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The impact of AI on the workforce: Tasks versus jobs?☆

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ABSTRACT

Will the adoption of AI by businesses substitute for worker tasks or jobs? This is a core question for which relatively scarce evidence exists—especially in the wake of recent advances in generative AI. Using a new large-scale business survey by the U.S. Census Bureau, we find that AI use is having a much greater impact on worker tasks than on employment levels at the firm level. About 27% of firms using AI report replacing worker tasks, but only about 5% experience employment change due to AI use. These rates are expected to increase to nearly 35% and 12%, respectively, in the near future.

1. Introduction

Many experts expect Artificial Intelligence (AI) to be transformative—especially given recent breakthroughs in generative AI. There are widely divergent views of the impact of AI on the workforce. Goldman Sachs (Hatzius et al., 2023) released a report that most workers in advanced economies will be exposed in some way to AI and that there could be large scale displacement of workers.[1] Other experts (see, e.g., Autor, 2024) are more optimistic about the potential positive benefits of AI for the workforce but emphasize the enormous uncertainty about this impact. In any event, the public is concerned about the impact of AI—a recent Gallup poll found that 75% of U.S. adults believe AI will lead to fewer jobs (Marken, 2023).

Using the results of a new large-scale, representative survey of U.S. employer businesses in 2023 and 2024, we shed light on the recent and expected impact of firms' AI use on worker tasks and employment. The results of this timely survey show that the use of AI for business purposes is still in the relatively early phases. However, it is already apparent that those using AI are changing how they do business, especially in the allocation of tasks for workers. We find that about 27% of firms that use AI are using it to perform tasks previously done by workers, and this fraction is expected to grow substantially (to nearly 35%) within the near future. However, the impact on employment is modest with only about 5% of firms changing employment levels. Moreover, a slightly higher fraction report an employment increase

☆ Any opinions and conclusions expressed herein are those of the authors and do not represent the views of the U.S. Census Bureau. The Census Bureau has reviewed this data product to ensure appropriate access, use, and disclosure avoidance protection of the confidential source data (Project No. P-7529868, Disclosure Review Board (DRB) approval numbers: CBDRB-FY23-0478, CBDRB-FY24-0162, and CBDRB-FY24-0225). We thank Joe Staudt and John Eltinge for helpful comments. John Haltiwanger was also a Schedule A employee of the Census Bureau at the time of the writing of this paper.

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[1] A number of studies have emphasized the potential large impact on the workforce (e.g., Eloundou et al., 2023).

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rather than a decrease. The fraction of businesses changing employment due to AI is expected to rise to nearly 12% in the near future, with an expected increase in employment being slightly more common than a decrease.[2]

These findings are based on the Business Trends and Outlook Survey (BTOS). The BTOS is an experimental data product from U.S. Census Bureau intended to capture the effects of changes in economic conditions on firms at a high frequency based on a representative sample of U.S. employer businesses.[3] This is the most timely (the survey was conducted in 2023 and 2024) comprehensive large-scale evidence available for the U.S. on how firms' use of AI have impacted their workforce after the major developments in generative AI in the last two years.

2. Results on tasks versus jobs

We first provide a brief summary of the new information gained from the BTOS survey on business use of AI in 2023 and 2024 (this summary draws heavily from Bonney et al., 2024). AI use rates start from a relatively low base (3.7%) in September 2023 but are projected to grow substantially by Fall 2024. However, given the low initial use rate, the projected use rate in Fall 2024 is still less than 10%. AI use rates are higher on an employment-weighted basis and much higher in sectors such as the Information sector; in this sector 18% of firms currently use AI, but 22% of the sector's workers are in these AI-using firms. These shares are expected to grow substantially in the near future.[4]

These basic facts are consistent with the view that AI use by businesses remains in a relatively nascent stage. Still there is a significant and increasing fraction of firms, and share of employment in these firms, actively using AI for business purposes. The active users provide a window into the potential impact on worker tasks and employment.

2.1. Impact of AI use on worker tasks and employment

The results in this section focus on active AI users. We find that the most commonly used technologies and applications are marketing automation (28.4%), virtual agents (21.6%), natural language processing (19.3%), text analytics (17.0%), data analytics (17.0%), and speech/voice recognition (15.9%). These patterns of use broadly suggest that workers with tasks related to marketing, data analysis, and information-retrieval activities may be more directly exposed to AI.

