

ESMA TRV Risk Analysis

Financial Innovation

AI adoption and trends in securities markets: EU evidence



ESMA Report on Trends, Risks and Vulnerabilities Risk Analysis

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AI adoption and trends in securities markets: EU evidence

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Summary

This article evaluates recent trends related to the use of artificial intelligence (AI) in securities markets. Based on a survey conducted in the summer of 2025 across the EU, it examines financial market participants' self-reported use of AI and yields insights on the benefits and the challenges associated with AI's growing relevance for firms' competitiveness.

Adoption and investment: AI adoption in the EU financial sector remains partial and uneven, with smaller firms lagging behind larger ones in terms of investment, deployment, expected efficiency gains, as well as the ability to develop models and leverage internal data. However, firms' sentiment on AI appears to be trending upward across the board, with 70% of firms anticipating an increase in AI-related investment between 2025 and 2027.

Use cases, benefits and risks: Current use cases focus on low-autonomy, general-purpose back-office tools expected to enhance operational efficiency, although firms are experimenting with a variety of more customised, sector-specific applications. Regarding the challenges associated with AI deployment, data- and model-related vulnerabilities introduced or amplified by AI systems are among firms' top concerns, with cybersecurity and third-party dependencies also frequently highlighted.

Infrastructure, models and data: While most surveyed firms (62%) rely exclusively on commercial cloud solutions for AI infrastructure, they deploy models from a variety of sources, from off-the-shelf tools (36%) to those developed in-house (43%). However, firms' reliance on a small number of AI infrastructure providers may be shaping third-party dependencies that warrant monitoring due to the potential operational risk they pose. At the same time, competitive pressures are pushing firms to scale up their use of and investment in AI to remain efficient and innovative.

Against this background, ESMA will continue monitoring AI developments in its remit to ensure their implications and potential risks are well understood and taken into account in our ongoing Risk Monitoring and ad-hoc Risk Analysis work.

¹ This article was written by Giulio Bagattini, Nassim Khelifi and Valentina Mejdahl. We are grateful to Claudia Guagliano, Alexander Harris and Steffen Kern for comments and discussions.

Introduction

This article evaluates recent trends related to the use of artificial intelligence (AI) in EU securities markets. While AI in various forms has long been used in the financial sector, the recent advances in large language models (LLMs), generative AI (GenAI) and broader computational capacity have drawn renewed attention from financial market participants due to their transformative potential. AI has also been the cornerstone of a broadly positive market sentiment since early 2023, fuelling the valuations of both private AI start-ups and large technology companies with significant investments in the AI value chain.

The European Securities and Markets Authority (ESMA) has been monitoring the uptake of AI in securities markets since before the advent of GenAI.² Although financial sector authorities have made progress in understanding AI use cases and their benefits and vulnerabilities, their surveillance tools are still at an early stage. Data on the trajectory of AI adoption in finance have typically been fragmented; in a rapidly evolving technological ecosystem, it is challenging for supervisors to draw organic insights on firms' strategy and approach to the use of AI.³

This article contributes to filling this gap by presenting evidence obtained from an EU-level industry survey conducted in the summer of 2025. It examines firms' self-reported use of AI, assesses typical and emerging use cases, and yields insights on the benefits and the challenges associated with AI's growing relevance for firms' businesses. Our analysis leverages the responses submitted by 728 entities domiciled in 19 EU countries, among which 274 investment managers, 262 investment firms, 106 credit institutions providing investment services, 77 financial market infrastructures (FMIs) and 8 credit rating agencies (CRAs).⁴ The article

retraces the structure of the survey around the following three principal themes.

Adoption and investment: First, we assess the extent to which firms are making use of AI, the level of investment in AI infrastructure, and the efficiency gains and the revenue growth firms expect. While most large companies have rolled out AI tools or are experimenting with them, the rate of AI adoption and the propensity to invest in AI decline significantly as firm size decreases. In line with this pattern, smaller firms expect, on average, somewhat lower cost savings and efficiency gains from the use of AI than larger firms, as well as lower revenue growth enabled by AI.

Use cases, benefits and risks: Second, we examine the AI applications reported by firms in different sectors. The most common use cases are for back-office activities and typically involve a low degree of AI autonomy, although firms also report a number of emerging client-facing applications. Firms identify a wide range of benefits from deploying AI, including increased ability to process large-scale structured and unstructured datasets, enhanced competitive differentiation, gains in operational efficiency and cost reduction. However, firms also recognise the risks that arise from an increased reliance on AI. Data- and model-related vulnerabilities introduced or amplified by the use of AI systems are among the top concerns, with cybersecurity and third-party dependencies also frequently highlighted. Regulators and policymakers worldwide are closely monitoring these risks, as poorly managed AI systems have the potential to exacerbate existing vulnerabilities and impair the effectiveness of risk management frameworks.

Infrastructure, models and data: Third, we describe the characteristics of the AI architecture that firms rely upon, including where they source the models, training data, and computing infrastructure that enable their use of AI. Most

² See ESMA (2023), ESMA (2023,2), ESMA (2024), ESMA (2025), and ESMA, Institut Louis Bachelier and the Alan Turing Institute (2025).

³ Given the broad nature of the topic, which can concern a wide range of activities and business areas, financial supervisors have typically not imposed comprehensive reporting requirements related to the use of AI, in line with a risk-based approach and resource optimisation. ESRB (2025) advocates for cross-border cooperation and

pooling of resources as critical for effective market surveillance of AI and the supervision of financial institutions' use of AI.

⁴ Participation in the survey was voluntary and participation rates varied across countries and sectors. Thus, the statistics presented in this article are not necessarily representative of the broader population of EU-domiciled securities markets firms. For more details on the demographics of survey respondents, see Annex 1.

surveyed firms (62%) rely exclusively on commercial cloud solutions for AI infrastructure, with private setups much more common among large enterprises (64%) than micro firms (18%). The AI models used in the reported applications have a variety of sources, from off-the-shelf models (36%) to models developed in-house (43%); larger firms also favour internal data for model training whereas smaller firms depend more on public or commercial datasets. The market for AI-related services displays a significant degree of concentration, with a few firms mentioned as the leading third-party provider (TPP) for most respondents.

Our findings are broadly consistent with evidence emerging from other recent surveys conducted among securities markets firms in EU countries not represented in our sample (see Annex 2). Like the present analysis, these surveys also highlighted the cautious pace of AI deployment, especially among smaller entities, although with a positive outlook for future investments and the benefits the technology is expected to bring.

Adoption and investment

While significant, the penetration of AI in firms' activities appears to be still partial, with 45% of the respondents reporting that they have no AI use cases either in production (i.e., fully rolled out in their business) or in development/experimentation (Chart 1).

