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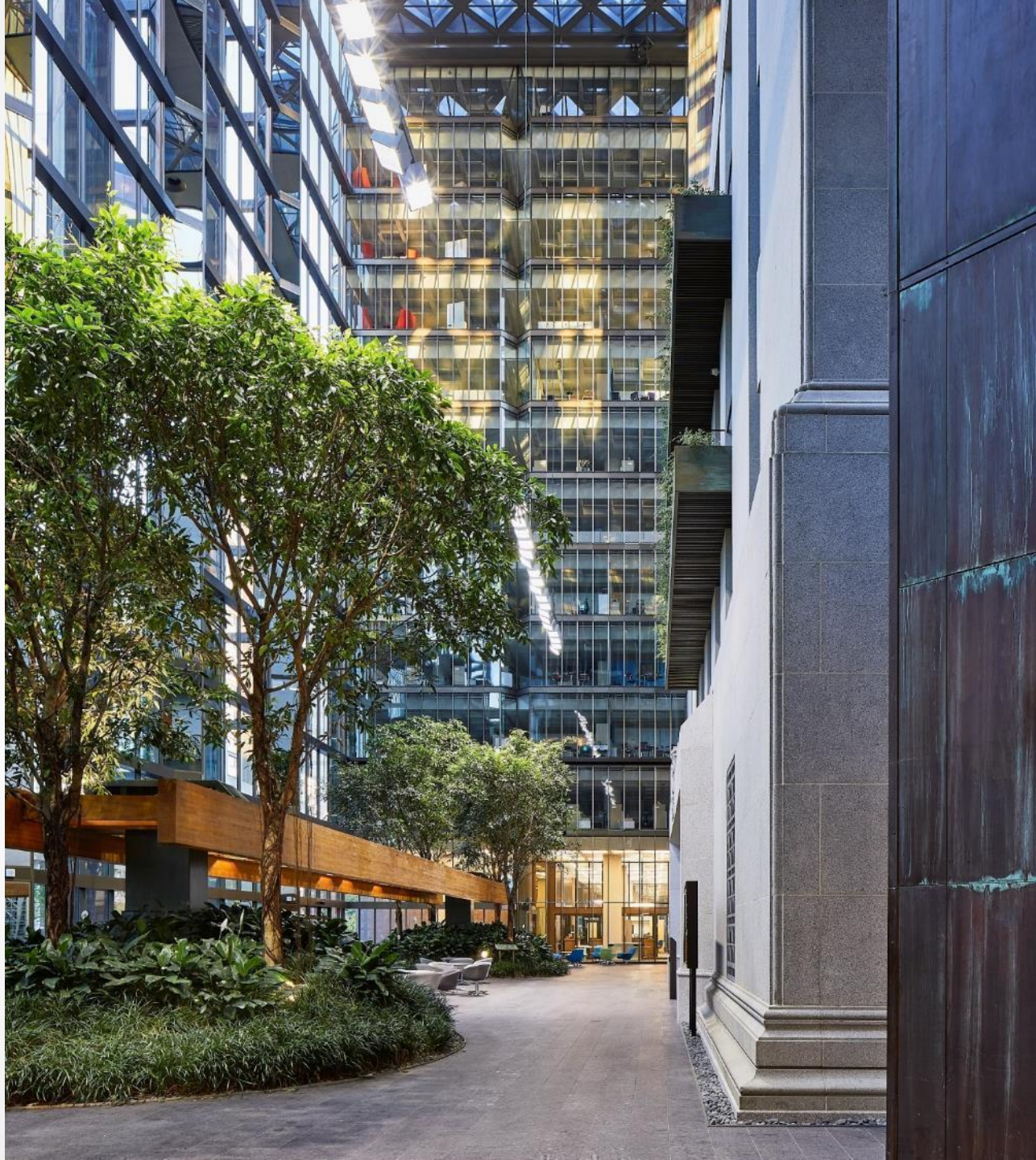
COVID-19 and implications for automation

Alex Chernoff (Bank of Canada), Casey Warman (Dalhousie University and NBER)

The views in this paper are those of the authors and do not necessarily reflect those of the Bank of Canada



COVID, automation, and potential labour market disparities

- *COVID-19 may accelerate automation:* employers substitute workers with technologies that are unaffected by pandemics.
- *What we do*: construct indexes measuring an occupation's automation potential and viral transmission risk.
- *We find:* women with low to mid-level educational attainment are at highest risk of COVID-induced automation.

At Fortis Hospital in Bangalore, India, a robot called Mitra uses a thermal camera to perform a preliminary screening of patients.