We find that 26.6% of the businesses use AI to replace worker tasks. The use of AI to replace tasks is expected to grow significantly in the near future: 34.4% of the firms anticipate they will utilize AI to substitute for worker tasks in the next 6 months—an increase of 29% of the current rate. Employment-weighted results reveal that 14.9% of the employment in AI-using firms are exposed to task replacement, with this fraction expected to grow to 25.2%.[5]

We also tabulate results on the intensive margin of task replacement. The extent of worker task replacement is low: nearly 85% of businesses using AI to replace any tasks use it to replace a small number of tasks, and only 2.4% use it to replace a large number of tasks. However, the extent of task replacement is expected to grow considerably in the near future: 20.8% of businesses (that expect to be using AI in the next 6 months) expect future AI use to replace a moderate or high number of tasks, up from 15.4%. The analogous employment-weighted results show that 87.0% of employment in AI-using firms is accounted for by firms that use AI to replace a small number of tasks. Another 12.3% is in firms using AI to replace a moderate number of tasks. A very small fraction (0.7%) of employment is in AI-using firms that use it to replace a large number of tasks. However, the employment share of firms using AI to replace moderate to large number of tasks is expected to be 19.8% in the next six months, a significant increase from the share (13.0%) of firms that used AI in the last six months.

While AI can replace some worker tasks and types of labor, it can also generate new tasks and jobs. The net effect on employment at the firm-level depends on the relative strength of these two effects. We find that "no change" in employment was, by far, the most common response. An overwhelming fraction (94.6%) of AI-using businesses reported not having experienced any net change in their employment in the last six months attributable to AI use. Firms that experienced an increase or a decline in employment constitute small fractions of firms: 2.8% and 2.6%, respectively. Overall, recent use of AI has not led to a net change in employment for many firms. Nevertheless, anticipated employment changes attributable to expected future use of AI indicate a changing pattern. The fraction of firms anticipating an increase in employment due to future AI use is 6.5% (up from 2.8% in the last six months). Similarly, the fraction anticipating a decrease (6.1%) is much higher than the 2.6% reporting a decrease in the last six months. These figures suggest that the fraction of firms expecting changes in employment due to AI will more than double between the last and next six months.

The employment-weighted results reveal that positive or negative net employment changes due to AI use are applicable to only 2.8% of the employment in firms that used AI in the last six months. This fraction is expected to increase to 7.7% in the near future, consistent with the corresponding rise in the case of firm-weighted results. However, employment-weighted results also indicate a larger share of employment in firms expecting an increase in employment rather than a decrease.

Overall, the results do not indicate that a large fraction of firms have reduced, or will reduce, employment due to AI use. However, both increases and decreases in employment are expected to be more prevalent in the future. At the same time, a slightly larger share of firms indicate experiencing (or expecting to experience) an increase rather than a decrease in employment.[6] While a significant fraction of firms use AI to replace worker tasks, a net employment decline due to AI use is a far less common outcome.

Our evidence on firm-level net employment outcomes is novel and informative but does not provide direct guidance about changes in worker mix (e.g., skill) within the firm. Evidence from Acemoglu et al. (2022) from the 2016–18 period, prior to the rapid improvement in

[2] Two important contributions closely related to this work are Acemoglu et al. (2022) and McElheran et al. (2024) who use evidence from the Annual Business Survey from the 2016–18 period. Another important related contribution of the impact of AI on firms is Babina et al. (2024). A useful synthesis of recent literature is in Calvino and Fontanelli (2023). Our contribution is to provide early insights in the most recent period (2023–24) after the rapid developments in generative AI.

[3] See Buffington et al. (2023). Bonney et al. (2024) and the online appendix for details.

[4] Caution needs to be used in comparing these statistics to those in Acemoglu et al. (2022) and McElheran et al. (2024) as the usage rates in these papers exclude "Do Not Know" which we include. Discussion of this measurement issue and comparable statistics are in Bonney et al. (2024). When we use the recent BTOS evidence and exclude "Do Not Know" for calculated use we find substantial increases in usage relative to the earlier ABS based evidence.

[5] See online appendix supplemental tables for more details of the results discussed in this section.

[6] These patterns are consistent with prior findings from the 2019 ABS (see Acemoglu et al., 2022) suggesting that, even with recent advances in AI, the impact on firm employment remains small and is, if anything, modestly positive.

generative AI, implies that there is a change in the skill mix within firms adopting advanced technologies like AI. Future research should explore both the net changes at the firm level, but also within-firm changes in the mix of workers.

3. Conclusion

While many businesses use AI to replace worker tasks, there is little evidence that AI use is associated with a decline in firm employment. Both types of employment change (increase and decrease) are expected to become more common in the near future, but the incidences of these changes will remain low relative to that of no change. Currently, a substantial fraction of the firms that use AI to replace worker tasks use it to replace only a small number of worker tasks—a pattern that is anticipated to shift towards a relatively higher number of tasks in the near future.