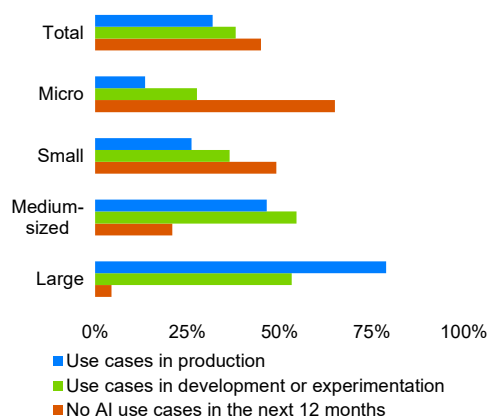
However, the survey reveals a pronounced disparity in AI adoption **across firm sizes**. The lack of adoption is particularly pronounced among micro firms, 65% of which have no active or planned AI use cases. In contrast, large firms are at the forefront of AI deployment, with 96% either already using AI or planning to do so. In terms of use case development or experimentation, large and medium-sized firms are similarly represented (respectively 53% and 55% of respondents), while small and micro firms lag behind. Production use cases are most

common among large firms (79% of respondents), with the numbers declining as firm size decreases.

Chart 1

Use of AI

Smaller firms trail larger competitors in AI rollout



Note: Answers to the question: "Which of the following best describes your company's current engagement with AI technologies?". Percentages out of the number of respondents in the respective company size category. Multiple answers possible.
Sources: NCAs, ESMA

Looking at how the AI adoption rate varies **across sectors**, credit institutions providing investment services and credit rating agencies (CRAs) appear the most advanced, with respectively 65% and 75% stating that they had fully rolled out at least one AI use case, and respectively 17% and 13% reporting no use case either in production or in the testing phase. Financial market infrastructures (FMIs) followed, with a larger share of firms reporting no planned AI use (45%) than fully deployed use cases (40%).⁵ Investment firms and investment management firms appear to trail the other sectors, with 53% of the respondents reporting no use cases.

However, these **sectoral differences largely reflect the different distribution of firms' size** across sectors shown in Chart B (see Annex 1). For example, more than 90% of large enterprises in any sector are engaging with AI use cases. Medium-sized credit institutions actually show the highest rate of non-adoption within this size category (32%), while investment firms and

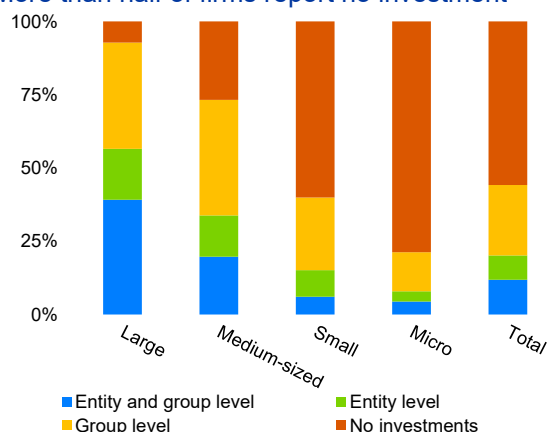
⁵ For the purpose of this article, FMIs include all the following types of firms: market operators of trading venues, central counterparties, trade repositories, data

reporting service providers, central securities depositories, crypto-asset service providers, virtual asset service providers and crowdfunding service providers.

investment managers display the lowest rates (respectively 16% and 19%).

When asked about their **investment in AI** in 2024, just 44% of all surveyed firms reported any investment, with large firms overwhelmingly leading this trend (Chart 2). Specifically, 93% of large firms reported some AI investments, compared with only 40% of small firms and 21% of micro firms. This concentration of investment among larger entities is further reflected in the group-level data, which includes non-EEA entities and shows a similar pattern. As with AI adoption, firm size appears to be a more significant driver of AI investment than cross-sectoral heterogeneity.

Chart 2
Investment in AI technologies in 2024
More than half of firms report no investment



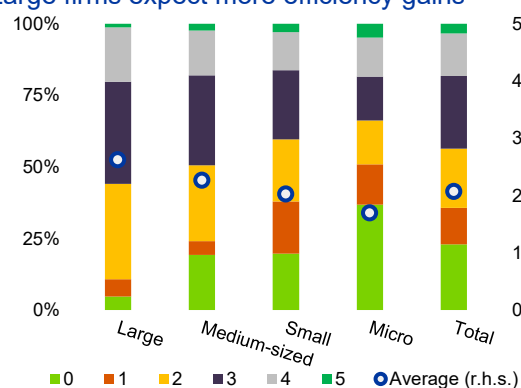
Note: Answers to the question: "Are investments in AI done at the group level, country (local) level, or both?". Percentages out of the number of respondents in the respective company size category. 100 entities did not answer/did not know.
Sources: NCAs, ESMA

Looking ahead, the **outlook for AI investment** is optimistic across the board. Seventy percent of all firms anticipate increasing their AI investments between 2025 and 2027. This expectation is nearly universal among large firms, all of which plan to either maintain or increase their investment levels, with only a single large firm indicating no change. Among other firms, the trend is also positive: 53% of micro firms, 68% of small firms and 79% of medium-sized firms expect to boost their AI spending. Notably, only

one micro and one medium-sized firm foresee a decrease in investment, suggesting a broad-based expectation of growth in AI adoption.

The primary **driver behind these investments** appears to be the pursuit of cost savings and efficiency gains, rather than a strong expectation of revenue growth. Firms were asked to rate their expected **cost savings** from GenAI adoption on a scale from 0 to 5. The overall average was 2.1, with large firms anticipating greater benefits (2.6) than small (2.0) or micro firms (1.7). However, a significant minority – 23% of all firms and 37% of micro firms – do not expect any cost savings from GenAI (Chart 3). Across sectors, CRAs expected the highest benefits on average (2.5), followed closely by credit institutions (2.4) and FMIIs (2.3), while investment firms trailed (1.8). Expected cost savings from adopting AI models other than GenAI are slightly lower than those expected from GenAI, averaging 1.8 across respondents.⁶

Chart 3
Expected cost savings from GenAI
Large firms expect more efficiency gains



Note: Answers to the question: "On a scale from 0 to 5, how would you rate your expected cost savings/efficiency gains over the next 2-3 years due to the adoption of GenAI?". Percentages out of the number of respondents in the respective company size category and average of answers (right axis). 75 entities did not answer/did not know.
Sources: NCAs, ESMA

When it comes to **revenues**, expectations are even more modest: the average anticipated revenue increase is just 1.2 out of 5 for both GenAI and other AI models, with more than half of micro firms expecting no revenue increase at all. This suggests that, at present, the business

⁶ However, 40 more firms did not provide an answer when asked to rate their expected cost savings from other AI models (115 vs. 75 no answers for GenAI). If firms did not answer because they do not use AI models other than

GenAI, which would mean that they effectively do not envisage any cost savings, then the true gap in the expected cost savings from GenAI and other AI across the sample might be larger.

case for AI in securities markets is primarily about operational efficiency rather than direct revenue generation.

