SPEECH

AI adoption in Europe

Keynote speech by Philip R. Lane, Member of the Executive Board of the ECB, at the Federal Reserve Bank of San Francisco Economic Research Symposium on AI and the economy

San Francisco, 30 October 2026

My aim today is to describe how AI is reshaping the euro area economy.[1] Although the development of frontier AI models is primarily taking place in the United States and China, the adoption of AI will be a key determinant of European productivity growth in the coming years, while expenditure on AI adoption also currently constitutes a significant stimulus to the euro area economy.[2] In addition, European firms are part of the global AI supply chain, while European investors are contributing to the funding of the global buildout of AI infrastructure through equity and debt markets and the banking system.

I will also describe the key patterns we see in the data, with a primary focus on how the surveys conducted by the ECB can provide insights into the AI adoption process and the implications for the financial system.[3][4]

Aggregate trends

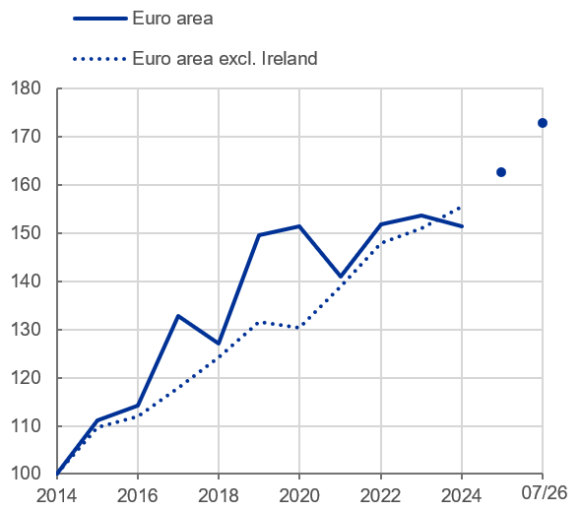
Digital investment in the euro area has expanded by 73 per cent in real terms since 2014, increasing from 2.3 per cent to 3.3 per cent of GDP (Chart 1a). While digital investment has grown far more quickly in the United States, the surge in digital investment (with an estimated clear acceleration since 2024) marks a distinct shift in the structure of the euro area economy.[5] As shown in Chart 1b, in the euro area digital investment has primarily been in intangible assets, while investment in data centres has constituted a relatively small share.[6]

Chart 1

Digital investment in the euro area

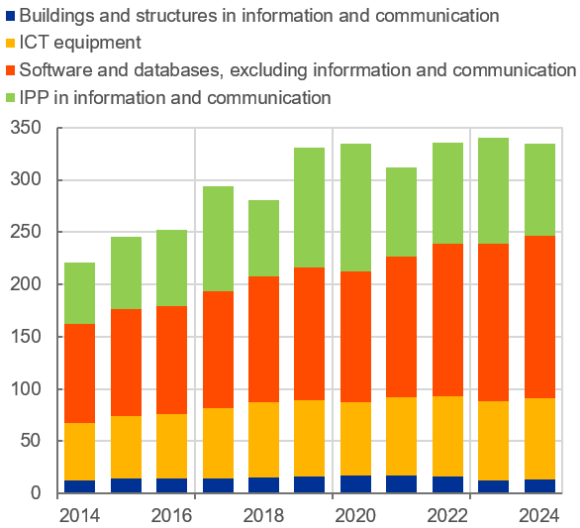
a) Digital investment proxy, euro area

(2014 = 100)



b) Digital investment proxy, euro area, with asset breakdown

(EUR billion)



Sources: Eurostat, ECB and ECB calculations.

Notes: Chart 1a shows the digital proxy for the euro area business economy, at constant 2020 prices, indexed to 2014. The blue dots for 2025 and 2026 extend the digital investment proxy based on the annual growth of an output proxy for digital services (weighted non-seasonally adjusted production of publishing activities; computer programming, consultancy and related activities; and information service activities). Chart 1b shows a digital proxy which refers to (i) investment in non-residential buildings and structures in the information and communication sector, (ii) information and communication technology (ICT) equipment in the business economy, (iii) investment in computer software and databases (CSDBs) in the business economy, excluding the ICT sector, and (iv) total intellectual property products (IPP) investment (in CSDBs and research and development) by the ICT sector. Missing country values are estimated based on known euro area aggregates of country-sector shares. On a whole-economy basis, digital investment has increased from around 2.3 per cent of euro area GDP in 2014 to 3.0 per cent in 2024 (and looks to have increased to 3.3 per cent by the end of the first half of 2026, on the basis of updates of digital services output). The latest observations are for 2024 for euro area annual accounts and July 2026 for euro area production data.

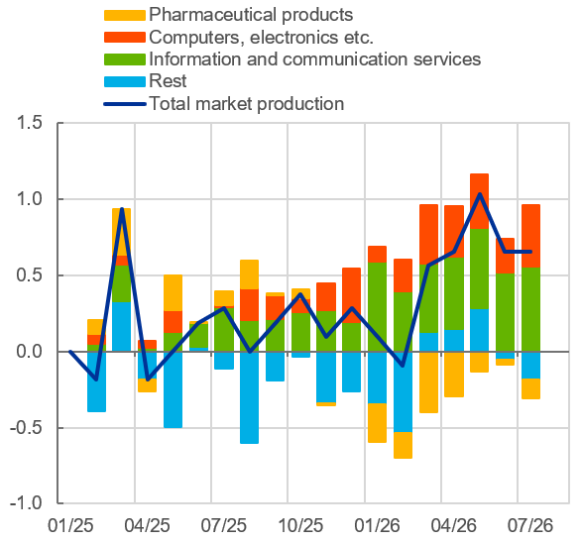
In the ECB Corporate Telephone Survey, firms report that AI has added about 10 per cent to their capital expenditure plans this year. AI-related demand has helped activity to hold up over the last two years – as reflected by the contributions of the “computers and other electronics” and “information and communication services” sectors to total market production (Chart 2a). As illustrated in Chart 2b, Purchasing Managers’ Index (PMI) indicators show that output, employment and new orders have developed considerably more favourably in the technology equipment subsector than in other manufacturing subsectors. For services, the software subsector has performed better than other services sectors in terms of output, albeit not in terms of employment and new orders.

Chart 2

Effects of the global AI boom on euro area output

a) Total market production

(cumulated changes since January 2025 in per cent)

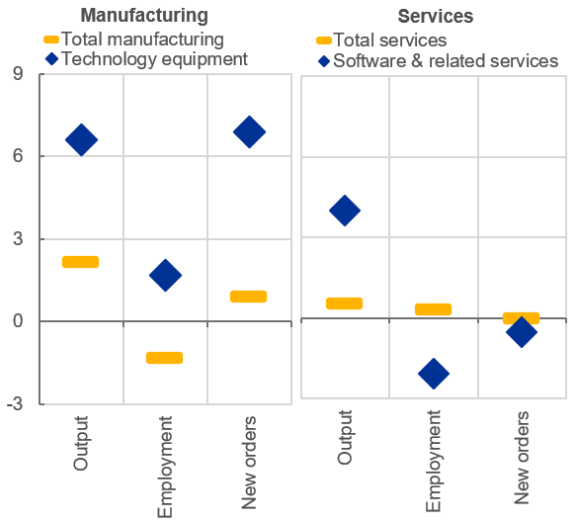


Sources: Eurostat and ECB calculations

Note: The latest observations are for July 2026.

b) PMIs for technology equipment and software in manufacturing and services

(diffusion indices, average January-September 2026)



Sources: S&P Global and ECB calculations.

Notes: Sectoral labels are taken from the July Global PMI press release. The latest observations are for September 2026.

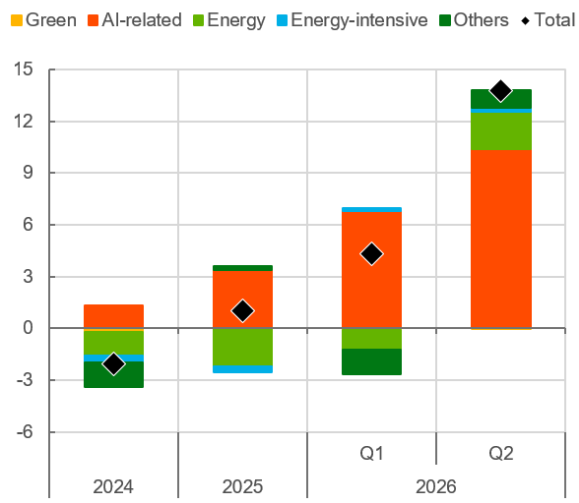
AI has been the main driver of global goods trade over the last year (Chart 3a). European firms are contributors to the global AI supply chain. Table 4 shows that AI-related exports and imports are growing quickly in the euro area, especially in relation to core data centre goods, which contain directly deployed hardware components related to AI compute, storage and networking capacity. Possibly related to differences in composition, the increase in AI import prices in the euro area is more muted than for the other major economic regions (Chart 3b). Chart 5 shows that, while AI-related price increases have contributed materially to the upward shift in goods inflation, the impact on headline inflation is limited owing to the relatively low weight of AI-exposed goods in the consumer price index (13.3 per cent in the non-energy industrial goods subcomponent and 3.4 per cent of the HICP).

Chart 3

Trade in goods and import prices of AI goods

a) Global goods imports by category

(annual percentage changes, percentage points; de-meaned)

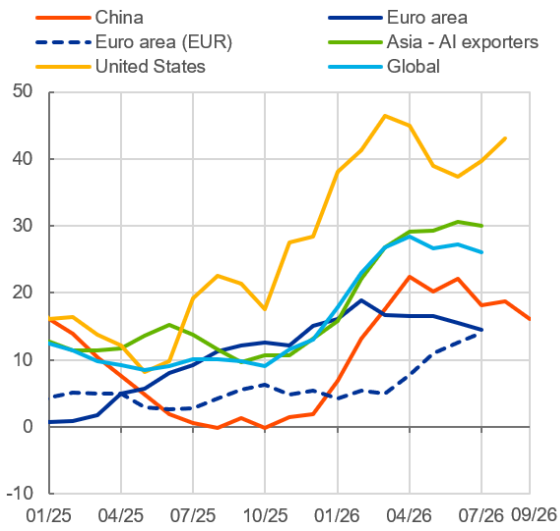


Sources: Trade Data Monitor and ECB staff calculations.

Notes: The figures are nominal data. Values are deviations from their respective mean over 2019-2023. "AI-related" reflects a basket of goods related to the construction and operation of AI data centres estimated by Emter et al. (2026) following Waugh (2026). The latest observations are for the second quarter of 2026.

b) Import prices of AI goods

(annual percentage changes, three-month moving averages)



Sources: Trade Data Monitor, ECB and ECB staff calculations.

Notes: Import prices are calculated as unit values. "AI goods" is a basket of goods related to AI data centre construction (Emter et al. 2026; Waugh 2026). Unless otherwise indicated, prices are in US dollars. "Asia – AI exporters" includes Hong Kong, India, Indonesia, Malaysia, Singapore, South Korea, Taiwan, Thailand and the Philippines. The latest observations are for July 2026 for the euro area, Asia and Global, August 2026 for the United States and September 2026 for China.

Table 4

Trade in AI goods

Trade in AI-related goods and subcomponents

(percentage of total trade; annual growth, percentage)

	Share		Growth			
	2023		2024-2025		2025H1-2026H1	
	Exports	Imports	Exports	Imports	Exports	Imports
	Total AI-related trade					
Euro area	**9.6**	**10.9**	**6.7**	**9.9**	**13.6**	**24.6**
United States	12.5	12.3	11.5	34.6	19.1	51.1
Rest of the world	14.4	14.1	19.4	16.8	42.4	37.5
	Core data centre goods					
Euro area	**3.6**	**5.0**	**11.7**	**16.2**	**35.7**	**46.4**
United States	6.6	7.1	22.4	55.7	32.9	85.2
Rest of the world	8.7	8.1	26	23.6	65.0	58.7
	Infrastructure data centre goods					
Euro area	**4.4**	**4.7**	**4.5**	**5.4**	**8.9**	**8.2**
United States	3.7	4.1	-5.2	-0.6	-4.7	-4.7
Rest of the world	3.9	4.1	6.9	5.9	8.1	4.4
	Other AI-related goods					
Euro area	**1.6**	**1.1**	**6.7**	**9.9**	**-3.2**	**8.5**
United States	2.2	1.1	11.5	34.6	1.7	29.6
Rest of the world	1.8	2.0	19.4	16.8	19.0	17.6

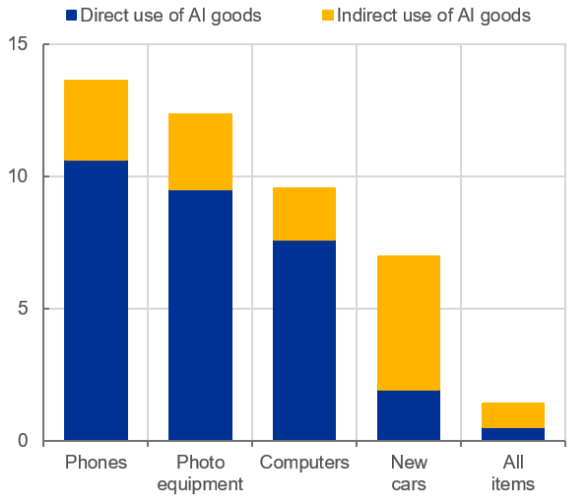
Sources: Eurostat, Trade Data Monitor and ECB staff calculations.
Notes: The table shows the share and growth in values. Rest of the world refers to the world excluding the euro area and the United States. 2023 shares are the shares of imports/exports in total imports/exports of the respective country or region. “AI-related trade” refers to goods related to the construction and operation of AI data centres (Emter et al., 2026; Waugh, 2026). “Core data centre goods” are directly deployed hardware components related to AI compute, storage, and networking capacity. “Data centre infrastructure goods” are physical infrastructure goods required to power, cool, and operate data centre facilities. “Other AI-related goods” are upstream AI goods and broad industrial goods used in AI production.

Chart 5

Price pressures from rising prices for AI goods

a) Consumer product exposure to AI goods

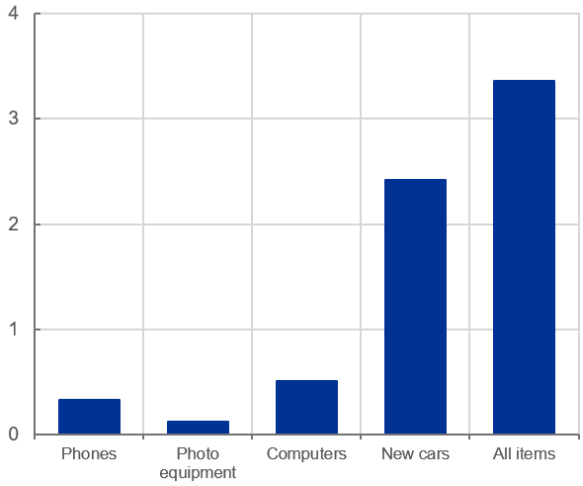
(percentage of output)



Sources: Trade Data Monitor, BEA (US Bureau of Economic Analysis), Eurostat and ECB staff calculations.
Notes: "AI goods" is a basket of goods related to AI data centre construction (Emter et al. 2026; Waugh, 2026). The data are based on US BEA tables (2017). Exposures are weighted by AI share, based on 2025 nominal trade data.

b) HICP weights of AI-exposed goods

(percentage points)



Sources: Eurostat and ECB staff calculations.
Note: HICP weights in 2026.