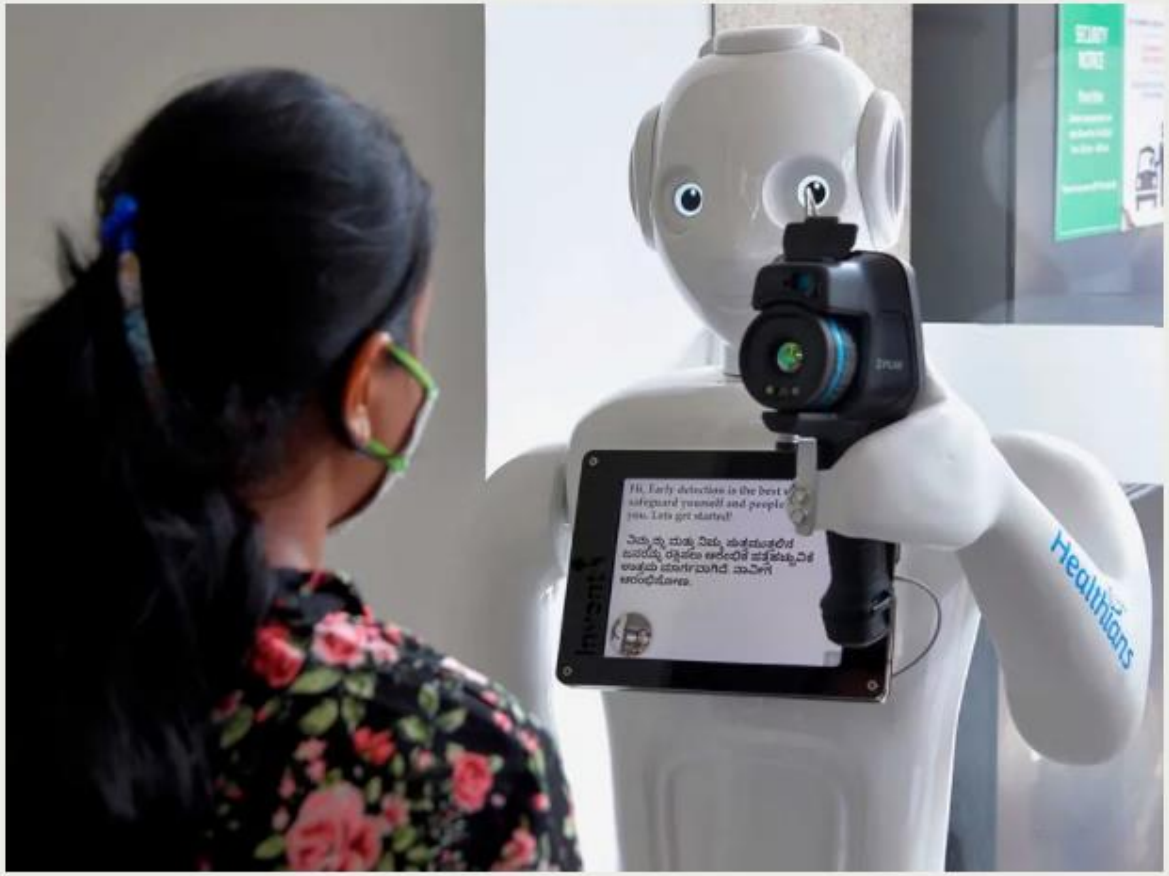


PHOTO: MANJUNATH KIRAN/AFP/GETTY IMAGES

In Tunisia, the police use a tanklike robot to patrol the streets of its capital city, Tunis, verifying that citizens have permission to go out during curfew hours.

PHOTO: KHALED NASRAOUI/PICTURE ALLIANCE/GETTY IMAGES

The New York Times

Toll Worker Job Losses Highlight Long-Term Fallout of Pandemic

The Pennsylvania Turnpike laid off workers to switch to labor-saving technology, in what might be a broader trend.

John Mahalis lost his job when the Pennsylvania Turnpike shifted to machine toll collection during the pandemic. Policymakers worry that many workers may face a similar technology-driven fate. Kriston Jae Bethel for The New York Times

Covid Brings Automation to the Workplace, Killing Some Jobs

Unable to find enough workers, employers are turning to technology to perform tasks—and women are likely to be the hardest hit.

An Ohio fast-food chain deployed an automated voice system to take orders. Sales rose and the system "never calls in sick," the CEO says. PHOTOGRAPH: BLOOMBERG/GETTY IMAGES

Related literature

Recessions and automation

- Jaimovich and Siu (2020), Hershbein and Kahn (2018)

COVID-19 and automation

- Caselli, Fracasso, and Traverso (2021), Leduc and Liu (2020), Dingel and Neiman (2020), Pierri and Timmer (2020)

Data

O*NET database is used to create occupation-specific measures of:

- Viral transmission risk,
- Automation potential (routine-task intensity).

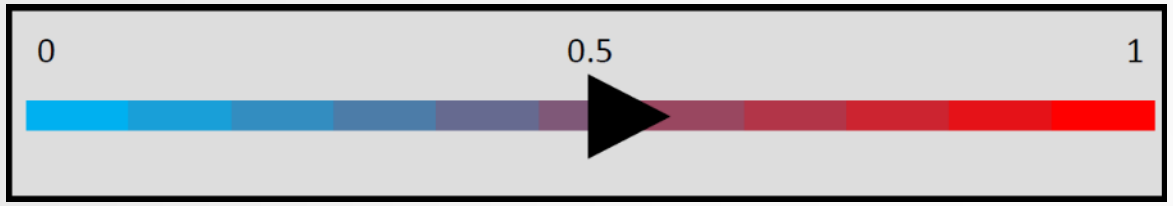
We map these indexes to various data to study:

- Demographic/geographic profile of occupations that are “at risk” in the US and internationally: (**American Community Survey (ACS)** and **Programme for the International Assessment of Adult Competencies (PIAAC)**),
- How jobs in high and low-risk occupations have evolved during the pandemic (**Current Population Survey (CPS)**).

