AI: Investment Intentions and Technology Diffusion among Irish (m)SMEs

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Digital transformation in Ireland:
Challenges and opportunities for jobs and investment
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AI as a general-purpose technology

- AI is increasingly viewed as a major general-purpose technology capable of enhancing efficiency and boosting productivity (Baily and Korinek, 2023; Trammell and Korinek, 2023; Korinek, 2024; Benassi et al., 2022)

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- Its economic impact will depend on both:
  - the pace of adoption and diffusion across firms, and
  - its complementarity with existing production factors at the firm level

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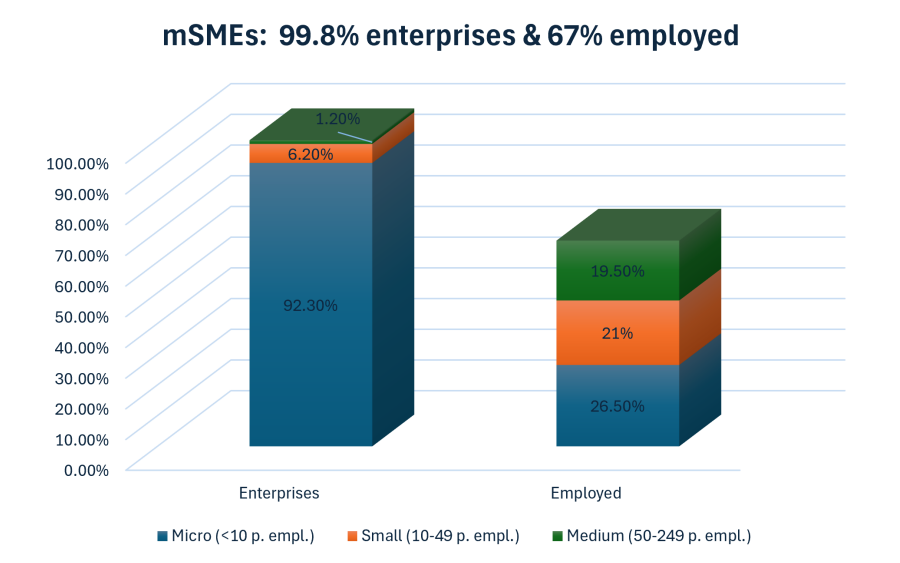
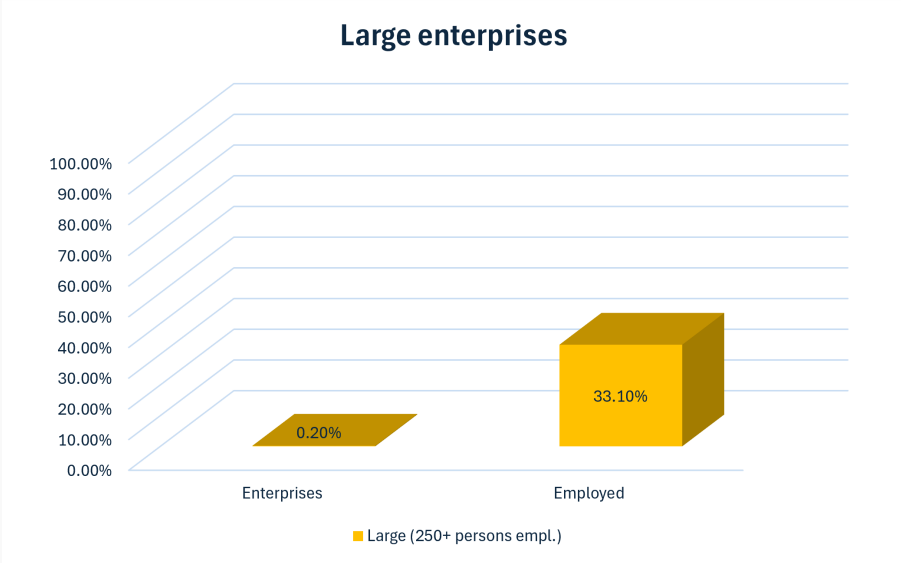
- Its economic impact will depend on both:
  - the pace of adoption and diffusion across firms, and
  - its complementarity with existing production factors at the firm level
- Debate remains ongoing:
  - the extent to which small firms can integrate AI tools into their core business activities
  - whether enabling conditions are in place for them to benefit from the digital transition

Small firms matter to unlock productivity gains





Source: CSO Business in Ireland 2024 - Insights on the Lifecycle of Businesses

Evidence gaps and policy implications

- Evidence remains limited on
  - how widely **smaller** firms are using AI technologies
  - how intensively **smaller** firms are using AI technologies
  - how important they perceive these tools to be for their growth, competitiveness, and long-term development
- Policy choices will play a decisive role in shaping:
  - whether AI adoption is labour-augmenting or labour-replacing
  - the accessibility of AI technologies across firms of different sizes (Brynjolfsson and Unger, 2023)

This paper

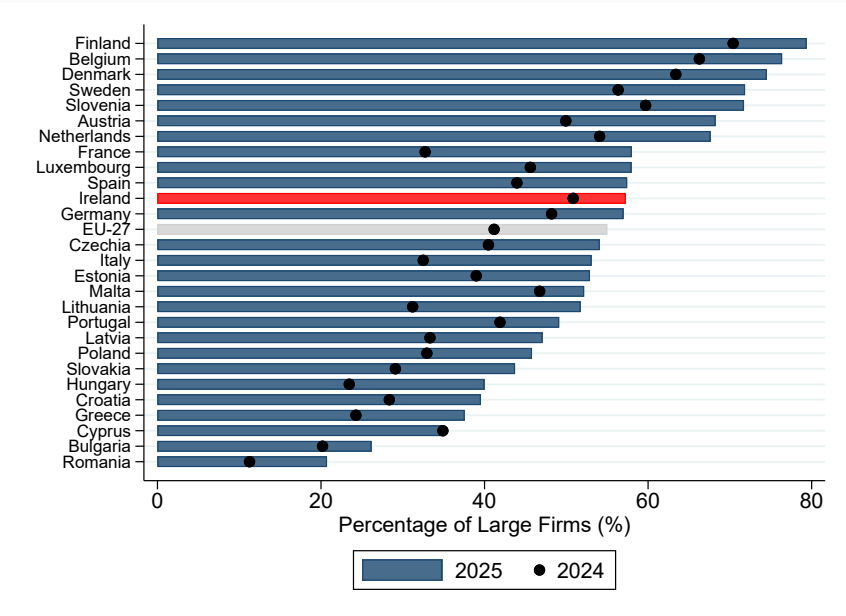
- Provides updated evidence on the adoption of and intentions to (further) invest in AI technologies among Irish (m)SMEs, drawing on the 2024 and 2025 Credit Demand Survey.
- Examines how investment intentions patterns differ across SMEs, accounting for perceived barriers to using these technologies
- Explores the link between the intensity of AI usage and both formal implementation of and satisfaction with AI by (m)SMEs

Data overview

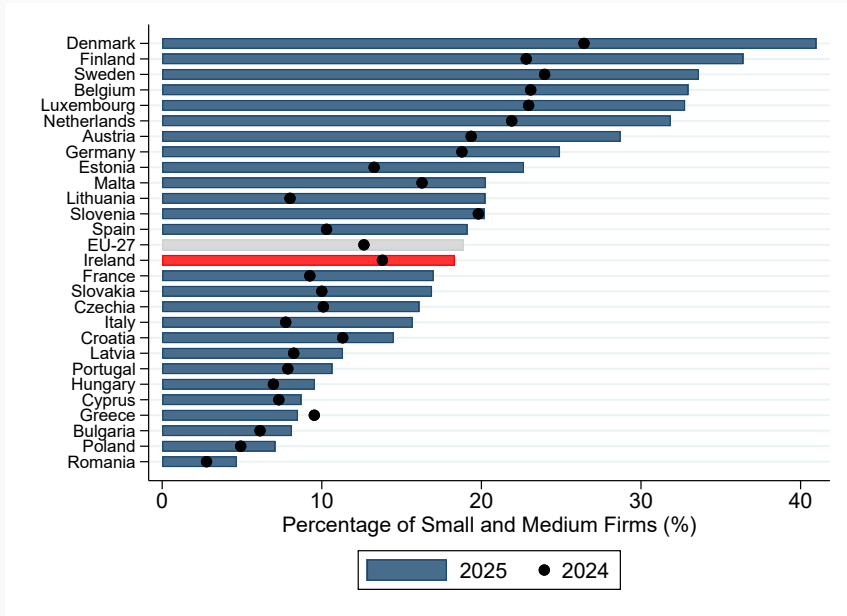
- 2024 and 2025 Credit Demand Survey (CDS) from the Department of Finance
- Includes a dedicated module on firms' use of AI technologies
- Nationally representative sample of (m)SMEs (firms with <250 employees)
- Total sample size: 3,008 firms