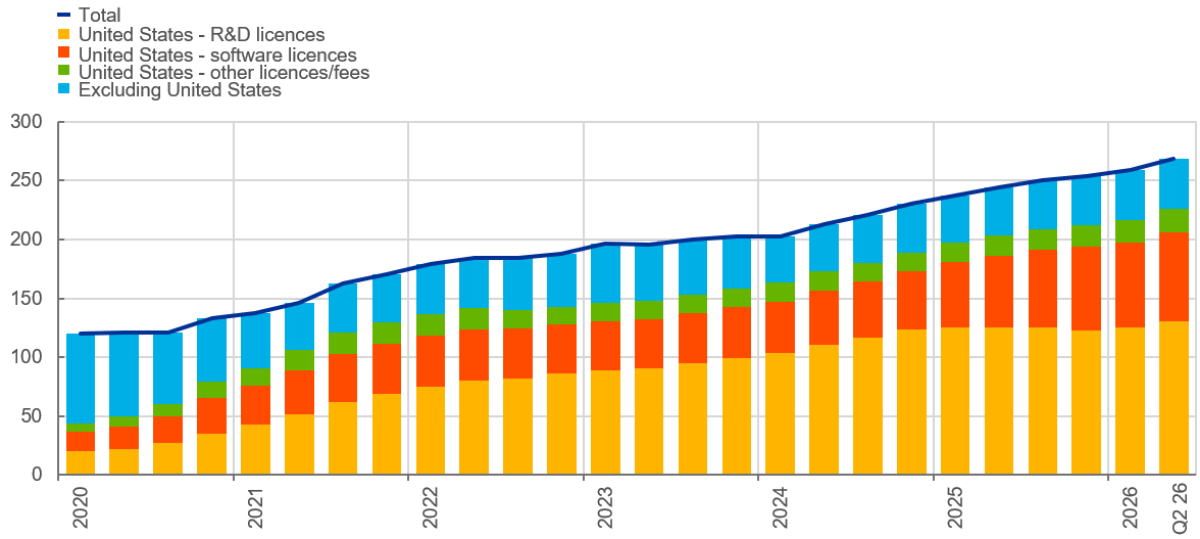
In relation to trade in services, Chart 6 shows a significant upward movement in software licence imports from the United States since 2022, consistent with increased purchasing of AI licences from the leading US firms.[7]

Chart 6

Euro area intellectual property products imports

Euro area payments for the use of intellectual property products (imports)

(four-quarter moving sums in EUR billions)



Sources: ECB (euro area balance of payments), BEA (US Bureau of Economic Analysis, US trade in services) and ECB staff calculations.

Notes: Euro area charges for the use of intellectual property (imports) are based on quarterly ECB balance of payments data. The latest observations are for the second quarter of 2026. Imports from the United States are broken down by type of intellectual property using annual shares by type in US exports to the euro area, as reported by the BEA (mirror data). These shares are applied to quarterly euro area imports of intellectual property from the United States for the corresponding year. The latest available BEA data refer to 2025; the 2025 shares are also applied to 2026 quarters.

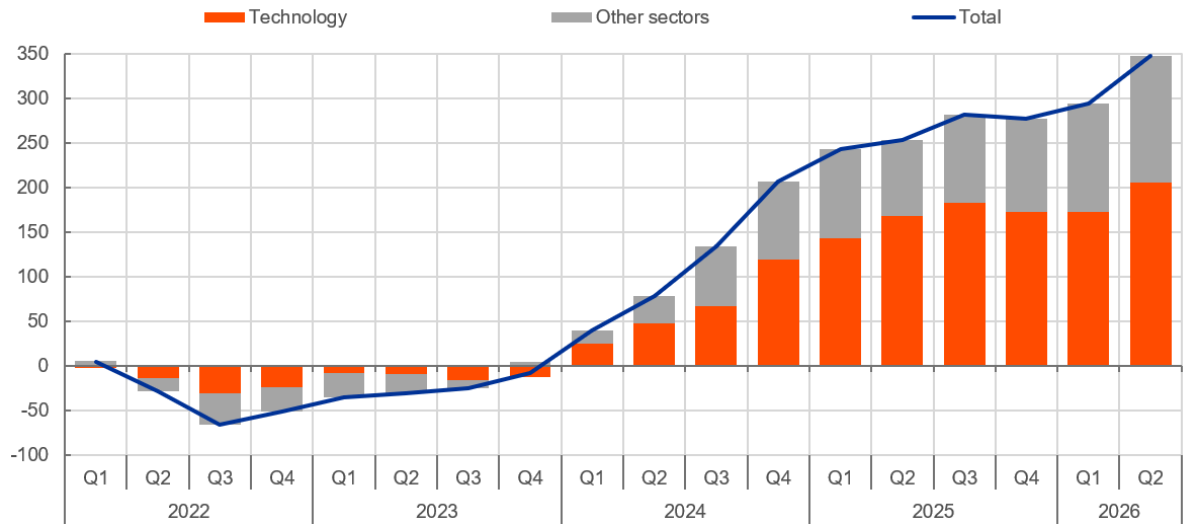
European investors are also major purchasers of US technology-related equities (Chart 7). Listed European tech firms have also benefited from rising stock market valuations (Chart 8a). Stock returns, revenue growth, operating margin growth and earnings per share growth are all increasing in AI-intensity (Chart 8b).

Chart 7

Euro area purchases of US shares

Net purchases of listed US corporate shares by euro area residents

(cumulated flows in EUR billions)



Sources: ECB SHSS (Securities Holdings Statistics by Sector), LSEG (London Stock Exchange Group) Data & Analytics, ECB calculations.

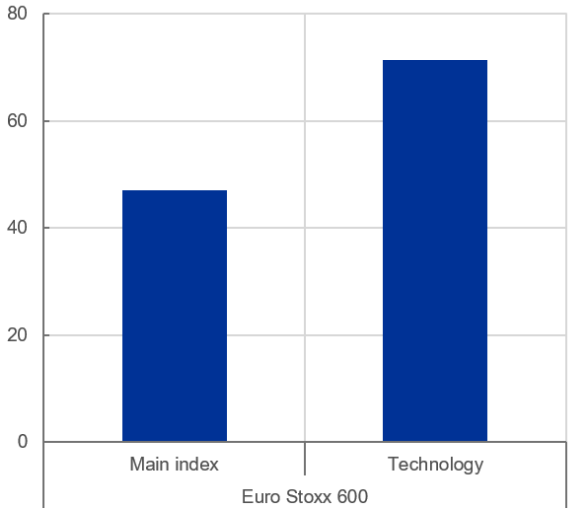
Notes: The sectoral breakdown is obtained using information from LSEG Data & Analytics on the firms issuing the shares whose International Securities Identification Number (ISIN) is identified in SHSS data. “Other sectors” includes academic and educational services, basic materials, financials, healthcare, institutions, associations and organisations, real estate, energy, industrials, utilities and consumer. The latest observations are for the second quarter of 2026.

Chart 8

Performance of European AI-related stocks since January 2023

a) Performance of European stock market indices since January 2023

(percentages)



b) Stock performance and financial metrics of Euro Stoxx 600 firms by AI intensity since January 2023

(lower right panel: EUR; other panels: percentage points)



Sources: Bloomberg, LSEG (London Stock Exchange Group) and ECB calculations.

Notes: Chart 8a shows stock market returns since 2 January 2023, in percentages in euro after adjusting for exchange rate movements, of the S&P500 and Euro Stoxx 600 indices, the subindices S&P 500 Information and Technology excluding Magnificent 7, Magnificent 7 and Euro Stoxx 600 Technology. Magnificent 7 firms comprise: Alphabet (Google), Amazon, Apple, Meta Platforms, Microsoft, NVIDIA and Tesla. Chart 8b shows stock market returns since 2 January 2023 in percentage points of value-weighted portfolios of Euro Stoxx 600 firms sorted by their AI classification. AI intensity groups are based on OECD methodology (for details, see "A sectoral taxonomy of AI intensity", *OECD Artificial Intelligence Papers*, No 30, December 2024). The classification comprises three AI intensity groups: high, medium and low, based on sectoral quartile allocations across four indicators: 1. AI human capital; 2. AI innovation; 3. Barrier-adjusted AI exposure; and 4. AI use. A sector is classified as high if it ranks in the top quartile for at least two indicators and not in the bottom quartile for the remaining two, and as low if it ranks in the bottom quartile for at least two indicators and not in the top quartile for the remaining two. Sectors such as IT services, media, telecommunications, finance and scientific research and development are classified as high-intensity, while food products, textiles, wood and paper, construction and hospitality are low-intensity. Sectors falling outside these criteria are classified as medium AI-intensive. The latest observations are for 20 October 2026.

US firms (especially the hyperscalers building out the AI infrastructure) have been large-scale issuers of euro-denominated bonds (reverse Yankees). So far, the available data show that purchases by European investors of euro-denominated bonds issued by US firms have increased alongside a decline in their purchases of US Treasury bonds (Chart 9a).[8]

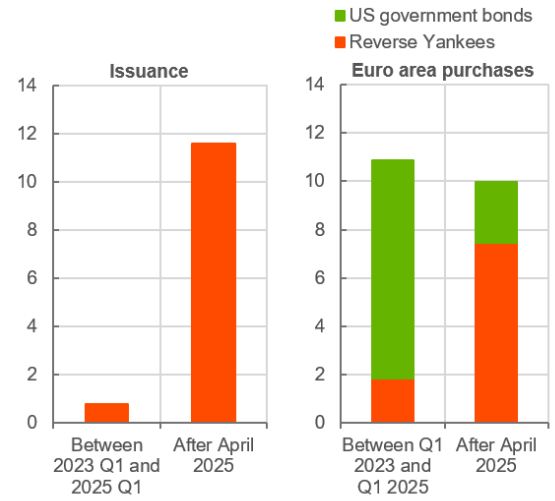
The AI boom has also led to large initial public offerings (IPOs), including the SpaceX IPO in the second quarter of 2026. In this context, euro area investors have stepped up their acquisitions of US equities, and at the same time they have lowered their purchases of other foreign equities (Chart 9b). Overall, these developments, together with analysis of credit spreads and the book-cover ratios of euro area corporate issuers and credit spreads, suggest only limited crowding-out up to now.[9]

Chart 9

Absorption of US AI issuance in the euro area

a) Issuance and absorption of reverse Yankees

(average of quarterly flows in EUR billions)

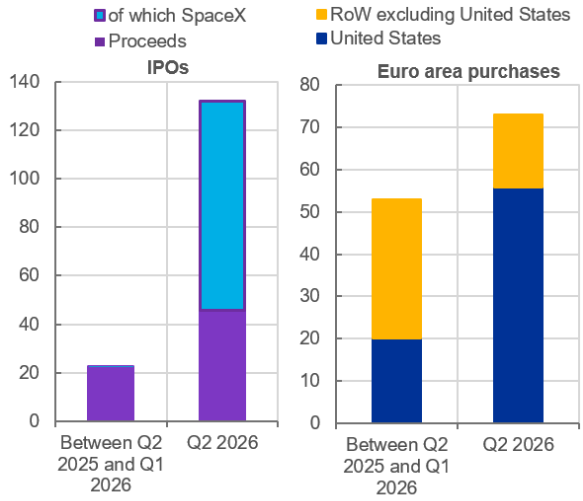


Source: ECB SHSS (Securities Holdings Statistics by Sector).

Notes: Reverse Yankees refer to euro-denominated bonds issued by US firms. Euro area purchases refer to the non-MFI sector. The latest observations are for the second quarter of 2026.

b) US IPOs and euro area purchases of foreign equities

(average of quarterly flows in EUR billions)



Sources: ECB SHSS (Securities Holdings Statistics by Sector)and Dealogic.

Notes: Euro area purchases refer to the non-MFI sector. “RoW” stands for rest of the world. The latest observations are for the second quarter of 2026.

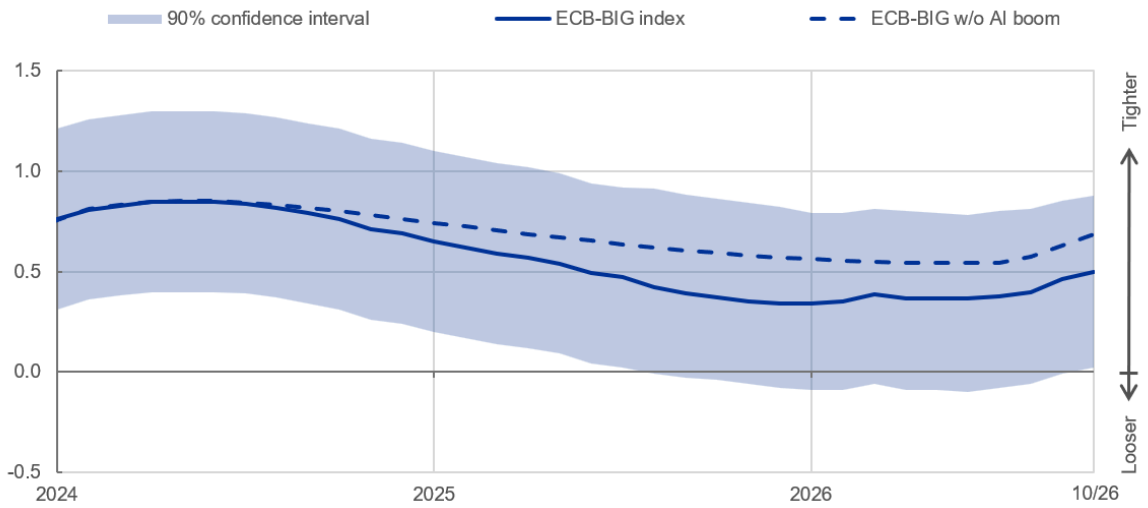
Finally, lending to AI-related firms has contributed substantially to aggregate credit growth. This is evident in Chart 10, which shows that the ECB Broad Intermediate Gauge (ECB-BIG) index would have indicated a tighter credit environment in the absence of AI-related lending. In response to a dedicated question in the October 2026 bank lending survey on the significance and impact of AI adoption, several banks indicated that they expect a gradual but sustained increase in loan demand to finance digital infrastructure, particularly data centres. Banks also reported that their current and prospective AI-related lending is more likely to target infrastructure providers rather than software developers or firms adopting AI, with this focus expected to become more pronounced over the coming months.

Chart 10

Effect of AI on intermediation conditions

ECB-BIG index

(index – higher means tighter intermediation conditions)



Sources: NL Analytics, PATSTAT (Patent Statistical Database), ECB, ECB projections database, Allayioti, Di Casola and Magistretti (2026) and ECB calculations.

Notes: The ECB Broad Intermediation Gauge (ECB-BIG) index uses a BVAR model with mixed-frequency. Price components include lending rates and the FCI; Quantity components include credit volumes and data from the bank lending survey. Shaded areas represent the 90 per cent confidence bands. The counterfactual assumes that the share of AI patents after June 2024 remained constant, conditioning only on the AI news shock. The latest observations are for October 2026.

