

AI Exposure without Labor Data: Measuring AI's Impact through Firms

By Jiacheng Liu

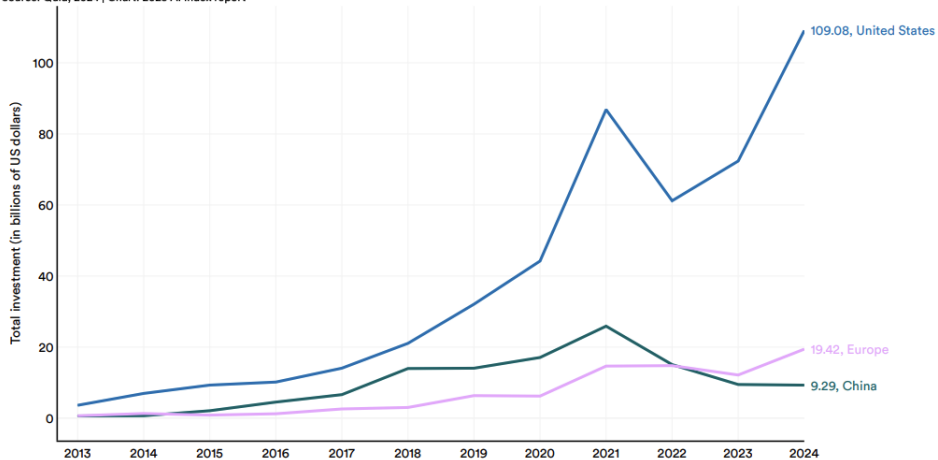
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Rising Global Investment in AI

Global private investment in AI by geographic area, 2013–24

Source: Quid, 2024 | Chart: 2025 AI Index report



Measuring AI

- Key question: How do firms invest in AI and how does AI investment affect firms?
- Empirical challenge: How to measure AI exposure or AI investment at the firm level?
- Most common solution: use labor data
 - AI heavily relies on human capital but requires little physical capital
 - Examples: [Acemoglu, Autor, Hazell, and Restrepo \(2022\)](#), [Babina, Fedyk, He, and Hodson \(2023, 2024\)](#), [Eisfeldt, Schubert, and Zhang \(2023\)](#), [Hampole, Papanikolaou, Schmidt, and Seegmiller \(2025\)](#)
- This paper uses earnings calls & SEC filings + LLM to measure firm-level exposure
- Other alternatives: patents ([Alderucci et al., 2020](#)), company websites ([Heinrich, 2025](#))

This Paper

- The paper has a lot of results (97 pages!)
- Main Findings:
 - The earnings-call-based measure is strongly correlated with labor-based measures on AI investment
 - Increased AI exposure improves firm performance and increases cost of capital
- The measure has a lot of potential, and the current paper does not fully exploit it
- My discussion will be mostly about focusing and positioning the paper to maximize contribution

What is AI Exposure?

- **Innovation** or **production** of AI technologies
 - Example: Microsoft, Nvidia
 - Measure: patents (Alderucci et al., 2020)
- **Application** of AI technologies to business operations or product development
 - Example: JPMorgan uses AI to assess credit risks and detect fraud
 - Measure: job descriptions from job postings or resumes (Babina, Fedyk, He, and Hodson, 2024)
- **Replacement of labor** by AI technologies
 - Example: IBM has a lot of back office IT workers who can be replaced by GenAI
 - Measure: occupation structure (Eisfeldt, Schubert, and Zhang, 2023)

What Does the Earnings-Call Measure Capture?

- **Innovation** or **production** of AI technologies [✓]
 - Nvidia 2026Q1: “AI workloads have transitioned strongly to inference, and AI factory buildouts are driving significant revenue.”
- **Application** of AI technologies to business operations or product development [✓]
 - JPMorgan 2023 Annual Report: “We have been actively using predictive AI and ML for years — and now have over 400 use cases in production in areas such as marketing, fraud and risk — and they are increasingly driving real business value across our businesses and functions.”
- **Replacement of labor** by AI technologies [✓]
 - IBM 2024Q1: “We see generative AI as a tool to augment and elevate our workforce, not replace it. Over the next few years, we expect 30% to 50% of repetitive back-office tasks—think HR, finance, procurement—to be automated. But critically, this isn’t about job elimination. It’s about reskilling and redirecting talent to higher-value work.”

