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Digital Transformation – Global

# AI will transform financial analysis, giving tech-savvy investors an edge

## Summary

Institutional investors are increasingly leveraging artificial intelligence[1] (AI) to enhance their day-to-day investment processes, and usage will likely soar as the technology advances. AI can automate routine tasks and uncover hidden patterns in vast datasets, improving the accuracy of forecasts, aiding risk management, and optimizing investment portfolios. However, harnessing AI is fraught with technical and organizational challenges and requires close collaboration among multiple stakeholders. It needs executive support, significant capital investment, and highly skilled teams, giving tech-savvy, deep-pocketed investors a decisive advantage.

» **AI will improve efficiency and gradually transform investment processes.** Large language models[2] will deliver significant productivity gains, freeing up time for investors to expand their analytical coverage and deepen their analyses. However, their widespread accessibility means using these models alone will not provide higher returns. Achieving this requires implementing more traditional AI models,[3] which are more challenging to deploy since they need in-house training and regular maintenance.

» **Execution will be critical, widening the gap between winners and losers.** Effective AI strategies will prioritize applications with proven track records, like using large language models for information summarization and extraction. When asset managers use AI to make predictions, they face the challenge of models becoming less reliable as they approach investment decision-making because patterns observed in financial markets change quickly. Consequently, they will need robust processes and automatic systems monitoring when a model loses effectiveness.

» **Alternative data will make analysis more timely and less reliant on corporate publications.** AI advances enable the conversion of alternative data[4] from social media, credit card transactions, or satellites into interpretable signals for investors, potentially leading to valuable insights for those able to deploy this technology. For now, these new sources of information raise considerable technical challenges, but today's alternative data may become tomorrow's mainstream information.

» **The risk assessment landscape will expand.** Productivity gains will enable investment houses to analyze smaller companies that were previously overlooked due to cost constraints. This would bring more transparency to the private credit market. AI could also deepen risk assessment, enabling investment professionals to measure risk more precisely at the asset level. The next frontier will be mapping relationships between assets across companies to reveal interconnected vulnerabilities.

## AI will improve efficiency and gradually transform investment processes

Institutional investors increasingly leverage AI to optimize their investment processes, and AI adoption will rise as the technology progresses. Large language models, such as OpenAI's GPT and Anthropic's Claude, can deliver significant productivity gains because they can process vast amounts of text data, such as annual reports, debt documentation, news articles, or broker research, much faster than humans. These models can automate the creation of documents like earnings reports or market commentaries and generate investment ideas. Moreover, they can assist in writing code, enabling investors to design small applications tailored to their needs.

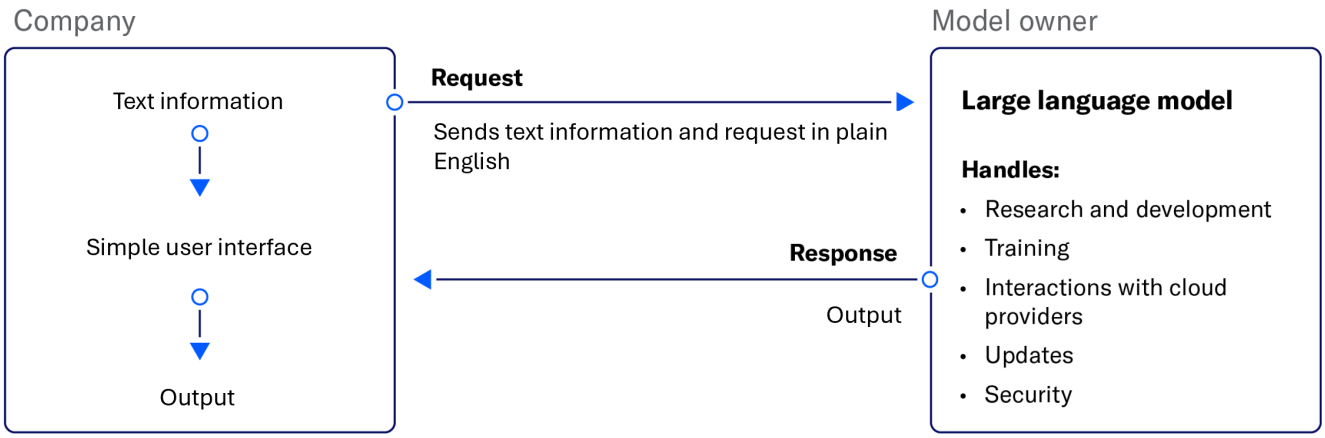
Assuming investors overcome legal and compliance constraints, barriers to adopting large language models are lower than for traditional AI. Their owners have set up websites and tools[5] enabling access to their models for a small fee, and large tech companies have already embedded AI functionalities into their products. For example, Microsoft offers a free version of Copilot in its Edge browser and a paid version that adds AI features to Microsoft 365 software. Investors willing to build applications on top of large language models can access them by writing just a few lines of code and expressing their desired functionality in plain English.