Use cases, benefits and risks

Use cases: Mainly in support functions

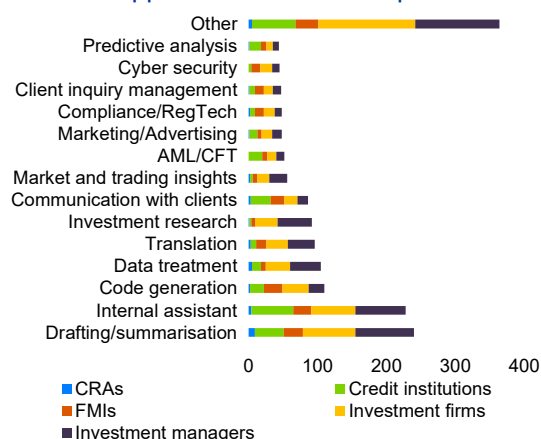
Among the AI use cases reported by firms, the majority are concentrated in **support functions** (Chart 4).⁷ The most common applications are drafting and summarising information (239 use cases, 29 % of the total) and internal assistant or copilot (227), followed by code generation (109), data quality and processing (105), and translation (95). **Client-facing applications** are less prevalent, with 86 use cases focused on communication with clients (e.g. chatbots) and 34 on know-your-customer/remote identification. **Core investment activities** such as portfolio risk management (20 use cases), portfolio optimisation (19), algorithmic trading (10), high-frequency trading (3), and robo-advising (2) remain relatively rare, with most still in development or experimental stages.

Separately, firms classified the vast majority of the use cases (87%) as being aimed at an **internal use only, as opposed to client-facing tools** used for customer relationship management (10%) or for the provision of investment services (3%). These distributions underscore the current role of AI as a tool for enhancing back-office efficiency rather than transforming front-office or investment decision-making processes, at least as regards its most widespread use across securities markets.⁸

Chart 4

AI use cases reported

Versatile support tools most widespread



Note: Answers to the question: "Which of the following categories best represents your use case?" for 833 use cases reported. Multiple choices possible. CRAs = credit rating agencies, FMIs = financial market infrastructures, AML/CFT = anti-money laundering and countering the financing of terrorism.
Sources: NCAs, ESMA

In line with this interpretation, respondents predominantly indicated the **presence of human oversight** over the functioning and output of the AI models. Seventy-seven percent of AI use cases operate with low or no autonomy, meaning that human approval is required or the AI system only provides suggestions.

Looking at the **type of models underlying these applications**, GenAI is the most widely used technology, characterising 571 of the reported use cases (71% of the total), followed by natural language processing (NLP) at 227 use cases – 28% of the total (Chart 5). There is some uptake of agentic AI systems, which are characterised by planning capabilities and access to external tools (141 use cases, 17% of the total). However, the use of AI agents does not necessarily appear to be associated with a higher degree of automation in the decision-making process, as 68% of these

⁷ Survey respondents were asked to list their main AI use cases (among those in production or in development/experimentation), with the possibility to list up to three use cases. A total of 847 use cases were reported by 395 firms, out of which 426 were indicated as being in production, 391 in development or experimentation, 30 not indicated.

⁸ Further recent evidence indicates that this is the dominant approach to AI deployment more broadly in the financial sector. For insurance companies, preliminary results from a survey conducted in 2025 by the European Insurance and Occupational Pensions Authority suggest rapid AI

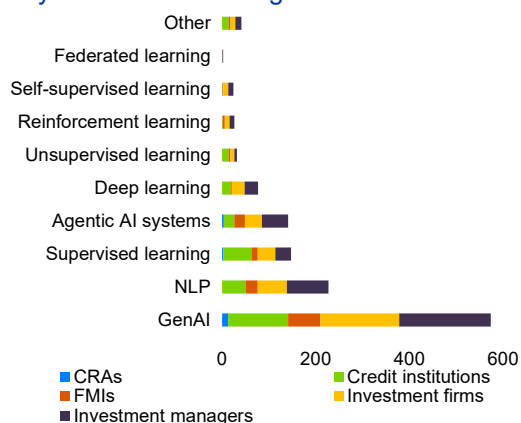
uptake concentrated in back-office functions such as document summarisation, internal tooling, and code assistance (see EIOPA, 2025). In the banking sector, evidence from the European Banking Authority's Risk Assessment Questionnaire of March 2025 indicates a higher adoption rate for AI (with 92% of the 85 respondents already using AI and a further 5% testing pilots) and more mature use cases compared to financial sector firms in our sample (see EBA, 2025). However, unlike the entities in our sample, banks that responded to the survey were mostly large enterprises.

use cases were still associated with either low or no autonomy and only 27% were indicated as having either high or medium autonomy.⁹

Chart 5

AI technology used

AI systems often leverage GenAI



Note: Answers to the question "What type of AI technology is used in your solution?" for 807 use cases reported. Multiple choices possible. NLP = natural language processing, CRAs = credit rating agencies, FMIs = financial market infrastructures.

Sources: NCAs, ESMA

Benefits: Operational efficiency as main driver

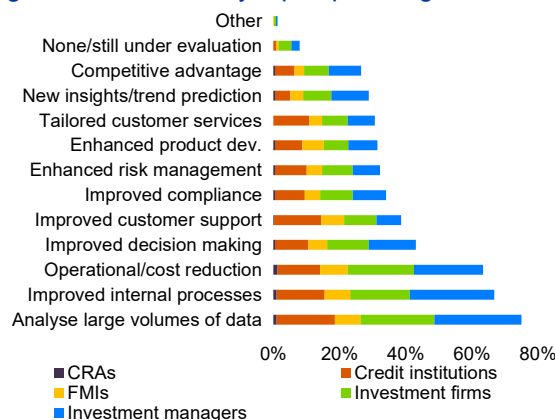
The survey highlights that the most widely recognised benefit of AI is its **capacity to enhance data analysis**. Among respondents, 75% cited the ability to process large volumes of structured and unstructured data as a key advantage (Chart 6). This is closely followed by **operational optimisation**, with 67% reporting improved internal processes and 63% noting cost reductions. Various **qualitative improvements** for more specific aims were also noted, including in decision making, customer support, compliance, and risk management. Despite use cases where AI systems interact with customers being a minority, over 30% of respondents recognised AI's usefulness for providing more **tailored customer services**. These findings are consistent with evidence from the International

Organization of Securities Commissions (IOSCO), the Organisation for Economic Co-operation and Development (OECD) and the Financial Stability Board (FSB), which emphasise operational efficiencies and the potential for marketing more customised products and services as key AI benefits.¹⁰

Chart 6

Benefits of AI

Big data and efficiency top expected gains



Note: Answers to the question "What are the main benefits from the use of AI technologies?". Percentages out of total number of respondents, multiple choices possible. 341 entities did not answer. CRAs = credit rating agencies, FMIs = financial market infrastructures.

