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Project Insights Report

Waiting for Takeoff: Implications of AI on Skills and Productivity in Canada

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(FULL RESEARCH REPORT)   PDF

Waiting for Takeoff: The Short-Term Impact of AI Adoption on Firm Productivity

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:≡ Executive Summary

This project investigated the short-term impact of artificial intelligence (AI) adoption on firm-level productivity in Canada, focusing on whether AI adoption improves productivity and by what mechanisms. Using data from Statistics Canada's *Survey of Digital Technology and Internet Use* and advanced causal analysis methods, the study revealed mixed evidence. While AI adopters were generally more productive than their peers, adoption itself did not significantly accelerate productivity growth. This suggests that while AI adoption holds long-term promise, AI requires thoughtful integration into operations. These findings have implications for policy, workforce planning and economic development strategies.

KEY INSIGHTS

1 AI adoption does not consistently lead to short-term productivity growth.

2 Firms adopting AI were already more productive, but adoption did not increase their productivity growth rates.

3 Broader AI adoption and integration could yield long-term productivity gains, but immediate results are uncertain.

▶ The Issue

Artificial intelligence is the most discussed technology of recent years. Advocates promise that it will help overcome productivity challenges and radically transform the economy through increased wage gains and higher economic output, among other benefits. This conversation about the intersection of AI and productivity growth is particularly important in Canada today, amid concern about a "productivity problem."

Productivity is a key ingredient in future economic growth and standard of living, as it offers the potential to increase output without increasing inputs—like worker hours, natural resources and investment costs. Yet in past waves of innovation, we have seen patterns where a technology achieves widespread adoption without any evidence of it increasing productivity.

The late American economist Robert Solow notably remarked that "you can see the computer age everywhere but in the productivity statistics." Will this time be different?

Understanding whether AI will follow the same trends as previous waves of innovation is essential. Gaining this understanding will inform economic policy, business investment decisions, workforce planning and broader discussions about AI's benefits and drawbacks.

🔧 What We Investigated

This project addresses these questions in the Canadian context, using firm-level data to assess whether AI adoption improves productivity. With low adoption rates and limited research in Canada, this study fills a vital gap, offering the first evidence-based insights on AI's short-term impacts.

Key research questions were as follows:

- Does AI adoption lead to measurable productivity gains?
- Are these gains concentrated among certain types of firms, such as larger or younger companies?

Using 2019 and 2021 data from Statistics Canada's *Survey of Digital Technology and Internet Use* linked to financial records, the study focused on firms that adopted AI between early 2020 and late 2021. Methods included analysis and causal difference-in-difference estimation.

The study targeted industries and firm types where AI adoption was most prevalent, such as in information and communications technology and professional services. The period of analysis coincided with significant disruptions caused by the COVID-19 pandemic, which may have influenced adoption patterns and productivity outcomes.

✔️ What We're Learning

When we define "short term" as one to two years post-adoption, we find the following:

- **Evidence of productivity gains from AI use is mixed.** There is no conclusive evidence of a strong positive or negative relationship between AI adoption and short-term productivity improvement.
- **There was no significant relationship between the adoption of AI in this period** and either total productivity or productivity growth in the short term.

The firms that adopted AI were already more productive than their peers, but the decision to adopt AI did not increase the rate at which their productivity grew.

These results suggest that while AI adoption can position firms for long-term success, it is not a quick fix for productivity challenges. Effective integration and complementary investments in skills and infrastructure are likely required to unlock AI's full potential.

⭐ Why It Matters

This study has critical implications for policymakers, businesses and researchers:

- **Policy**: Policymakers should prioritize supporting firms in integrating AI effectively without expecting immediate productivity gains. Investments in complementary areas, such as workforce upskilling and digital infrastructure, are crucial.
- **Practice**: Firms should approach AI adoption strategically, focusing on embedding it into core business processes to realize long-term benefits.
- **Research**: Future studies should explore the impacts of newer generative AI technologies, such as ChatGPT, which were not covered in this analysis.

These findings emphasize that while AI is not an immediate productivity panacea, it holds promise for long-term economic growth if implemented thoughtfully.

While this is the first report in Canada to provide a look into the relationship between AI adoption and firm productivity, the overall rates of AI adoption in the Canadian economy remain low, and at an early stage.

**State of Skills:
Unleashing AI into the Skills Development Ecosystem**

To reap the benefits that AI has to offer, its adoption and deployment should be a collaborative and inclusive process that recognizes and addresses genuine concerns individuals have about AI and technology more broadly.

Read Thematic Report

As applications in AI become more widespread and are increasingly embedded across various operations, there could be an increased chance for potential efficiencies to translate into increased productivity.

Most notably, this research focuses on the impacts of AI adoption *before* the public launch of OpenAI's ChatGPT in late 2022, which sparked widespread interest in the latest generation of generative AI technologies. As generative AI tools like large language models offer different capabilities than other types of AI, further research is needed to assess its impact on productivity growth in Canadian firms. Data from the next iteration of the Statistics Canada survey conducted in late 2023 through early 2024 will make this possible.

Many private-sector and policy leaders presume that business adoption of AI can be a silver bullet in addressing Canada's productivity growth challenge. Our findings call for caution in asserting that AI adoption at the firm level results in short-term productivity gains. We look forward to continuing to analyze and research how the deployment of these fast-changing technologies affects the course of the Canadian economy.

▶▶ What's Next

Future steps

- **Broader integration**: Develop resources and frameworks to support firms in leveraging AI effectively.

- **Expanded research**: Analyze data from the 2023–2024 *Survey of Digital Technology and Internet Use* to capture generative AI's impacts.

- **Policy engagement**: Disseminate findings to policymakers to inform AI-related economic development strategies.

Have questions about our work? Do you need access to a report in English or French? Please contact communications@fsc-ccf.ca.

How to Cite This Report
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