ITIF | INFORMATION TECHNOLOGY & INNOVATION FOUNDATION

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COMMENTS OF ITIF

Before the

Digital Enforcement and Intelligence Branch

Competition Bureau Canada

Gatineau, Quebec, Canada

In the Matter of:	)
Feedback on artificial intelligence and competition in Canada.	)

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INTRODUCTION AND SUMMARY

The Information Technology and Innovation Foundation (ITIF), the world's leading think tank for science and technology, appreciates the opportunity to contribute to the Competition Bureau Canada's consultation for feedback on artificial intelligence (AI) and competition.[1] This submission represents feedback from ITIF's Center for Data Innovation, ITIF's Schumpeter Project on Competition Policy, and ITIF's Centre for Canadian Innovation and Competitiveness.

The AI market is experiencing early-stage growth with no significant entry barriers concerning data and computational resources evident or any exclusionary trade practices. Companies like OpenAI, Anthropic, and Mistral AI have succeeded in developing leading models despite not having pre-existing large user data sets of large social media platforms. In the market for computing, competition exists at multiple levels, including among cloud providers like Google, Microsoft, and Amazon, and chip manufacturers such as Nvidia, AMD, and Intel. Competition among firms making AI models centers on performance, price, speed, interface, licenses, customization, and specialization. Varying degrees of vertical integration among large tech companies, such as Meta, Amazon, and Google, as well as different approaches to producing open-source versus proprietary AI models, indicate firms are pursuing different strategies which provide users with more choice.

Canada's AI sector is vibrant and diverse, with over 1,600 startups collectively securing more than seven billion dollars in funding.[2] Notable companies like Cohere AI, focusing on enterprise AI models; Inference Labs, specializing in AI infrastructure for web3; and Ada, an AI-driven customer service platform, showcase the wide-ranging applications of AI technologies in Canada. This diversity underscores the sector's potential to create value for consumers across different domains. Given the focus on areas like web3 infrastructure, understanding the specifics of these sectors in the light of AI development is vital before any regulatory action. These firms are succeeding, in part, because of the presence of healthy competition and collaboration with other firms across the sector, large and small, domestic and foreign.

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[1] "Artificial intelligence and competition: Discussion paper," Competition Bureau Canada, March 20, 2024, https://ised-isde.canada.ca/site/competition-bureau-canada/en/how-we-foster-competition/education-and-outreach/artificial-intelligence-and-competition.

[2] "Canada Artificial Intelligence Companies," *Crunchbase*, accessed April 23, 2024, https://www.crunchbase.com/hub/canada-artificial-intelligence-companies.

SECTION 1: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Are there any additional technologies to those listed that the Bureau should consider to advance its understanding of artificial intelligence?

The Bureau has included a comprehensive list of AI technologies in its discussion paper. The discussion paper also rightly notes that definitions of AI are often ambiguous. Still, a clear and unambiguous definition of AI is crucial to avoid inadvertently including other software and systems within the scope of potential new regulations. AI covers a broad range of technology and is integrated into many hardware and software products. The Bureau should not use broad definitions of AI in potential regulation if it only intends to regulate uninterpretable machine learning or deep learning systems.[3] For example, the European Union's AI Act initially included such a broad definition of AI that basic spreadsheet software such as Microsoft Excel would likely have fallen within its scope.[4] Using a definition of AI in regulations that is too broad would impose substantial costs on those developing or deploying products and services that integrate basic analytics or automation.

Are any of the identified technologies particularly significant to the AI sector in Canada?

It is crucial for the Bureau to maintain a neutral stance on specific technologies. The substantial investment in various technologies and techniques across the Canadian AI sector indicates market confidence in their potential viability. Rather than predicting which technologies will be most crucial, the Bureau should impartially assess all technologies, recognizing the dynamic nature of the AI industry and its potential for innovation and growth.