Sources: NCAs, ESMA

Risks: Data and model risks as primary concern

However, firms also appear to be aware of the **risks and challenges** associated with AI. **Data and model-related issues** are the most frequently cited risks (Chart 7), with 82% of respondents identifying at least one data-related challenge such as data protection (59%), data quality (55%) and data governance (46%). Notwithstanding the continuous improvements in the LLM performance achieved by AI developers, **model hallucinations** remain a concern for the majority (51%) of respondents. Respectively 46% and 37% of firms are concerned about **cyber**

⁹ Still, agentic AI systems reported in the survey were more frequently associated with a high or medium degree of autonomy than other AI types (27% of agentic AI use cases vs. 19% of all use cases).

¹⁰ IOSCO highlights AI's potential for operational efficiencies and the creation of new market opportunities (IOSCO, 2025). The OECD similarly points to increased efficiency and reduced costs, improved performance,

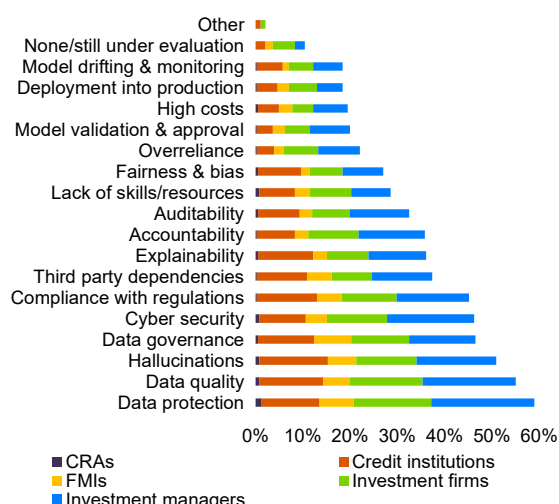
more personalised products and services, strengthened risk management and controls, and broader access to credit and other banking services (OECD, 2025). The FSB echoes these benefits, emphasising enhanced efficiency, improved regulatory compliance, advanced data analytics, and the development of personalised financial products (FSB, 2025).

risks and **reliance on TPPs** – two mutually-reinforcing operational vulnerabilities with potential systemic implications.¹¹ The **lack of skills and resources** is a notable barrier, affecting 29% of respondents and an even higher share of large enterprises (34%). **High costs** are considered a significant challenge by 19% of firms, although – somewhat surprisingly – to a smaller extent among micro enterprises (10%), which suggests that financial constraints are not always the principal barrier to AI investment. Notably, **compliance with regulations** was indicated as a challenge by 45% of respondents.

Chart 7

Risks of AI

Data-related and cyber risks dominate concerns



Note: Answers to the question: "What are the main challenges from the use of AI technologies?". Percentages out of total number of respondents, multiple choices possible. 345 entities did not answer. CRAs = credit rating agencies, FMIIs = financial market infrastructures.

Sources: NCAs, ESMA

In terms of **regulatory compliance**, the **EU's AI Act** – which entered into force on 1 August 2024 and sets out requirements for AI developers and deployers across sectors – is an important reference for firms dealing with AI.¹² When asked

to assess whether they are affected by the upcoming AI Act provisions, 23% and 53% of the respondents stated that they are respectively strongly or moderately affected, with only 24% reporting no impact. The impact was particularly felt among large firms, with all but one respondent stating they were strongly or moderately affected, consistent with their broader deployment of and reliance on AI tools to date.

The **material impact of AI use cases** as perceived by firms remains generally low, especially among smaller firms, with 77% of the use cases from micro firms and 75% of those from small firms assessed as having low materiality.¹³ Larger firms report more material use cases (low materiality for 56% of the use cases and medium or high for 44%), but overall, these answers suggest that the sector does not yet see AI as a transformative risk or opportunity in terms of financial outcomes. Across sectors, FMIs and credit institutions report higher materiality (respectively 43% and 41% of the use cases are associated with a medium or high level of materiality) than investment managers (30%), CRAs (26%) and investment firms (25%). Nonetheless, different firm sizes appear again to partly explain this cross-sectoral variation.

When asked to assess the degree of **explainability of the AI models** underpinning their use cases on a scale from 0 to 5, firms attributed an average score of 3.3.¹⁴ Explainability scores are lower for GenAI, confirming that these models are, by nature, less transparent in how they produce their output. The use of explainability methods was not widely reported, and among those that were mentioned, Shapley values emerged as the most prominent.

¹¹ Among the others, the European Systemic Risk Board noted the potential systemic risk implications from the interaction of high concentration risk from the use of third-party ICT providers and cyber threats to critical infrastructure (ESRB, 2024).

¹² Regulation (EU) 2024/1689 of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (AI Act). Besides the AI Act, several further pieces of existing legislation may apply to specific uses of AI in securities markets. For example, MiFID II includes requirements for investment firms and trading

venues engaged in algorithmic trading and high-frequency trading – activities that can also leverage AI systems.

¹³ Materiality, in this context, refers to the potential impact of the AI application on a firm's solvency, financial performance, or risk profile.

¹⁴ AI explainability was defined as the extent to which the internal processes, logic, and criteria used by the AI systems can be understood, communicated, and evaluated by humans.

Risk mitigation: Need to fill knowledge gaps

To address the challenges and risks associated with the use of AI, firms first evaluate their **internal preparedness**, including the level of understanding of AI technologies across different layers of the organisation – operational staff, middle and senior management, and the board. A minority of firms reported that their staff have a complete understanding of AI technologies: 17% at the board and senior management levels and 8% at the operational level. Additionally, 6% of firms reported having little or no internal expertise and therefore rely on third-party support functions.

Recognising that further AI adoption will require significant **capacity-building and knowledge development** within organisations, 65% of respondents reported that they have already trained – or plan to train – their employees on AI-related topics.