The AI adoption divide: large vs. small firms across European countries [1]

(a) Large Firms

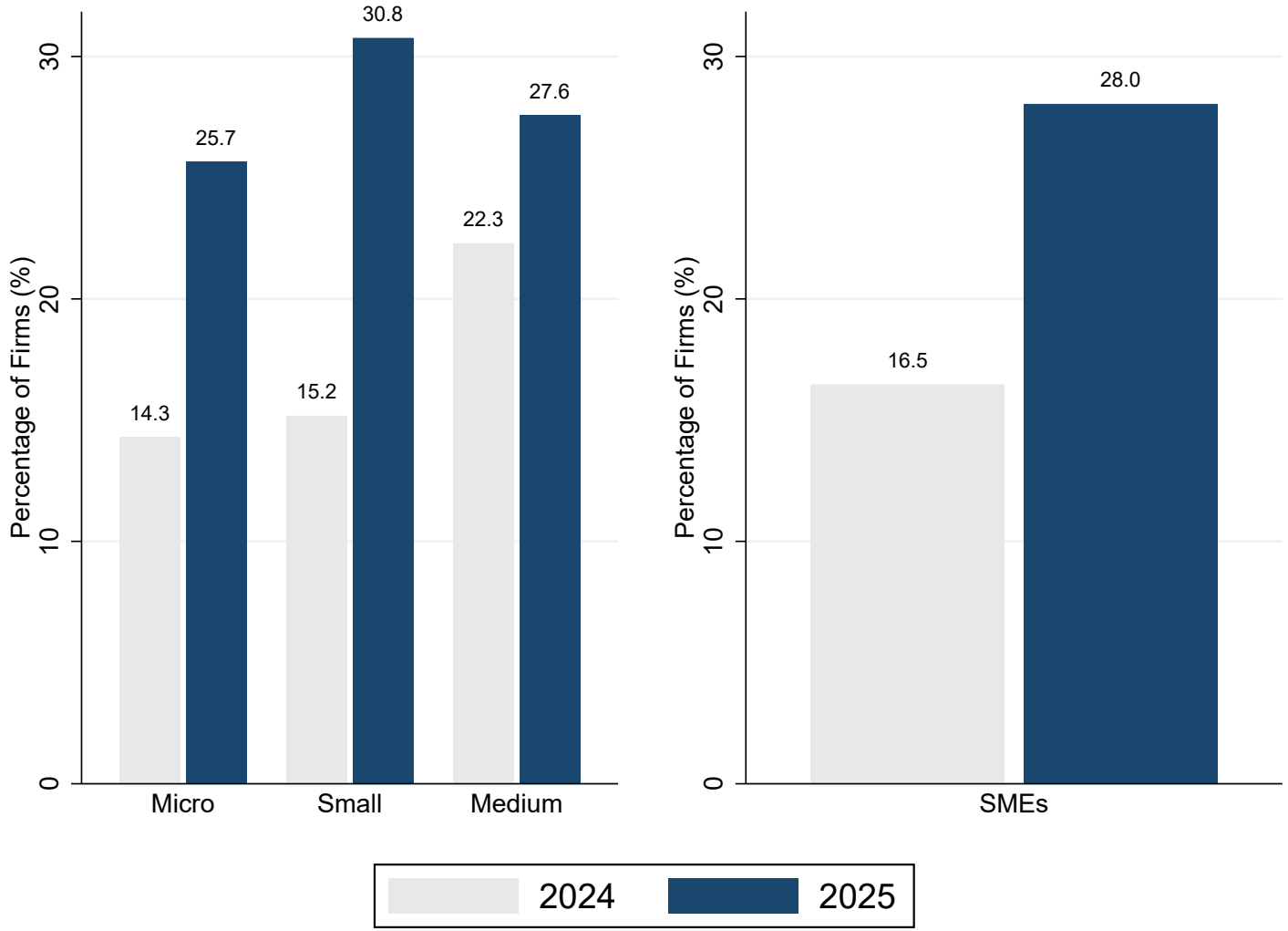


(b) SMEs

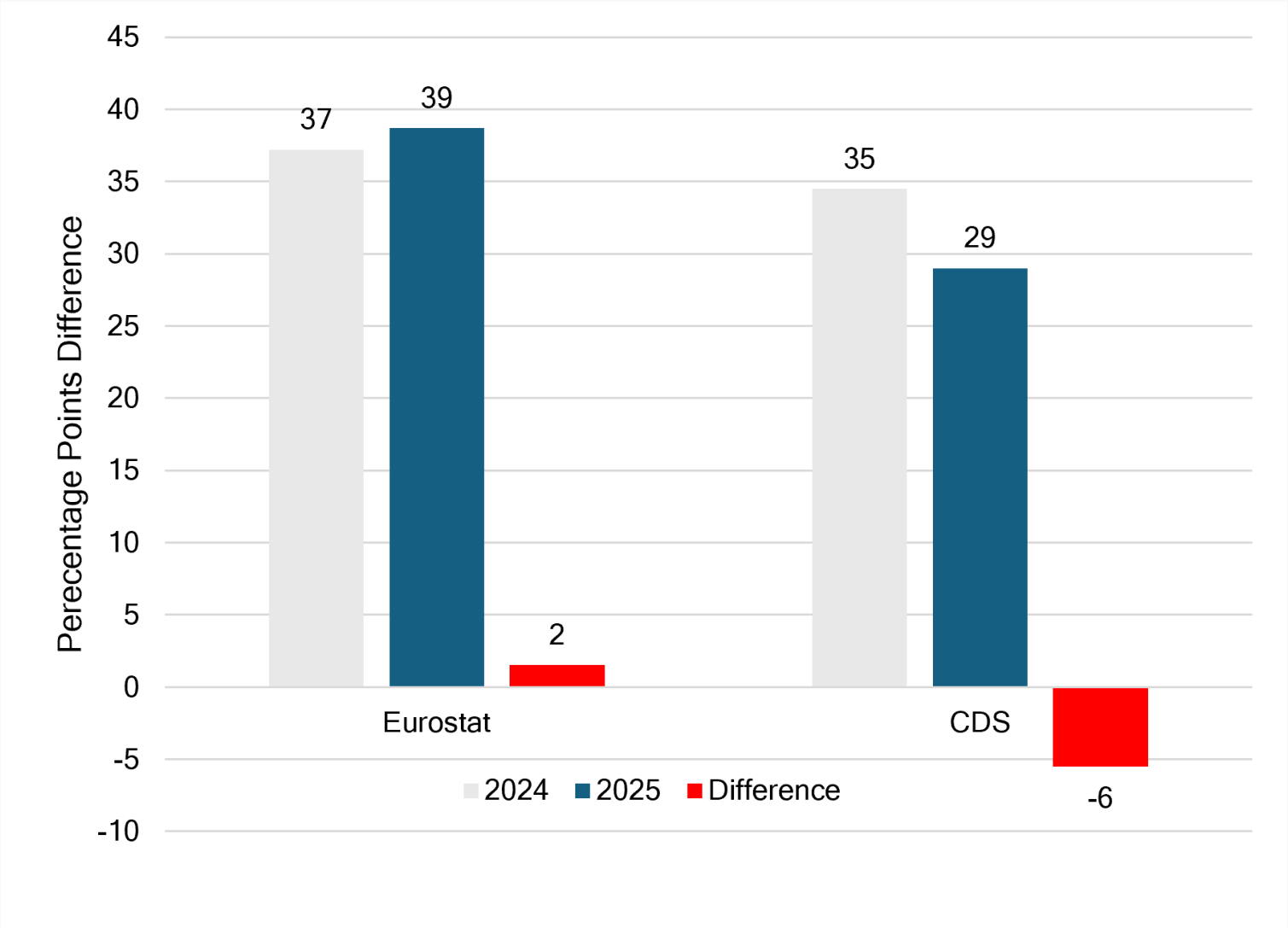


[1] Data from Eurostat ICT Usage in Enterprises Survey

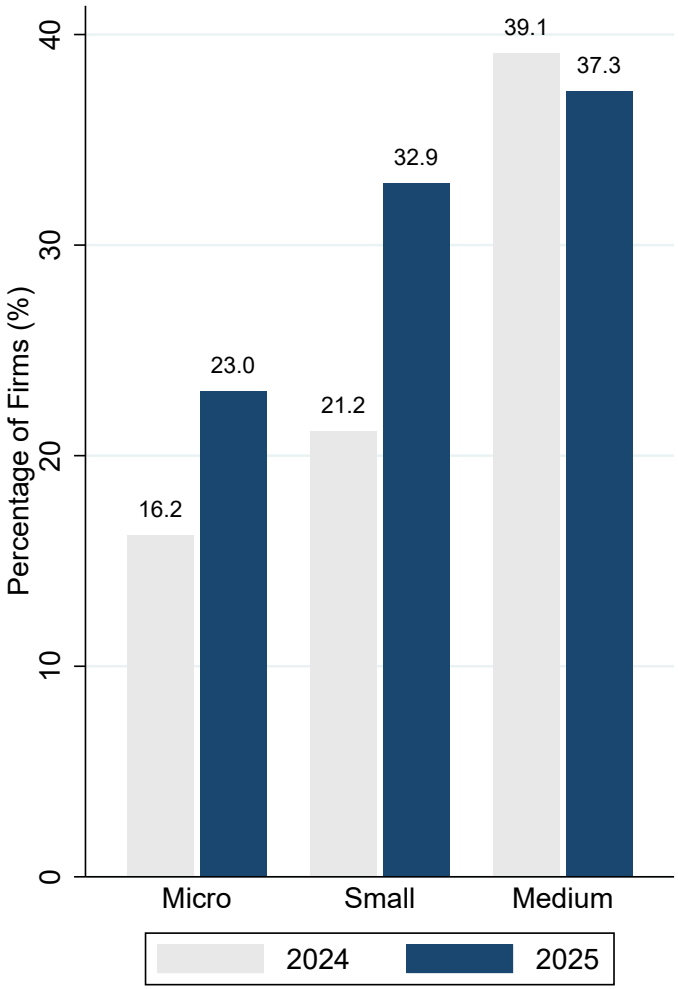