Measuring the risk of COVID-induced automation

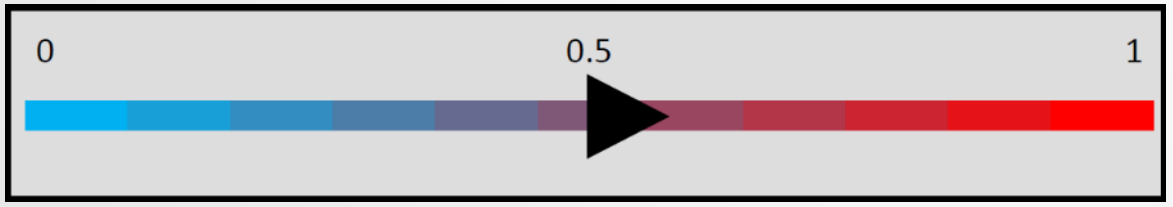
Viral transmission risk index

disease exposure (+), face-to-face discussions (+), physical proximity (+), work outdoors (-)



Automation potential index

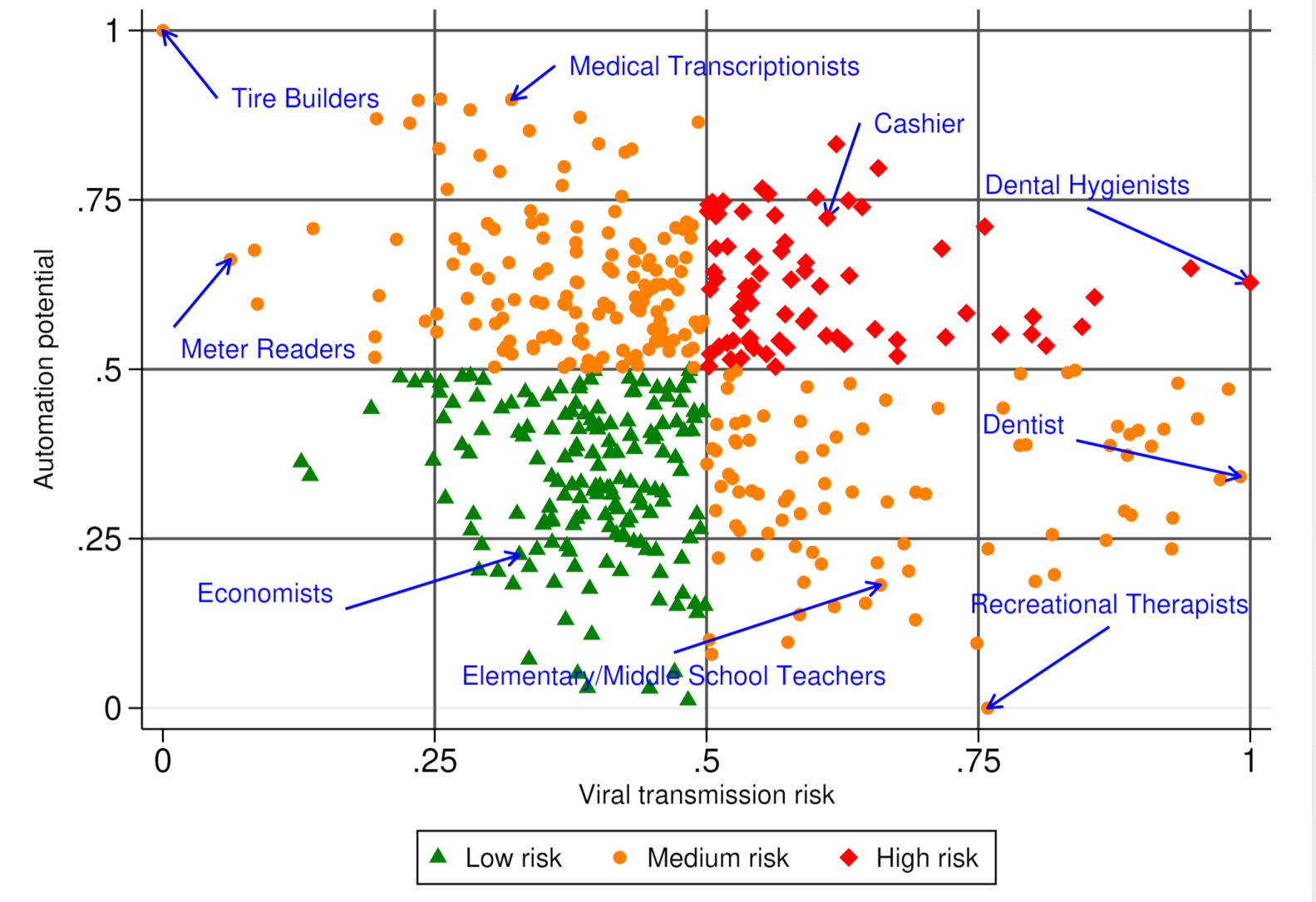
routine tasks (+), non-routine task (-)



High-risk occupations (both indexes ≥ 0.5):

- Retail salespersons
- Secretaries and administrative assistants
- Cashiers

Automation potential and viral transmission risk



Females are more likely to be in high-risk occupations

	Females			Males		
	Both ≥0.5	Both ≥0.4	Both <0.5	Both ≥0.5	Both ≥0.4	Both <0.5
Overall	0.243	0.551	0.191	0.120	0.422	0.434
White	0.232	0.508	0.212	0.113	0.393	0.467
Black	0.259	0.627	0.135	0.155	0.518	0.324
Latino or Hispanic	0.272	0.661	0.124	0.119	0.452	0.376
Asian American	0.245	0.547	0.263	0.140	0.473	0.461
All other races	0.262	0.578	0.192	0.144	0.465	0.392
Low pay	0.298	0.685	0.109	0.149	0.502	0.359
Medium pay	0.233	0.525	0.187	0.118	0.428	0.397
High pay	0.091	0.278	0.389	0.068	0.301	0.578
High school or less	0.315	0.740	0.093	0.118	0.469	0.383
Post-secondary < BA	0.316	0.650	0.140	0.161	0.477	0.388
BA or higher	0.119	0.308	0.317	0.083	0.313	0.541
Age 18 to 49	0.248	0.556	0.187	0.131	0.441	0.412
Age 50 to 65	0.234	0.539	0.200	0.096	0.379	0.487