In parallel with training, firms are also implementing a range of **security measures** to address AI-specific vulnerabilities. These include techniques designed to prevent, detect, and respond to threats such as data poisoning, adversarial attacks, evasion attacks, and other model-targeted exploits. The most frequently cited security measure by respondents is human oversight, cited by 65% of the respondents, which is consistent with the generally cautious approach observed throughout the survey and the reported low levels of autonomy granted to AI applications. Other security measures mentioned include input and output restrictions, data-integrity checks, redundancy and backup systems, and secure data pipelines, each indicated by more than 30% of the respondents. Human oversight of AI was also reported as one of the most frequently addressed aspects in company AI policies, where such policies exist.

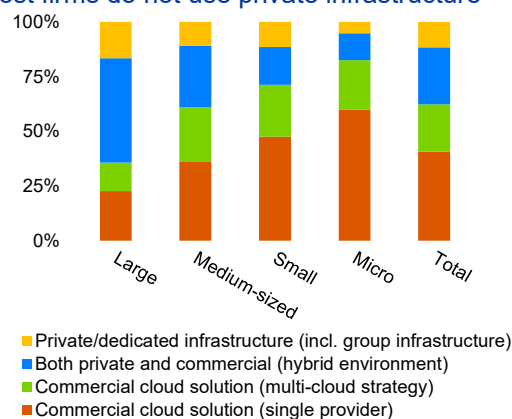
Infrastructure, models and data

The previous section suggested that firms have so far adopted a cautious approach to AI, with an

apparently limited role for critical functions and operations, in particular for GenAI. At the same time, survey responses show that the emergence of GenAI and LLMs has created novel AI use cases that a wide range of financial market participants are exploring and integrating into their business activity. This section assesses the **approach to the technical deployment of AI tools** that firms are taking in terms of infrastructure, models and training data.

As regards **computing infrastructure**, 62% of respondents rely exclusively on commercial cloud solutions – 41% from a single provider (Chart 8). The share of firms that have set up private or dedicated infrastructure is lower but increases with the firm's size, from 18% for micro firms to 64% for large enterprises. This is in line with the pattern observed for AI investments.

Chart 8
Type of AI infrastructure
Most firms do not use private infrastructure



Note: Answers to the question: "Where is your AI solution hosted?". Percentages out of the number of respondents in the respective company size category. 331 entities did not answer.

Sources: NCAs, ESMA

Firms were then asked to name their top three **TPPs of AI-related services** (including model development and implementation, data provision and preparation, and cloud computing). Microsoft was the top provider for almost half of the respondents, before OpenAI (20%) and AWS

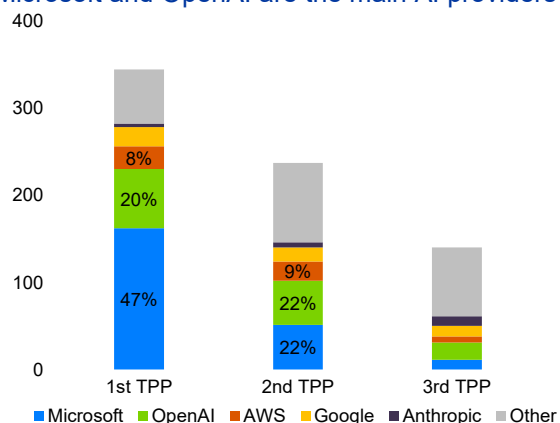
(8%), delineating substantial concentration in this market (Chart 9).¹⁵

With GenAI integration into financial services set to potentially accelerate thanks to the technology's growing accessibility, AI may reinforce the longstanding configuration of **concentrated digital services markets**, where few providers dominate thanks to economies of scale and integrated offerings.

The EU's Digital Operational Resilience Act (DORA) mandates relevant safeguards in this regard, significantly enhancing the EU financial sector's ability to mitigate and monitor risks from third-party AI and ICT dependencies, for instance, by adopting multi-provider strategies and exit plans for critical services.¹⁶ Out of those respondents who indicated their top TPP, 69% also listed a second TPP and 41% listed a third, which denotes some degree of **vertical or horizontal diversification** in firms' current sourcing of AI services. This multiplicity of AI TPPs notwithstanding, firms almost entirely rely on providers based in non-EU jurisdictions, with only about 8% of the TPPs named in the survey being domiciled in the EU.

Chart 9

Third-party providers of AI systems
Microsoft and OpenAI are the main AI providers



Note: Answers to the question: "Who are your top three TPPs for AI-related services (including models, cloud and data) by fees?". 344 respondents indicated at least one TPP. TPP = third-party service provider.

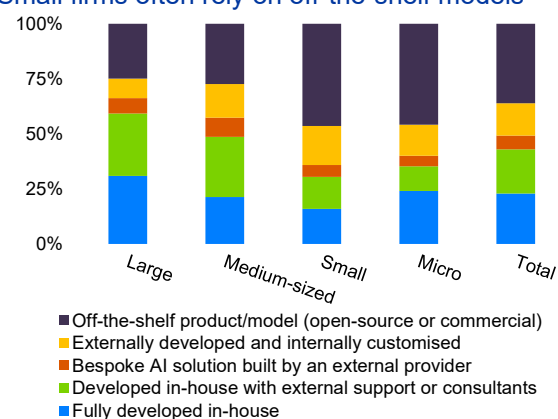
Sources: NCAs, ESMA

The survey data also zoom in on the **development approach of the specific AI use**

cases listed by the respondents, distinguishing among the different strategies for AI model development. Most firms **depend on TPPs** to some degree for their AI models: 36% of the use cases leverage off-the-shelf models, 15% customise externally developed models (for example, by fine-tuning them with proprietary data) and 6% use bespoke AI solutions built by an external provider (Chart 10). The off-the-shelf approach is most prevalent among small and micro firms, possibly because they more often lack the technical expertise, infrastructure, or financial resources to build models internally. A significant remaining proportion of use cases (43%) is developed by firms in-house (either fully or with the support of consultants), especially by credit institutions (59%) and large firms in general (59%).

Chart 10

Use of off-the-shelf vs customised AI models
Small firms often rely on off-the-shelf models



Note: Answers to the question: "What is your development approach?" for 823 use cases reported. Percentages out of the number of use cases reported by firms in the respective size category.

Sources: NCAs, ESMA

Training data is another critical dimension. The survey indicates that 49% of firms and 63% of large firms use internal data for model training or fine-tuning, while smaller firms rely more heavily on public or third-party commercial datasets (Chart 11). The preference for internal data among larger firms may reflect their ability to leverage proprietary transaction and client datasets, which can enhance model relevance

¹⁵ Some respondents indicated using Microsoft Azure, which also provides access to OpenAI models. Likewise, Amazon Web Services (AWS) provides access to GenAI models from several manufacturers.