AI adoption rates by firm size for mSMEs: CDS data

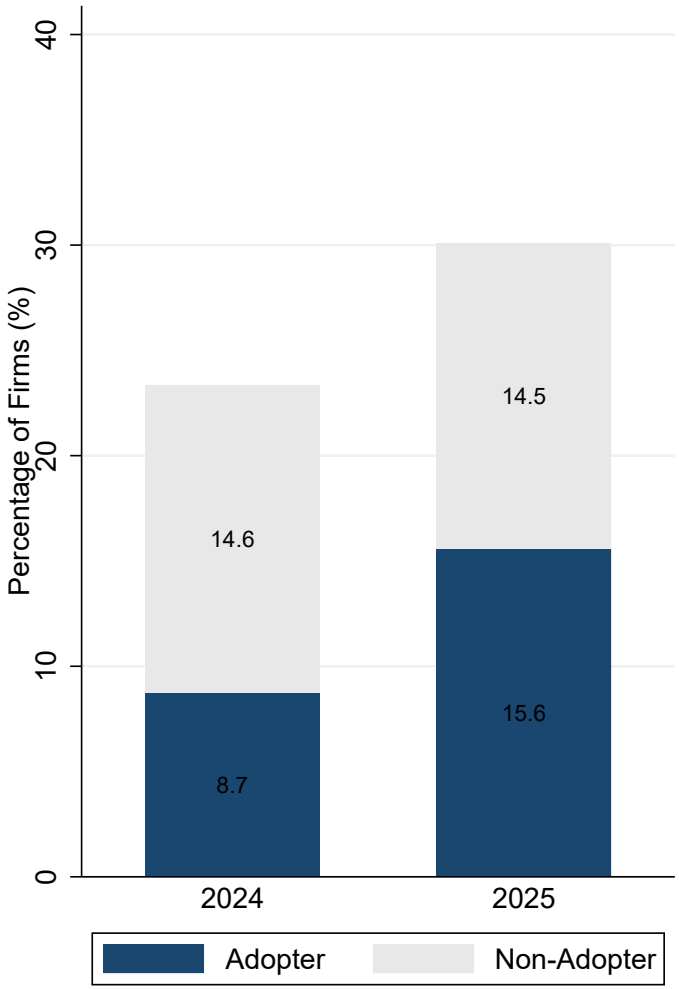


Digital divide = large - (m)SMEs adoption rates

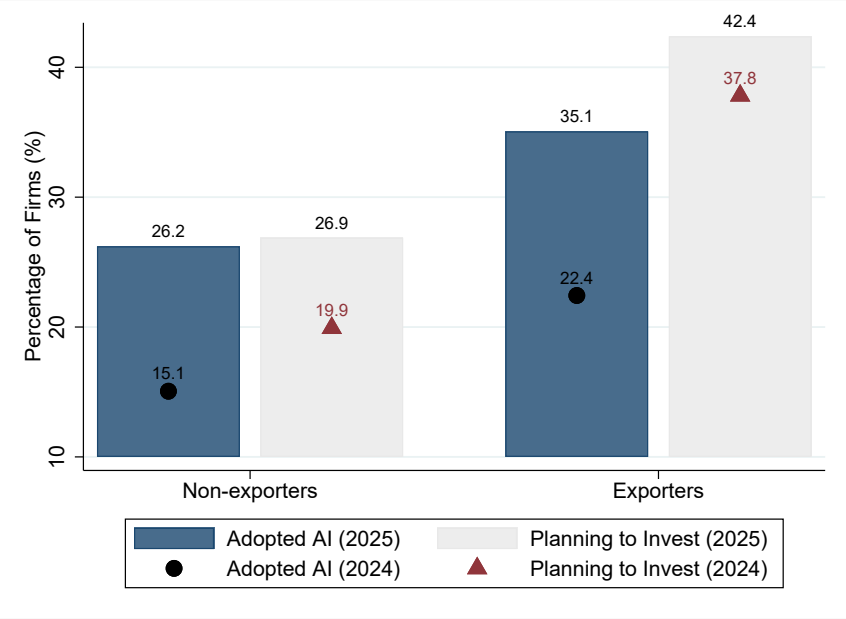


AI Investment Intention rates by firm size

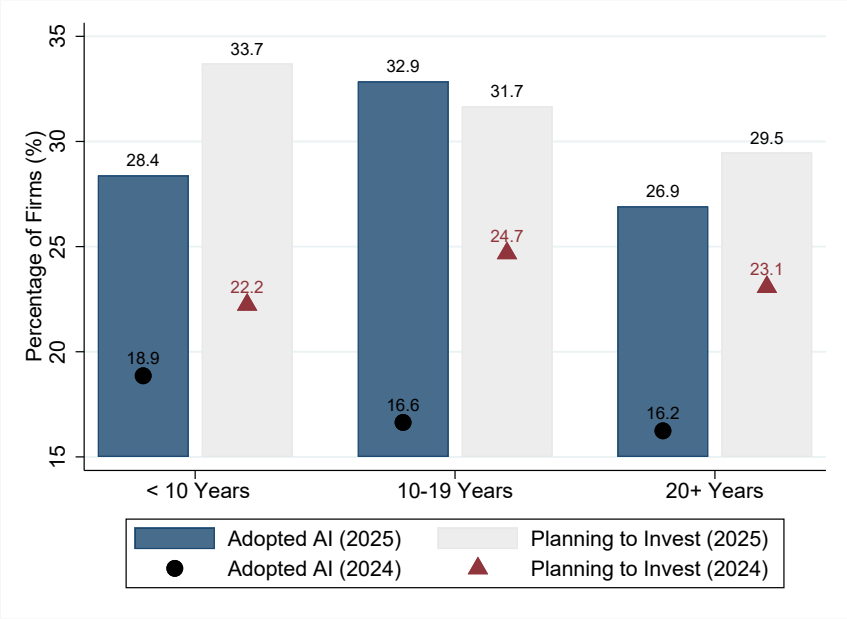




AI Adoption rates by key attributes (1/2)