I will now turn from aggregate trends to firm-level and household-level surveys on AI adoption before examining how AI is being funded by the financial system.

AI adoption

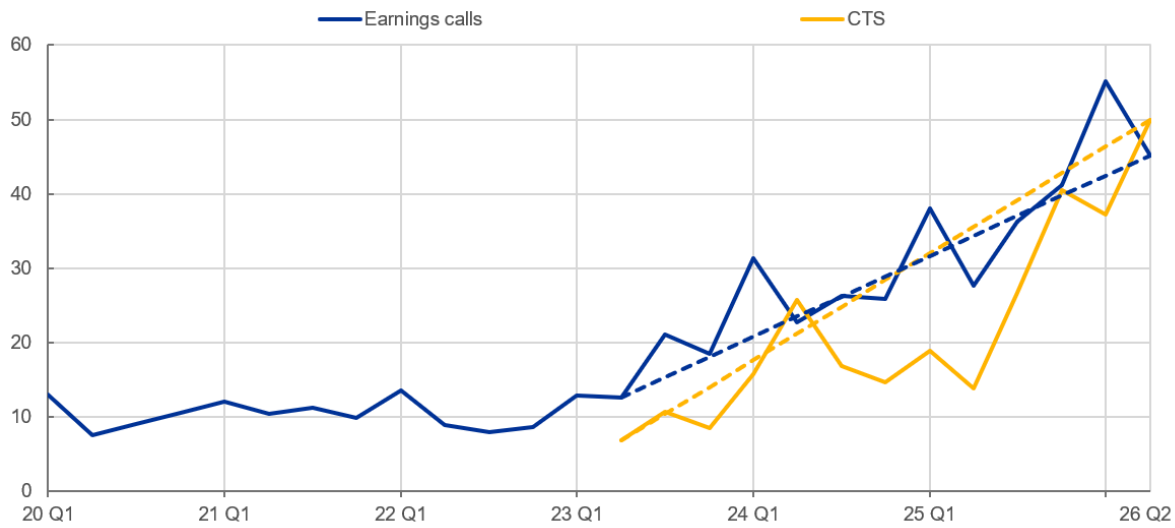
The pace of AI adoption by European firms has trended upwards since the launch of ChatGPT in late 2022. Chart 11 shows that the proportion of firms citing AI-related topics in earnings calls has expanded from about 10 per cent to about 40 per cent over this period. A similar pattern is evident in our Corporate Telephone Survey.

Chart 11

Alternative measures of AI adoption

Proportion of firms mentioning AI or related terms

(percentage of firms)



Sources: NL Analytics, Corporate Telephone Survey Team and ECB calculations.

Notes: CTS (Corporate Telephone Survey) refers to the proportion of euro area firms which mentioned “AI” during the call; Earnings calls refer to the quarterly average proportion of euro area firms which mentioned “AI”, “artificial intelligence”, “machine learning”, “large language models”, “LLM”, or alternatives during the earnings call. The dashed lines indicate the trend since the second quarter of 2023. The latest observations are for the second quarter of 2026.

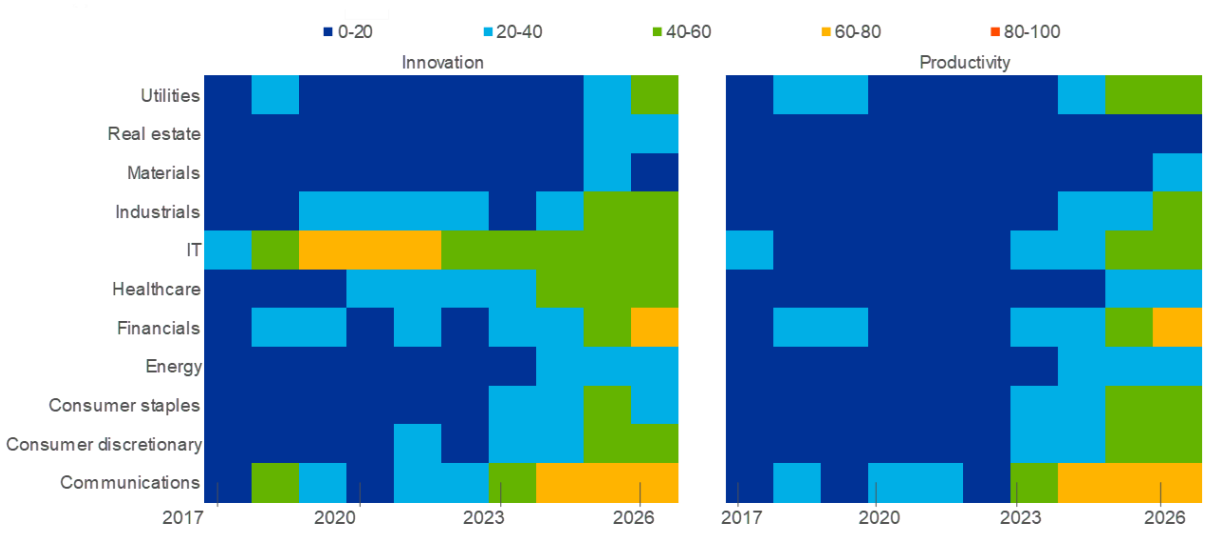
The earnings calls data show significant variation across sectors.[10] The left panel of Chart 12 shows that there has been an increase in the range of sectors in which firms frame AI as an innovation that expands the technology frontier. Although less widespread, there has also been an increase in the range of sectors in which AI is seen as potentially reducing costs by improving production efficiency (right panel).

Chart 12

AI adoption across the European economy

Share of Euro STOXX 600 AI-exposed companies by adoption type

(percentages)



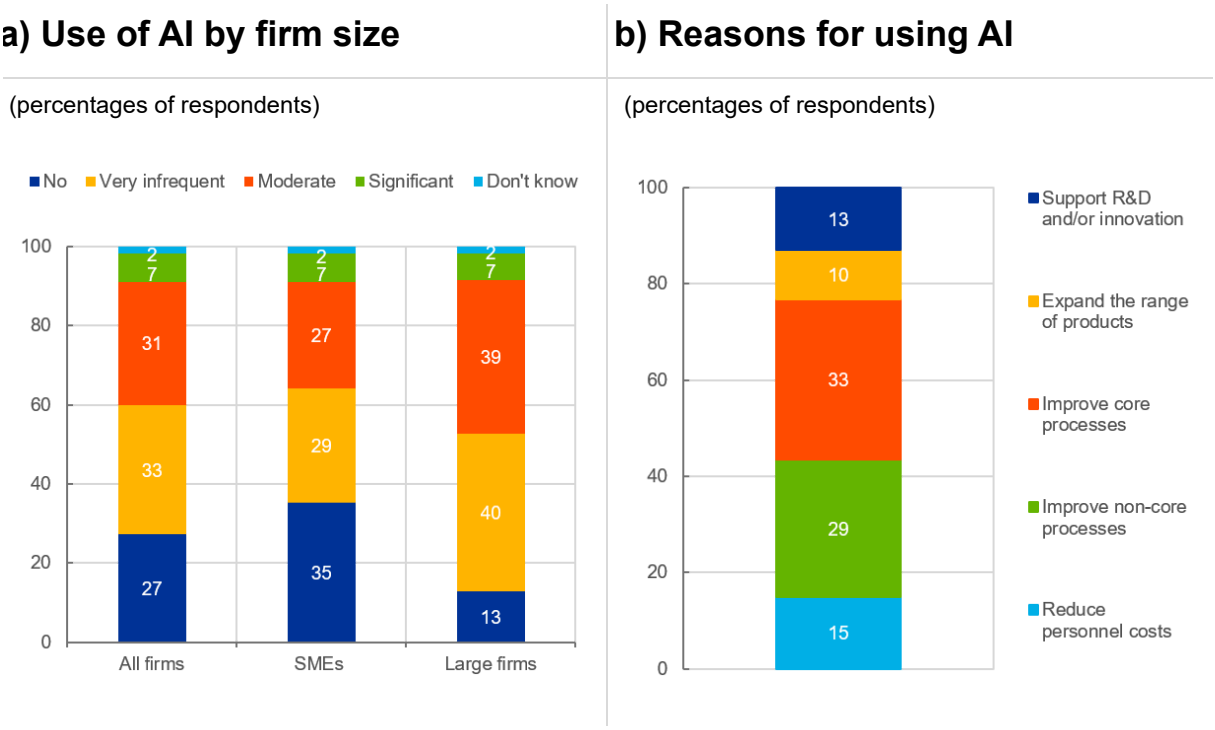
Sources: LSEG (London Stock Exchange Group) and ECB calculations.

Notes: The sample covers all Euro STOXX 600 constituents from the first quarter of 2017 to the second quarter of 2026. The chart shows, for each Global Industry Classification Standard (GICS) sector, the annual share of firms whose earnings calls mention AI in connection with innovation and growth (left panel) or productivity and efficiency (right panel), according to the classification introduced in Ferrari, I., Groß, J., Schupp, F. and Steffensen, S. (2026), "AI Exposure and the Costs of Market-based Financing in Europe: Evidence from Earnings Call Transcripts", mimeo. Figures for 2026 are based on the first two quarters of the year. The latest observations are for the second quarter of 2026.

While the earnings calls data cover publicly listed firms, our Survey on the Access to Finance of Enterprises (SAFE) is a large-scale survey that covers both large firms and small and medium-sized enterprises (SMEs).[11] In the fourth quarter of 2025 most firms participating in the SAFE reported that they were using AI: 64 per cent of firms said they were using it either experimentally or moderately, while only 7 per cent of firms reported that their use was "significant" (Chart 13).[12] In terms of the reasons to use AI, 62 per cent cited improving business processes and 23 per cent cited innovation, research and development or expanding their range of products, while just 15 per cent cited reducing labour costs.

Chart 13

AI use and reasons for adopting or not adopting AI in the euro area



Sources: ECB SAFE (Survey on the Access to Finance of Enterprises) and ECB calculations.
Notes: Chart 13a shows the weighted share of firms by the intensity of AI use, for all firms, by size class. Chart 13b shows the weighted share of firms by reasons for using AI. For the chart 13b, the base is firms which use AI very infrequently, moderately or significantly. The latest observations are for the fourth quarter of 2025.

The round of the SAFE survey conducted in the fourth quarter of 2025 also ran a field experiment to test whether planned AI investment by a firm responds to perceived competitive pressure from domestic peer firms and foreign peer firms.[13] Chart 14a shows that firms underestimate the rate of AI adoption by their peer firms, with most firms underestimating the share of competitors that have invested in AI, some by as much as 50 percentage points.

The results of the field experiment indicate that providing information about the AI investment plans of their peers makes firms change their beliefs. In the field experiment, half of the firms were randomly told the true share of peers investing in AI, at home and abroad. These firms revised up their beliefs about the share of peers investing in AI, by 4.3 percentage points for domestic competitors and 3.3 percentage points for foreign competitors.

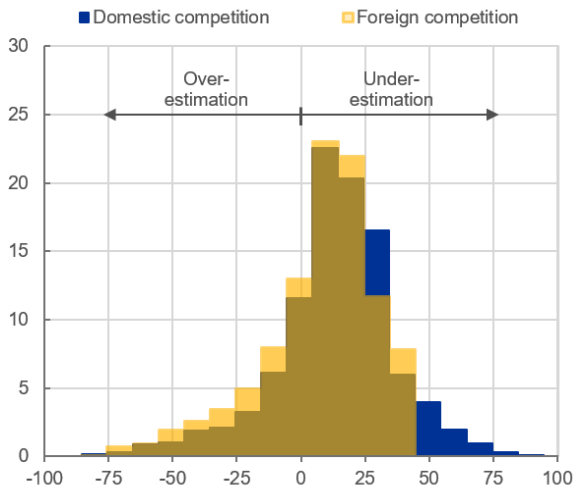
Chart 14b shows a striking asymmetry: firms plan more AI investment when they expect more domestic peers to invest, whereas beliefs about the AI investment plans of foreign firms have no effect. The impact of domestic competition is sizeable: a 1 percentage point increase in the expected share of domestic firms undertaking AI investment raises their own expected AI investment rate by about 0.6 percentage points. That is a marked increase, given an average expected AI investment rate of 8.3 per cent.

Chart 14

Perception of firms' AI adoption and effects of competition on investment

a) Misperception about AI adoption by competitors

(percentage points)

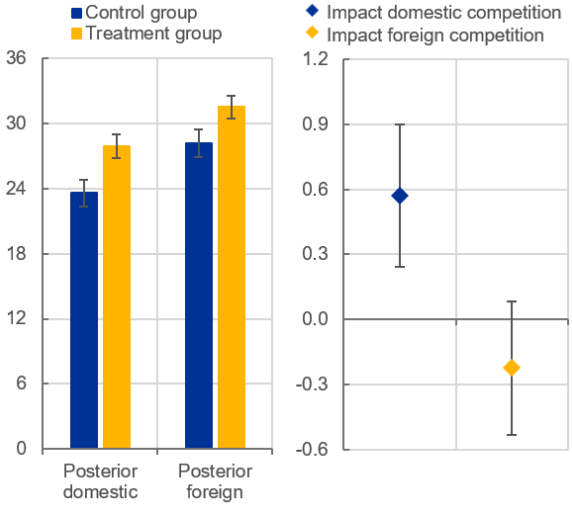


Source: Baumann et al. (2026).

Notes: The chart shows the distribution of the difference between the actual share of firms investing in AI and firms' perceived adoption rates by domestic and foreign competitors up to June 2025 as indicated by firms, before receiving information on the true share of competitor firms investing in AI. A positive difference between the true share of firms investing and firms' prior beliefs indicates underestimation. The latest observations are for December 2025.

b) Impact of competition on own future AI investment

(left panel: percentages; right panel: percentage points)



Source: Baumann et al. (2026).

Notes: The left panel shows how firms update their beliefs about the share of domestic and foreign competitors investing in AI over the next twelve months, after receiving information on the true share of domestic/foreign competitors which invested in AI until June 2025. The right panel shows the impact of domestic and foreign competition on firms' own expected AI investment rate. The dependent variable is firm-level expected AI investment as a share of total investment, taking a value between 0 and 100. The latest observations are for December 2025.

