

Executive summary

Artificial intelligence (AI) is advancing faster than any technology in modern history, and this has major implications for Canada's financial sector. AI is reshaping how financial institutions operate, where they invest, and the broader economic and geopolitical environment in which they compete.

Critical to this shift is the physical infrastructure that enables AI. AI systems depend heavily on electricity, water, land, and specialized materials. Data centres are particularly energy-intensive, and their rapid expansion is placing increasing strain on power grids in North America and globally. In Canada, data centres could account for a significant share of electricity demand within the next decade, raising concerns about grid reliability, energy price volatility, and regulatory intervention.

While much of the focus has been on AI's capabilities, its underlying infrastructure is emerging as a critical constraint and source of risk. In Canada, recent industry discussions through the Financial Industry Forum on Artificial Intelligence (FIFAI II) have highlighted that AI-driven risks are increasingly systemic in nature—cutting across operational, market, and consumer domains simultaneously and challenging traditional siloed risk management approaches.¹

Against this backdrop, this paper explores three primary categories of AI-related risks facing Canadian financial institutions. These include:

1. Operational risks that arise from the growing dependency of Canadian financial institutions on AI systems and the physical infrastructure that supports this technology. These risks are compounded by the extraordinary concentration of AI infrastructure among a small number of American-owned cloud providers, and by the mounting strain that AI data centres are placing on electrical grids and the impact a disruption in these energy supplies could have for AI operations.

2. Investment risks that arise from the exposure of Canadian financial institutions to both AI-concentrated markets and to the physical resource constraints that may limit AI's growth trajectory. Currently, the global AI investment landscape is defined by two features. The first is an extraordinary level of capital expenditure, and the second is significant market concentration in a small number of mega-cap technology firms such as the so-called "Magnificent Seven," which collectively account for over 30% of the S&P 500. Investment portfolios of Canadian financial institutions carry correspondingly high exposure to AI and the broader technology sector, through both direct holdings and passive index strategies. This portfolio concentration creates a vulnerability to correlated losses in the event of an AI

downturn. Underpinning these financial risks are physical resource constraints on AI infrastructure, particularly around energy and water, that may limit the growth trajectory currently embedded in AI valuations.

3. Downstream risks are the second- and third-order effects of AI's proliferation across the economy, society, and the world's geopolitical order. These are the least visible and potentially most consequential dimensions of AI risk for Canadian financial institutions, and they are the risks for which institutions are least prepared. A defining feature of downstream risks is their ability to interact and amplify one another. For example, resource constraints affecting data centres could trigger regulatory action, shift market sentiment, and lead to asset revaluations, all while disrupting operational systems. Similarly, geopolitical shocks could simultaneously affect supply chains, market valuations, and regulatory environments. These interconnected risks challenge traditional risk management approaches that treat risks as isolated and independent.

In this context, managing AI-related risk is not solely an operational challenge; it is a strategic imperative. Institutions that develop a comprehensive understanding of AI's investment and downstream risks, particularly those linked to infrastructure and resource constraints, will be better equipped to sustain resilience and capture long-term value in an increasingly AI-driven economy.