Females are also more likely to be at risk using a lower cutoff

	Females			Males		
	Both ≥0.5	Both ≥0.4	Both <0.5	Both ≥0.5	Both ≥0.4	Both <0.5
Overall	0.243	0.551	0.191	0.120	0.422	0.434
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Age 50 to 65	0.234	0.539	0.200	0.096	0.379	0.487

Males are more likely to be in "low-risk" occupations

	Females			Males		
	Both ≥0.5	Both ≥0.4	Both <0.5	Both ≥0.5	Both ≥0.4	Both <0.5
Overall	0.243	0.551	0.191	0.120	0.422	0.434
White	0.232	0.508	0.212	0.113	0.393	0.467
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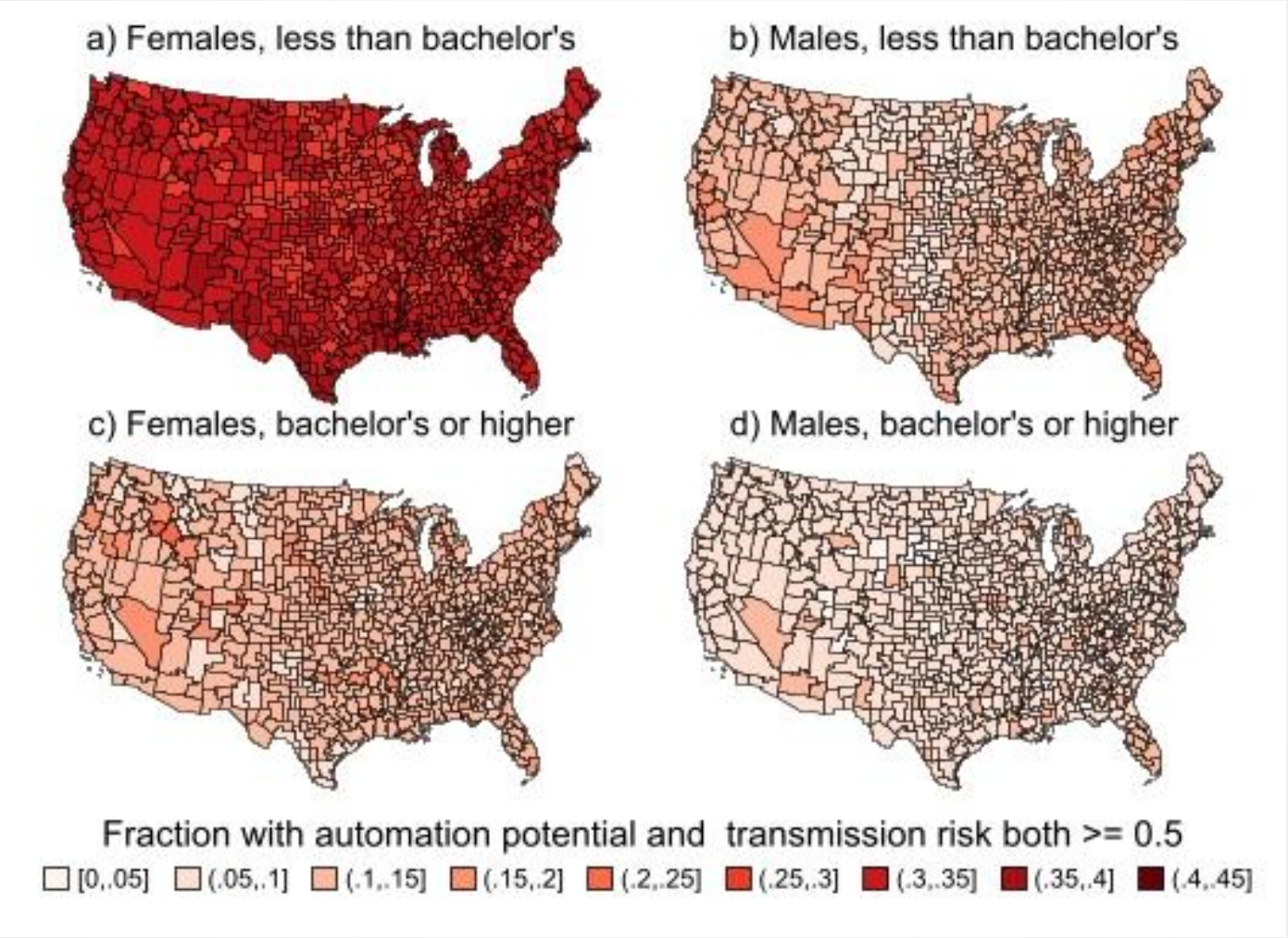
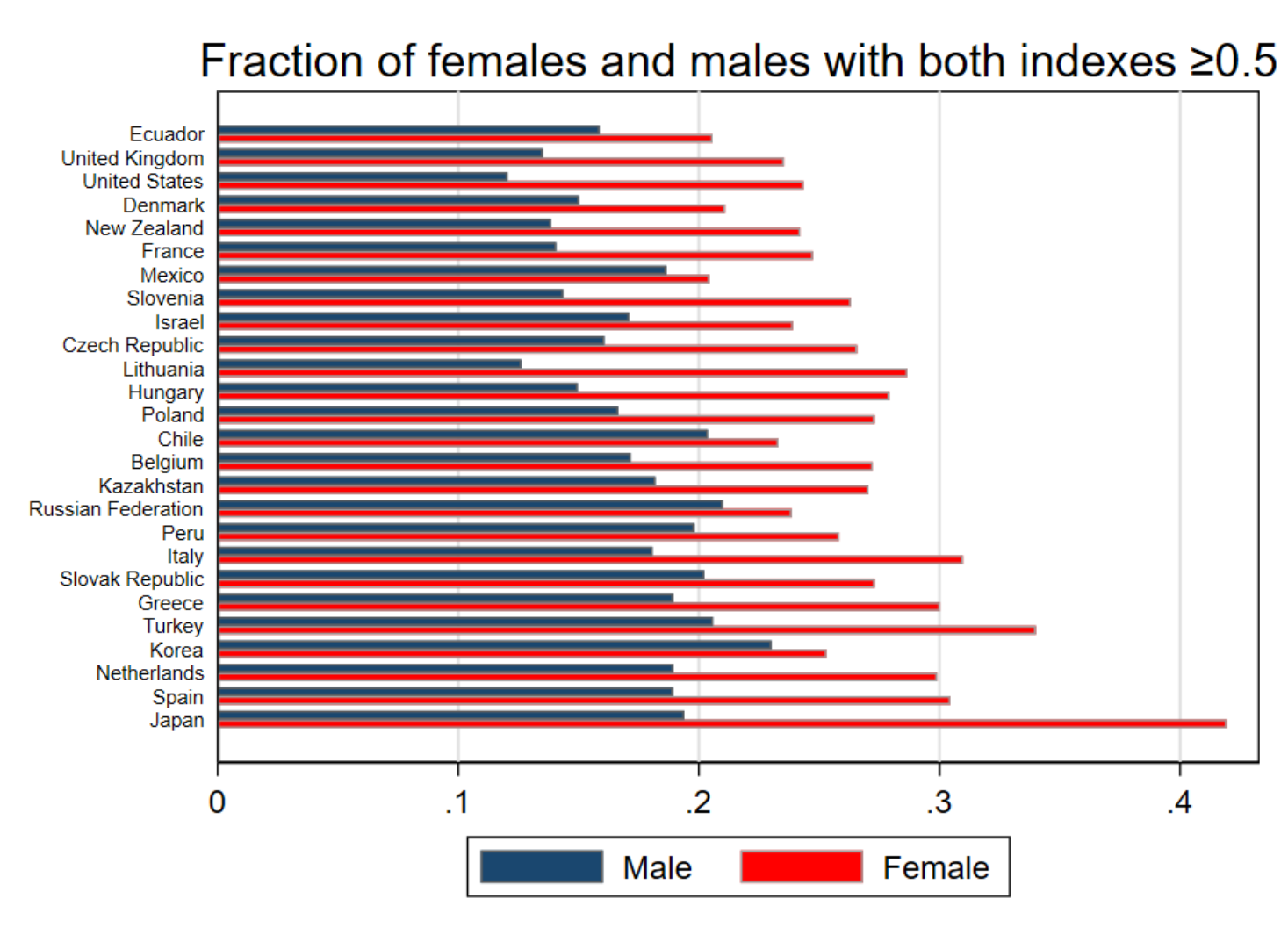
Risk varies by demographics, not geography