Data availability

The data that has been used for the reported analysis is confidential. There are public use tabulations of AI use by businesses from the same underlying source data at https://www.census.gov/data/experimental-data-products/business-trends-and-outlook-survey.html.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.econlet.2024.111971.

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A Supplemental tables

Table A1: Effects of AI Use on Worker Tasks and Employment (Firm-weighted)

Panel A: Did the firm use AI to perform worker tasks?		
	Last 6 months	Next 6 months (Expected)
Yes	26.6%	34.4%
	(0.38%)	(0.41%)
No	65.2%	51.2%
	(0.46%)	(0.43%)
Don't Know	8.1%	14.4%
	(0.23%)	(0.38%)
Panel B: How many worker tasks were performed by AI?		
	Last 6 months	Next 6 months (Expected)
Small number	84.6%	79.2%
	(0.49%)	(0.60%)
Moderate number	13.0%	17.7%
	(0.54%)	(0.51%)
Large number	2.4%	3.1%
	(0.24%)	(0.28%)
Panel C: How did AI affect total firm employment?		
	Last 6 months	Next 6 months (Expected)
Increase	2.8%	6.5%
	(0.23%)	(0.21%)
Decrease	2.6%	6.1%
	(0.13%)	(0.17%)
No change	94.6%	87.4%
	(0.32%)	(0.26%)

Source: Business Trends and Outlook Survey (BTOS).
Notes: Standard errors in parentheses. Results based on the pooled sample across 6 two-week panels, with the first and last reference periods ending on December 3, 2023 and February 11, 2024, respectively. The percentages represent the share of businesses in each response category during the six months prior to data collection or in the six months following data collection (expected). Panels A and C are conditional on a firm responding "yes" to using AI (or expecting to use AI), and Panel B is conditional on using AI (or expecting to use AI) to perform tasks previously done by employees.

TABLE A2: EFFECTS OF AI USE ON WORKER TASKS AND EMPLOYMENT (EMPLOYMENT-WEIGHTED)

Panel A: Did firm use AI to perform worker tasks?		
	Last 6 months	Next 6 months (Expected)
Yes	14.9%	25.2%
	(3.3%)	(5.9%)
No	48.1%	52.0%
	(7.1%)	(9.2%)
Don't Know	37.0%	22.8%
	(6.9%)	(7.9%)
Panel B: How many worker tasks were performed by AI?		
	Last 6 months	Next 6 months (Expected)
Small number	87.0%	80.3%
	(5.7%)	(7.1%)
Moderate number	12.3%	18.0%
	(5.5%)	(7.1%)
Large number	0.7%	1.8%
	(0.4%)	(1.0%)
Panel C: How did AI affect total firm employment?		
	Last 6 months	Next 6 months (Expected)
Increase	1.6%	4.4%
	(0.9%)	(1.9%)
Decrease	1.2%	3.3%
	(0.2%)	(0.8%)
No change	97.2%	92.3%
	(0.9%)	(2.6%)

Source: Business Trends and Outlook Survey (BTOS).
Notes: Standard errors in parentheses. Results based on the pooled sample across 6 two-week panels, with the first and last reference periods ending on December 3, 2023 and February 11, 2024, respectively. The percentages represent the employment-weighted share of businesses in each response category during the six months prior to data collection or in the six months following data collection (expected). Panels A and C are conditional on a firm responding "yes" to using AI (or expecting to use AI), and Panel B is conditional on using AI (or expecting to use AI) to perform tasks previously done by employees.

B Data and Measurement

The BTOS sample of about 1.2 million businesses is drawn annually from the Census Bureau's Business Register, which covers all non-farm, private employer businesses dur-

ing our analysis period.[1] Within this sample, there are six panels each year. Each panel includes approximately 200,000 businesses. The average bi-weekly response rate over the period of collection for AI-related content is about 16%, resulting in about 164,500 businesses for our main analysis sample. Survey responses and nonresponse-adjusted survey weights are used to create estimates of the percent of businesses corresponding to each response category. The weights make the estimates representative at the national level and by state, sector, and size.

Questions about current and future (i.e., expected during the next six months) AI use in the production of goods and services were added to the second wave of the BTOS, which runs from September 2023 to August 2024. The question text contained examples of AI such as machine learning, natural language processing, virtual agents, and voice recognition. A supplement to the BTOS was added covering six bi-weekly periods or a "cycle" (December 2023 to February 2024) to collect more detail on AI usage. The supplement focused on understanding the types of AI technologies and applications used by businesses; task-, labor-, and capital-augmenting (versus replacing) effects of AI; organizational changes made to accommodate AI; and the reasons for businesses not using AI. We report results through the end of the collection of the supplement (February 2024).

[1] See Bonney et al. (2024) and BTOS Methodology for additional details.