

# Submission to HUMA Committee on AI and Work

Viet Vu, Angus Lockhart | November 2023



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## Executive Summary

The Dais at TMU is pleased to contribute this submission to the Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities. The Dais is a public policy and leadership think tank at Toronto Metropolitan University, connecting people to ideas and power we need to build a more inclusive, innovative, prosperous Canada. This includes a focus on the responsible adoption and governance of new technology, which we have been engaged with for the past seven years.

While the latest wave of artificial intelligence (AI) tools have sparked a global conversation on the impact AI is likely to have on workers, the conversation about automation more broadly is not new. This brief provides a background on the known impacts of automation and the path Canada should take to support workers:

**1. The prosperity benefits of responsible AI adoption in Canadian workplaces should outweigh the risk to workers.** Slowing adoption risks both disruptions in the labour market, as well as a loss in international competitiveness for Canadian firms. That risk is likely to be larger than the labour market disruption that may result from the technology itself.

**2. AI is not yet present in most Canadians businesses, and so most workers have yet to be exposed to it.** Just 4% of businesses are using AI, and only 2% of online job postings in September 2023 listed AI skills. We have yet to see the largest impacts that AI will have on the Canadian economy and on workers.

**3. We need to be thoughtful and responsible in the way we adopt AI.** In the quest to adopt AI more broadly, we must be mindful of careless adoption of AI that hurts workers, by advancing responsible adoption principles and legal guardrails to ensure the resulting economic gains from AI do not come at the expense of Canadians.

**4. Generative AI is different from previous waves of artificial intelligence.** While previous automation technology was largely labour replacing, GPTs can be more labour-complementary, providing support for less skilled workers to perform better at existing tasks, rather than outright replacing them.

**5. This is a fast changing issue that requires continued research** to support policy development as all types of AI become more prominent. Properly understanding this issue requires cooperation from both Statistics Canada and external research partners.





# Historical Context

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In 2021, we produced a knowledge synthesis on the impact of digital technology on labour.<sup>3</sup> In this work, we note that the modern scholarship on understanding the impact of automation technologies on workers started in the early 1990s, coinciding with a wave of labour-saving automations, particularly in the manufacturing industry that deeply impacted workers in areas with concentrated manufacturing industries (such as Southwestern Ontario).

These early models of automation suggested that low skilled workers would be most hurt by increased automation while highly skilled workers would benefit. However, our knowledge synthesis finds that empirical evidence from more recent waves of automation has shown that, in some cases, the economic benefits went to both the most highly skilled and the least skilled workers with those in the middle of the skill distribution experiencing the most economic harm.

This has led to the development of a class of model that we continue to use today: the “task-based” model of automation. This model broke down a job into a set of tasks, with each being classified as manual or cognitive, and routine or non-routine.<sup>4</sup> It then focused on automation technology’s potential to automate routine tasks (both cognitive and manual) performed by middle skilled workers. The model became the standard way we understand how automation impacts workers.

We also note that there was a scholarly consensus that technological adoption (including labour-saving AI) raised productivity. As a result, the literature largely focused instead on the distributional impact of technology adoption, its impact on vulnerable workers, and how to better target policy interventions to support workers facing structural disruption from such adoption.

This focus also meant that comparatively few studies looked at cases in which a technology does not replace a worker’s task, but allowed a worker to perform that task better. In qualitative research that we engaged in examining the impact of automation technology on the Ontario labour market, we documented multiple stories that point towards specific implementation of automation technologies that have improved work conditions, workplace safety, and improved accessibility to work opportunities (including, for example, in the construction industry).<sup>5, 6</sup>

In fact, our work concluded that the risk from labour-market disruption as a result of lack of adoption of technology (and the resulting loss in international competitiveness) was larger than the labour-market disruption that may result from the technology itself. From identifying challenges faced by Canadian industries to adopt technologies (with a particular focus on the manufacturing and finance sector)<sup>7, 8</sup>, to the largely stagnant tech sector (across a variety of metrics including pay, firm growth, and existence of scale-ups) in Canada that still excludes many workers.<sup>9, 10, 11</sup>

We also noted digital skills demand in Canada to still be largely focused on fairly low-intensity workforce digital skills (such as Microsoft Excel), as opposed to those that involve high-level digital skills that relate to AI.<sup>12</sup> With that historical work established, we will now provide an overview of the current state of AI in the economy, with a particular emphasis on how it is impacting workers.