Although creating the application will require IT resources, adding and maintaining the AI component is relatively straightforward for simple tasks such as summarization, translation, or information extraction because the model owners handle the training and the infrastructure.

Exhibit 1

**Owners of large language models handle the technical complexity that has slowed the adoption of traditional AI**

**High-level overview of a solution powered by a large language model**



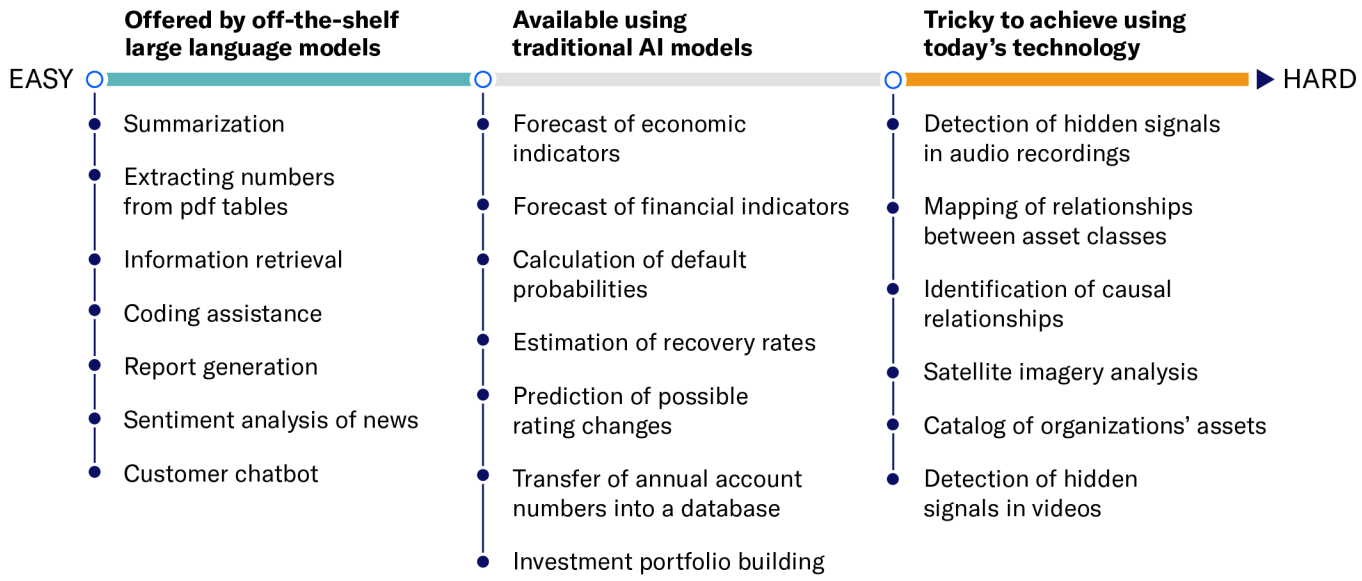

*Source: Moody's Ratings*

While many asset managers have restricted access to large language models due to privacy concerns, solutions exist to ensure that users' data remains confidential. The main challenges in adopting this technology lie in setting up adequate risk and compliance frameworks and educating the workforce about the possibilities and limitations of AI models.