Women face a higher risk across countries



Automation risk and the COVID-19 pandemic

Summary of ACS and PIAAC results:

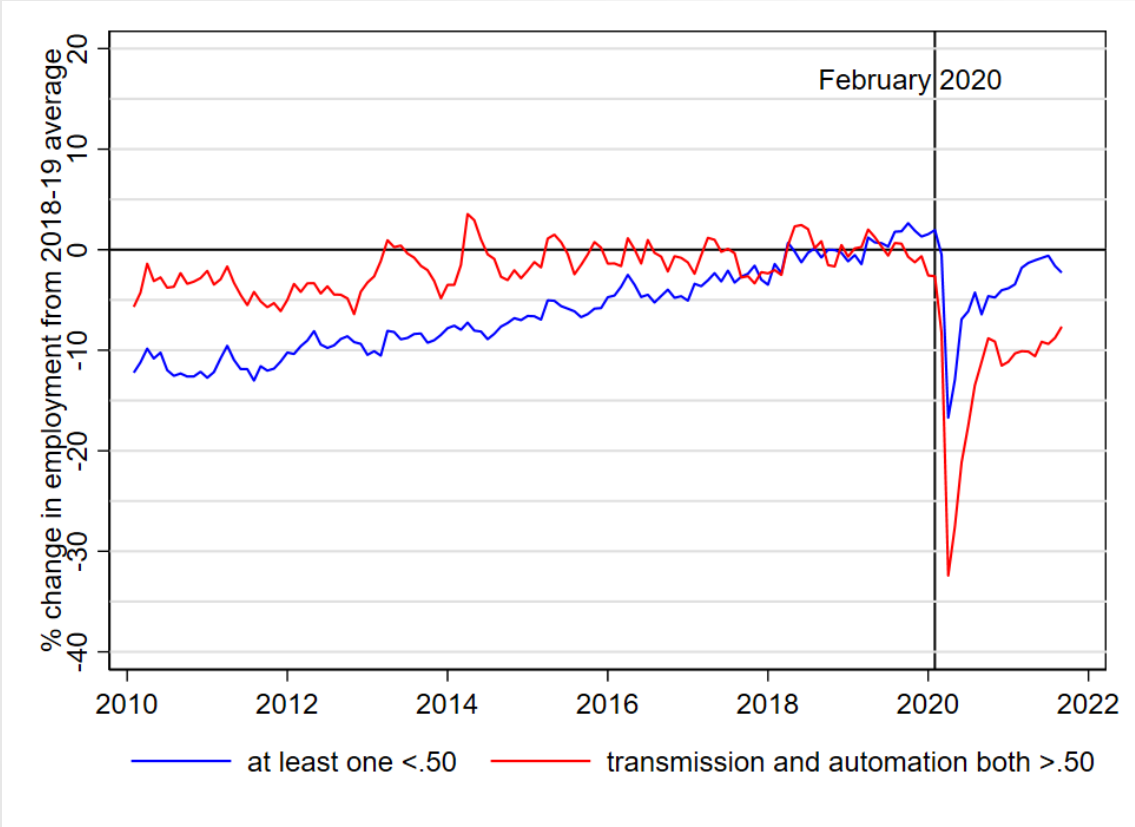
- US females are about twice as likely as males to be in occupations that are at high risk of both COVID-19 transmission and automation.
- PIAAC results show similar findings for other countries.
- Caveat: these results relate only to automation *potential*, which may or may not be realized.