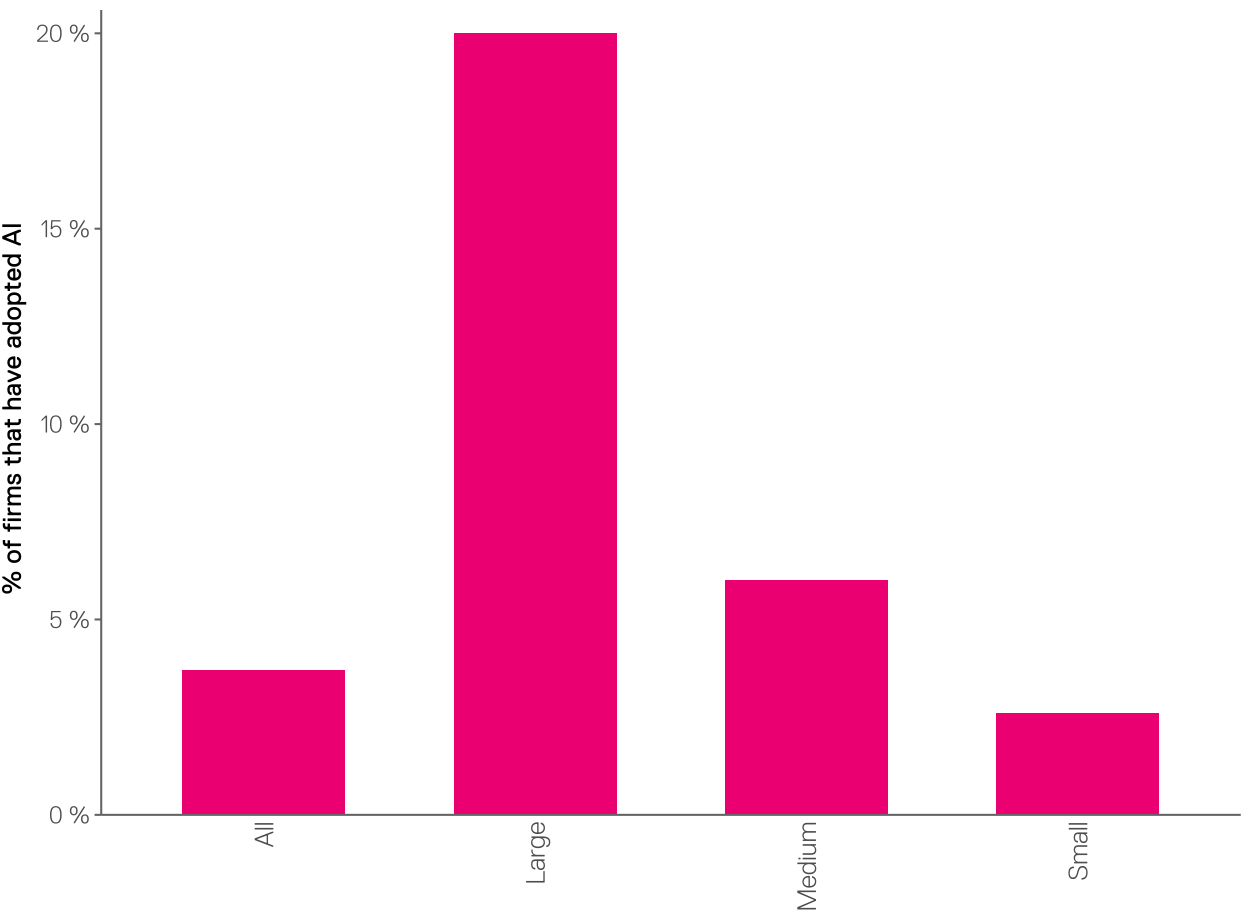
# The Current Situation

## Pace of Adoption

Canada is still in the early days of AI in the workplace. In a recent study we authored using data from Statistics Canada's Survey of Digital Technology and Internet Use, we found that as of late 2021, less than 4% of businesses in Canada had adopted any kind of AI,<sup>13</sup> placing Canada in 20th place out of the 38 countries that are part of the OECD. That deployment of AI is concentrated in the largest businesses of over 100 employees with 20% of firms having adopted the technology, while among businesses of under 20 employees, only 3% have adopted AI.