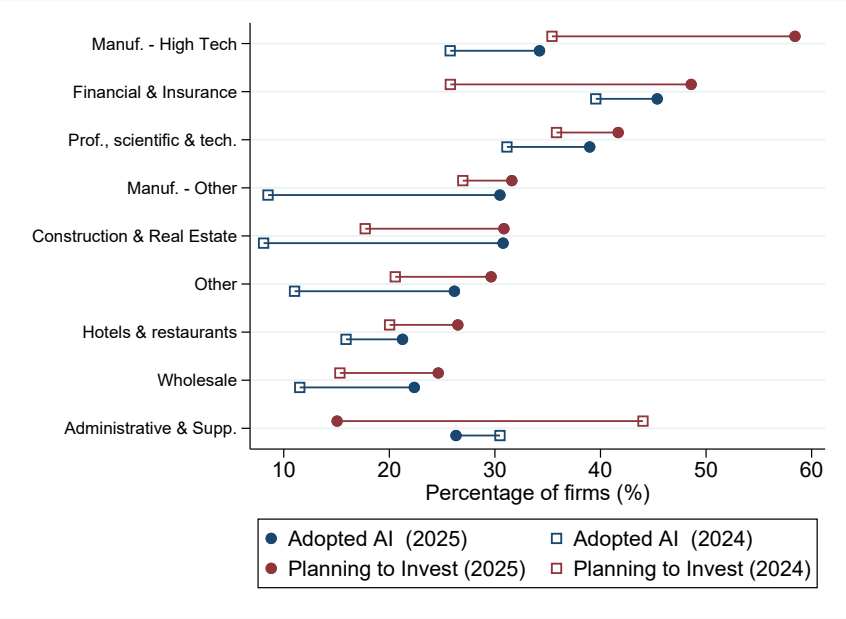
(a) Exporters



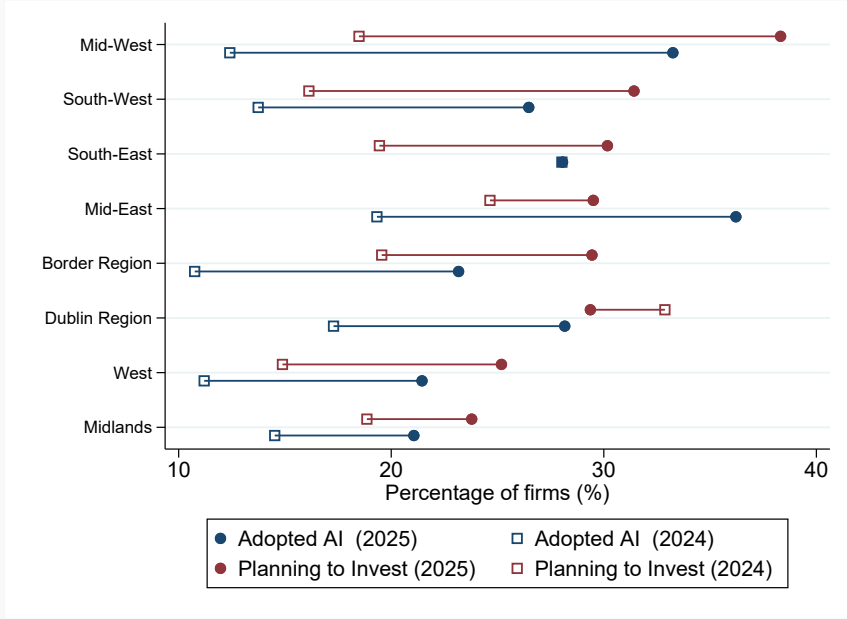
(b) Age

Source: Credit Demand Survey (2024, 2025) and authors' calculations

AI Adoption rates by key attributes (2/2)



(a) Sectors



(b) Regions (NUTS-3)

Source: Credit Demand Survey (2024,2025) and authors' calculations

Research approach

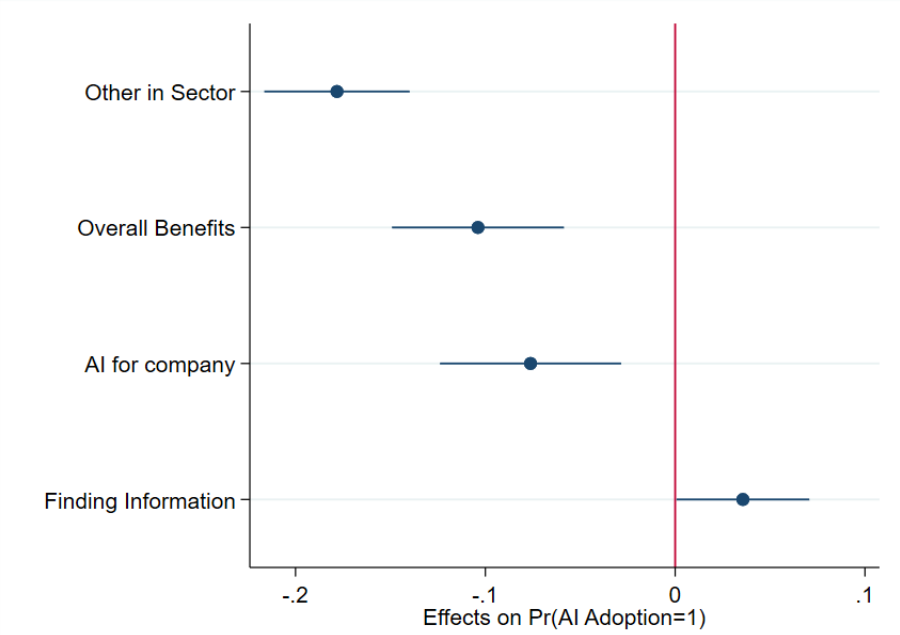
- Identify the key factors shaping firms' decisions to adopt AI technologies and their attitudes toward future AI investment.
- Consider four groups of determinants
  - Knowledge-related barriers
  - Operational barriers
  - Firm characteristics
  - Demand for external financing
- Model AI adoption and intentions to invest as two distinct, yet related, decision processes
- Ground the analysis in the economic intuition that a profit-maximising firm adopts or invests in AI only when the expected net benefits are positive

Results

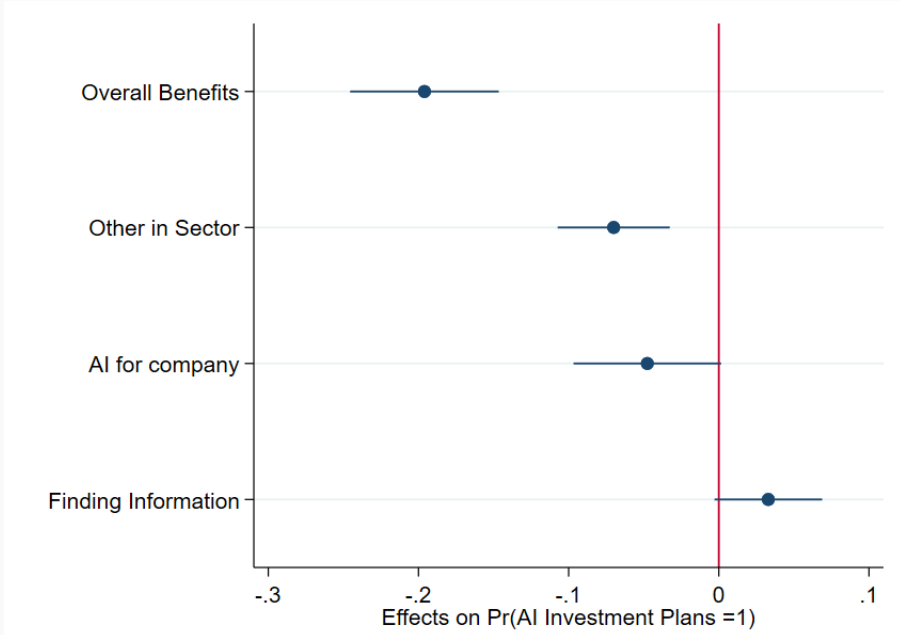
- We estimate the marginal effects on the probability of AI adoption and planned AI investment using a probit specification
- In what follows, effects are shown for firms that report specific barriers or exhibit particular characteristics - whilst holding other factors constant
- The reported marginal effects show how being in a particular category shifts the predicted probability — expressed as a percentage increase or decrease — of adopting AI or planning AI investment
- Pooling 2024 and 2025 CDS data adds power to the analysis compared to that carried out with only one year of data

