to remain at the forefront of quantitative investing. We are confident in our ability to navigate the complexities of global markets and deliver differentiated outcomes as the investing landscape evolves.

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All investing involves risk including potential loss of capital.

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Emerging markets investments may be less liquid and are subject to greater risk than developed market investments as a result of, but not limited to, the following: inadequate regulations, volatile securities markets, adverse exchange rates, and social, political, military, regulatory, economic or environmental developments, or natural disasters.

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