Similarly, we found that, according to the Canadian Survey of Business Conditions, firms that are majority owned by women, Indigenous peoples, and people living with disabilities are less likely to have adopted AI technology than other firms. For firms owned by people in each of those groups, we saw an adoption rate of less than 1%.

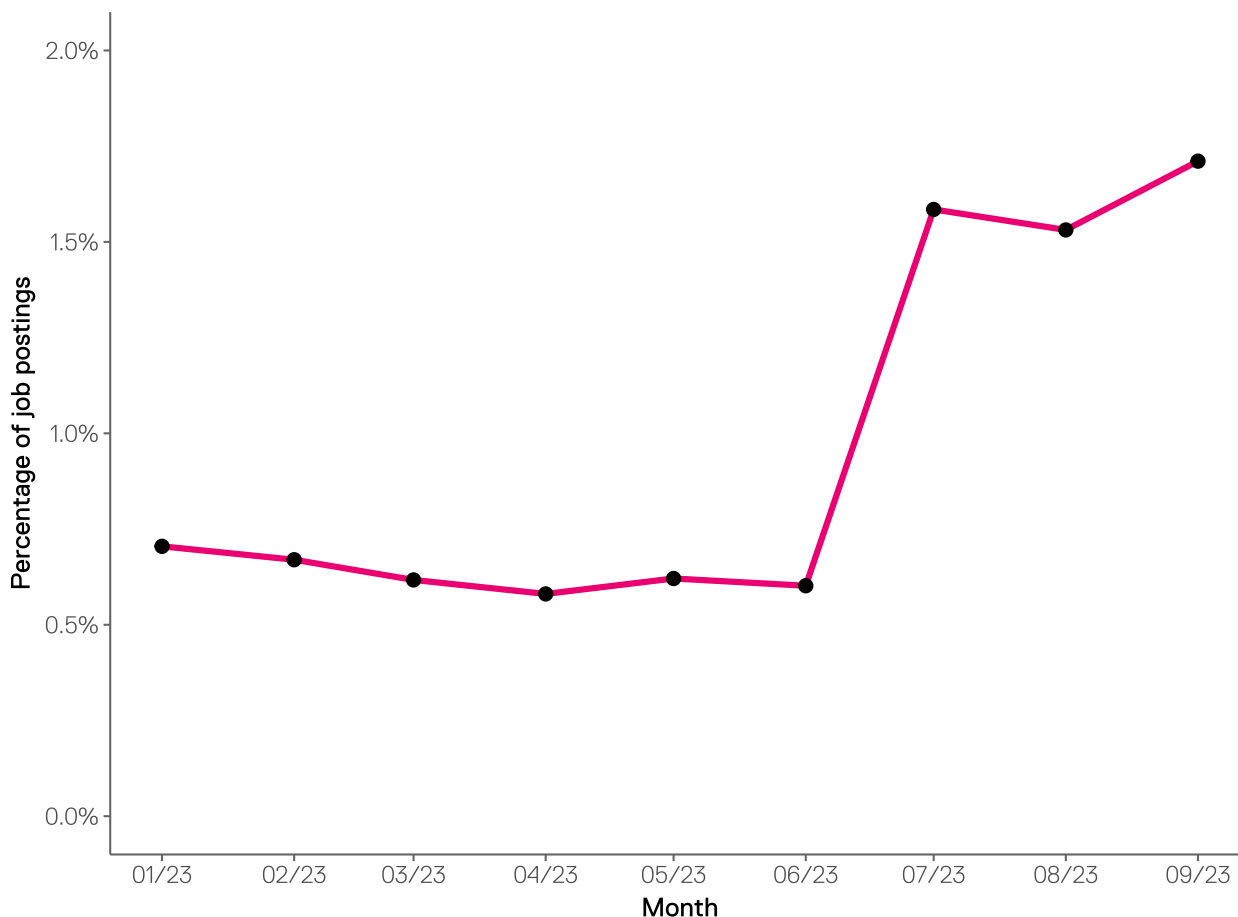
**Figure 1:** AI Adoption by Firm Size



Source: Survey of Digital Technology and Internet Usage



**Figure 2: Job postings demand for skills in Artificial Intelligence (as a % of total job postings)**



Source: Vicinity Jobs

Because of this lopsided adoption across firms of different sizes, exposure to AI in the workplace is more widespread than a 4% adoption rate would suggest. We estimate that over 2.3 million Canadians may be exposed to AI at their workplaces, representing 14.7% of all workers.<sup>14</sup> However, even this estimate suggests that AI has yet to reach most Canadians' jobs.