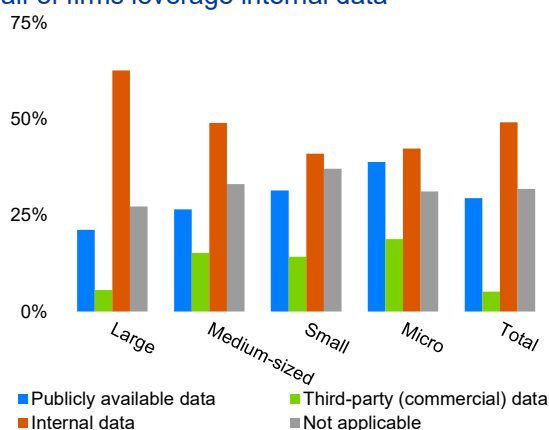
¹⁶ Regulation (EU) 2022/2554 of the European Parliament and of the Council on digital operational resilience for the financial sector.

and performance. Looking at the different sectors, CRA use cases stand out for their frequent use of internal data (79%), ahead of credit institutions (63%). CRAs are well placed to use internal data for their AI models because they may leverage the vast amount of information they collect from financial market participants in their credit rating activity, as well as – for those CRAs that are part of large, diversified groups – data collected by other business segments.

Chart 11

Data used to train AI models

Half of firms leverage internal data



Note: Answers to the question: "What type of training data do you use for your model?" for 833 use cases reported. Percentages out of the number of use cases reported by firms in the respective size category. Multiple choices possible.
Sources: NCAs, ESMA

Zooming in on **GenAI use cases**, 81% of firms rely on commercial GenAI models, especially CRAs (all 17 reported use cases) and FMIs (67 out of 70 use cases). Commercial models typically dominate because they offer state-of-the-art performance and continuous updates, with firms gravitating toward these solutions presumably due to limited internal expertise and the high cost of developing proprietary models. On the other hand, 21% of the GenAI use cases rely on open-source alternatives and 6% on

internally developed models (14% for credit institutions).¹⁷

Even when they rely on an externally developed GenAI model, firms can "**fine-tune**" it and equip it with **retrieval-augmented generation (RAG)** to improve its performance and accuracy.¹⁸ Just under half of the GenAI use cases described in the survey are based on models enhanced with RAG, typically operating on internal data (especially for larger firms, in line with their wider use of internal training data observed in Chart 11), and less frequently on external data. Fine-tuning is less common, with only 15% of the GenAI models having been calibrated with this methodology. Taken together, these results point to an adaptable approach to the use of GenAI by financial market participants, with a notable – but by no means dominant – share of the applications relying on customised models, in line with the diverse nature and materiality of the use cases reported by survey respondents.

Disjoint from the specific use cases, firms were also asked whether they allow their staff to **access and use publicly available GenAI tools** on the internet that have not been purchased, developed, or tailored by the firm (e.g., ChatGPT, Microsoft Copilot). Seventy-four percent of respondents reported allowing staff to access such public GenAI tools, with 39% doing so without any restrictions (e.g., limited access rights or limits on the number of employees who may use them). However, only a limited number of firms have established a policy governing the use of these publicly available GenAI tools, with just 32% of respondents reporting the existence of such rules. Conversely, almost one-third of the firms allowed unrestricted access to online AI tools without having a related policy in place.¹⁹

¹⁷ FSB (2025) highlights that GenAI uptake in finance is often through pre-trained models that rely on specialised hardware and cloud services for AI development. Financial institutions would face significant constraints in cost and talent acquisition if they were to try to develop these models internally.

¹⁸ Fine-tuning trains a base model on an organisation's proprietary data to internalise its terminology, processes, and analytical logic. RAG – a technique in which an AI-powered chatbot retrieves the most relevant data from

internal databases – helps ensure that responses are based on relevant and trustworthy sources.

¹⁹ These results are in line with evidence that ESMA collected during a workshop with market participants in June 2024. This highlighted that most organisations had not developed comprehensive and specific guidelines for the use of LLMs, with some participants observing that existing guidelines were too broad and lacked a focus on concrete use cases (see ESMA, Institut Louis Bachelier and the Alan Turing Institute, 2025, pp. 21-23).

Conclusion

While financial market participants are increasingly turning to innovative AI technologies in the hope that they will bring improvements across a range of business processes, the recent survey data assessed in this article suggest that **AI adoption in EU securities markets has been gradual and uneven**, with smaller firms often lagging behind larger competitors.

This disparity is also reflected in firms' different **propensity to invest in AI**. In line with this pattern, smaller firms expect somewhat lower cost savings and efficiency gains from the use of AI than larger firms, on average. Potential for revenue growth enabled by AI is still assessed as low overall, with most of the reported use cases considered to have low or moderate materiality on firms' businesses. The **most widespread applications are in back-office activities** with a low degree of autonomy, but also a number of emerging client-facing functions, with most firms forecasting a positive trend for their AI-related investments in the foreseeable future. Although legacy systems, risk aversion and regulatory constraints have historically prompted a cautious approach to new technologies in the financial sector, looking ahead, competitive pressures and the maturation of tools such as AI agents could accelerate AI uptake in certain areas.

Survey respondents' arrangements with respect to their AI infrastructure corroborate existing evidence that the **resource-intensive nature of AI development has magnified a long-standing dependence on TPPs** and may reinforce the market dominance of a few non-EU providers of AI systems, cloud services and financial data aggregators. While the majority of firms stated having multiple providers of AI systems, 41% rely on a commercial cloud solution based on a single provider. If AI systems – at present still largely confined to support functions – were to be increasingly deployed in core business lines and critical operations, this could entail correspondingly greater operational

risks. Cloud-based environments and critical ICT providers, while offering scalability, may also become single points of failure if not properly diversified and secured.²⁰

As embracing AI evolves from a matter of efficiency to one of strategic relevance – ensuring that EU financial markets remain apt to supporting economic growth and stability in a rapidly evolving geopolitical landscape – **safeguarding the reliability of AI infrastructure is likely to become ever more important** for policymakers. Thanks to existing frameworks – such as DORA – financial sector authorities are developing capabilities in monitoring third-party dependencies and service provider concentration, and financial firms are strengthening their operational risk management practices, but challenges remain.

Meanwhile, investors have rewarded companies along the AI value chain with lofty valuations, indicating growing recognition of the technology's potential in driving innovation and growth throughout the economy. However, this **concentration of investment in a limited number of firms with potentially correlated outcomes may make markets more vulnerable to a shift in expectations**.

These challenges notwithstanding, the **ability to harness AI is one of the key innovation drivers in the global and European financial industry**. In this context, efforts to step up the Savings and Investments Union (SIU) – which aims to reduce barriers for firms to access the EU single market and ensure a level playing field across national jurisdictions – can foster technological innovation more broadly, as access to a larger integrated market allows firms to scale up their investment in new technologies.