SECTION 2: MARKETS FOR ARTIFICIAL INTELLIGENCE

Does the description of AI markets align with what is seen in Canadian markets? Are there other markets, or characteristics of the outlined markets, that the Bureau should consider?

The discussion paper notes that some firms in the AI market are vertically integrated, meaning they provide multiple components along the AI value chain, but it does not explore how different firms exhibit varying degrees of vertical integration. Each firm chooses its level of integration based on what it believes will be most profitable. For example, Meta has decided to build large language models (LLMs) and make them available via an open-source license. While Meta has access to compute infrastructure, it does not provide cloud services or allow others to run its models on its servers. On the other hand, Amazon and Microsoft provide cloud services to organizations that are building and deploying LLMs. Google provides cloud services and has built LLMs that run on its compute resources. The varying degrees of vertical integration among large tech

[3] Daniel Castro, "Ten Principles for Regulation That Does Not Harm AI Innovation" (Center for Data Innovation, 2023), https://www2.datainnovation.org/2023-ten-principles-ai-regulation.pdf.

[4] Mikołaj Barczentewicz and Benjamin Mueller, "More than Meets the AI: The Hidden Costs of a European Software Law," Center for Data Innovation, December 1, 2022, https://www2.datainnovation.org/2021-more-thanmeets-the-ai.pdf; Insurance Europe, "Response to EC proposal for a Regulation on AI," n.d., https://www.insuranceeurope.eu/publications/2413/response-to-ecproposal-for-a-regulation-on-ai/.

companies suggest that each approach has its own tradeoffs, and not all firms will adopt the same integration strategies.

Microsoft, for example, integrates a generative AI system (Copilot) with its operating system, web browser, and office productivity suite to enhance the user experience.[5] However, this integration does not give it an inherent advantage over standalone AI systems like those developed by Anthropic or Mistral AI.[6] Microsoft must work within specific constraints to ensure compatibility and usability within the Windows and Office environments, which differ significantly from creating standalone AI models.

Further, the discussion paper does not adequately consider the benefits of vertical integration. Vertical integration often results in a number of procompetitive benefits relating to increased scale and scope that can drive innovation and consumer benefits. Vertical integration between a cloud provider and an AI model maker can reduce the cost of compute. Because the cloud provider has the scale economies in the compute market. New AI firms entering the market can buy cloud computing to build their models; they have access to computing without incurring the cost of investing in compute infrastructure. The harms of vertical integration are theoretically possible if there is a monopoly in the compute market, but empirically, there are many compute providers. As noted above, there are benefits of vertical integration to firms like Microsoft and Google, as they combine cloud services with AI models. Vertical integration can also incentivize innovation through complementarities that support dynamic capabilities.[7] Thus, many of the competition concerns expressed in the discussion paper regarding vertical integration are unfounded.

Are there specific considerations for Canadian market participants access to inputs such as compute, data, or AI technologies (such as AI models), that the Bureau should be aware of?

The generative AI market is still in its early stages, and as of now, there is no evidence of significant entry barriers. Concerns about data being an entry barrier in AI are speculative and unsubstantiated. Firms seeking to create generative AI models can use data from variou s sources, including publicly available data on the Internet, government and open-source datasets, datasets licensed from rightsholders, data from workers, and data voluntarily shared by users. They also have the option to generate synthetic data to train their models. Some firms, such as OpenAI, Anthropic, and Mistral AI, have succeeded in creating leading generative AI models despite not having access to the large corpus of user data held by social media companies such as Meta or X.com. Additionally, companies with internal data can leverage it to build specialized models tailored to specific tasks or fields, such as financial services or healthcare.

Similarly, compute resources required for training generative AI models have not proven to be an entry barrier. Numerous players in the cloud server market provide the necessary infrastructure for training and

[5] Michael Muchmore, "What Is Microsoft Copilot?," *PCMag*, March 16, 2023, https://www.pcmag.com/explainers/what-is-microsoft-copilot.