This is further supported by recent research that we published looking at employer skills demand in Canada, where AI skills only appeared in 1.7% of online job postings in Canada in September of 2023. While this was a substantial increase from 0.6% recorded in early 2023, AI skills are still considered a specialized skillset within the economy, not required by all.<sup>15</sup>



## Existing Impacts

Where AI has already been adopted, it has been most successful when it can be used to eliminate repetitive low-value tasks. In work that we conducted in conjunction with the OECD, we found that AI had successfully been deployed in auto manufacturing to monitor stock levels and automatically request replenishment when needed.<sup>16</sup> This allowed electromechanical equipment assemblers to spend more time on high-value tasks and increased their overall productivity.

Others have seen similar results in different contexts, showing that adoption of AI at the firm level is effective at increasing productivity.<sup>17, 18</sup> In addition, our research shows that scale-ups in technology industries contribute disproportionately to productivity growth (measured through Total Factor Productivity) in Canada (see Table 1).<sup>19</sup>

**Table 1:** Productivity growth by scale-up and tech status

	Productivity growth in non-scale-ups	Productivity growth in scale-ups
Economy-wide	-2.7%	8.8%
Tech	-4.6%	17.3%

The state of AI adoption we are starting from, we believe, is an opportunity. We have an opportunity to adopt AI in the economy in a sensible and responsible manner that limits negative consequences to workers, while concretely improving economic productivity. There are two distinct considerations we must have: how Canada can further commercialize AI without increasing inequality and harm to society; and how the latest advancements in GPTs might make this wave of automation different.



# A Worker Focused View of AI Adoption

While our brief does not focus on the broad societal impacts of AI technologies (see our recent [submission to the INDU committee](#) on the proposed Artificial Intelligence and Data Act for more), the issue of bias in AI is nonetheless relevant to the workforce. We first need to treat the potential for artificial intelligence tools to widen existing inequality as a social problem and not a technical one. Any technical solutions to this bias must embed specific inclusion values, meaning they are inherently a social decision and interpretation of those concepts. As a result, we need to ensure those involved in creating commercial AI technologies are not only technical experts, but also bring learned and lived experiences that encompass multiple social domains.

The current composition of the tech workforce in Canada should be worrying in this regard. Our research using Canadian Census data from 2001 to 2021 shows that the share of women working in technology occupations has largely stayed constant at around 20% of the tech workforce for the full 20 years.<sup>20, 21</sup> An equity-focused approach to AI development and adoption cannot start unless we address this, among other inequities in the tech workforce.

There is some hope on this front — while Canada continues to face challenges in having the technology workforce reflect the diversity of the country, we have found evidence that the Canadian tech sector is more equitable than other jurisdictions (such as the United States).<sup>22</sup>

Even with well designed algorithmically neutral AI models, we must still acknowledge that AI adoption will likely result in structural disruptions that differentially impact different workers. Our research suggests that workers who are most likely to experience persistent negative consequences from such disruptions include those who lack formal educational credentials, and live in areas that are over reliant on a particular industry or company.

We also note risks for workers in companies where decision makers lack the necessary digital literacy and expertise to appropriately implement digital technology or the appropriate legal guardrails to enforce appropriate use. This can lead to irresponsible use of automation technologies that not only hurt workers, but also the company's performance.<sup>23</sup> In fact, our research shows that firm investment in training for ICT staff is associated with a 16% higher chance of adoption of AI technologies in Canadian businesses.<sup>24</sup> Harmful and inappropriate adoption can come in many forms, from declining work conditions driven by use of AI-driven workplace surveillance technologies to the loss of privacy from improper use of facial recognition technology.<sup>25</sup>



# On Generative Technologies

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This brief would not be complete without discussing GPTs. Most AI applications in the past had outcomes that were either numeric (most often expressed in terms of probabilities), or deterministic (choosing an outcome from a set of options, e.g. how Spotify algorithmically recommends specific songs). In these instances, users of the technology had little input in directly changing the generated outcome. What is different with GPTs is their ability to generate outputs that are “unique” or “novel”, in a format where users can directly edit the output.