Marginal effects of knowledge barriers to AI

(a) Probability of AI Adoption



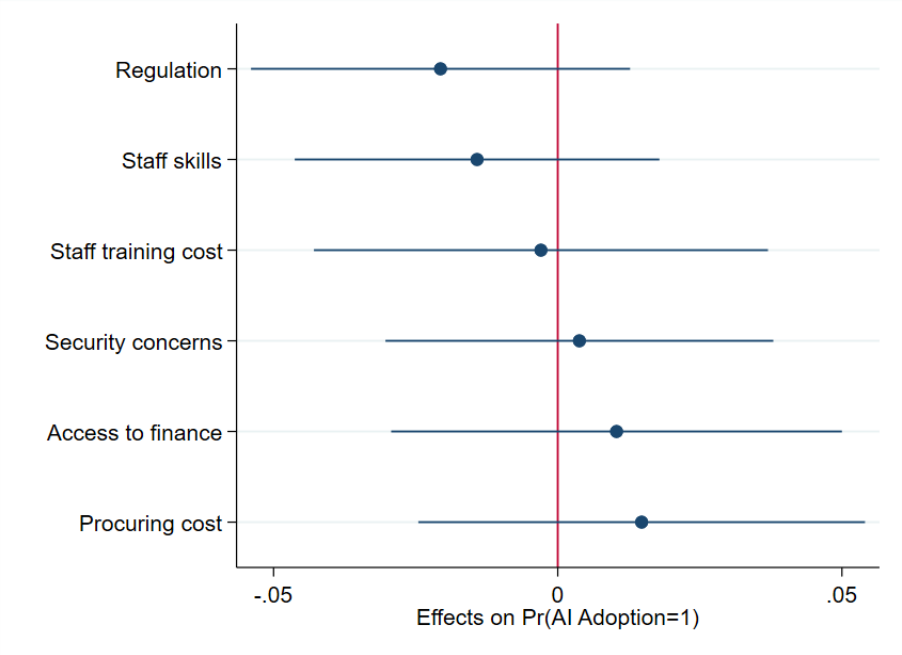
(b) Probability of Future AI Investments



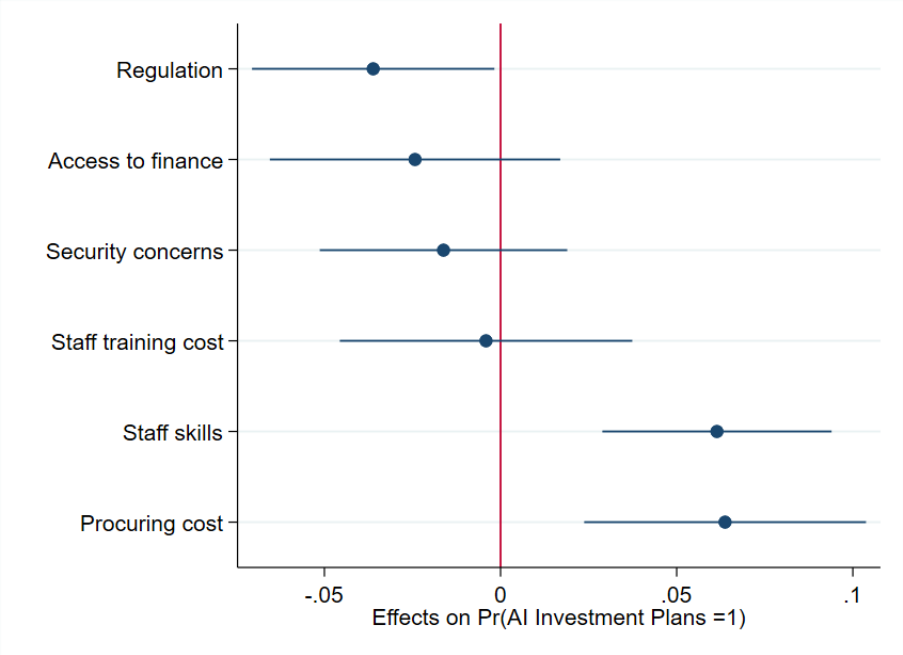
Notes: Points represent estimated marginal effects; horizontal lines denote 95% confidence intervals. The vertical line at zero indicates no effect.

Marginal effects of operational barriers to AI

(a) Probability of AI Adoption



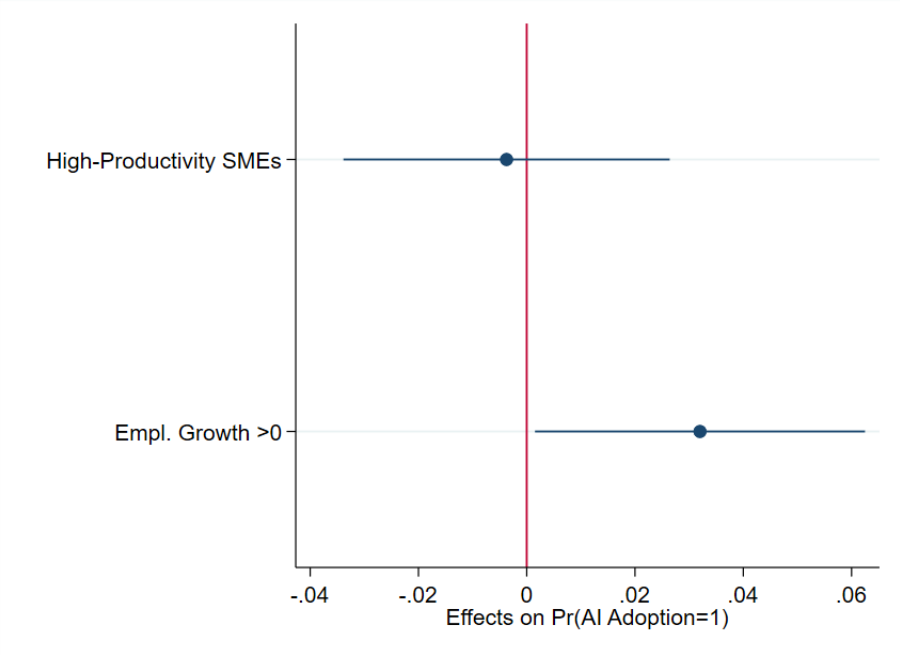
(b) Probability of Future AI Investments



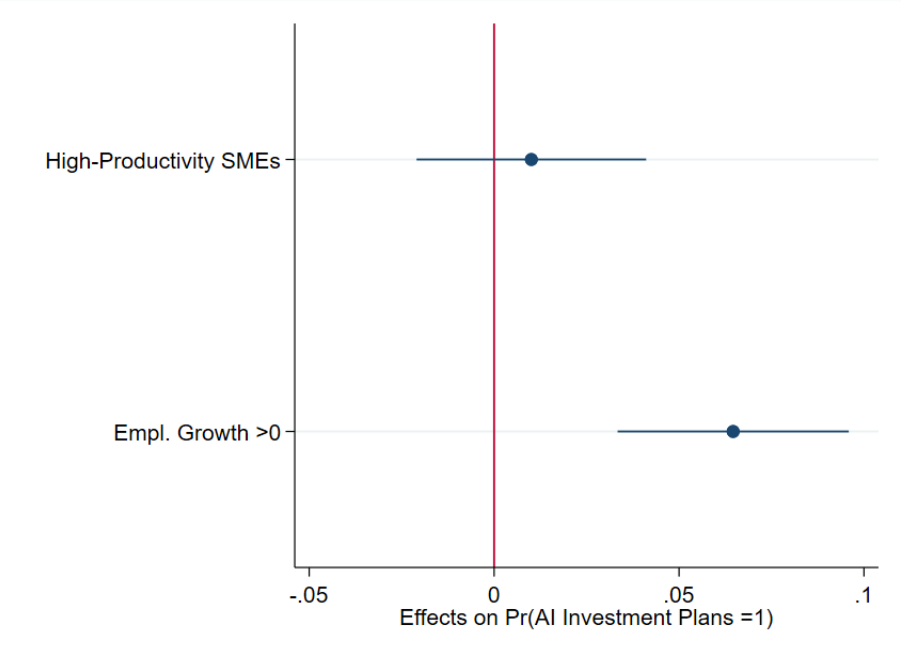
Notes: Points represent estimated marginal effects; horizontal lines denote 95% confidence intervals. The vertical line at zero indicates no effect.