In light of these circumstances, ESMA will continue monitoring AI developments in its remit to ensure their implications and potential risks are well understood and taken into account by supervisors and market participants.

²⁰ Among the others, FSB (2024) highlighted potential vulnerabilities from the financial sector's reliance on TPPs and concentration risks.

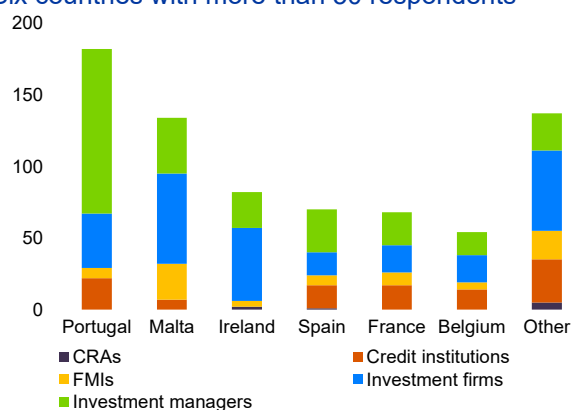
References

- BCL (Banque Centrale du Luxembourg) and CSSF (Commission de Surveillance du Secteur Financier) (2025), *Thematic review on the use of Artificial Intelligence in the Luxembourg financial sector. May 2025*. https://www.cssf.lu/wp-content/uploads/Thematic_report_AI_2024.pdf.
- EBA (European Banking Authority) (2025), *Risk Assessment Questionnaire. Spring 2025*. <https://www.eba.europa.eu/sites/default/files/2025-06/8b04db15-e8c0-47c1-9c28-ea5ee356637c/RAQ%20Booklet%20graphs%20Spring%202025.pdf>
- EIOPA (European Insurance and Occupational Pensions Authority) (2025), 'Supervision of AI: Finding the right balance'. https://www.eiopa.europa.eu/supervision-ai-finding-right-balance-2025-09-16_en.
- ESMA (European Securities and Markets Authority) (2023), *TRV Risk Analysis – Artificial intelligence in EU securities markets*. https://www.esma.europa.eu/sites/default/files/library/ESMA50-164-6247-AI_in_securities_markets.pdf.
- ESMA (European Securities and Markets Authority) (2023, 2), *TRV Risk Monitor – Report on trends, risks and vulnerabilities, No. 2 2023*. https://www.esma.europa.eu/sites/default/files/2023-08/ESMA50-1389274163-2681_trv_2-23_risk_monitor.pdf.
- ESMA (European Securities and Markets Authority) (2024), *TRV Risk Monitor – Report on trends, risks and vulnerabilities, No. 1 2024*. https://www.esma.europa.eu/sites/default/files/2024-01/ESMA50-524821-3107_TRV_1-24_risk_monitor.pdf.
- ESMA (European Securities and Markets Authority) (2025), *TRV Risk Analysis – Artificial intelligence in EU investment funds: adoption, strategies and portfolio exposures*. https://www.esma.europa.eu/sites/default/files/2025-02/ESMA50-43599798-9923_TRV_Article_Artificial_intelligence_in_EU_investment_funds.pdf.
- ESMA (European Securities and Markets Authority), Institut Louis Bachelier and the Alan Turing Institute (2025), *Leveraging Large Language Models in Finance: Pathways to Responsible Adoption*. https://www.esma.europa.eu/sites/default/files/2025-06/LLMs_in_finance_ILB_ESMA_Turing_Report.pdf.
- ESRB (European Systemic Risk Board) (2024), 'The General Board of the European Systemic Risk Board held its 56th regular meeting on 28 November 2024'. <https://www.esrb.europa.eu/news/pr/date/2024/html/esrb.pr241205~6f54b13a54.en.html>.
- ESRB (European Systemic Risk Board) (2025), *Artificial intelligence and systemic risk. Advisory Scientific Committee No 16 / December 2025*. https://www.esrb.europa.eu/pub/pdf/asc/esrb.ascreport202512_Alandsystemicrisk.en.pdf.
- Finansinspektionen (2024), *AI in the Swedish financial sector*. <https://www.fi.se/contentassets/084ebc13d6364a28a87a37c9a557ec9c/report-ai-swedish-financial-sector.pdf>
- FSB (Financial Stability Board) (2024), *The Financial Stability Implications of Artificial Intelligence*. <https://www.fsb.org/uploads/P14112024.pdf>.
- FSB (Financial Stability Board) (2025), *Monitoring Adoption of Artificial Intelligence and Related Vulnerabilities in the Financial Sector*. <https://www.fsb.org/uploads/P101025.pdf>.
- IOSCO (International Organization of Securities Commissions) (2025), *Artificial intelligence in capital markets: Use cases, risks, and challenges (Consultation report)*. <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD788.pdf>.
- OECD (Organisation for Economic Co-operation and Development) (2024), *Regulatory approaches to artificial intelligence in finance*, OECD Artificial Intelligence Papers, No. 24. OECD Publishing. https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/09/regulatory-approaches-to-artificial-intelligence-in-finance_43d082c3/f1498c02-en.pdf.

Annex 1

The results presented in this article are based on a survey conducted by 15 EU national competent authorities (NCAs) and by ESMA between June and September 2025. The survey enquired about AI-related investment strategies, benefits, risks, regulatory impacts, infrastructure and specific use cases. Participation in the survey was on a voluntary basis, and a total of 728 entities domiciled in 19 different countries submitted their responses (see Chart A), including 274 investment management-related companies (115 alternative investment fund managers (AIFM), 96 AIFM and undertakings for collective investment in transferable securities (UCITS) management companies, 34 venture capital fund managers, 22 UCITS management companies, 5 long-term investment funds and 2 social entrepreneurship fund managers), 262 investment firms, 106 credit institutions providing investment services, 77 entities classified as financial market infrastructures (21 virtual asset service providers, 20 crowdfunding service providers, 12 market operators of trading venues, 8 central counterparties, 8 crypto-asset service providers, 3 central securities depositories, 3 trade repositories and 2 data reporting service providers), 8 CRAs and 1 benchmark administrator. The respondents were domiciled in 19 EU countries, namely Portugal (182 entities), Malta (135), Ireland (82), Spain (70), France (68), Belgium (54) and others (137).²¹ In terms of size, large enterprises represented 12% of the respondents, medium-sized enterprises 12%, small firms 30%, micro firms 33% and firms not reporting their number of employees 12% (see Chart B).²² In the sample, credit institutions tend to be larger (78% are either large or medium-sized enterprises) while investment firms and investment managers tend to be smaller (respectively 74% and 73% are either small or micro firms).