The widespread accessibility of off-the-shelf large language models means that they will not, by themselves, enable institutional investors to outperform their peers. Nevertheless, these AI tools can substantially enhance productivity by summarizing and analyzing financial and legal documents, drafting internal research documents, customizing portfolios, and improving customer service. These productivity gains will enable investors to expand their coverage to more companies, conduct more thorough and timely analyses, and realize significant cost efficiencies. Conversely, investors who fail to adopt AI tools will likely find themselves at a competitive disadvantage.

Although large language models have attracted significant attention recently, they often struggle with tasks that require ingesting large databases of numbers, such as forecasting economic or financial indicators. Traditional AI models yield better results for these use cases, which account for a significant portion of financial analysis work. In particular, traditional models based on decision trees[6] often perform well in these situations.

Exhibit 2
**AI's potential benefits for institutional investors extends beyond large language models**
**Possible AI applications**




*Source: Moody's Ratings*

Traditional AI models, however, are far more challenging to roll out than the large language models behind generative AI because they require investors to train and maintain the models themselves. Investors who can overcome the challenges to combine traditional and large language models will be able to set themselves apart, increasing the likelihood of peer outperformance. Such tech-savvy investors are therefore likely to benefit the most from AI in the near term.

### AI will augment rather than replace human judgment

Although AI's role will likely grow, it will augment rather than replace human judgment.[7] All AI models, whether generative or traditional, typically perform well in situations similar to those they have encountered during their training and they struggle with novel or unusual circumstances. For example, an algorithm trained solely on data gathered during a period of economic stability is unlikely to perform well during a financial crisis. AI models will also malfunction if they are fed with incorrect or fake data.[8]

That said, AI's progress will strengthen the popularity of quantitative investment, especially for investment strategies leveraging short-term patterns. Quantitative investment makes use of, among other things, mathematics, probability, and data and statistical analytics to build portfolios, develop trading strategies, and manage risk. Since machines can process large amounts of data and draw inferences far more rapidly than humans, we will likely see a surge in strategies that capitalize on minute price discrepancies or fleeting market anomalies.

## Execution will be critical, widening the gap between winners and losers

AI offers significant potential for institutional investors, particularly in cost-cutting, but using it to boost returns rather than merely enhance efficiency poses considerable organizational and technical challenges. Outperformance in financial markets is, collectively, a zero-sum game. Asset managers that outperform the index are essentially taking money from others, and only a tiny minority can consistently beat their peers. AI could widen the difference between that small pool of investors and the rest of the pack.

Effective AI solutions existed before ChatGPT's debut, yet most asset managers have not implemented them, often struggling to scale beyond proof-of-concept stages. Implementing a solution based on a traditional AI model requires extensive collaboration between investment teams, data scientists, data engineers,[9] machine learning engineers,[10] IT specialists, and risk, legal, and compliance departments, among others.

Exhibit 3

**Generating higher returns using traditional AI requires involving many stakeholders**

**Stakeholders engaged at each step of the AI development process**

| | Data science | Investment team | IT | Senior management | Legal and compliance | Risk |
|---|---|---|---|---|---|---|
| Risk appetite and governance definition | | | ● | ● | ● | ● |
| Use case selection | ● | ● | | ● | | |
| Provisioning of cloud resources | ● | | ● | | | |
| Data processing | ● | ● | | | | |
| Feature engineering | ● | ● | | | | |
| Model training | ● | | | | | |
| User interface creation | | ● | ● | | | |
| Model deployment | ● | | ● | | | |
| Model maintenance | ● | | ● | | | |
| Performance indicator calculation and assessment | ● | ● | | ● | | |
| Monitoring of risk, legal and regulatory developments | | | | | ● | ● |

*Source: Moody's Ratings*

Aligning work teams that have divergent incentives requires a hands-on approach by asset management leadership that will need to cascade to middle management. AI experimentation often begins at the grass roots level, with financial analysts or asset managers developing small AI tools to optimize daily tasks. However, such initiatives will not scale without the commitment of all management layers to reimagine existing value chains and workflows.