[6] Lance Whitney, "AI startup Mistral launches a 281GB AI model to rival OpenAI, Meta, and Google," *ZDNet*, April 10, 2024, https://www.zdnet.com/article/ai-startup-mistral-launches-a-281gb-ai-model-to-rival-openai-meta-and-google/.

[7] David J. Teece, Gary Pisano & Amy Shuen, Dynamic Capabilities and Strategic Management, 18 STRATEGIC MANAGEMENT JOURNAL 509 (1997) ("Our approach is especially relevant in a Schumpeterian world of innovation-based competition").

running AI models. For example, Anthropic used Google Cloud to train its Claude AI models.[8] Microsoft has also made its cloud computing services available to many competing AI model developers, including OpenAI, Meta, and Mistral. In terms of chips, Nvidia's graphics processing units (GPUs) are popular, but face meaningful potential competition from firms like AMD and Intel.[9] Other firms are also investing in chip design and manufacturing, fostering competition in the market.[10] For example, Google has invested heavily in Tensor Processing Units (TPU), specialized chips designed to train and run AI models. These options ensure that Canadian firms can access the necessary infrastructure without being locked into a single vendor.

Similarly, market participants who want access to AI models have many options. End users who want to use AI models can access proprietary models such as ChatGPT 4 or Claude Opus both through APIs as well as chatbot interfaces. Those who want to access open-source models can run Mistral and Meta's open-source models locally on their own devices and access them through APIs and chatbot interfaces. In the case of firms that want to use AI models to build other services, they also have access to proprietary as well as open-source models. There hasn't been any case of exclusionary practice by any model makers; considering the availability of multiple choices, it is unlikely that any firm will engage in such practices.

SECTION 3: AI AND COMPETITION

Are there additional factors that can affect competition in the AI sector?

There are various dimensions AI firms compete on to differentiate themselves in the market not expounded on in this section of the discussion paper. The main drivers of competition include performance, price, speed, interface, licenses, customization, and task specificity.

In terms of pricing, many generative AI systems providers, such as OpenAI, Gemini, and Claude, offer chat interface access to their models at around $20 per month.[11] However, the prices for API access may vary between these providers.[12]

Speed is another crucial factor, with models like GPT Turbo and Claude Instant focusing on delivering faster inferences to meet the demands of real-time applications.[13] Firms also compete on the licensing structure.

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[8] Anthropic Partners with Google Cloud, Anthropic, February 3, 2023, https://www.anthropic.com/news/anthropicpartners-with-google-cloud.

[9] Jacob Kastrenakes, "Nvidia Is Launching a New Must-Have AI Chip — as Customers Still Scramble for Its Last One" The Verge, November 13, 2023, https://www.theverge.com/2023/11/13/23958823/nvidia-h200-ai-gpuannounced-specs-release-date.

[10] Emilia David "Chip Race: Microsoft, Meta, Google, and Nvidia Battle It out for AI Chip Supremacy" The Verge, February 1, 2024, https://www.theverge.com/2024/2/1/24058186/ai-chips-meta-microsoft-google-nvidia.

[11] Frederic Lardinois, "Google Launches Gemini Ultra, Its Most Powerful LLM Yet" TechCrunch, February 8, 2024, https://techcrunch.com/2024/02/08/google-goes-all-in-on-gemini-and-launches-20-paid-tier-for-gemini-ultra/.

[12] Kyle Wiggers, "Anthropic Claims Its New AI Chatbot Models Beat OpenAI's GPT-4" TechCrunch, March 4, 2024, https://techcrunch.com/2024/03/04/anthropic-claims-its-new-models-beat-gpt-4/.

[13] Benj Edwards, "Anthropic Introduces Claude, a 'More Steerable' AI Competitor to ChatGPT" Ars Technica, March 17, 2023, https://arstechnica.com/information-technology/2023/03/anthropic-introduces-claude-a-more-steerable-ai-competitor-to-chatgpt/.