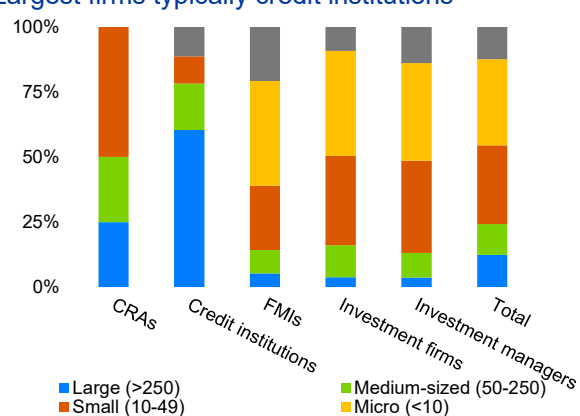
Chart A
Survey respondents by domicile and sector
Six countries with more than 50 respondents



Note: Number of survey respondents by country of domicile and main activity. The column "Other" includes Greece (37 entities), Italy (21), Croatia (13), Cyprus (11), Iceland (11), Denmark (10), Germany (10), Netherlands (8), Bulgaria (7), Luxembourg (4), Poland (3), Hungary (1) and Slovenia (1). CRAs = credit rating agencies, FMIs = financial market infrastructures.

Sources: NCAs, ESMA

Chart B
Survey respondents by sector and size
Largest firms typically credit institutions



Note: Distribution of survey respondents by sector and firm size in the country of domicile (number of full time equivalents). Percentages out of the number of respondents in the respective sector. CRAs = credit rating agencies, FMIs = financial market infrastructures.

Sources: NCAs, ESMA

²¹ Some NCAs did not distribute the survey as they had recently completed – or were in the process of completing – similar exercises. The Finansinspektionen published a report on the use of AI in the Swedish financial sector in December 2024 (see Finansinspektionen, 2024). The Commission de Surveillance du Secteur Financier and Banque Centrale du Luxembourg published a thematic review on the use of AI in the Luxembourg financial sector in May 2025 (see BCL and CSSF, 2025). The Dutch Authority for the Financial Markets (AFM) conducted a survey on the use of AI in the Dutch financial sector in the first half of 2025. The OECD, CONSOB (Commissione nazionale per le società e la borsa) and Banca d'Italia conducted a survey on the use of AI in the Italian financial sector in the first half of 2025.

²² Firms were asked to report their number of full-time equivalents (FTEs), indicate whether they belong to a larger corporate group and specify whether they operate outside the EU. For the purpose of this article, we classified firms as micro when their internal (non-outsourced) staff was below 10 FTEs; small when they employed 10–49 FTEs; medium-sized when they employed 50–250 FTEs; and large when their total number of FTEs exceeded 250.

Annex 2

This annex presents an overview of recent evidence on the use of AI in securities markets, based on separate surveys conducted in two EU jurisdictions between mid-2024 and early 2025.

Luxembourg

The Banque centrale du Luxembourg (BCL) and the Commission de Surveillance du Secteur Financier (CSSF) conducted a survey in the Luxembourg financial sector in June 2024.²³ They received responses from 461 firms, which together reported 402 AI use cases. Although the scope of the Luxembourg survey was broader than the securities markets – also covering banking, payments and insurance – the key findings are aligned with those emerging from ESMA's survey.

In 2024, AI investment levels were uneven, with 36% of respondents indicating that they did not make any investments in AI technologies – slightly less than in ESMA's survey. AI investments were expected to increase over the 2025–2026 period. In terms of AI adoption, 28% of respondents reported using AI in production or in development, while a further 22% were experimenting with AI or planned to do so within the next 12 months – slightly lower rates than in ESMA's survey. Consistent with ESMA's survey, the main perceived benefits of AI concerned internal efficiency: improved internal processes, optimised operations, reduced costs and analysing large volumes of data. The main challenges were data-related, with data quality cited most frequently, followed by data protection and data governance.

The vast majority of the reported use cases (92%) were for internal purposes and not client-facing – similar to the use cases reported in ESMA's survey. The most frequently reported use case categories were search and summarisation of information (43%), process automation (30%), chatbots and virtual assistants (27%), text content generation (27%) and translation (19%), all of which were largely associated with GenAI. Accordingly, 61% of all reported use cases relied on GenAI, followed by NLP (30%) and machine learning (28%). With respect to autonomy and human oversight, 90% of use cases involved a human in the loop, reflecting a cautious approach consistent with the findings from ESMA's survey.

Regarding technical infrastructure, 45% of the respondents primarily relied on commercial cloud solutions – a lower proportion than in ESMA's survey – while fewer used private or dedicated infrastructures (22%) or hybrid environments combining cloud and on-premises solutions (24%).

Netherlands

The Dutch Authority for the Financial Markets (AFM) conducted a survey in the Dutch financial sector in the first half of 2025. It received responses from 173 investment firms, 95 fund managers, 36 proprietary traders and 19 other financial firms, for a total of 323 entities.

The survey responses show that AI adoption in the Netherlands was uneven, with 53% of the respondents using AI or planning to use it within 12 months – almost identical to ESMA's survey. Most entities (76%) did not allocate any budget to AI in 2024, but the outlook remained positive, with 60% of the respondents expecting their AI-related investments to increase in 2025-2026.

The reported benefits and challenges were closely aligned with those emerging from ESMA's survey, with the main concerns being data-related, including data quality (160), data protection (137) and data governance (89). In terms of benefits, optimisation of support tasks and back-office automation remain highly relevant. Firms identified efficiency gains (226), the ability to analyse data (144), improved internal processes (123) and optimised operations (106) as the main gains from the use of AI.

²³ See BCL and CSSF (2025).

The AI use cases reported by firms are aligned with the identified benefits, the most frequently cited being information sourcing (137), analysis of unstructured, alternative or big data (81) and research writing (77). Fewer use cases were related to core investment tasks, with 24 firms using or planning to use AI to improve trade strategies and 7 to automate trading. Some respondents (22%) used or planned to use agentic AI – close to the share of use cases from ESMA’s survey that leverage this technology.

Despite only 20% of firms considering third-party dependencies as a key challenge related to AI adoption, only 5% hosted their AI systems on private infrastructure, while more relied on commercial cloud (35%) or hybrid (11%) solutions. Similarly, only a few firms use internally developed models (10%) or tailored models developed externally (7%), instead preferring general-purpose (49%) or open-source (7%) models.²⁴

²⁴ “General-purpose AI”, as defined e.g. in the EU AI Act, includes GenAI but is broader in scope.