Developing an effective AI strategy also requires careful resource allocation. Asset managers may be tempted to apply cutting-edge technology to complex use cases when implementing AI, but this approach may not yield the best results. For instance, training a large language model from scratch is challenging, requires a lot of resources and the finished product may underperform models developed by the big tech firms.

Since technology progresses quickly, the most effective AI strategy will be to avoid tying too many resources to a limited number of applications. Instead, the focus will need to be on applications with proven track records in other industries. One good approach might be to start by experimenting with large language models to deliver productivity gains. Hiring people with specialized skills may not be necessary for simple applications like summarizing documents or producing brief reports. Harvesting these low-hanging fruits would enable asset managers to gain experience and build trust with stakeholders, setting the stage for more ambitious projects.

A next step for asset managers would be to gather data to train traditional AI models or fine-tune large language models. To do so, they would need to hire people with dedicated expertise, such as data scientists, and work closely with their IT teams to set up cloud

environments and data infrastructures. As in other industries, asset managers will need to develop numerous AI applications before seeing a significant impact on their business model. Consequently, they will need to set up tools to automate model deployment and retraining so that data scientists can focus on creating new models instead of maintaining existing ones.

Asset managers face the unique challenge that the AI investment models they develop will become increasingly unreliable as they move closer to the investment decision. Patterns observed in financial markets change quickly because market prices depend not only on a security's fundamental characteristics but also on how investors perceive it and incorporate such information. Moreover, asset managers will chase the same sources of excess return, which will vanish when too many develop AI models identifying the same patterns.

As a result, asset managers will need to set up robust systems to monitor when a model's investment strategy stops working and decide whether it can be retrained or should be discontinued. They will also need to create investment models that financial analysts and portfolio managers can understand; otherwise they may be reluctant to use them.

Using large language models to identify investment opportunities is tempting, but this approach faces several problems. The risk of hallucinations - returning plausible but incorrect output - is now well-known, although it has decreased in the latest generation of models.[11] Additionally, large language models may produce unpredictable results, with slight input variations or model differences yielding inconsistent outputs, making back-testing[12] difficult in the development phase.[13] Nevertheless, these models' capabilities are progressing rapidly and will gradually gain increasing importance in the investment process.[14] They can also take in the output of a tool explaining the model output[15] and generate reports that non-experts will understand, facilitating adoption by financial analysts and portfolio managers.