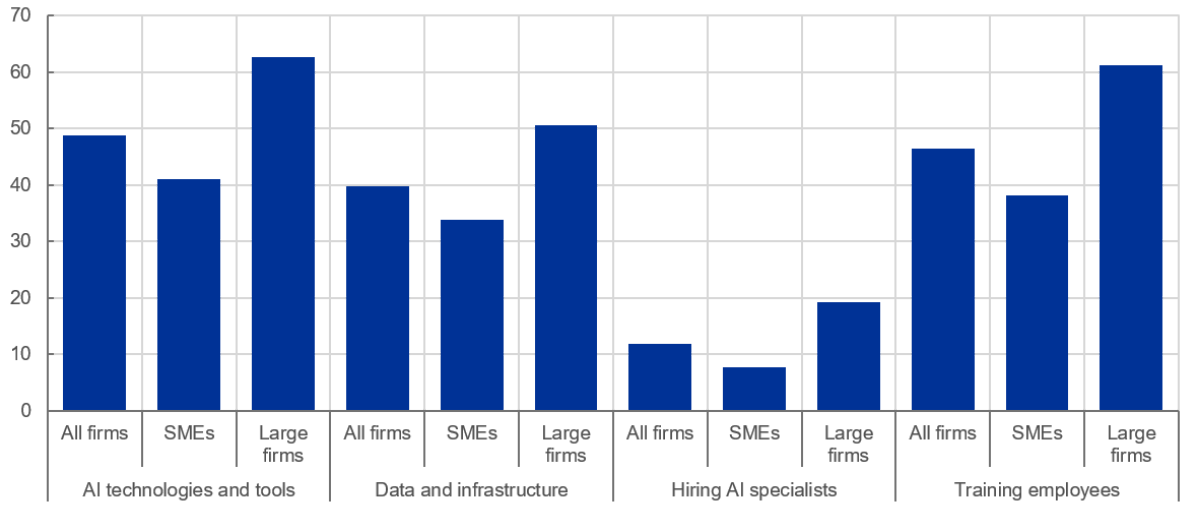
According to the round of the SAFE survey conducted in the second quarter of 2026, among firms planning AI-related investment over the next twelve months, most expect to invest in AI-related technologies and tools, as well as in employee training. Firms were allowed to indicate multiple types of expected AI-related investment: 49 per cent plan to invest in AI technologies and tools (e.g. software licences), 46 per cent in training employees, 40 per cent in data and infrastructure, and 12 per cent in hiring AI specialists. Investment patterns are broadly similar across firm sizes, although the shares are consistently higher for large firms than for SMEs across all investment types.

Chart 15

Types of expected AI investment

Types of expected AI investment, by firm size

(percentages of respondents)



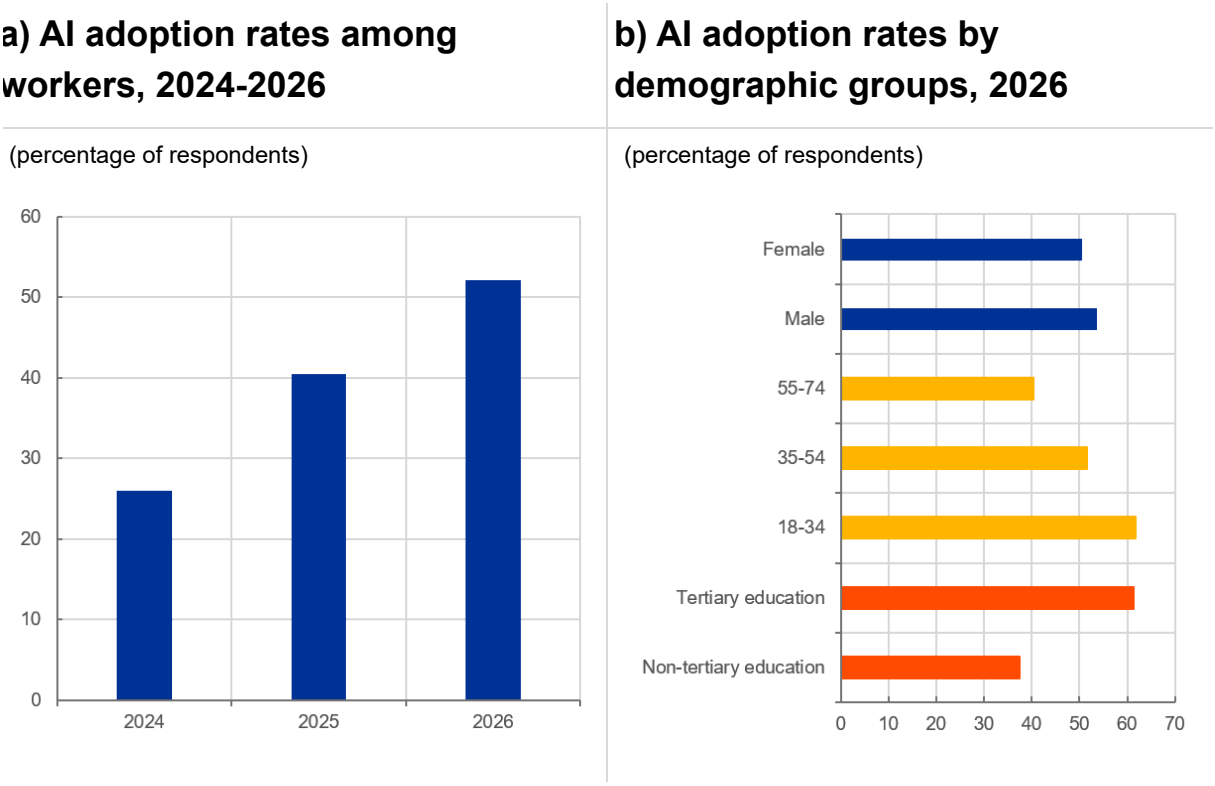
Sources: ECB SAFE (Survey on the Access to Finance of Enterprises) and ECB calculations.

Notes: The chart shows the weighted share of firms by the type of expected AI investment over the next 12 months, for all firms and by size class. The latest observations are for June 2026.

Turning to AI adoption by workers, our Consumer Expectations Survey (CES) asks households on a regular basis about AI usage in the workplace. According to the CES, the proportion of workers using AI has doubled over the last two years, with 52 per cent now reporting that they use AI at work, compared with 26 per cent in 2024 (Chart 16a).[14] Adoption rates are higher for younger and more educated workers (Chart 16b).[15]

Chart 16

AI adoption rates in the euro area



Sources: CES (Consumer Expectations Survey) and ECB calculations based on the earning calls database.
Notes: The chart shows the share of employed workers reporting the use of AI in their work. The question reads: “Do you personally use artificial intelligence (including a large language model, such as ChatGPT or Gemini) in your work?”

Chart 17a reports the time saved by workers on a range of tasks. The median working user reports saving three hours per week, or about 7.7 per cent of median working time.[16] However, the distribution is highly skewed: most users enjoy only moderate time savings, while a small number report very high efficiency gains. Generating or debugging code yields the largest gains, at six hours per week, although only around 15 per cent of workers use AI for this purpose. A similar pattern emerges for data analysis, automation of routine tasks and creating audio or visual content. By contrast, research, information gathering, writing and text editing are among the most frequently cited uses. Yet time savings reported for these tasks are considerably lower than for more technical tasks such as coding.

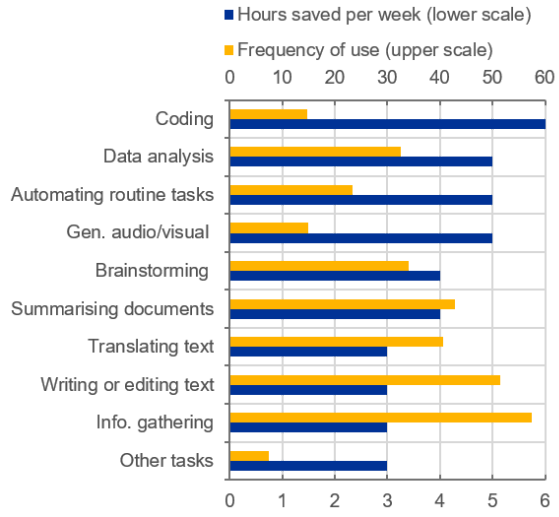
In most professions, workers do not see perceived efficiency gains as a threat to their jobs (Chart 17b). The occupations that have the highest adoption rates tend to save the most hours and have more positive views of AI. For example, managers use AI the most, save the most time and ultimately have the most positive perception of the technology; this places them in a good position to help steer AI adoption in the workplace.[17]

Chart 17

AI at the workplace and hours saved

a) Tasks performed with AI and hours saved per week

(upper scale: percentage of workers using AI; lower scale: median number of hours per week)

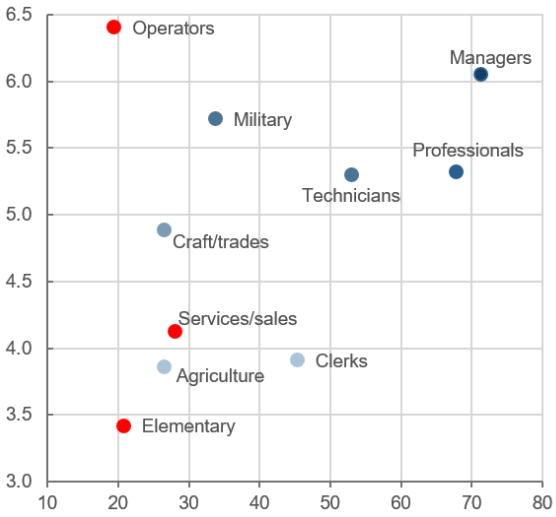


Source: Dias da Silva, A., Lebastard, L. and Sondermann D. (2026), "AI adoption and the productivity promise: what workers report", *The ECB Blog*, ECB, 26 August.

Notes: The chart combines two survey questions: (i) "In a typical week last month, how many additional hours do you think you would have needed to complete the same amount of work without using artificial intelligence (AI)?" and (ii) "For which of the following tasks do you typically use artificial intelligence (AI) in your work?". Time saved per task represents the average total weekly hours saved by workers who reported using AI for that specific activity. Respondents can select multiple tasks, and those who reported saving significant time with AI are more likely to choose a greater number of tasks, which mechanically inflates the average hours saved.

b) Hours saved, adoption and sentiment about AI across occupations

(x-axis: percentage of workers; y-axis: number of hours saved per week)



Source: Dias da Silva, A., Lebastard, L. and Sondermann D. (2026), "AI adoption and the productivity promise: what workers report", *The ECB Blog*, ECB, 26 August.

Notes: Dot colours represent net sentiment about the impact of AI on jobs, with red representing net negative sentiment and shades of blue indicating a scale of positive sentiment, with the highest net positive being dark blue. The chart contains information about three survey questions, (i) "In a typical week last month, how many additional hours do you think you would have needed to complete the same amount of work without using artificial intelligence (AI)?", (ii) "Do you personally use artificial intelligence (AI) in your work (including tools such as ChatGPT, Claude, Gemini, etc.)?" and (iii) "Do you think that technological advancements (e.g. the increasing use of artificial intelligence, large language models, automation) will affect your current job or employment prospects in the next five years?".

Chart 18a shows that employment perceptions are net positive for all education levels and all demographic groups, with the most positive beliefs among the younger, more educated workers. Chart

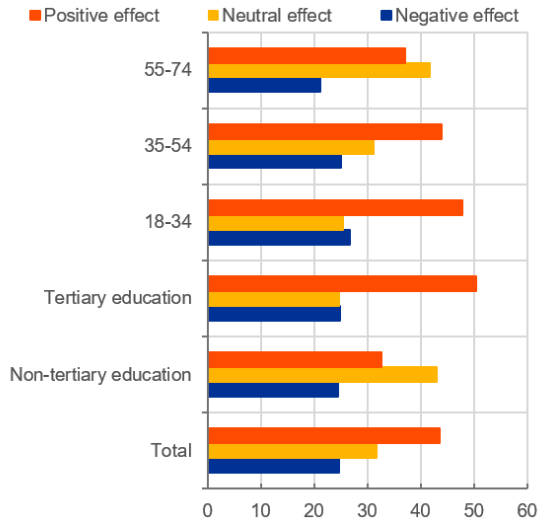
18b shows that employment perceptions are net positive for all economic sectors but that the share reporting negative perceptions is highest for professional services and financial services.

Chart 18

Employment perceptions by demographic group and sector

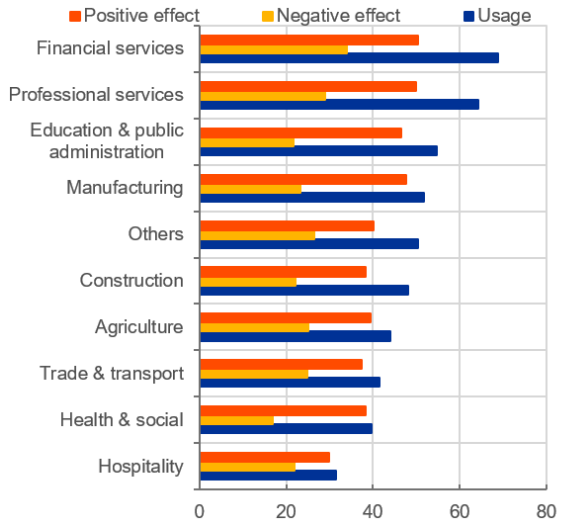
a) Employment perceptions by demographic group

(percentage of respondents)



b) Usage and perceptions by sector

(percentage of respondents)



Source: ECB CES (Consumer Expectations Survey).
Notes: 2026 data. The question reads “Do you think that technological advancements (e.g. the increasing use of artificial intelligence, large language models, automation) will affect your current job or employment prospects in the next five years?” with three possible answers: a) Yes, they will affect me positively (e.g. by increasing my productivity and/or improving my employment prospects); b) Yes, they will affect me negatively (e.g. by making my job less necessary and/ or worsening my employment prospects); and c) No, they will not affect me at all. The perceptions shown in Chart 18b exclude workers who expect no effect of technological advancements (such as AI or automation) on their current or future employment prospects. Perceptions are reported for all workers independently of their AI usage.