Meta's Llama model, along with Mistral's Mixtral-8x7B and Mistral 7B models, and the BLOOM model created by independent researchers, use an open-source license that allows users to use, reproduce, distribute, and modify the original model. This freedom allows developers to use and adapt the model to a diverse set of applications, including some of which the original model developers might not have accounted for. Other generative AI models, including GPT-3 from OpenAI and Claude from Anthropic, have built proprietary models. From a consumer's point of view, having different licensing models increases the options in the market. From the supply side, an open-source model maker does not bear the full cost of creating and sharing the models. For example, Mistral shared its models via a torrent file on a peer-to-peer file-sharing network. Hardware advancements are also driving competition in both the provision and distribution of models. As the AI industry matures, there is a growing demand for specialized AI systems. Companies like Bloomberg have recognized this need and have created their own models tailored to specific applications of AI in finance.[14]

Are there additional aspects of the AI sector that are relevant to these competition factors?

Since the groundbreaking work of Joseph Schumpeter in the 1940s, it has long been understood that competition is not merely, as neoclassical economics holds, an equilibrium where price equals marginal cost. Nor is it simply, as Adam Smith imagined, a rivalry between many sellers in a market. Rather, as Schumpeter explained, innovation or dynamic competition occurs through "gales of creative destruction" whereby one firm competes for the market by creating a new product, only to be challenged by additional "leapfrog competition" that supplants the formerly dominant firm with a still newer product that not just dazzles consumers but allows for the firm to recoup the costs of its innovation.[15]

Indeed, Schumpeter's theory of innovation competition helps elucidate the amazing transformation of economic life in the Western world from a more atomistic economic system largely constituted by small and regional firms defined by static forms of competition to one driven by large, national, and now international concerns powered by scale economies and R&D-driven innovation. And AI is the next generation of this radical Schumpeterian paradigm shifting and industrial change at work. As ITIF's Rob Atkinson observed, "the first industrial revolution of the steam engine in the 1780s and 1790s, the second revolution of iron in the 1840s and 1850s, the third revolution of the 1890s and 1900s based on steel and electricity, the fourth revolution in the 1950s and 1960s based on electromechanical and chemical technologies, the fifth of our present era based on information technology and communications technology, a sixth wave will emerge, likely grounded in AI, robotics…"[16]

Viewed in this dimension, economic concentration is a feature—not a bug—of not just a competitive process to facilitate innovation and economic growth but the evolution of capitalist society itself.[17] In other words, amidst Schumpeterian gales of creative destruction wrought by AI, firms often benefit from the size and scale

[14] Shijie Wu et al"BloombergGPT: A Large Language Model for Finance" arXiv.org, December 21, 2023, https://doi.org/10.48550/arXiv.2303.17564.

[15] Joseph A. Schumpeter, CAPITALISM, SOCIALISM, AND DEMOCRACY 81 (1942).

[16] Rob Atkinson, Shaping Structural Change in ab Era of New Technology (2019).

[17] Schumpeter, at 106 ("What we have got to accept is that [the large-scale establishment or unit of control] has come to be the most powerful engine of [economic] progress.…In this respect, perfect competition is not only impossible but inferior, and has no title to being set up as a model of ideal efficiency.").

needed to make the investments necessary to drive innovation and recoup the costs of these investments in the face of uncertainty. Indeed, numerous studies across many economies around the world continue to confirm that the relationship often takes the form of an inverted-U, where markets characterized by many firms are less innovative than markets with a few firms, and markets with a few firms exhibit more innovation than those characterized by monopoly.[18]

Are any of the possible issues identified above particularly significant to the AI sector in Canada?

Canada's economy has not witnessed the sort of Schumpeterian competition and emergence of large-scale tech firms needed to thrive in the current innovation environment. Indeed, Canada's R&D spending as a percentage of GDP is declining and falls below the average of other OECD countries.[19] Addressing these structural issues is crucial for Canada's long-term economic success and competitiveness.[20] Ultimately, Canada's policy framework, rather than misplaced concerns about increased concentration, bears much of the blame. Today, a misguided approach to AI regulation risks ensuring that Canada similarly misses the next technological revolution instead of using it to rejuvenate its economy.