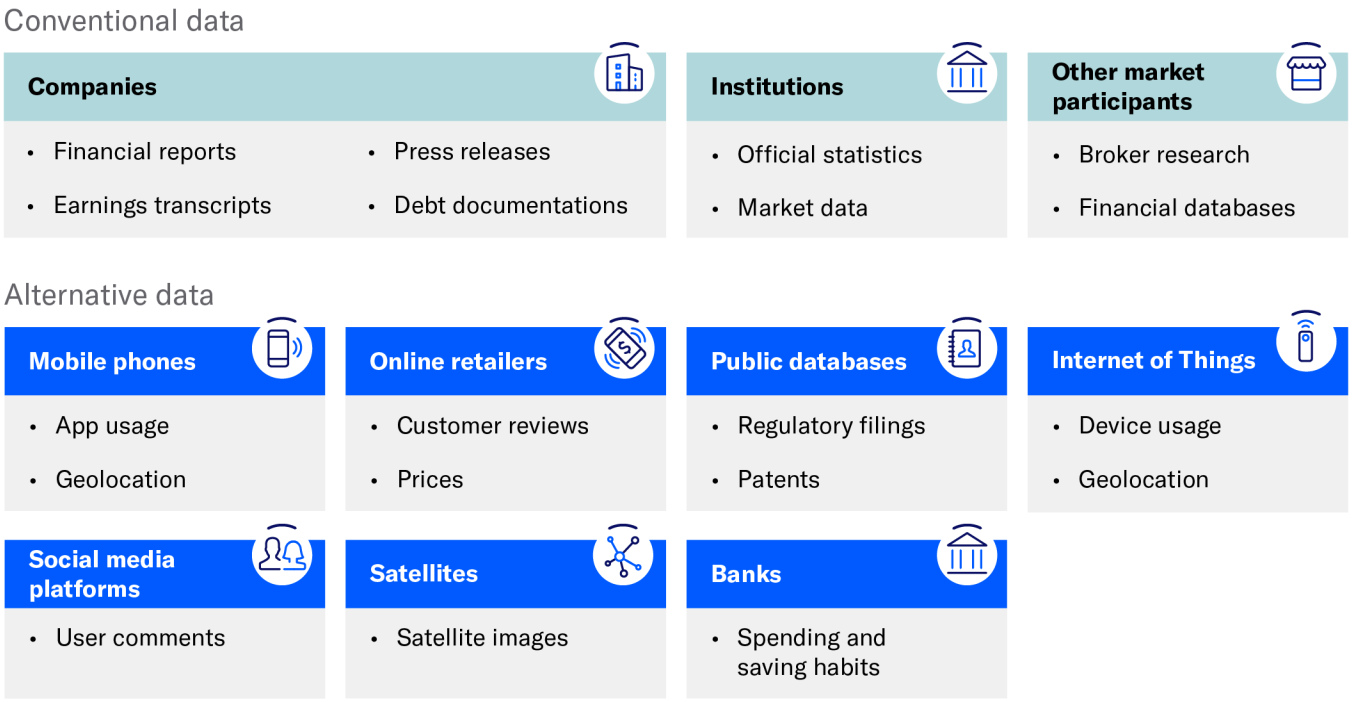
## Alternative data will make analysis more timely and less reliant on corporate publications

While many cutting-edge large language models are proprietary, most traditional AI models are open-source and accessible to all. Initially, implementation challenges will favor asset managers with high-level technical expertise, but this advantage will ultimately erode as AI adoption becomes widespread in the industry. As a result, the data used to train AI models will become a crucial source of competitive advantage.

Currently, most investors rely only on conventional data sources like financial statements and economic reports for investment decisions. These sources often contain structured data, making them fairly easy to incorporate into conventional or AI-based analytical processes. However, conventional data have limitations: they come from limited sources, are published with time lags, and are equally accessible to all market participants.

Conventional data sources represent only a tiny fraction of available information from the increasing digital footprint of individuals and machines.[16] More investors are turning to alternative data from sources such as social media, online retail websites, credit card transactions, mobile phones, Internet of Things (IoT) sensors and satellites to gain an edge.

Exhibit 4
**Alternative data allows access to new information sources**
Sources of alternative data




*Source: Moody's Ratings*

Alternative data often lacks structure, making it challenging to analyze using conventional methods. However, advancements in AI algorithms, coupled with lower computational and data storage costs, now enable the conversion of alternative data into interpretable signals for investors.

These signals add forward-looking or complementary information to standard market data, potentially helping to generate higher investment returns. Forward-looking insights provide early access to crucial information, such as using factory geolocation data to estimate an automaker's production levels before official releases. Complementary insights allow investors to evaluate company performance and risks beyond financial statements, for example by examining social media and e-commerce reviews to gauge consumer brand loyalty.