This sectoral ranking is broadly consistent with task-based calculations of occupational AI exposures (Chart 19a).[18] To illustrate the possible economic impact of a global increase in productivity in the IT sector (where the time savings from AI are greatest), Chart 19b reports a model-based simulation of a 30 per cent increase in productivity.[19]

Chart 19 shows the euro area in 2030, five years after the shock. The overall result is that a productivity gain concentrated in one small industry lifts real wages across the economy, but the jobs lost are concentrated in that industry and among the workers whose tasks it replaces. The IT sector shows 4.4 per cent fewer jobs but a 4.3 per cent increase in real wages. In the model, the rise in sectoral

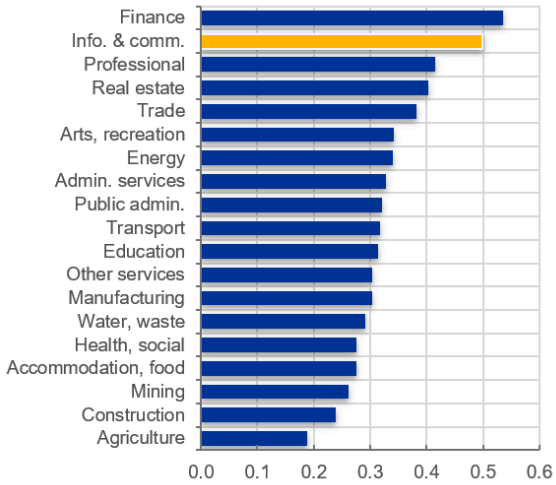
productivity triggers a relative price decline of about one third, with relative demand rising by 28 per cent. Employment of clerical workers outside the IT sector also declines (0.9 per cent fewer jobs) but their real wages increase (3.2 per cent). For managers, professional and technicians outside the IT sector, there is no change in employment and a 4.4 per cent increase in real wages. These workers are complements to IT inputs (elasticities 0 to 0.5): cheaper IT raises what they can do rather than replaces them. Finally, manual and service workers see no change in jobs while their real wages rise by 5.4 per cent. These workers are not directly affected by IT; they gain through higher demand and lower prices. The headline macroeconomic picture is an increase of 3.8 per cent in euro-area output by 2030 (4.1 per cent in the long run) and a 5.5 per cent increase in consumption in the long run.[20]

Chart 19

Impact of GenAI exposure on wages and employment in the euro area

a) Estimated GenAI exposure score per euro of pay

(exposure score of an average euro of pay in each industry; 0 = AI cannot do any part of the job, 1 = the whole job; 2023)

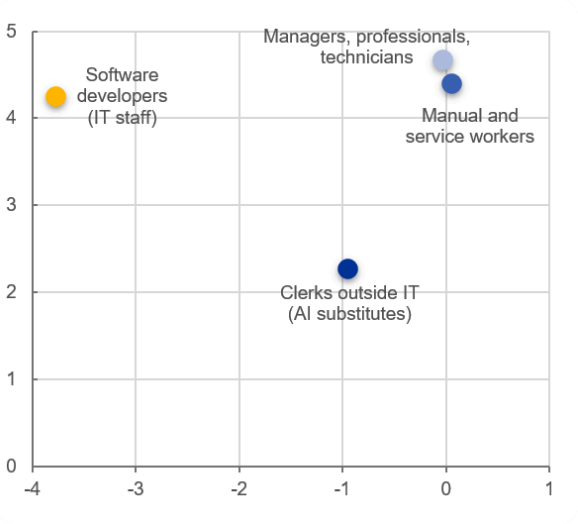


Sources: Gmyrek et al. (2025), ILO Working Paper 140; Eurostat Structure of Earnings Survey and national accounts; US Bureau of Labor Statistics Occupational Employment and Wage Statistics (occupation by industry); ECB staff calculations.

Notes: ILO task-based exposure scores of 427 detailed occupations, placed in industries with US occupation-by-industry data and weighted by earnings by occupation in each euro-area country and industry in 2023. The euro-area average is 0.34. Yellow: information and communication, the section that contains the IT services (J62-63) and which is shocked in the simulation.

b) Response of real wages and hours worked to a 30 per cent TFP shock in IT services by 2030

(x-axis: percentage change employment; y-axis: percentage increase real wage)



Sources: MANKIO model simulations (Rubbo, Osbat et al., forthcoming); shock size from Blumenfeld et al. (2026).

Notes: 30 per cent total factor productivity gain in IT services (NACE J62-63) in every country, unanticipated and near-permanent. Software developers are all staff of the IT services industry; clerks, managers/professionals/technicians and manual/service workers are the same International Standard Classification of Occupations (ISCO) groups outside IT.

In terms of barriers to AI adoption by workers, one-third of respondents explain that they do not use AI because it is irrelevant for their current tasks (Chart 20a). Other respondents prefer traditional methods or are discouraged by accuracy and reliability concerns, or a lack of provision from their employer. More broadly, Chart 20b shows that a substantial share of workers simply expresses no appetite for the technology: 41 per cent are uninterested in using AI (34 per cent of managers). When asked what would encourage them to adopt AI, around half of all workers point to better training on using AI tools

and a better understanding of the usefulness of AI. Employers appear to be responding to some of these needs. About half of firms plan to invest in AI training over the next 12 months (according to the latest SAFE survey wave), directly addressing the barrier most frequently cited by workers. Conversely, this means that around half of firms are not investing in AI training – this is possibly also affected by one-third of managers not being interested enough in AI.

Chart 20

Barriers to AI use at the workplace and solutions

a) Barriers to using AI

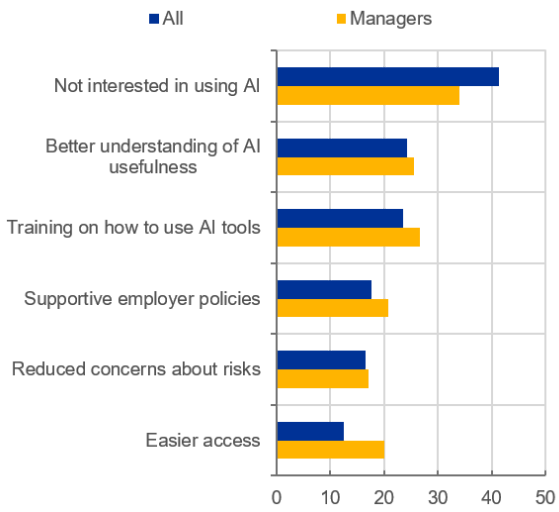
(percentage of workers)



Source: Dias da Silva, A., Lebastard, L. and Sondermann D. (2026), "AI adoption and the productivity promise: what workers report", *The ECB Blog*, ECB, 26 August. Note: "What are the reasons why you are not using artificial intelligence (AI) in your work?"

b) Incentives for using AI

(percentage of workers)



Source: Dias da Silva, A., Lebastard, L. and Sondermann D. (2026), "AI adoption and the productivity promise: what workers report", *The ECB Blog*, ECB, 26 August. Note: "What factors – if any – would encourage you to start using artificial intelligence (AI) tools in your work?"

The financing of AI

In this section, I report on how the European financial system has responded to the funding needs associated with AI-related activity, together with the impact on financial market pricing.[21]

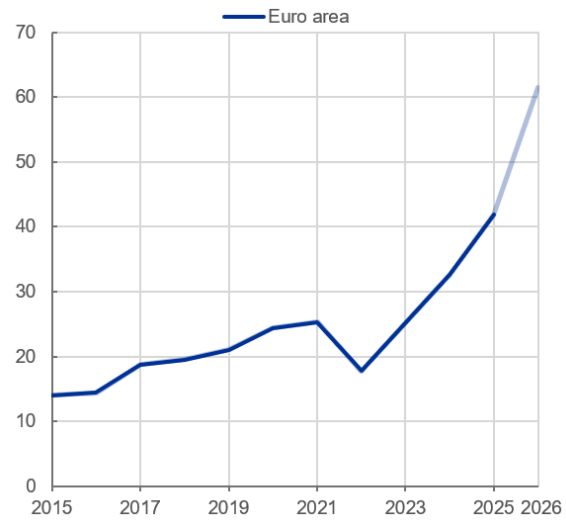
Chart 21 shows that there has been a step up in venture capital financing of AI, with AI now accounting for the majority of new originations. At the same time, venture capital is only relevant for a small set of firms: most firms rely on internal funding, while the most popular sources of external funding are bank loans and leasing arrangements (Chart 22).[22]

Chart 21

Venture capital and AI in the euro area

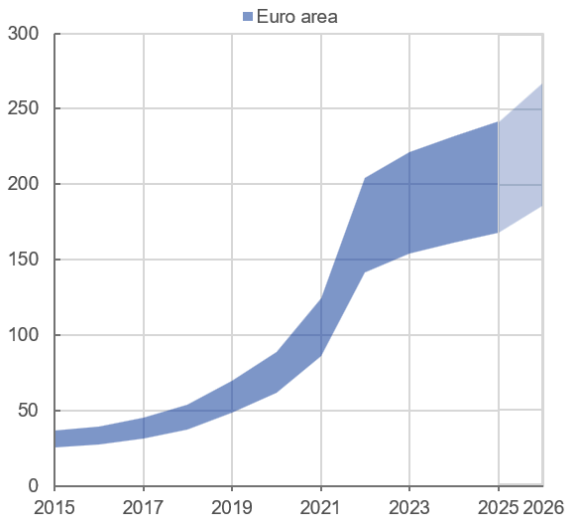
a) Share of AI-related financing in venture capital

(percentages of yearly flows of new originations)



b) Venture capital outstanding

(EUR billions)



Sources: Pitchbook and ECB calculations.

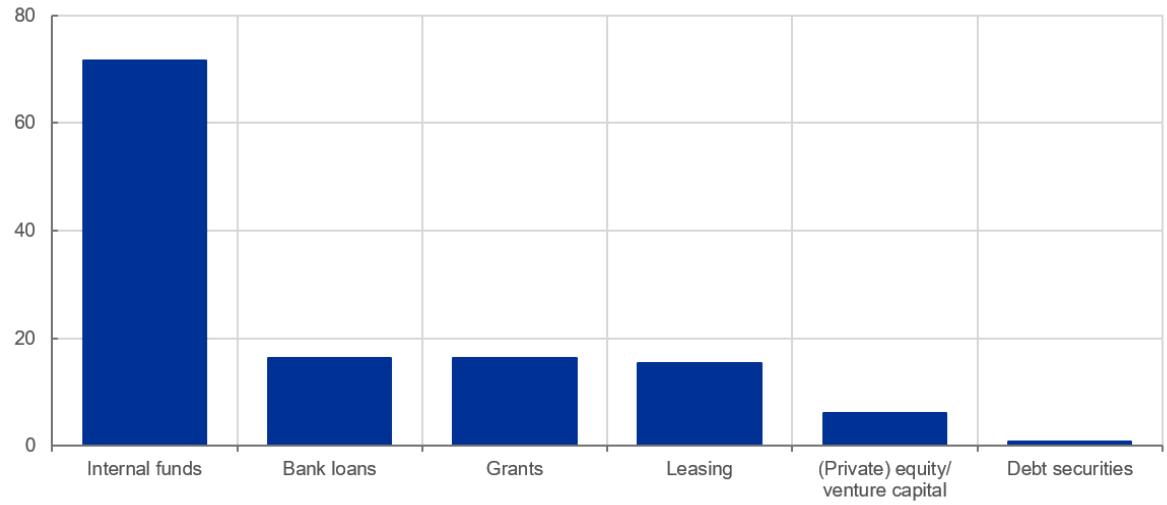
Notes: In Chart 21a, AI-related originations are defined as a transaction where the financed company's products, services or industry are associated with AI and machine learning. In Chart 21b, the bands reflect different assumptions for the repayment or transfer of the instruments based on the distribution of available information. The data are aggregated at annual frequency to year-end values. The year-end value for 2026 is shaded because it is linearly interpolated with data up to 30 September 2026. The latest observations are for year-end 2026.

Chart 22

Financing mix and types of AI investment

Types of financing sources for AI investment, for all firms

(percentages of respondents)



Sources: ECB SAFE (Survey on the Access to Finance of Enterprises) and ECB calculations.

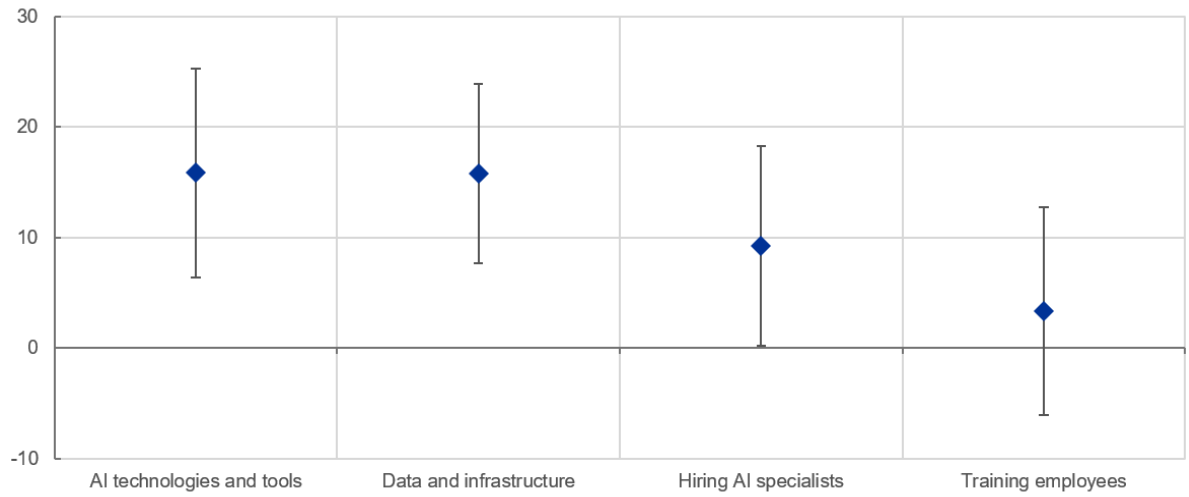
Notes: The chart shows the weighted share of firms by the type of financing sources for planned AI investment over the next 12 months, for all firms. The latest observations are for June 2026.

A comparison of the AI financing plans of firms within the same country, industry and size class indicates that more tangible investment tilts financing towards external sources (Chart 23). The use of external finance for AI appears to hinge on the tangibility of the underlying investment: assets that are pledgeable or collateralisable attract external funding, whereas more intangible expenditures are financed internally. Investments in hardware and data infrastructure typically require large upfront capital outlays that exceed available internal cash flow while providing pledgeable collateral, prompting firms to seek complementary external funding. In contrast, employee training represents a smaller, more incremental and intangible expense that firms can more readily finance out of retained earnings. Overall, the findings highlight the importance of collateral in securing external financing. This pattern may also point to a potential financing gap for intangible investments, which are critical for building long-term AI capabilities.

Chart 23
AI investment financing

External finance and expected AI investment types

(percentage points)



Sources: ECB SAFE (Survey on the Access to Finance of Enterprises) and ECB calculations.

Notes: The chart shows marginal effects from a logit regression of external sources of finance on the types of expected AI investment captured in the survey, controlling for firm size, industry and country. The outcome variable is 1, if the firm uses any type of external finance besides internal funds. The latest observations are for June 2026.

Firms that prioritise internal funds for AI may need external financing for other operational needs. To explore these dynamics, Chart 24 examines the financing choices of firms since the launch of ChatGPT in late 2022, comparing them with the preceding period. Chart 24a shows that firms in high AI-exposed sectors tend to rely more on internal funds and credit lines than firms in low-AI exposed sectors, although the differences are not very large: 32 per cent of firms in high-AI exposure sectors reported having used internal funds and 22 per cent credit lines, compared with 29 per cent and 19 per cent of those in low-AI exposure sectors. The result for credit lines aligns with recent findings from the United States where banks play a key role in facilitating AI adoption by providing liquidity through credit lines. [23] High AI-exposed firms also report having issued more equities and debt securities, even if these market-based instruments are not widely used overall among firms in the SAFE sample. Bank loans remain a common source of external finance (19 per cent of firms), with no significant differences across sectors based on AI exposure.

Since late 2022, firms in high AI-exposure sectors have shown a relative increase in their use of credit lines, bank loans and debt securities compared with those in low AI-exposure sectors (Chart 24b). Compared with the period before late 2022, the share of firms in high AI-exposed sectors using bank

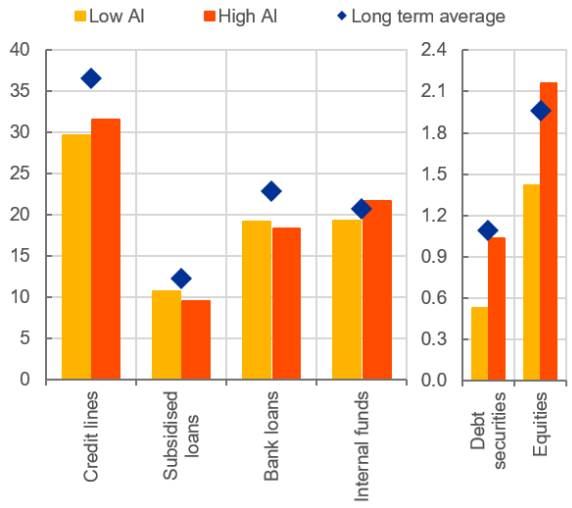
loans rose by 1.8 percentage points more than that of firms in low AI-exposed sectors. The corresponding relative increases are 1.7 percentage points for credit lines and 0.5 percentage points for debt securities. Among SMEs, there is also a rise in the reported use of subsidised loans. These developments indicate a shift towards debt financing for firms in the sectors most affected by AI.