Have "high-risk" jobs been automated during the pandemic?

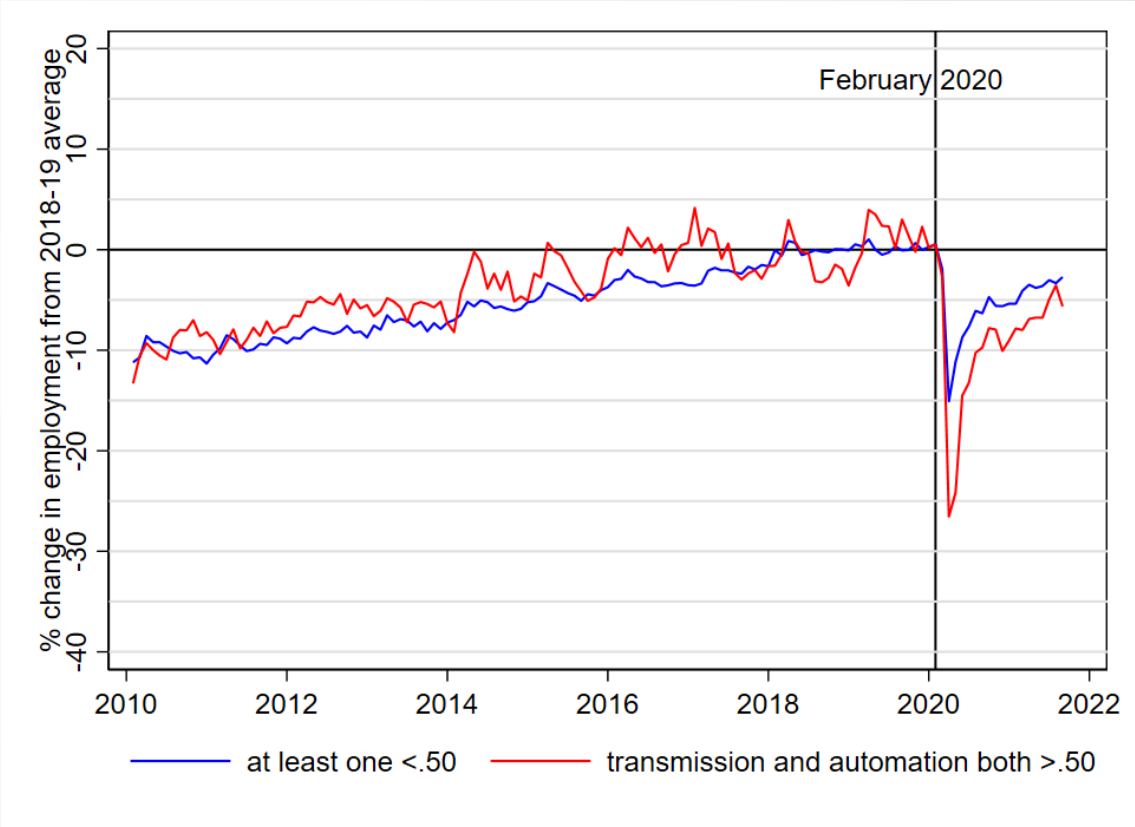
- The data needed to convincingly answer this question are not yet available.
- However, early insights can be gained by looking at US monthly employment trends in the CPS.