Integrating alternative data can significantly enhance the investment process but it is not a simple process. Selecting the right dataset is difficult due to the plethora of options available, and its value depends on factors such as asset class, time horizon, investment strategy, and the datasets to which the investor already has access. Legal issues may also arise when harvested data includes proprietary or personal information. Once a dataset is selected, transforming it into signals humans or machines can understand requires sophisticated IT infrastructure, such as tools that can ingest large datasets in real-time and high-performance computing capabilities. The value extracted from alternative data must also exceed its costs.

Ingesting alternative data requires advanced expertise. For instance, processing social media data involves complex tasks such as filtering out fake accounts and accurately associating company mentions across various writing styles and languages. Backtesting alternative data is challenging due to limited historical reach. Investors face a dilemma between acting on limited information or waiting for more data to accumulate, potentially diminishing the dataset's value as it becomes more widely accessible.

The growing popularity of alternative data will gradually erode its value, compelling asset managers to constantly seek new, exclusive data sources. A possible way to slow down this decay is to use multiple alternative datasets to create a unique combination. This approach extends the lifespan of the data's value and potentially creates insights that individual datasets might not reveal. Another

strategy could be to combine alternative data with proprietary data, such as trading data or information gathered during previous transactions.

The numerous challenges suggest that only the most sophisticated investors will be using alternative data today. However, these alternative sources will gradually become more accessible, and today's alternative data may become tomorrow's mainstream information. Such a shift would accelerate investment decisions by providing insights into market dynamics between reporting periods. It would also challenge the concept of a single source of truth, enabling investors to verify information from official sources. Those relying solely on traditional data would find themselves at a competitive disadvantage in this new environment.

## The risk assessment landscape will expand

Although only a tiny minority of investors will boost their returns by integrating AI into their investment process, most will improve their productivity in the coming years. These efficiency gains will reduce the cost of risk assessment, enabling analysis of smaller borrowers previously overlooked due to profitability constraints. At the same time, alternative data will provide more information on these smaller entities.

These trends could further fuel the growth of private markets, notably private credit—non-bank lending that is not publicly traded or issued. Private credit borrowers are typically smaller than listed companies, with annual revenues between $10 million and $1 billion.[17] Although this segment has grown rapidly, rising to $1.5 trillion in 2023 from $1 trillion in 2018,[18] its opacity hinders faster expansion.[19] AI could also streamline the analysis of financials and legal documents, which are less standardized than in public markets, and facilitate investment valuation.

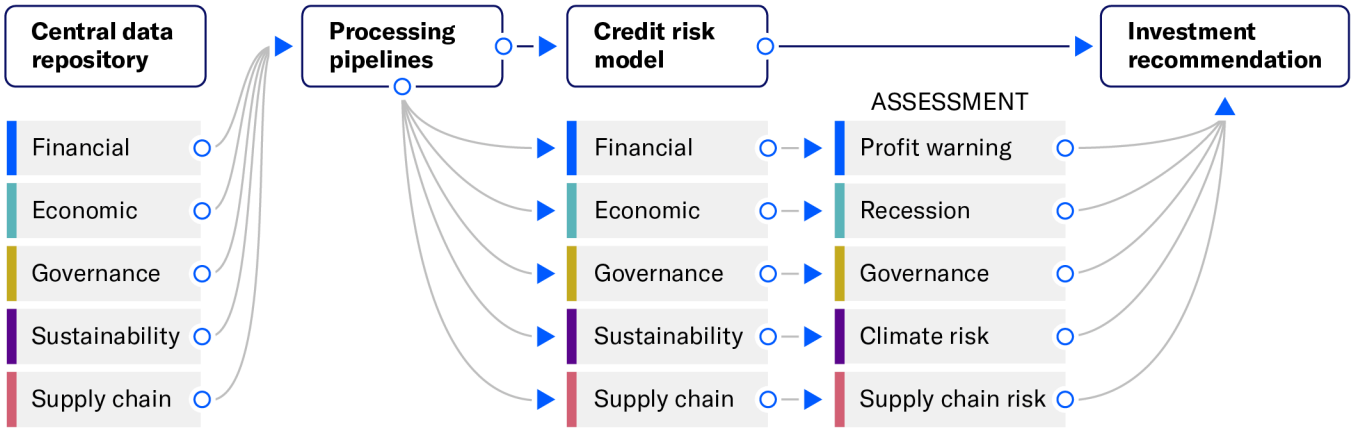
The demand for credit assessments in private markets may increase further if distributed ledger technology[20] (DLT), such as blockchain, enhances liquidity in this segment. Tokenization can convert debt instruments into tradable blockchain tokens and help create a secondary market. DLT could also establish a trusted data repository accessible to all market participants. However, numerous technological and operational complexities remain unsolved, and the legal status of token holders is unclear in many regions. As of May 2024, tokenized private credits amounted to only $544 million.[21]