Marginal effects of economic indicators

(a) Probability of AI Adoption



(b) Probability of Future AI Investments

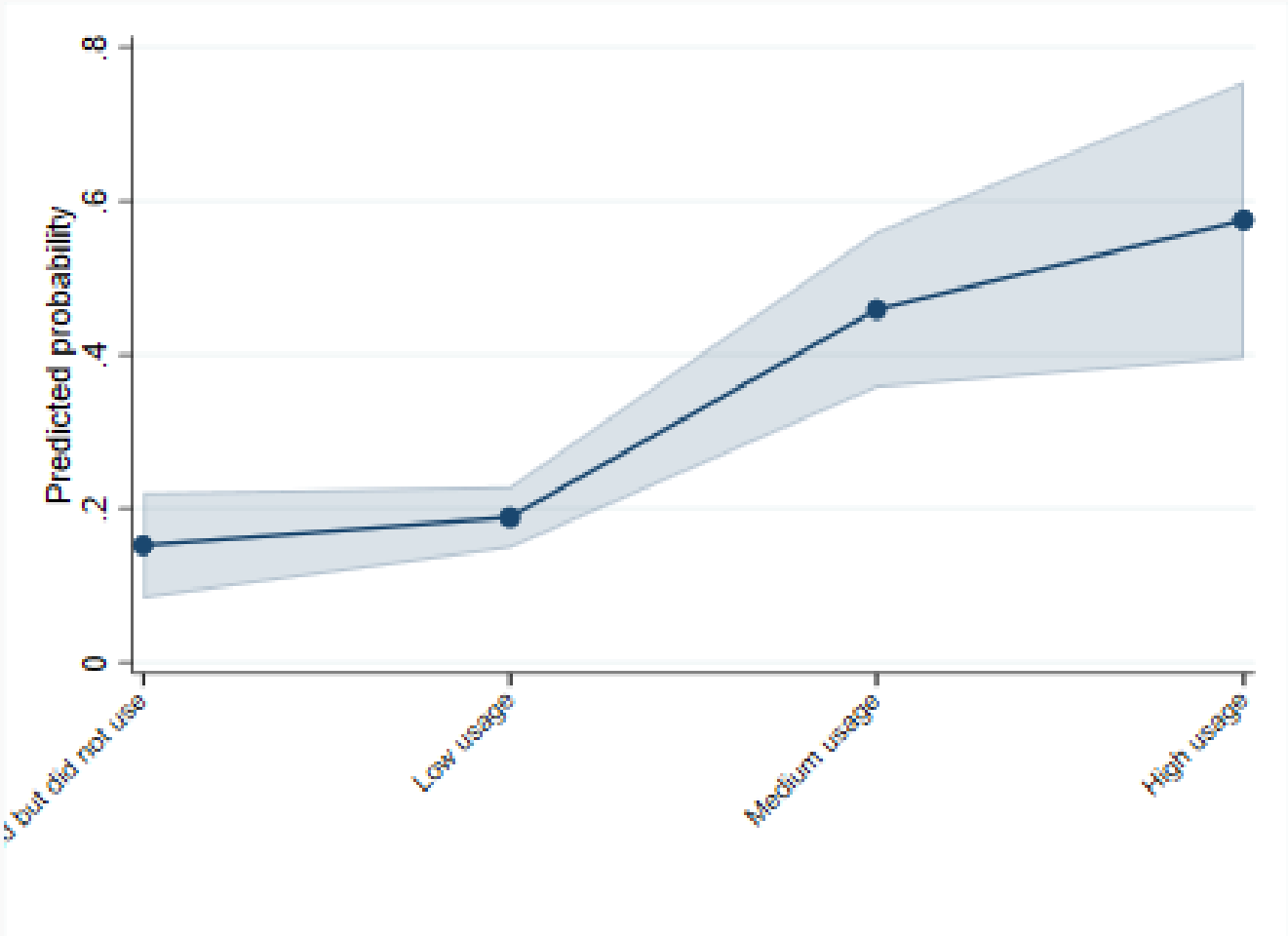


Notes: Points represent estimated marginal effects; horizontal lines denote 95% confidence intervals. The vertical line at zero indicates no effect.

AI usage intensity, formal adoption and satisfaction

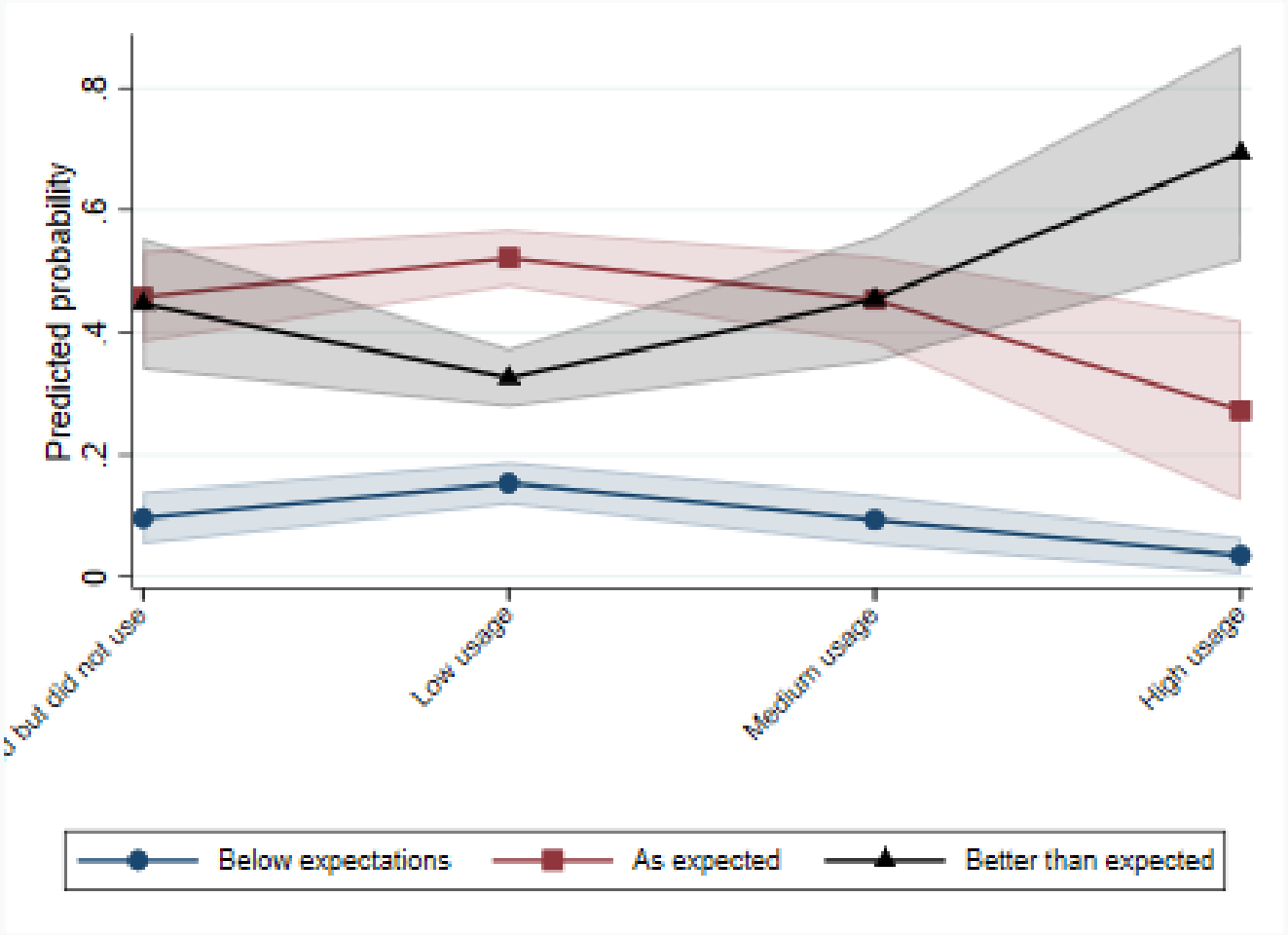
- Next, we look at the relationship between ...
  - AI usage intensity (low, medium, high), and
  - Formal usage of AI technologies within firms (ad-hoc vs formal basis), or
  - Firms' satisfaction with overall performance of AI (below expectations, as expected or better than expected)
- Is there a statistical association between the level/intensity of AI usage and whether a firm formally adopts AI and/or the satisfaction with AI tools that firms report, controlling for observable firm characteristics?