Chart 24

AI exposure and the overall funding structures of euro area firms

a) Share of firms using financing instruments by AI exposure since fourth quarter of 2022

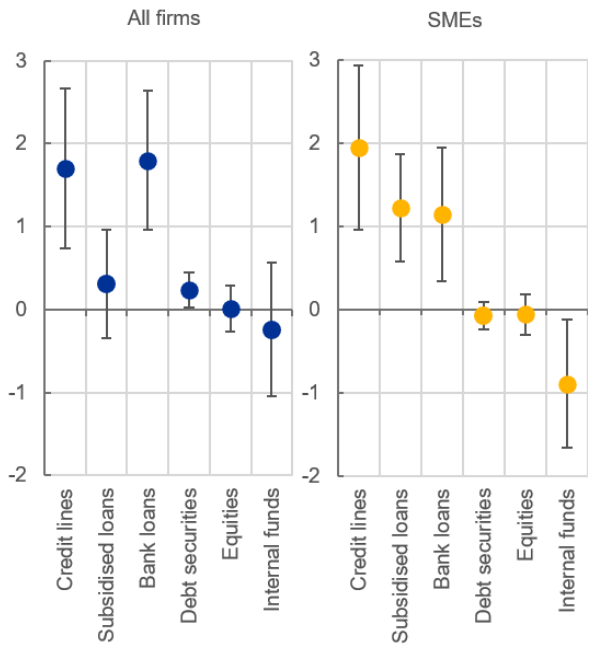
(percentages of respondents)



Sources: ECB SAFE (Survey on the Access to Finance of Enterprises) and ECB calculations.
Notes: The chart shows the share of firms using the financing instruments based on their size, sector and country, by the AI exposure as defined in footnote 3. The “Bank loans” bars indicate no statistically significant difference between the averages for low and high AI firms. The long-term average refers to the period between the second quarter of 2014 and the third quarter of 2026. The latest observations are for the third quarter of 2026.

b) Change in the share of firms using financing instruments after fourth quarter of 2022: high versus low-AI exposure sectors

(percentages of respondents)



Sources: ECB SAFE (Survey on the Access to Finance of Enterprises) and ECB calculations.

Notes: The chart shows the coefficient of the interaction term high AI with the dummy indicating past the fourth quarter of 2022 in a regression of use of financing instrument on high AI, time, and firm size, sector and country. Blue dots indicate that the sample of the regression include all firms, yellow dots only SMEs. The latest observations are for the third quarter of 2026.

Turning to bond pricing, Chart 25a (left panel) shows that AI-exposed non-financial firms in the STOXX Europe 600 exhibit lower option-adjusted spreads than their non-exposed counterparts, although this pattern has reversed somewhat recently. In particular, both the median and interquartile range of spreads for AI-exposed firms have shifted downward in most years of the sample period. Concurrently, these firms have issued a larger share of bonds with maturities exceeding ten years, whereas non-exposed issuers exhibit a greater concentration of bonds at intermediate maturities.

Checking for credit risk (Expected Default Frequency, leverage, profitability and size), bond characteristics and bond fixed effects, AI exposure is estimated to correspond to around 5 basis points tighter spreads (Chart 25a, right panel). This combination of lower spreads and longer maturities suggests more favourable debt financing conditions for AI-exposed firms, since longer maturities would typically be associated with higher spreads in the absence of such advantages. Taken together, these results indicate a modest but robust relation between AI exposure and a lower market-implied cost of debt financing.

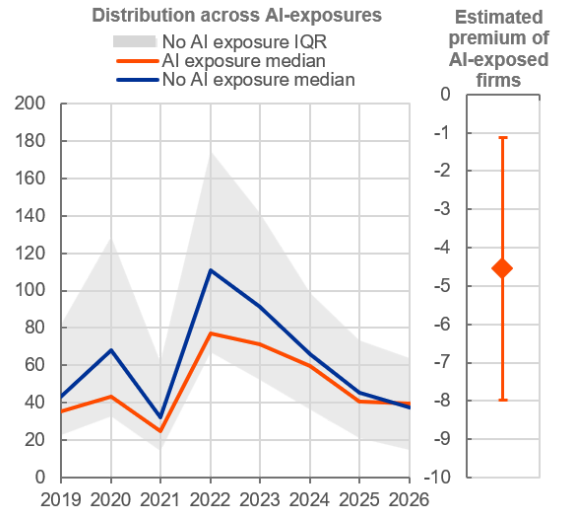
In relation to the equity market, AI-exposed firms recorded higher median annual stock returns than non-exposed firms in most years of the sample (Chart 25b, left panel). The upper part of the return distribution is also generally shifted upwards, suggesting that AI exposure has been associated not only with higher typical returns but also with some strong outperformers. AI-exposed firms also tend to trade at higher price-earnings ratios, consistent with investors assigning higher valuations to their expected future earnings and, potentially, with a longer-duration equity profile. The evidence also points to a robust equity-return premium to AI exposure of around 1.3 percentage points per quarter (Chart 25b, right panel). This finding does not appear to be driven by the technology sector, as excluding firms from that sector leaves the estimates virtually unchanged, nor by sector-wide AI rallies, since the spread differential persists when AI-exposed issuers are compared only with peers in the same sector and quarter.[24]

Chart 25

Cost of market-based financing for AI-exposed firms

a) Cost of market-based debt and AI-exposure

(left panel: percentage points; right panel: basis points)

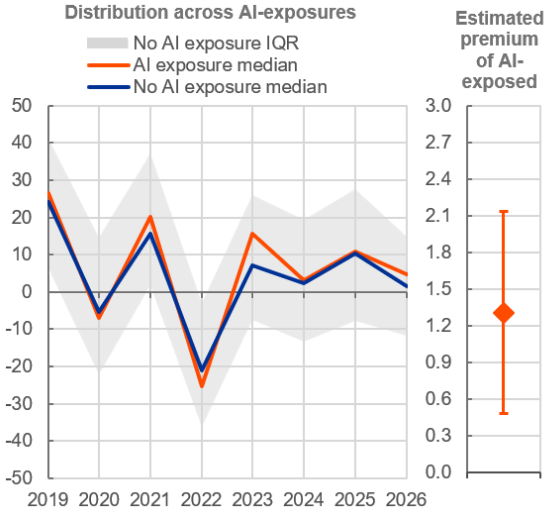


Sources: CreditEdge, ECB CSDB (Centralised Securities Database) and ECB calculations.

Notes: The left panel shows the annual median and IQR of the distribution of option-adjusted spreads (OAS) over the swap/LIBOR curve by issuer AI-exposure, identified via the LLM-based approach of Ferrari, I., Groß, J. Schupp, F. and Steffensen, S. for EUR bonds with 1–30y residual maturity, issued amount above €1mn, and OAS in (-100bp, 3500bp) (cf. Anderson-Cesa-Bianchi, 2024). The right panel shows the average bond spread premia related to AI mentions in quarterly earnings calls. The latest observations are for the second quarter of 2026.

b) Equity returns and AI-exposure

(percentage points)



Sources: Capital IQ, Bloomberg, LSEG (London Stock Exchange Group) and ECB calculations.

Notes: The left panel shows the annual median and IQR of the distribution of equity returns of STOXX Europe 600 constituents (year-over-year as of last trading days) by AI-exposure, identified via the LLM-based approach of Ferrari, I., Groß, J., Schupp, F. and Steffensen, S. The right panel shows the estimated average equity premia related to AI mentions in quarterly earnings calls. The latest observations are for the second quarter of 2026.

Turning to the banking sector, loans to euro area AI companies have been rising faster than loans to other sectors, although they still account for just under €200 billion. Banks allocate a relatively small share of their equity portfolio to AI companies outside of the euro area (the allocation to foreign AI firms in bank equity portfolios is below their market share in total global equities) (Chart 26a).[25] By contrast, banks overweight shares of euro area AI companies in their equity portfolios relative to their market share in the global equity basket, reflecting strong home bias in their equity holdings.[26] This is particularly evident in the holdings of “AI adopters” - a broad group of companies integrating AI technologies in their production processes across a wide range of economic activities. Similarly, euro

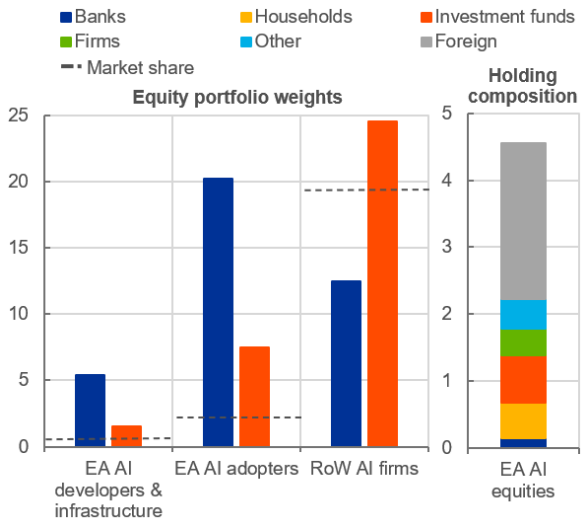
area bank exposures to AI firms via debt securities also remains contained and are mostly focused on euro area non-financial corporate bond issuers (Chart 26b).

Chart 26

Weight of AI in equity portfolios and banks' exposure

a) AI weights in euro area investors equity portfolios

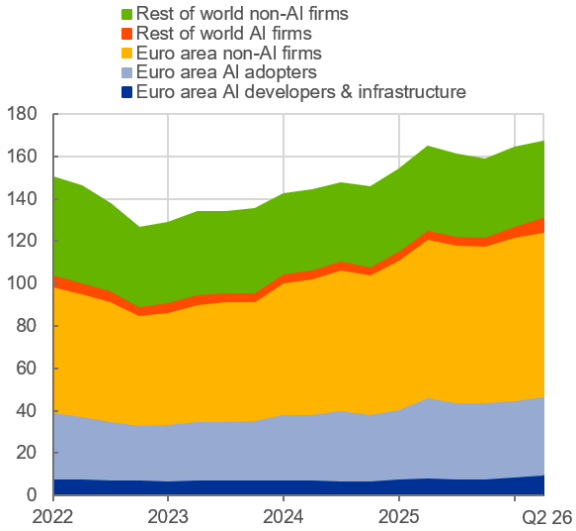
(left panel: percentages of AI stocks in equity portfolios; right panel: AI equities valuations in EUR trillions)



Sources: ECB (SHSS (Securities Holdings Statistics by Sector), RIAD (Register of Institutions and Affiliates Database)), Bloomberg, LSEG (London Stock Exchange Group), PATSTAT (Patent Statistical Database) and ECB calculations.
Notes: Rest of the world (RoW) AI firms constitute the bulk of the leading 200 global firms contributing to the AI boom (e.g. hyperscalers, data centres, semiconductors, AI financing ecosystem, AI labs, software companies and AI integrators). Left panel shows the weight of AI companies within total bank or investment fund equity holdings. Market shares represent the market value of AI companies in total equity market capitalisation. Right panel represents the total market capitalisation of EA (euro area) AI companies and splits it by holding sector. The latest observations are for the second quarter of 2026.

b) Bank exposure to AI in non-financial corporate debt securities

(EUR billions)



Sources: ECB (SHSS (Securities Holdings Statistics by Sector), RIAD (Register of Institutions and Affiliates Database)), PATSTAT (Patent Statistical Database) and ECB calculations.

Notes: The chart shows total holdings of NFC debt securities by euro area banks split by location. Debt securities are further split by issuer country and AI category. Rest of the world AI firms constitute the bulk of the leading 200 global firms contributing to the AI boom that have been compiled using a combination of LLM requests and manual reviews. The latest observations are for the second quarter of 2026.

The banking sector is itself a significant AI adopter. Banks are increasingly deploying AI technologies to enhance cost efficiency. An LLM contextual analysis of bank earnings calls reveals that bank

executives increasingly highlight their AI adoption plans in their interactions with investors (Chart 27a). Almost half of those references specifically focus on the potential benefits of AI in terms of cost optimisation and automation. More general remarks on broader AI adoption strategy are also mentioned relatively frequently. Mentions of the operational risk of cyber threat incidents in earnings calls remain more limited, standing in contrast with the evidence that banks are facing rising cybersecurity threats.

Fast-advancing AI is widening the set of operational risks to which banks are exposed (Chart 27b). The rapid advancement of AI models is creating new cybersecurity challenges for banks by exposing previously hidden vulnerabilities. While it is difficult to elicit the share of threats that is exclusively related to the use of AI models, IT, cybersecurity and related incidents are already rising, accounting for 10-12 per cent of all operational risk events in 2025, nearly double their incidence in 2018. Recent evidence shows that cyberattacks affecting payment systems can prompt banks to tap their liquidity reserves or increase central bank borrowing. Cyberattacks on small banks can also disrupt local banking markets, as depositors and customers may shift activity away from affected institutions. This highlights how cyber risk can amplify liquidity and funding pressures, particularly for banks with limited cyber resources. Cyber risk is only a part of a broader set of operational risks that banks are currently facing.

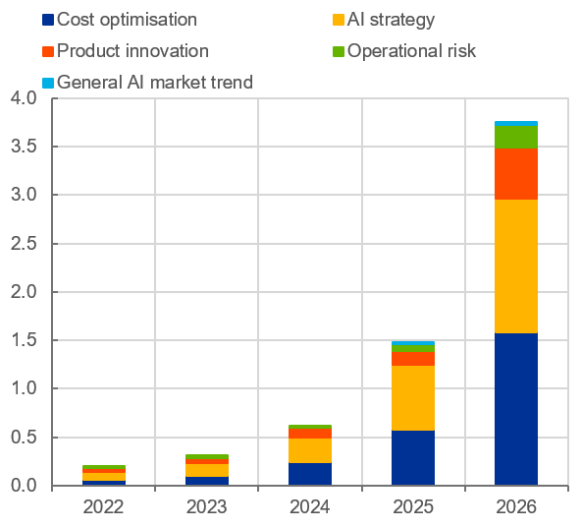
In general, losses from these risks remain contained, amounting to 0.9 per cent of aggregate capital in 2025. However, this masks substantial heterogeneity in the distribution of losses across significant institutions, with losses concentrated in tail events which may have repercussions for bank valuations, earnings expectations and, when large or interconnected institutions are hit, systemic risk.