As demand grows for credit assessments combining human and machine insights, AI will enable new types of risk assessment. Asset managers could reuse components from their AI investment recommendation model to generate new signals. For instance, a model predicting bond prices based on financial information could be repurposed to forecast profit warnings.

Exhibit 5

**New levels of risk assessment will emerge**

**How investors can reuse components of their AI infrastructure to generate new signals**

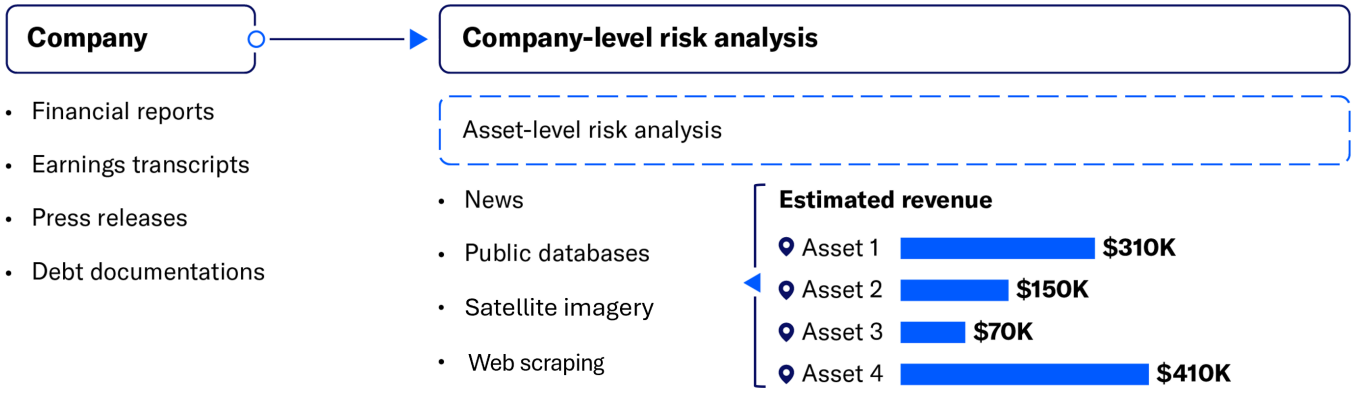



*Source: Moody's Ratings*

The new signals will support standalone investment strategies or be combined to create new approaches. Well-structured AI tools will enable investors to apply improvements in one model to another.

AI and alternative data also allow investors to measure risk beyond the level of the organization, drilling down to an individual asset. Today, most risk assessments focus on entire organizations, as they typically report data this way. But solutions combining AI and alternative data can automatically catalog an entity's assets, identifying characteristics such as location, type, earnings, surroundings, and ownership structure. This is achieved by analyzing annual reports, news, public databases, satellite imagery, and other sources.