Predicted probabilities of formal usage



(a) By Usage Intensity Predictions

Predicted probabilities of satisfaction levels



(a) By Usage Intensity Predictions

Conclusions

- AI adoption has grown markedly across the (m)SME sector over the past year
  - Albeit adoption rates have increased more rapidly than firms' intentions to invest in AI technologies
  - The digital divide between small and large firms persits
- Knowledge-related barriers are important determinants of the decision to adopt new AI technologies and in shaping related-investment behaviours
- Operational barriers are particularly binding for firms' investment decisions compared to their adoption decisions
- Firms using AI more intensively are substantially more likely to have formalised its use within the organisation and are also more likely to report positive experiences with the technology

Policy recommendations

Evidence suggests a two-pillars framework for deepening AI diffusion remains important:

- **Bridging knowledge gaps to expand the *extensive margin***
  - Strengthen AI literacy and awareness.
  - Sector-specific information and training initiatives.
  - Opportunities for employees to gain hands-on AI experience.
- **Improving the operating environment to strengthen the *intensive margin***
  - Support AI investment
  - with particular emphasis on promoting a robust and certain regulatory approach to AI usage by firms

Thank you

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Appendix

Back

Definition of AI in the survey

"I would now like to ask you a few questions about using Artificial Intelligence (AI) in your business. AI technologies can be:

- *Embedded in devices, like autonomous robots or drones.*
- *Or, software-based, such as chatbot virtual assistants based on natural language processing, object and face recognition, speech recognition, machine translation, or data analysis using machine learning."*

Empirical Model

- System of two latent-variable equations.
- $adopt_i^*$ and $invest_i^*$ represent the (unobserved) net benefits of adopting AI and planning future AI investment.

$$
\begin{aligned}
ai_adopt_i &= 1 && \text{if } ai_adopt_i^* = x_i'\alpha + \eta_i > 0, && (1)\\
ai_adopt_i &= 0 && \text{otherwise;}\\
\\
plans_to_invest_i &= 1 && \text{if } invest_i^* = y_i'\beta + \gamma\, ai_adopt_i + \varepsilon_i > 0, && (2)\\
plans_to_invest_i &= 0 && \text{otherwise.}
\end{aligned}
$$

Estimation Strategy

- Estimate a seemingly unrelated bivariate probit model, i.e. a system of equations
  - Captures the recursive structure in which AI adoption may endogenously influence firms' intentions to invest.
- Test for correlation in unobserved factors:

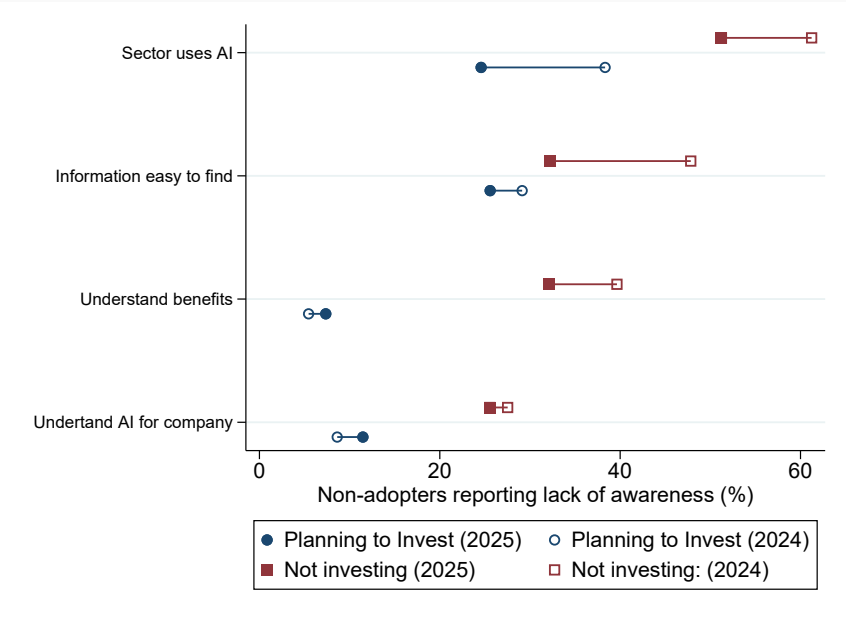
$$H_0 : \rho = 0$$

  - If $\text{Cov}(\eta_i, \varepsilon_i) = \rho \neq 0$, the adoption and investment decisions are jointly influenced by unobservable factors.
- We fail to reject H_0 indicating that the two processes are statistically independent

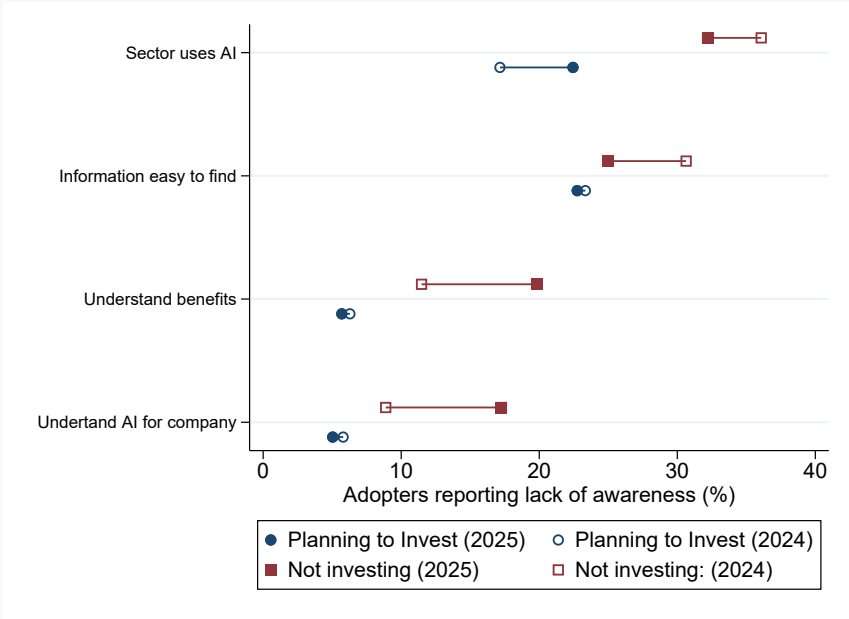
$\Rightarrow$ Estimating separate probit models is appropriate