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thank god earnings season is over so we don't have to hear about AI anymore. Every company made a token AI statement to cushion blow

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DOW JONES  +1% NASDAQ  +0.39% S&P 500  +0.52% AAPL  +0.08% NVDA  -0.06% MSFT  -0.02% AMZN  -0.34% META  -0.36%

TECH

DeepSeek, DeepSeek, DeepSeek: CEOs keep getting asked about the Chinese AI startup on earnings calls

Industry	2016	2022	Avg. Growth	Std. Growth
Arts, Entertainment, and Recreation	0.03	0.06	0.369	1.043
Construction	0.05	0.08	0.917	2.670
Other Services (except Public Administration)	0.00	0.31	∞	NaN
Agriculture, Forestry, Fishing and Hunting	0.15	0.43	0.213	0.280
Educational Services	0.00	0.50	∞	NaN
Utilities	0.04	0.12	0.369	0.792
Accommodation and Food Services	0.00	0.21	∞	NaN
Transportation and Warehousing	0.03	0.17	0.677	1.341
Wholesale Trade	0.02	0.17	0.594	0.628
Health Care and Social Assistance	0.05	0.38	0.434	0.391
Mining, Quarrying, and Oil and Gas Extraction	0.03	0.21	0.407	0.242
Real Estate and Rental and Leasing	0.05	0.15	0.230	0.188
Administrative	0.07	0.51	0.420	0.323
Retail Trade	0.07	0.30	0.328	0.356
Professional, Scientific, and Technical Services	0.11	0.56	0.337	0.243
Finance and Insurance	0.04	0.22	0.331	0.236
Information	0.12	0.62	0.330	0.255
Manufacturing	0.12	0.31	0.175	0.069

Refining the Measure

- Vague claims vs. substantive implementation (“AI Washing”)
- Persistence: whether a company talks about AI once or in multiple quarters
- Differentiate between producing AI, using AI, and being exposed to AI (more on this later)
- Management discussion vs. Q&A session

Measure Advantages

- Current paper focuses on validating the measure with labor-based measure and results on AI and firm performance
 - The labor-based measures are widely available: firm-level AI measure in Babina, Fedyk, He, and Hodson (2024) is posted online (2024 update coming soon)

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- What are the unique advantages of the earnings-call measure?
 - Measure **how** a company is exposed to AI
 - Measure **AI washing**
 - Measure **internal** vs. **external** AI investment

How Companies Are Exposed to AI

- Differentiate between AI producer, AI user, and occupational exposure to AI as well as different ways of using AI technologies
 - Labor-based measure focuses on AI users because job descriptions are about how workers *use* AI
 - Using AI is mainly associated with increased product innovation and scale (Babina, Fedyk, He, and Hodson, 2024); occupational exposure to AI is associated with labor replacement and productivity improvement (Eisfeldt, Schubert, and Zhang, 2023)
- The paper already uses LLM to assess topic of AI impact: labor, investment, revenue, competition, M&A. Labor accounts for 50% and investment accounts for 32%
 - The Kroger earnings call is classified as “Labor” because “most cited benefits relate to enhancing associate tasks (e.g., store order optimization), reducing manual processing time (e.g., customer feedback), and simplifying work.”
- Alternative: LLM + embedding model (Hampole, Papanikolaou, Schmidt, and Seegmiller, 2025)

AI Washing

- Li (2025) studies “AI washing” and finds substantial differences between AI talk (claiming AI investment in earnings calls) and AI walk (actual AI investment measured by resumes)
- AI talk and AI walk also have different effects: AI talk boosts stock returns, and AI walk improves real outcomes

Internal vs. External AI Investment

- One important limitation of labor-based AI measures is they only capture in-house AI hiring and do not measure external AI investment well
- Earnings calls can be useful to study: how pervasive is external AI investment? Complement/substitute with internal AI investment? What's the effect on firm performance?
- Example (Coca-Cola 2023Q1): "Coca-Cola is the first company to **collaborate with OpenAI and Bain & Company** to harness the power of ChatGPT and DALL-E to enhance marketing capabilities and business operations and to build capabilities through cutting-edge artificial intelligence (AI)."