Chart 27

Banks navigating AI adoption: cost optimisation amid growing cybersecurity risks

a) Mentions of AI topics in bank earnings call transcripts

(number of mentions per transcript)

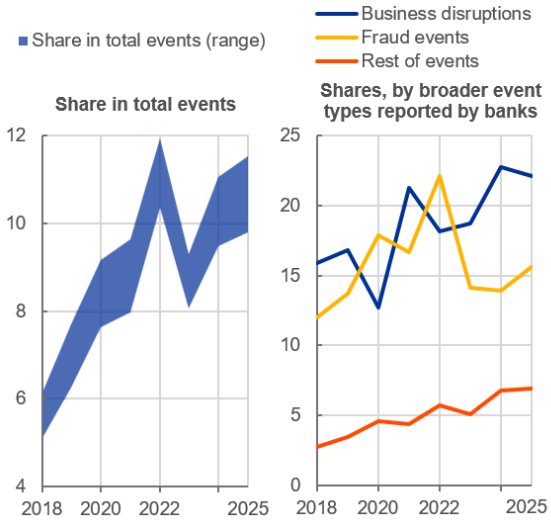


Sources: Capital IQ (earnings call transcripts) and ECB calculations.

Notes: 761 earnings call transcripts of 51 euro area banks are analysed with a large language model using a comprehensive prompt. The LLM identifies the mentions of AI and categorises them into five broad themes; statements can span multiple themes. The mentions include both positive and negative sentiment, including Q&A. The latest observations are for the second quarter of 2026.

b) Share of cyber security, IT and related incidents in large-loss operational risk events

(percentages)



Sources: ECB Supervisory Reporting and ECB calculations.

Notes: A sample of large-loss events related to operational risk. An LLM was used to guide the generation of cyber-related terms that help identify malicious cyber activity, related and unrelated system failures, security breaches, and attacks targeting customers, including fraud events. The lower bound of the range is the share of cyber-related events in total, while the upper part excludes from the denominator events for which no event description is available. The right panel shows the share of cyber-related events in broader event types, as reported by banks. The latest observations are for 2025.

Recourse to debt financing by AI firms in the euro area increased recently (Chart 28a). Internal estimates suggest that the AI boom accounts for around 0.9 percentage points of additional aggregate annual credit growth – about one quarter of the total credit growth as of the first quarter of 2026. As a result, even for AI developers – despite their greater need for equity finance – the incremental source of funding used to expand their operations over the last year has been in the form of debt. As is shown in Chart 28b, relative to the United States, equity markets in Europe are shallower, venture capital is less developed, and firms rely more heavily on debt financing – especially via banks – to scale up

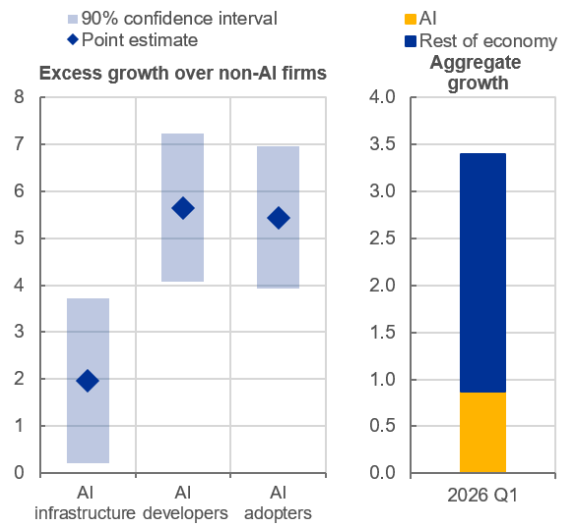
throughout their life cycle. This aggravates the knowledge gap (measured by patents) across the Atlantic.

Chart 28

Link between depth of capital markets and scale of AI adoption

a) Financing of AI firms and credit growth

(percentage points)

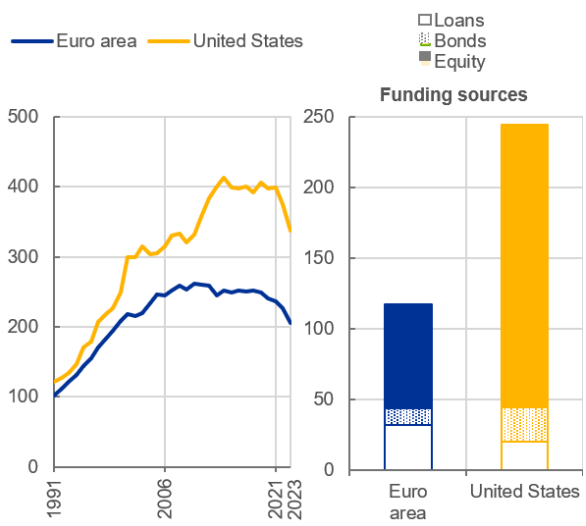


Sources: ECB (AnaCredit, BSI (Balance Sheet Items)), PATSTAT (Patent Statistical Database), LSEG (London Stock Exchange Group) Data & Analytics, datacenters.com and ECB calculations.

Notes: For the left panel, estimates show the difference in average annual credit growth of AI firms compared to non-AI firms since the first quarter of 2025. Estimations control for sector, size and firm location. For the right panel, percentage points of aggregate credit growth attributable to the excess loan growth of AI firms over other firms (approximately one quarter of aggregate credit growth standing at 3.4 per cent in the first quarter of 2026). The latest observations are for the first quarter of 2026.

b) Innovation and funding sources

(left panel: thousands; right panel: percentages of GDP)



Sources: Altavilla, Burlon, Kalemli-Özcan, Ramos (forthcoming), “Monetary Policy, Segmented Capital Markets and Innovation”, PATSTAT (Patent Statistical Database), ECB (QSA (Quarterly Sector Accounts)), US Flows of Funds.

Notes: The left panel includes regular patent applications and international PCT applications in the international phase, filed after 1990 and with at least one identified applicant. Utility models, provisional applications, design and plant patents, translations and artificial applications are excluded. The latest observations are for 2025.

Recourse to debt financing by AI firms increased recently, both for AI developers and AI adopters, strengthening aggregate firm debt dynamics. Since early 2025 and up to the first quarter of 2026, AI developers and AI adopters have increased their leverage by between 1 and 1.5 percentage points more than comparable firms that were not exposed to AI (Chart 29a). The increase in debt was less

notable for data centre projects, which seem to have relied on other sources of funding, including mergers and acquisitions, amid already elevated leverage ratios.

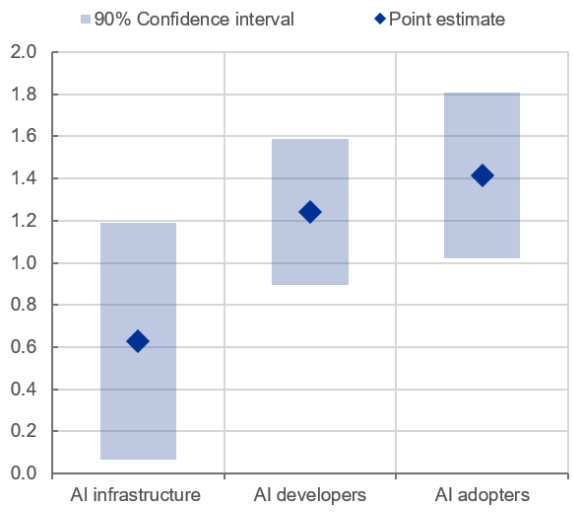
The increase in debt was more marked in the form of marketable debt than loans (Chart 29b). Bond issuance by AI firms has become more visible since late 2025, with the contribution to annual growth driven particularly by strong issuance among AI adopter firms, while AI infrastructure and AI developers contributed to a smaller extent.

Chart 29

Role of AI firms for debt funding

a) Change in leverage of AI firms relative to non-AI since 2025

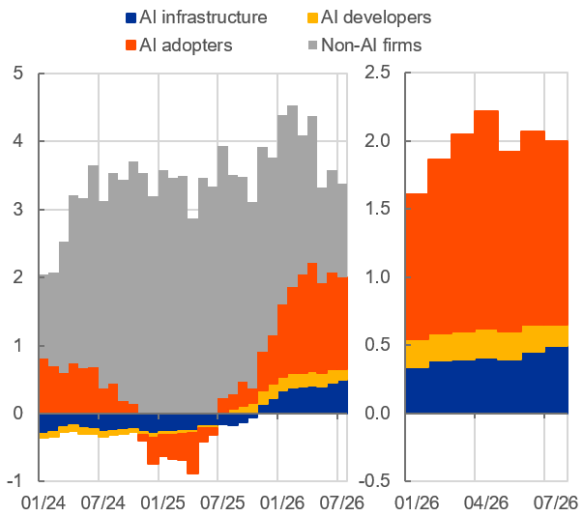
(percentage of assets)



Sources: LSEG (London Stock Exchange Group) Data & Analytics, datacenters.com, PATSTAT (Patent Statistical Database) and ECB calculations.
Notes: Estimates show the difference in annual changes of AI-firms' debt relative to assets, compared with non-AI firms since the first quarter of 2025. The estimations control for firm sector, size and location. The latest observations are for the first quarter of 2026.

b) Contribution of AI ecosystem to the annual growth rate of debt securities issuance

(percentage points)



Sources: CSDB, datacentre.com, PATSTAT (Patent Statistical Database) and ECB calculations.

Note: The latest observations are for July 2026.

AI firms in general also tend to be more liquid than their non-AI peers (Chart 30). Among them, AI developers specialised in intangibles are more cash-rich, with cash ratios around 12 percentage points higher than those of comparable non-AI firms. AI infrastructure firms also display higher cash ratios than their non-AI peers, by around 5 percentage points. High cash reserves are consistent with their

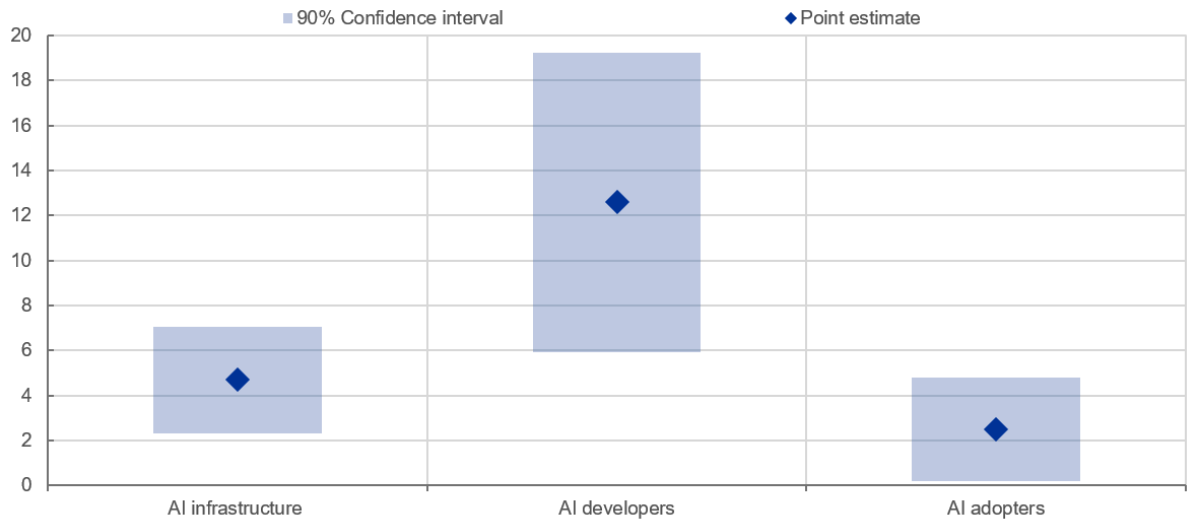
business models along two dimensions. First, AI infrastructure firms have high temporal mismatches between set-up costs and revenues, thus requiring higher precautionary liquidity buffers to operate. Second, high cash buffers allow them to improve balance sheet figures and potentially to better negotiate funding with financial institutions when this is needed to expand operations. AI adopters also tend to display higher cash by about 3 percentage points, relative to their peers, suggesting that stronger balance sheets are linked to AI adoption.

Chart 30

Excess cash by type of AI firm

Excess cash ratios of AI firms relative to non-AI firms

(percentages of assets)



Sources: LSEG (London Stock Exchange Group) Data & Analytics, datacenters.com, PATSTAT (Patent Statistical Database) and ECB calculations.

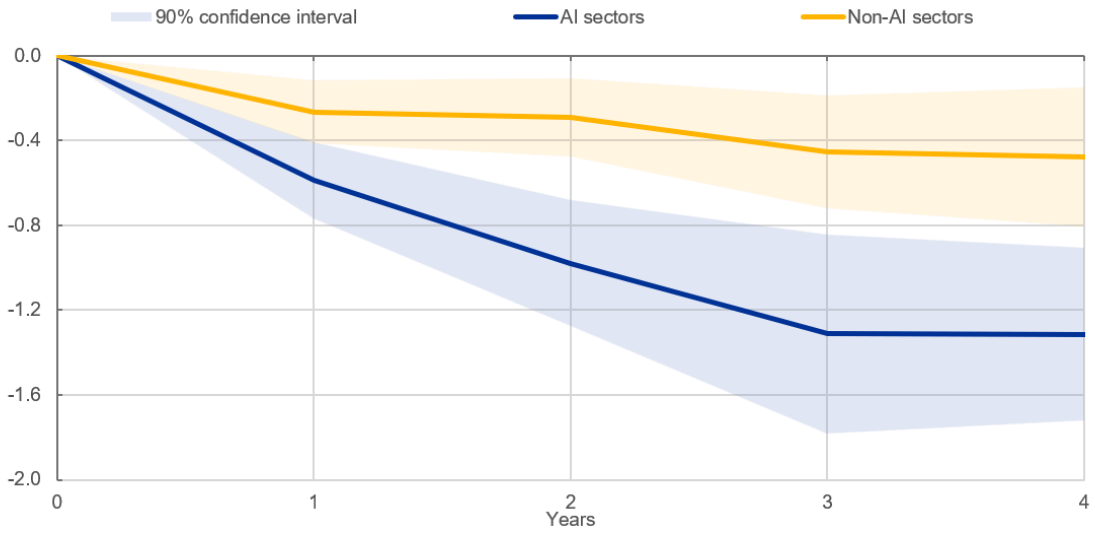
Notes: Estimates show the cash over assets of AI firms relative to comparable non-AI firms, controlling for firm sector, size and location and for time fixed effects. The latest observations are for the first quarter of 2026.

Finally, there is empirical evidence that the innovation activity of AI firms responds more strongly to monetary policy than that of comparable non-AI firms (Chart 31).[27] After a rate hike, patenting by AI firms falls by about one per cent more than that of comparable non-AI firms. These results reflect that AI firms have high financing needs in a context where the segmentation of capital markets in the euro area induces them to rely excessively on forms of external finance that are more sensitive to the monetary policy cycle.[28]

Chart 31
Role of monetary policy

Impact of monetary policy on innovation

(percentage points)



Sources: Altavilla, Burlon, Kalemli-Özcan, Ramos (forthcoming), “Monetary Policy, Segmented Capital Markets and Innovation”.