This means that a user of ChatGPT (for example), without deep technical knowledge, can still potentially derive benefits from the technology to create a first draft of a writing task that they then edit to create the final output. The ability for a worker to directly interact with and change the output from an AI and materially improve such outputs create new opportunities for this technology to be used as a labour-complementary technology, as opposed to a labour-replacing technology.

However, this very feature means that one needs to be intentional when using a GPT as a labour-replacing technology. In particular, due to the inherent lack of built in mechanisms for information verification, current GPT-based tools are prone to “hallucinating” incorrect results or facts, particularly when it is asked to write human-language based responses. This means that without a human verifying the outputs, it can lead to lower quality outputs (and therefore lower productivity). This makes these tools uniquely capable of augmenting the quality of work produced by less skilled workers, as opposed to outright replacing them. In an experiment looking at a mid-level professional writing task, ChatGPT was able to significantly improve the quality of writing from those who performed worst unaided, significantly reducing the inequality of writing between workers.<sup>26</sup>

There are thoughtful ways around this problem. One example is to rely on the much lower error rate for text-based GPT tools in generating computer code, and to use that code to develop results. A **community-developed tool** followed this approach and allows users to ask questions about the City of Toronto's budget, after which the tool will output a database query that compiles the data from a human-compiled database (based on published open data) to then return the results from such queries. GPT error rates are also likely to improve over time, as the models fine tune between authoritative and creative outputs.

Taking a labour-complementary view of generative AI, we can shift the conversation from a fight between human workers and machines to a conversation about how AI could improve the quality and productivity of jobs. To be clear, this does not mean we ignore thoughtless use of AI, particularly to replace workers. What we argue for is an intentional focus on adoptions that augment a worker's work, as opposed to replacing them. Such include, for example, parts of human work that are unpleasant or repetitive and how AI could potentially alleviate these frustrations. That said, we must also acknowledge that some tasks will be more prone to disruption from GPTs, such as customer service or translation.

# Where to from here

We are still at an early stage of AI adoption in Canada, and many of the implications of the technology for workers have yet to be realized, but this does not mean that we can ignore this issue. If Canada is to remain internationally competitive, our businesses and economy must learn to adopt AI and other new technologies in a responsible manner. Such responsibility must include improving our understanding of workers who are likely to experience negative consequences from such adoption, and how best to support them.

In such efforts, it will be vitally important to track key indicators of AI's penetration in the Canadian economy to assess its impacts. Statistics Canada has conducted a series of surveys such as the Survey of Digital Technology and Internet Use, the Canadian Internet Use Survey, and the Canadian Survey of Cyber Security and Cyber Crime. The results of these surveys have benefited research that we cite in this very brief. These surveys are currently run on an occasional basis, and we recommend long-term investments in these important survey programs to support the evidence base on this important issue.

We also need more investment in the kind of research that identifies how best to introduce these technologies in the workplace, how (and to what extent) these latest advancements in AI improve productivity, and, importantly, how that impacts work conditions and workers. Through such research, it will also be important to better understand how we can support the development and deployment of technologies that are inclusive, and work for all those in Canada.

Finally, we need to continue our efforts in understanding the landscape of who is negatively impacted by AI-induced disruption, and importantly, how best to support these workers. Federal investments have been made into clarifying and strengthening the roles of training providers, employment organizations, labour unions, and other

organizations that support workers. We need to equip these organizations with the right tools to navigate supporting workers whose work is disrupted due to digital technology. Evidence from previous waves of disruption suggests the need for planning and support at a systems and industry-specific level to support up-skilling and transitions, rather than solely a worker-by-worker support approach post-disruption.

We thank the committee for engaging in this important work, and for receiving our input.