Female employment: larger decline and weaker recovery in high-risk occupations

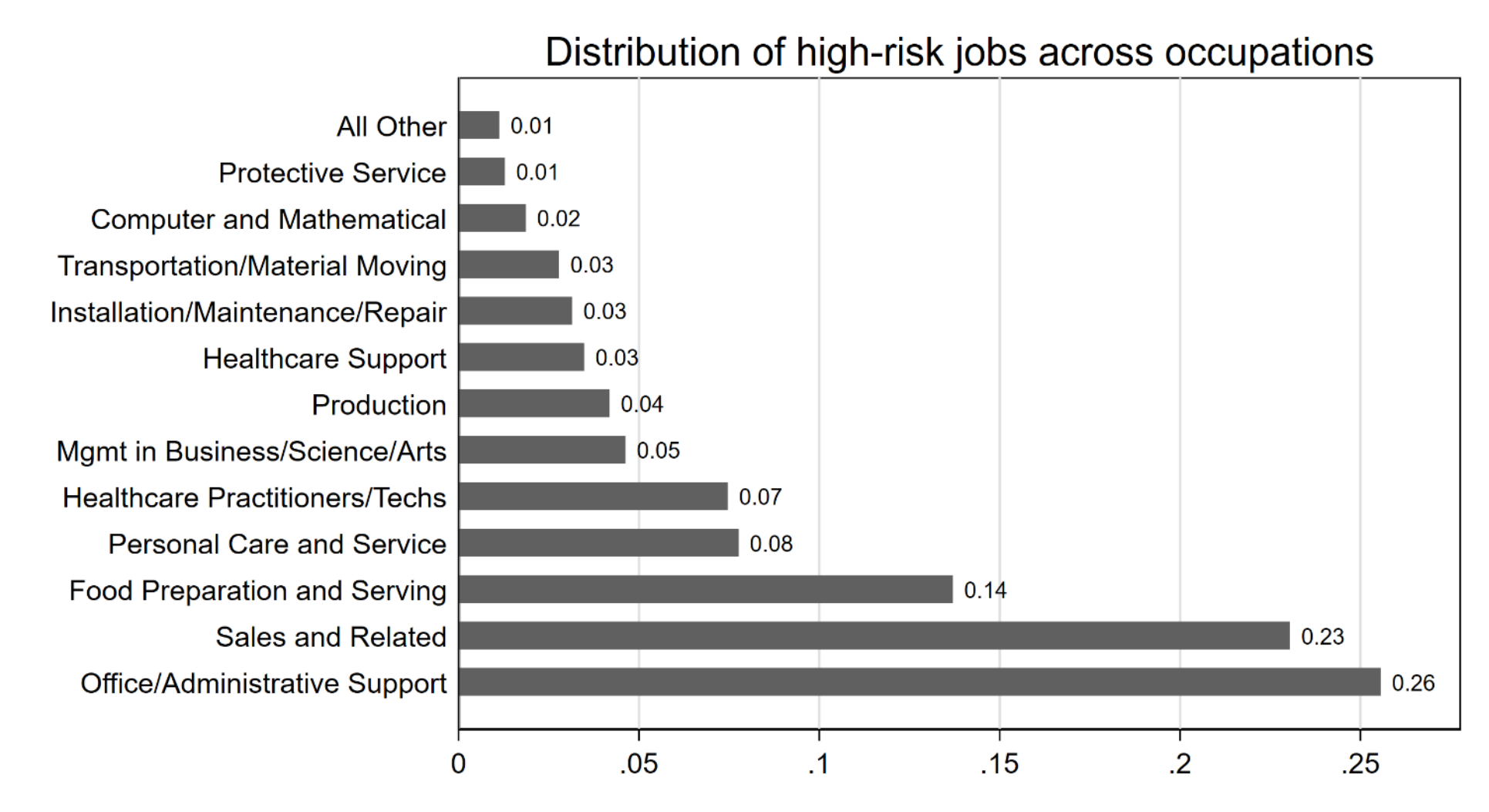
Females



Males

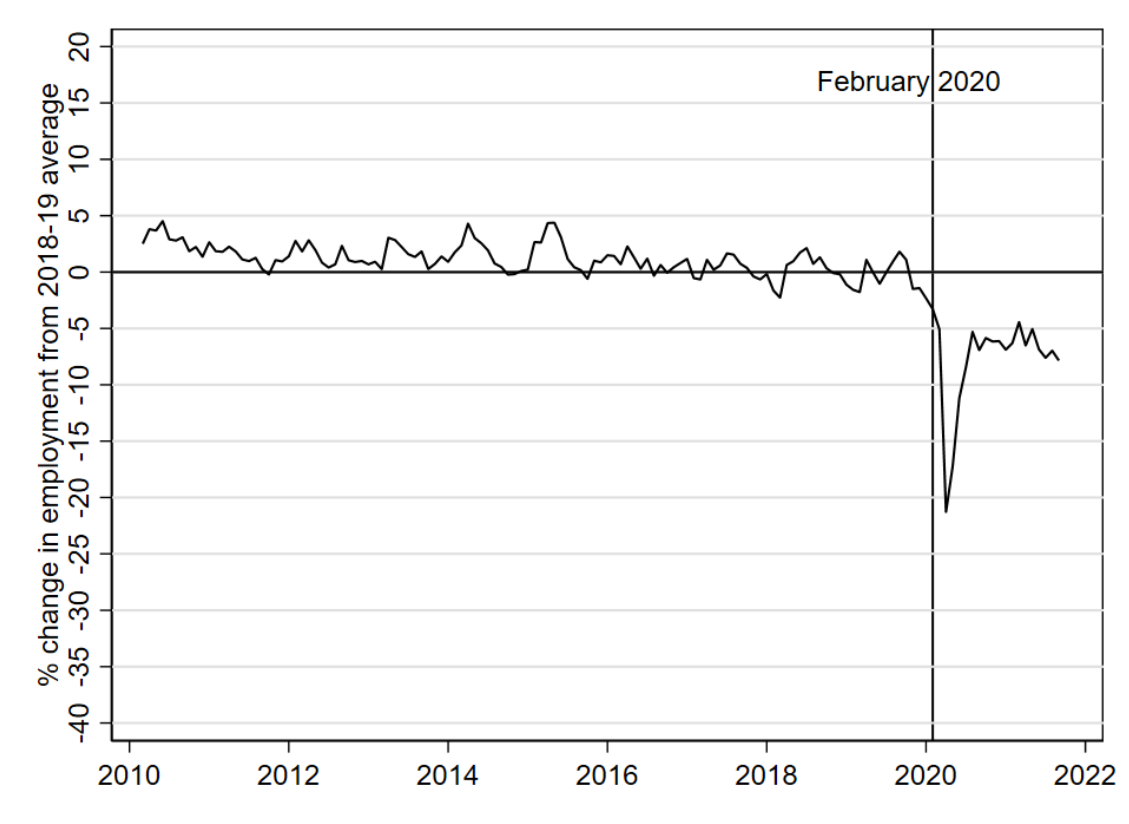


Roughly half of high-risk jobs are in sales and office jobs

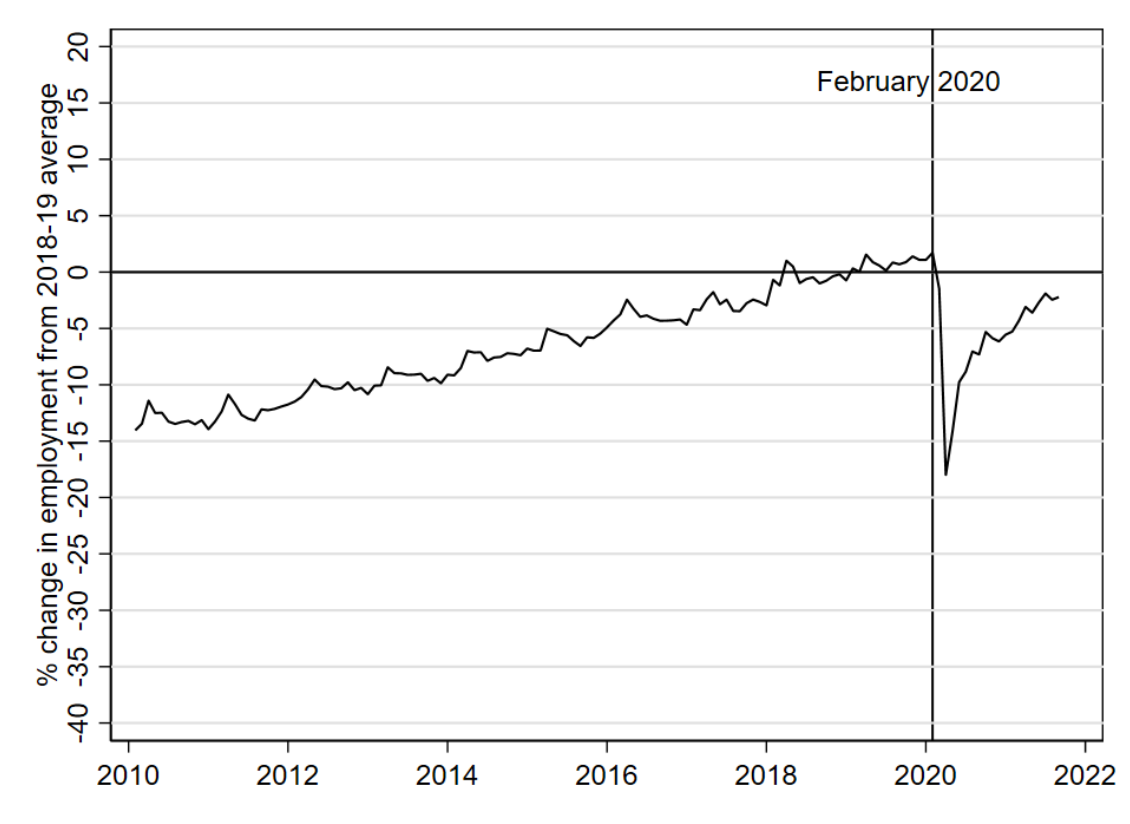


Declining routine cognitive employment during recovery

Routine Cognitive (sales and office occupations)

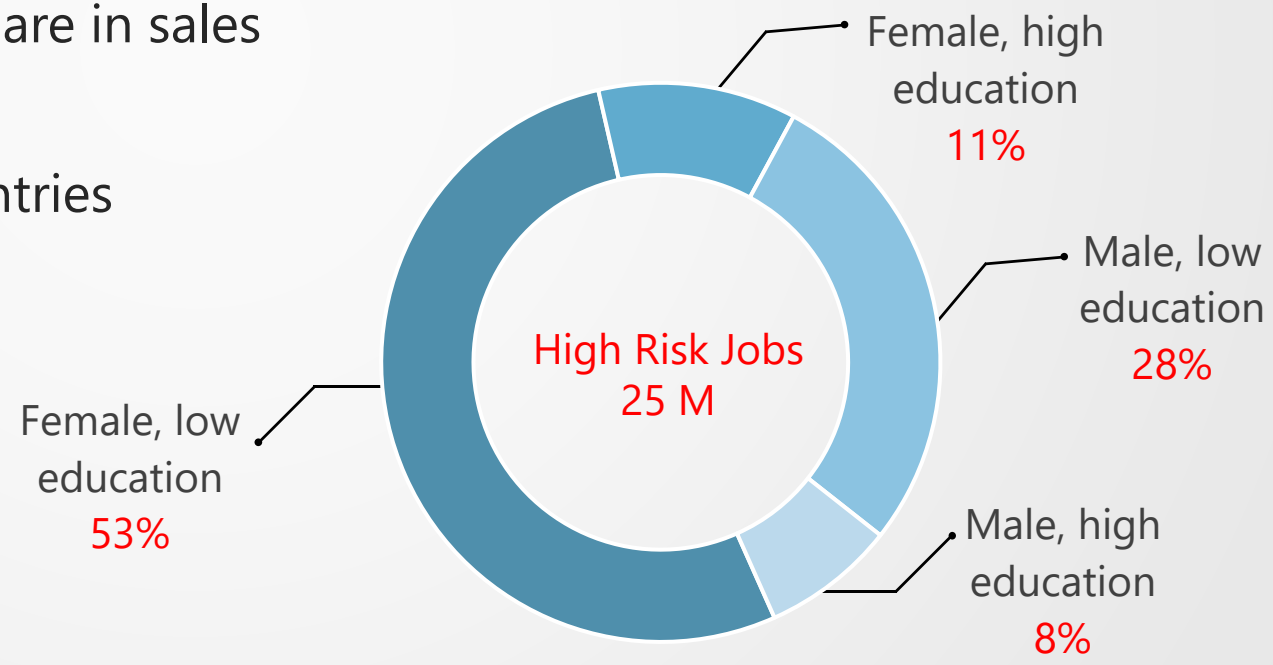


All other occupations



Key takeaways

- We estimate that 25 million US jobs are at risk of COVID-induced automation
  - Nearly two-thirds of these jobs are held by females
  - Women with lower levels of education and wages drive this result
  - Roughly half of high-risk jobs are in sales and office occupations.
  - Similar findings for other countries




Thank you!

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