Knowledge-related barriers by AI adoption status & intentions to invest

(a) Non-Adopters



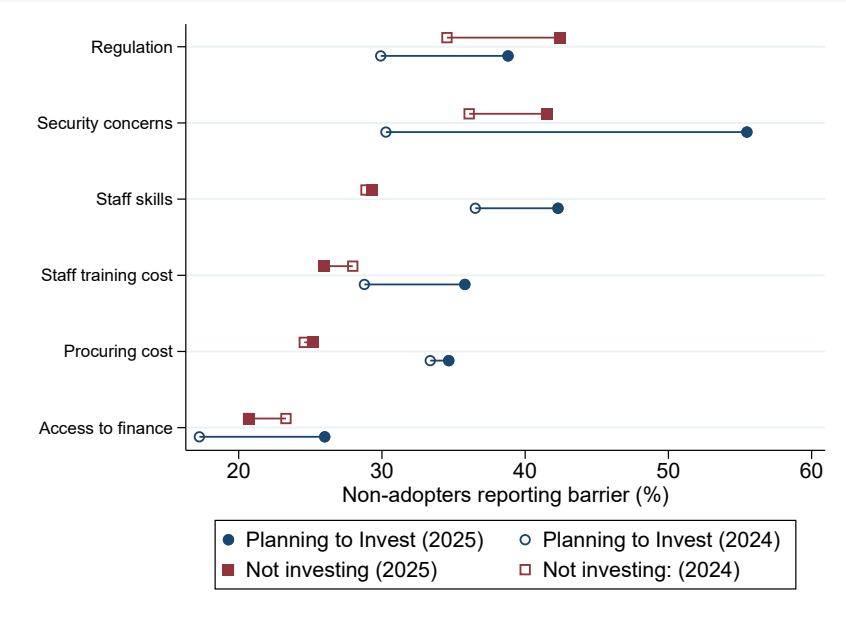
(b) Adopters



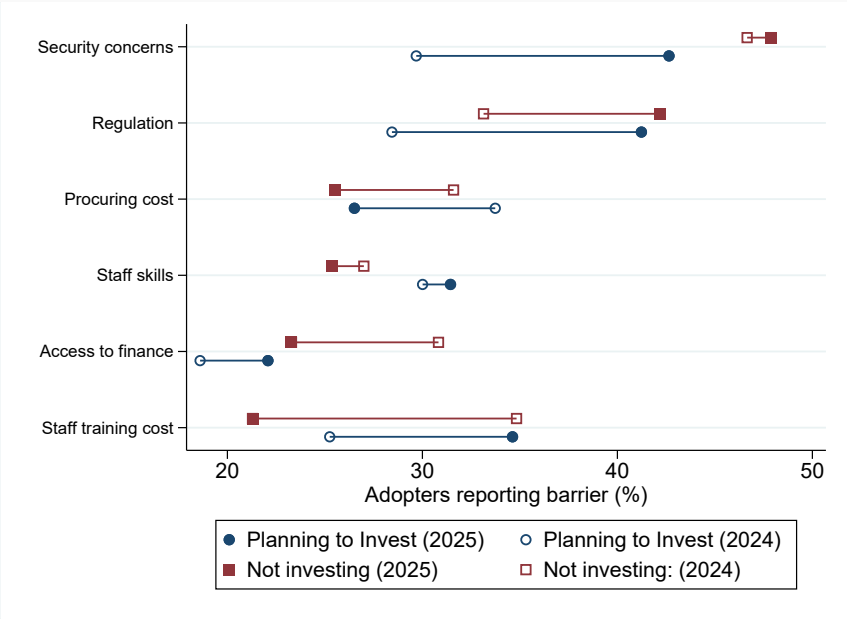
Source: Credit Demand Survey (2025) and authors' calculations

Operational barriers by AI adoption status & intentions-to-invest

(a) Non-Adopters

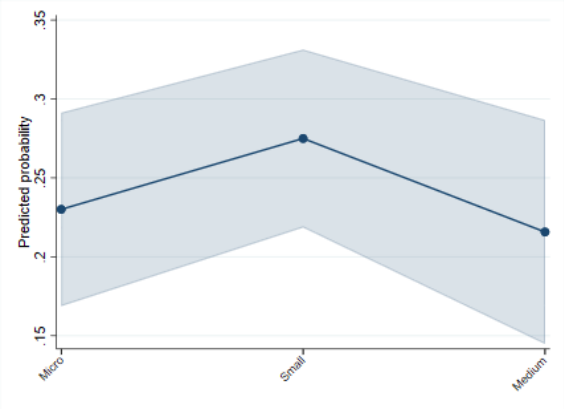


(b) Adopters

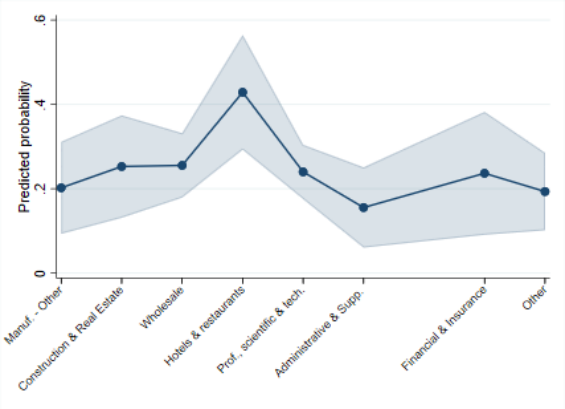


Predicted probabilities of formal adoption by key characteristics

(a) Firm Size



(b) Sector



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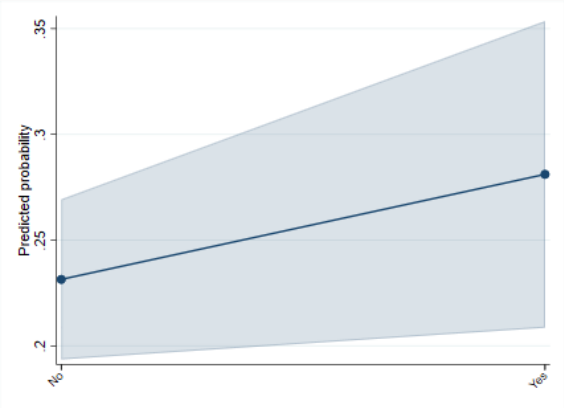
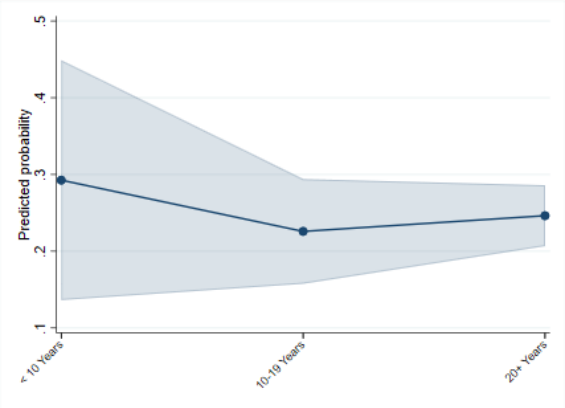
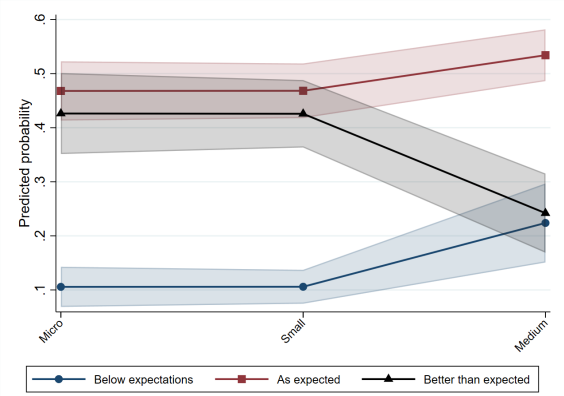


(d) Age

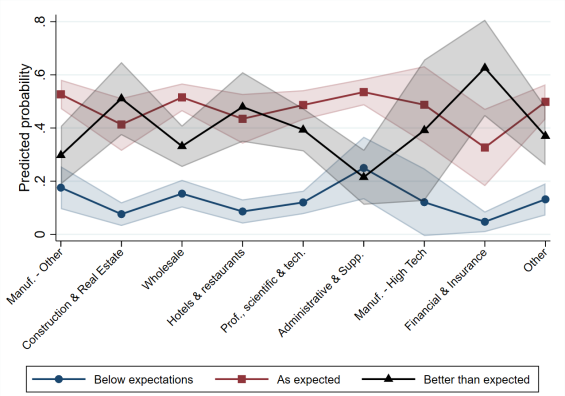


Predicted probabilities of satisfaction levels by key characteristics

(a) Firm Size



(b) Sector



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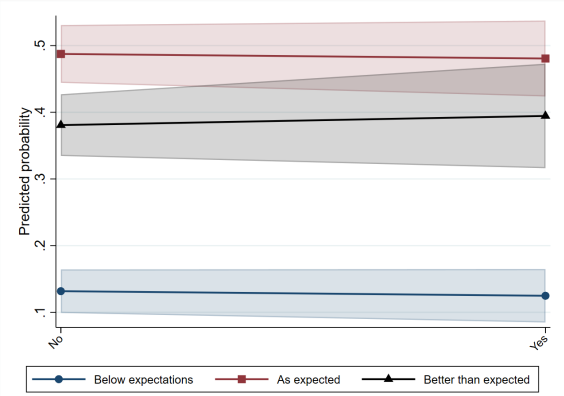
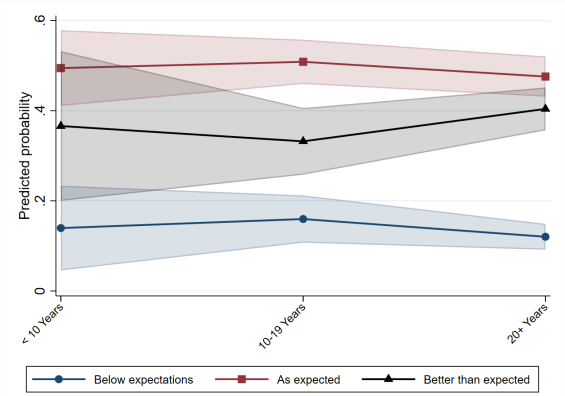
(d) Age