# Endnotes

- <sup>1</sup> David Ricardo, *On the Principles of Political Economy and Taxation*, 3rd ed. (London: John Murray, 1821).
- <sup>2</sup> Creig Lamb, Daniel Munro, and Viet Vu, "Better, Faster, Stronger: Maximizing the Benefits of Automation for Ontario's Firms and People," Brookfield Institute, 2018, <https://www.deslibris.ca/ID/10097212>.
- <sup>3</sup> Viet Vu and Steven Denney, "Just Out of Reach: The Elusive Quest to Measure the Digital Economy," *Brookfield Institute*, 2021.
- <sup>4</sup> A routine task is a task where step-by-step instructions can be given or written out, such that any reasonable person can follow the set of instructions and achieve results of similar quality.
- <sup>5</sup> Leah Birnbaum and Jane Farrow, "The Impact of Technological Change on Ontario's Workforce," *Brookfield Institute*, 2018, <https://doi.org/10.1177/002218568302500401>.
- <sup>6</sup> Joshua Zachariah and Thomas Goldsmith, "Laying Foundations: Technological Maturity in Canada's Construction Sector," *Brookfield Institute*, 2022.
- <sup>7</sup> Lamb, Munro, Vu "Better Faster Stronger", 2018.
- <sup>8</sup> Thomas Goldsmith, "Picking Up Speed: Digital Maturity in Canada SMEs and Why Increasing It Matters," *Brookfield Institute*, 2021.
- <sup>9</sup> Viet Vu, Asher Zafar, and Creig Lamb, "Who Are Canada's Tech Workers?," *Brookfield Institute*, 2019.
- <sup>10</sup> Viet Vu, "Further and Further Away: Canada's Unrealized Digital Potential," *Brookfield Institute*, 2022.
- <sup>11</sup> Scott Henry and Viet Vu, "Flying Too Close to the Sun: Overoptimism of Tech Companies during the Pandemic," *The Canadian Chamber of Commerce*, 2023.
- <sup>12</sup> Viet Vu, Creig Lamb, and Rob Willoughby, "I, Human: Digital and Soft Skills Driving Canada's Labour Market," *Brookfield Institute*, 2019.
- <sup>13</sup> Angus Lockhart. "Automation Nation? AI Adoption in Canadian Businesses", *The Dais*, 2023, <https://dais.ca>.
- <sup>14</sup> Based on the 2022 Survey of Employment, Payroll, and Hours.
- <sup>15</sup> Vivian Li., Tiffany Kwok, Mahmeh Hamza. "The Skills Algorithm: Digital Skills Demand Across Canada's Labour Market". *The Dais*, 2023. <https://dais.ca>.
- <sup>16</sup> Anna Milanez, "The impact of AI on the workplace: Evidence from OECD case studies of AI implementation," *OECD*, 2023, <https://doi.org/10.1787/2247ce58-en>.
- <sup>17</sup> Tamay Besiroglu, Nicholas Emery-Xu, and Neil Thompson, "Economic Impacts of AI-augmented R&D." arXiv Preprint, Economics, 2023, <https://arxiv.org/abs/2212.08198>.
- <sup>18</sup> Giacomo Damoli, Vincent Van Roy, and Daniel Vertesy, "The Impact of Artificial Intelligence on Labor Productivity." *Eurasian Business Review* 11 (2021): 1–25, <https://doi.org/10.1007/s40821-020-00172-8>.
- <sup>19</sup> Companies that experience a rapid growth period that leads to structural changes in firm decision making structure.
- <sup>20</sup> Vu, Further and Further Away, 2022.
- <sup>21</sup> Viet Vu, "Percentage of Women in Tech Has Largely Stagnated for 20 Years - This Must Change," *The Globe and Mail*, July 31, 2023, sec. Business Opinion, <https://www.theglobeandmail.com/business/commentary/article-women-tech-workers-canada/>.
- <sup>22</sup> Vivian Li, Mahmeh Hamza, Anusha Arif. "Mind the Gap: Compensation Disparity Between Canadian and American Technology Workers". *The Dais*, 2023. <https://dais.ca>.
- <sup>23</sup> Mohammed (Joe) Masoodi et al., "Monitoring Remote Work in Canada: Support or Surveillance," *Future Skills Centre*, 2023.
- <sup>24</sup> Lockhart. "Automation Nation? AI Adoption in Canadian Businesses", 2023.
- <sup>25</sup> The Right2YourFace Coalition (of which the Dais is a member) has done important work pushing for increased regulation in the use of facial recognition technology.
- <sup>26</sup> Shakked Noy, Whitney Zhang, "Experimental Evidence of the Productivity Effects of Generative Artificial Intelligence." 2023, <https://dx.doi.org/10.2139/ssrn.4375283>.