Notes: AI sectors include firms in NACE sectors classified as medium and high AI. Non-AI sectors include firms with no patenting activity and in NACE sectors classified as low AI. For an overview of the NACE sectors’ AI classification. see also Cianfarani, A. S., Di Casola, P., Ramos, J. and Zander, D. (2026), “Funding the AI revolution: evidence from euro area sectors”, *The ECB Blog*, ECB, 6 October. Specification includes firm controls as well as firm fixed effects. The latest observations are for 2025.

Conclusions

This speech has highlighted that AI is currently a significant contributor to growth in the euro area, driven by both expenditure on AI adoption and the role of European firms in the global AI supply chain. Surveys of firms and households indicate significant AI adoption rates, albeit unevenly distributed across sectors and demographic groups. A striking pattern is that European households are net positive about the employment impact of AI. However, the AI adoption process is still at a relatively early stage and the extent and timing of the economy-wide transformative potential of AI remain highly uncertain.

The European financial system has responded to the external financing needs generated by increased AI activity, even if internal funding remains the most important source of funding. European investors are also major investors in foreign AI equities and the euro-denominated bond issuances by American hyperscalers, even if the latter are primarily funded by a lower allocation to US Treasury bonds.

Looking ahead, tracking the near-term and medium-term implications of AI will remain high on the analytical agenda at the ECB.

Annexes

30 October 2026

Slides

1.

I thank Malin Andersson, Ursel Bauman, Elena Bobeica, Katalin Bodnar, Veronica Campostrini, Leonardo Carrai, Kaustubh Dharmapuri, Paola Di Casola, António Dias Da Silva, Julia Doleschel, Lorenz Emter, Annalisa Ferrando, Irene Ferrari, Max Freier, Johannes Groß, Vanessa Gunnella, Valerie Jarvis, Gerrit Koester, Borbala Kovacs, Marton Kovacs, Tibor Lalinský, Sara Lamboglia, Laura Lebastard, Peter McQuade, Baptiste Meunier, Roberto Motto, Giulio Nicoletti, Iván Ordoñez Martínez, Chiara Osbat, Fausto Pastoris, Klara Pavić, José Ramos, Judit Rariga, Stefan Schaefer, Caspar Matthias Schauhoff, Maurice Schmidt, Martin Schmitz, Fabian Schupp, Silvia Scopel, Marta Skrzypińska, David Sondermann, Sigurd Steffensen, Marcel Tirpak, Paulina Ullrich, Jules Voisin, Jakob Wenzl and Dennis Zander for their contributions to this speech. The views expressed are my own and should not be interpreted as representing the collective view of the ECB Governing Council.

2.

The monetary policy statement released after yesterday's ECB monetary policy meeting cited AI as a driver of current economic activity. It is beyond the scope of this speech to review yesterday's meeting but a slide deck is included as an annex to this speech on the ECB website.

3.

For a broader overview of how AI may affect the euro area economy, see Lane, P.R. (2026), "AI and the euro area economy", keynote speech at ECB-SAFE-RCEA International Conference on the Climate-Macro-Finance Interface (3CMFI), Frankfurt, 23 March. See also: Lane, P.R. (2026), "The AI opportunity for Europe", dinner remarks at the International AI Summit, Dublin, 13 October.

4.

For a comparison of AI adoption in Europe and the US, see Bick, A., Blandin, A., Deming, D. J., Fuchs,-Schündeln, N. and Jessen, J. (2026), "Mind the Gap: AI Adoption in Europe and the U.S.", *NBER Working Paper*, No. 34995, March. The major AI producers also provide insightful data on AI adoption patterns. These include: Anthropic (2026), "Anthropic Economic Index", June 26 ; the recent reports by OpenAI on the adoption of agentic AI in Europe (OpenAI (2026), "The EU's next chapter on AI is agentic", October 14) and on how consumers use ChatGPT for work (OpenAI (2026), "ChatGPT's expanding world of work," October 26); and Microsoft (2026), "Global AI Diffusion Report", Q2 2026 Trends and Insights. Payments data can also be used to track the economic impact of AI: see Stripe

Economics (2026), "An empirical agenda for AI," October 8; and Stripe Economics (2026), "Europe versus the US: how big is the AI gap?", October 28.

5.

As a share of GDP, digital investment in the United States has expanded from 3.3 per cent in 2014 to 7.3 per cent in H1 2026.

6.

Data centres are a subcomponent of the category "buildings and structures" in the ICT sector.

7.

Imports of intellectual property from the United States is often organised through intra-firm trade between the US parent corporation and its overseas affiliates. See also Emter, L., Fidora, M., Pastoris, F., Schmitz, M. and Schuler, T. (2025), "US trade policies and the activity of US multinational enterprises in the euro area", Economic Bulletin, Issue 4, ECB.

8.

European investors also purchase the dollar bonds issued by US hyperscalers.

9.

See Furtuna, O., Duquerroy, A., Rahmouni-Rousseau, I. and Vaz Cruz, L. (2026), "Big tech, big debt: when US tech giants tap the euro area bond market", *The ECB Blog*, ECB, 31 August.

10.

Ferrari, I., Gori, S., Groß, J., Schupp, F. and Steffensen, S. (2026), "Artificial intelligence and European firms: the cost of market-based financing", forthcoming in *Economic Bulletin*, Issue 7, ECB.

11.

The SAFE results are broadly consistent with other surveys on AI adoption among firms. A European Commission survey conducted in 2026 Q1 finds that 42 per cent of European mid-caps and SMEs use AI or automated systems at work. Of these, 30 per cent use these tools only to a limited or experimental extent, and 12 per cent use them extensively. A further 21 per cent plan to adopt them, while 35 per cent neither use nor plan to use them. The most common applications are customer service (47 per cent), productivity monitoring (36 per cent) and logistics or staff scheduling (30 per cent). See European Commission (2026), "Workplace-related drivers and obstacles for the adoption of AI", Eurobarometer, October, Brussels. The European Investment Bank Investment Report reports similar adoption rates: 46 per cent of EU firms used big data analytics or AI in 2025, and 49 per cent used digital platforms (European Investment Bank (2026), "Investment Report 2025/26: Capitalising on Europe's strengths", *Investment Report*, Luxembourg). Harmonised central bank business surveys for Germany, France and Italy (2024/2025) likewise show AI use spreading rapidly, with most firms still at an experimental or limited stage: Bencivelli, L., De Masi, L., Falck, E., Fernández Cerezo, A., Formai, S., Hidalgo Bricio, I., Mattevi, E. and Nagengast, A. (2026), "Embracing AI in Europe: New evidence

from harmonised central bank business surveys", VoxEU, 9 January. However, a survey of senior corporate executives in a number of countries indicates higher adoption rates (Yotzov, I., Barrero, J. M., Bloom, N., Bunn, P., Chawla, C., Davis, S. J., Foster, K. M., Jalca, A., Meyer, B. H., Mizen, P., Navarrete, M. A., Oh, S., Loredo, K. G., Reid, M., Smietanka, P., Thwaites, G. and Wang, B. Z. (2026), "Firm Data on AI", *NBER Working Paper*, No. 34836, October). The same study shows that AI spending is highly concentrated: a small group of top spenders (around 2 per cent of firms) accounts for a large share of total expenditure.

12.

Among firms planning AI-related investment over the next 12 months, most expect to invest in AI-related technologies and tools, as well as in employee training, financed mostly through internal funds. 49 per cent of firms plan to invest in AI technologies and tools (e.g. software licences), 46 per cent in training employees, 40 per cent in data and infrastructure and 12 per cent in hiring AI specialists. See also: Ferrando, A., Lamboglia, S., Rariga, J. and Schmidt, M. (2026), "Adopting and investing in AI: evidence from euro area firms in the SAFE", Economic Bulletin, Issue 2, ECB; Chaloupka, D., Lalinský, T. and Lopez-Garcia P. (2026), "What separates firms that use AI intensively from firms that don't?", *The ECB Blog*, ECB, 24 June. On how firms are financing AI, see: Cianfarani, A.S., Di Casola, P., Ramos, J. and Zander, D. (2026), "Funding the AI revolution: evidence from euro area sectors", *The ECB Blog*, ECB, 6 October.

13.

Baumann, U., Cullen, Z., Faia, E., Ferrando, A., Perez-Truglia, R. and Rariga, J. (2026), "Innovation without borders? The geography of technological diffusion", *Working Paper Series*, No. 3246, ECB, Frankfurt am Main.

14.

Dias da Silva, A., Lebastard, L. and Sondermann, D. (2026), "AI adoption and the productivity promise: what workers report", *The ECB Blog*, ECB, 26 August.

15.

Compared to other surveys of employees, the level of AI adoption indicated by the Consumer Expectations Survey (CES) is at the upper end of the range. This may reflect its broad framing on question on AI usage. A recent survey finds that 32 per cent among European workers (Germany, France, Italy, the Netherlands, Sweden and the UK) use AI for their job: see Bick, A., Blandin, A., Deming, D. J., Fuchs,-Schündeln, N. and Jessen, J. (2026), "Mind the Gap: AI Adoption in Europe and the U.S.", *NBER Working Paper*, No. 34995, March. This survey finds similar cross-sectional patterns as in the ECB CES survey: younger and more educated workers have higher AI adoption rates. According to the latest Eurostat data for 2025, 32.7 per cent of people aged 16-74 in the EU used

generative AI tools, with about half of them using generative AI for work: see Eurostat (2026), "Use of artificial intelligence by individuals", *Statistics Explained*, No. 145512, European Commission.

16.

Other surveys also point to positive but modest time savings. In a 2026 European Commission survey employed AI users report time savings of about 7.4 hours per month (4.6 per cent of working time): see European Commission, (2026), "AI at work in Europe: Perceived impacts on productivity, quality of work, and job security", European Economy Technical Paper, No. 087, Directorate-General for Economic and Financial Affairs. The Bick et al. survey (2026, op. cit.) finds aggregate time savings of between 1.0 per cent and 1.8 per cent in the European countries in the sample. In a recent Danish survey, users report average time savings of 2.8 per cent of work hours: see Humlum, A. and Vestergaard, E. (2025), "Still waters, rapid currents: Early labour market transformation under generative AI", *NBER Working Papers*, No. 33777, National Bureau of Economic Research. A recent LSE study finds similar estimates to those in the CES: see Jolles, D. and Lordan, G. (2025), "Bridging the generational AI gap: Unlocking productivity for all generations", Research report, The Inclusion Initiative at the London School of Economics and Political Science.

17.

With respect to employment perceptions, other surveys support the evidence from the CES that euro area workers are, on balance, positive about how AI will affect their own jobs. In a 2024 Eurobarometer, 66 per cent of EU employees reported that AI and recent digital technologies benefit their work: see European Commission (2025), "Artificial intelligence and the future of work", *Special Eurobarometer*, No. 554, February. Among employed AI users in a 2026 European Commission survey, about 60 per cent report no fear of losing their job because of AI, while 13.9 per cent are very concerned and 26.2 per cent somewhat concerned: see European Commission, Directorate-General for Economic and Financial Affairs. (2026), "European Business Cycle Indicators: AI at work in Europe: Perceived impacts on productivity, quality of work, and job security", *European Economy Technical Paper*, No. 087. Views of respondents are also more negative about jobs in general than about their own job. In the same Eurobarometer survey, 66 per cent of respondents reported that AI and robots could take jobs rather than create them.

18.

Each bar is the GenAI exposure score of an average euro of pay in that industry, euro area, 2023. The scale runs from 0 (AI can do nothing of the job) to 1 (AI could do the whole job). The score comes from the ILO's task-based index (Gmyrek, P., Berg, J., Kaminski, K., Konopczynski, F., Ladna, A., Nafradi, B., Roslaniec, K. and Troszynski, M. (2025), "Generative AI and Jobs", *ILO Working Paper*, No. 140, International Labour Office, Geneva). Detailed occupations are placed into industries using US occupation-by-industry data (US Bureau of Labour Statistics Occupational Employment and Wage

Statistics), because the same broad occupation means different jobs in different industries: "professionals" are software developers in IT services but doctors and nurses in health care. The scores are weighted by earnings: Eurostat's Structure of Earnings Survey gives pay by occupation in each country and industry, and national accounts give each industry's weight in the wage bill.

19.

The simulation is run using the MANKIO model (Rubbo, E., Osbat, C., Buss, G., Cantelmo, A., Dobrew, M., Dominguez-Dıaz, R., Elfsbacka Schmöller, M., Gallegos, J.-E., Lisack, N., Pisani, M., Quintana Gonzalez, J. and Verdini, D. (2026), "Shock transmission in a monetary union: Aggregate impacts and cross-sectional incidence across EA countries", *mimeo*.) This is a multi-country, multi-industry model with sticky prices and monetary policy. The geographic regions are: 20 euro-area countries, the United States, an Asia-AI bloc (China, Japan, Korea) and the rest of the world. There are 75 industries per country from the FIGARO input-output tables, 2023. The experiment is as follows: Total factor productivity of the IT services industry (NACE J62-63: software, IT consulting, data services) rises by 30 per cent, everywhere in the world at once, as an unanticipated and near-permanent change. The 30 per cent shock is broadly in line with the 32.6 per cent gain in software-engineering productivity between November 2022 and December 2025 that can be inferred from stock prices (Blumenfeld, A., Hazell, J., Lian, C. and Schaab, A. (2026), "The Macroeconomic Effect of AI: Sizing the Software Engineering Channel", *NBER Working Paper*, No. 35793, September). Since this study calculates the priced effect more than doubled by mid-2026, the 30 per cent scenario is just one scenario. Field experiments across three firms suggest that developers with AI tools completed 26 per cent more pull requests (Cui, K. Z., Demirer, M., Jaffe, S., Musolff, L., Peng, S. and Salz, T. (2026), "The effects of generative AI on high-skilled work: evidence from three field experiments with software developers", forthcoming in *Management Science*.

20.

The inflation impact is limited: prices fall in the first year, then inflation returns to target and the policy rate is back near baseline.

21.

It is beyond the scope of this speech to assess the implications for credit dynamics and asset price dynamics if there were a shift in beliefs about the future economic impact of AI or if there were a shift in global risk appetite.

22.

Grant finance also plays a role.

23.

Haque, S., Kim, Y., Mayer, S. and Wu, E. (2026), "Liquidity for Transformation: Bank Credit and Firms' AI Adoption", Social Sciences Research Network, No. 7247864.

24.

At the same time, these findings, as well as the lower cost of debt financing for AI-exposed firms, could also reflect market optimism about the benefits of AI which may turn out not to be fully warranted.

25.

Banks are minor investors in euro area AI equities, holding around €150 billion out of their €4.5 trillion market capitalisation.

26.

Investment funds also exhibit home bias in their equity portfolios but to a lesser degree than banks.

27.

See: Altavilla, C., Burlon, L., Kalemli-Özcan, S. and Ramos, J. (2026), "Monetary Policy, Segmented Capital Markets and Innovation", (forthcoming in *ECB working paper series*); Hartmann, P. and Maver, V. (2025), "Implications of Artificial Intelligence for Monetary Policy – A First Conceptual Assessment", *SUERF Policy Brief*, No 1080, 30 January.

28.

The evidence indicates that sectors with high AI adoption potential see higher business formation rates. See Bena, J., Bian, B. and Giannetti, M. (2026), "Prompted to start: how GenAI is transforming entrepreneurship," CEPR discussion paper no. 21282.

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