Exhibit 6
**AI and alternative data can help assess the risks of organizations' assets**
**High-level overview of asset-level risk analysis**




*Source: Moody's Ratings*

Obtaining asset-level information is crucial for accurately assessing certain risks. Climate-related hazards like floods or wildfires can significantly impact specific assets, such as office buildings or warehouses vital to operations. Similarly, local problems can have major effects on companies' credit quality. A tragic example is the Brumadinho dam disaster involving mining company Vale S.A. (Baa3 positive). The dam's collapse in 2019 unleashed a mudflow that engulfed the mine's headquarters and nearby villages, causing numerous fatalities, extensive environmental damage, and $18 billion in compensation costs.[22]

Asset-level assessments also help to measure precisely the risks of political upheaval or armed conflicts. The ongoing Russia-Ukraine war, for instance, has led to widespread destruction of infrastructure and the seizure of numerous assets.

Such granular risk estimates are valuable for insurers, customers and suppliers. They also refine the overall assessment of risk at a company level, or provide a more accurate and comprehensive assessment of the exposure to a specific risk within a portfolio. The next frontier in risk assessment will be to map relationships between assets from different companies to reveal an interconnected view of potential vulnerabilities. This approach would help to uncover hidden risks and dependencies across industries and geographies, providing a more comprehensive understanding of risk in an increasingly complex global economy.

## Endnotes

1 Artificial intelligence is a collection of technologies dedicated to creating systems capable of performing tasks that usually require human intelligence, such as understanding text or recognizing patterns.

2 A large language model (LLM) is an AI model capable of understanding and generating human-like language, often trained on vast tracts of text data.

3 In our report, we categorize AI models that are not large language models as "traditional models." This category encompasses a wide variety of tools, including tree-based models and neural networks.

4 Alternative data is data gathered from non-traditional sources. Traditional data sources include company filings and official statistics.

5 Developers can access these models using Application Programming Interfaces (APIs), which are tools enabling computers to communicate between each others. Their use is straightforward; see for instance OpenAI's documentation.

6 This model family comprises notably random forest and gradient boosting

7 Artificial general intelligence, a type of artificial intelligence that matches or surpasses human capabilities across a wide range of cognitive tasks, remains years if not decades away.

8 See Moody's - GenAI-powered deepfakes introduce new and transformed credit risks, 23 May 2024..

9 Data engineers set up and maintain data ingestion tools and processes.

10 Machine learning engineers are responsible for optimizing data scientists' code, and deploy and maintain models.

11 See Bloomberg - AI Startup Anthropic Says New Models Cut Hallucination Risks, 4 March 2024. Several techniques also exist to reduce the risk of hallucinations. See Anthropic – Reduce hallucinations.

12 Back-testing is the process of measuring performance by comparing predictions with historical data.

13 Adjusting the model "temperature", that is, the randomness of its output, can help. However, identical inputs can still lead to varying results across different models or versions of the same model. Switching to newer and more powerful model versions is therefore complex.

14 For instance, large language models may outperform human analysts in making predictions (see Alex G. Kim, Maximilian Muhn, and Valeri V. Nikolaev, Financial Statement Analysis with Large Language Models, 2 May 2024.) However, traditional artificial intelligence models such as gradient boosting would likely yield better results for this task.

15 SHAP has become a market standard thanks to its ability to explain the contribution of each feature to the outcome of most AI models. However, non-experts often struggle to understand its theoretical underpinning and its output.

16 See Moody's - Alternative data's timely insights can enhance conventional data, not replace it, 10 April 2024.

17 See Fed - Private Credit: Characteristics and Risks, 23 February 2024.

18 Source: Pitchbook. 2023 data as of 31 March.

19 See Moody's - Escalating private credit competition will increase risk and scrutiny, 5 March 2024.

20 Distributed ledger technology is a collection of systems recording transactions in multiple places almost simultaneously.

21 See Moody's - Private credit could become less opaque, and easier to trade, through tokenization, 16 May 2024.

22 See Vale – Brumadinho.

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