Are there any particularly relevant or informative market study topics, specific to the AI sector or a portion of the AI sector, which the Bureau should consider?

As ITIF's recent report assessing Canadian innovation, productivity, and competitiveness explains, this new techno-economic revolution, of which AI is a foundational part, has the potential to deliver significant social and economic benefits, as well as power the next wave of Canadian technology companies.[21] In fact, the report found that the number of AI jobs in Canada is growing at a faster rate than in any other country examined in the report. This portends real opportunities for the Canadian economy, especially if it can continue to support AI research and not put in place a regulatory system that limits AI innovation and use.[22]

But Canada needs the right policy framework in place. Put simply, Canada should reject the "precautionary principle," or the idea that if a technological innovation may risk harming the public or the environment, then those proposing the technology should bear the burden of proving it will not. Instead, Canada should embrace the "innovation principle," which holds that because the overwhelming majority of technological

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[18] *See* Philippe Aghion at al., *Competition and Innovation: An Inverted-U Relationship*, 120 Q. J. ECON. 701 (2005); Michael R. Peneder & Martin Woerter, *Competition, R&D and Innovation: Testing the Inverted-U in a Simultaneous System*, 24 J. of Evolutionary Econ. 653 (2014) (Switzerland); Michiyuki Yagi & Shunsuke Managi, *Competition and Innovation: An inverted-U relationship using Japanese industry data*, Discussion Papers 13062, Research Institute of Economy, Trade and Industry (RIETI) (2013) (Japan); Michael Polder & Erik Veldhuizen, *Innovation and Competition in the Netherlands: Testing the Inverted-U for Industries and Firms*, 12 J. of IND. COMPETITION AND TRADE 67 (2012) (Netherlands); Chiara Peroni & Ivete Gomes Ferreira, *Market competition and innovation in Luxembourg*, 12 J. OF IND, COMPETITION AND TRADE 93 (2012) (Luxembourg).

[19] Robert D. Atkinson and Lawrence Zhang, "Assessing Canadian Innovation, Productivity, and Competitiveness," (ITIF, April 2024), https://itif.org/publications/2024/04/29/assessing-canadian-innovation-productivity-and-competitiveness/.

[20] Ibid.

[21] Ibid.

[22] Ibid.

innovations benefit society and pose modest and not irreversible risks, the government's role should be to pave the way for widespread innovation while building guardrails, where necessary, to limit harm. The innovation principle (something U.S. policymakers, until recently, have embraced) recognizes that market forces, tort law, existing laws, and regulations, or light-touch targeted interventions can usually manage the risks new technologies pose. In cases wherein regulations are needed, it stresses the importance of designing regulatory interventions and structuring regulatory enforcement in ways that minimize the harm to innovation, while still achieving the regulatory goals.

CONCLUSION

The artificial intelligence market in Canada is still in its early stages but is growing rapidly and becoming increasingly competitive. At this juncture, there is no clear evidence of market failure, substantial barriers to entry, or exclusionary practices that would necessitate intervention by the Competition Bureau.

AI companies are able to access the key inputs they need, such as data and compute resources, through a variety of means. Cloud computing providers and chipmakers are engaged in robust competition to supply the infrastructure for AI. New entrants have proven able to develop state-of-the-art AI models without needing proprietary access to extensive user datasets.

Moreover, AI companies are differentiating themselves and competing across a range of important vectors, including performance, price, inference speed, user interface, licensing approach, and specialization. The fact that major tech companies are pursuing varying strategies and degrees of vertical integration is a positive sign for market competitiveness and user choice.

The Bureau should embrace the "innovation principle" instead of the "precautionary principle" when crafting AI-related policies and allow this dynamic and innovative market to continue evolving and competing to deliver new benefits for Canadian consumers and businesses.

Thank you for your consideration.

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