The role of data in jobs

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Roadmap

1. What is the OECD Innovation LAB?

2. Project “the role of data in jobs”

What is the Innovation LAB?

- The LAB was conceived as an incubator of innovative projects that can be directly applied to OECD work.

- 2 facets:
  - Build up the technical capacity of OECD staff
  - Help a community of researchers develop and deliver innovative projects

- Scope: innovative projects that can enrich the breath of our analysis, improve the timeliness and the granularity of data.

The role of data in jobs

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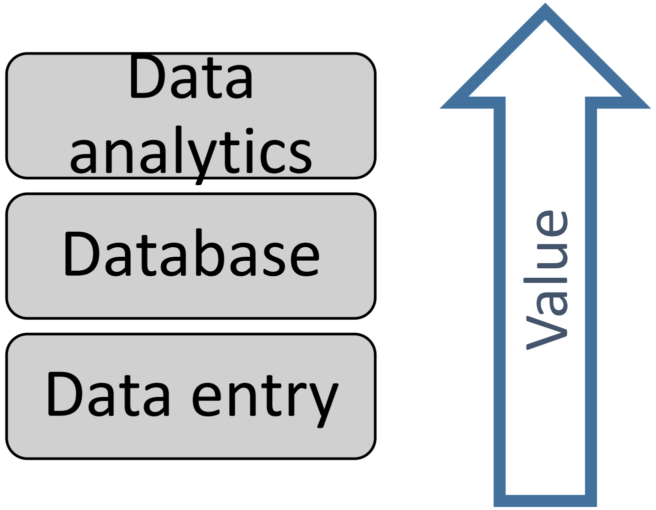
1. Methodology
2. Main insights
3. Conclusions

What have we done?

The approach

- Use NLP and online job advertisements to derive estimates of the data intensity of jobs in the United Kingdom, Canada and the United States, for the year 2020.
- We identify jobs that are involved in data production using the skills/tasks that are reported in the job advertisement.
- Follow the framework set out by Corrado et al. (2022) and Statistics Canada (2019)



A four-step approach

1. Extract from the job advertisement the skills/tasks that are related to the production of data using natural language processing

2. Classify the job as data-intensive or not, based on a set of rules including the extent to which the job description refers to data entry, database or data analytics activities

3. Aggregate data-intensive jobs to get estimates of shares by occupation, industry and at the economy-wide level

4. Inject those shares into a sum of cost approach to derive estimates of investment in data

The pros and cons of using online job advertisements (Lightcast)

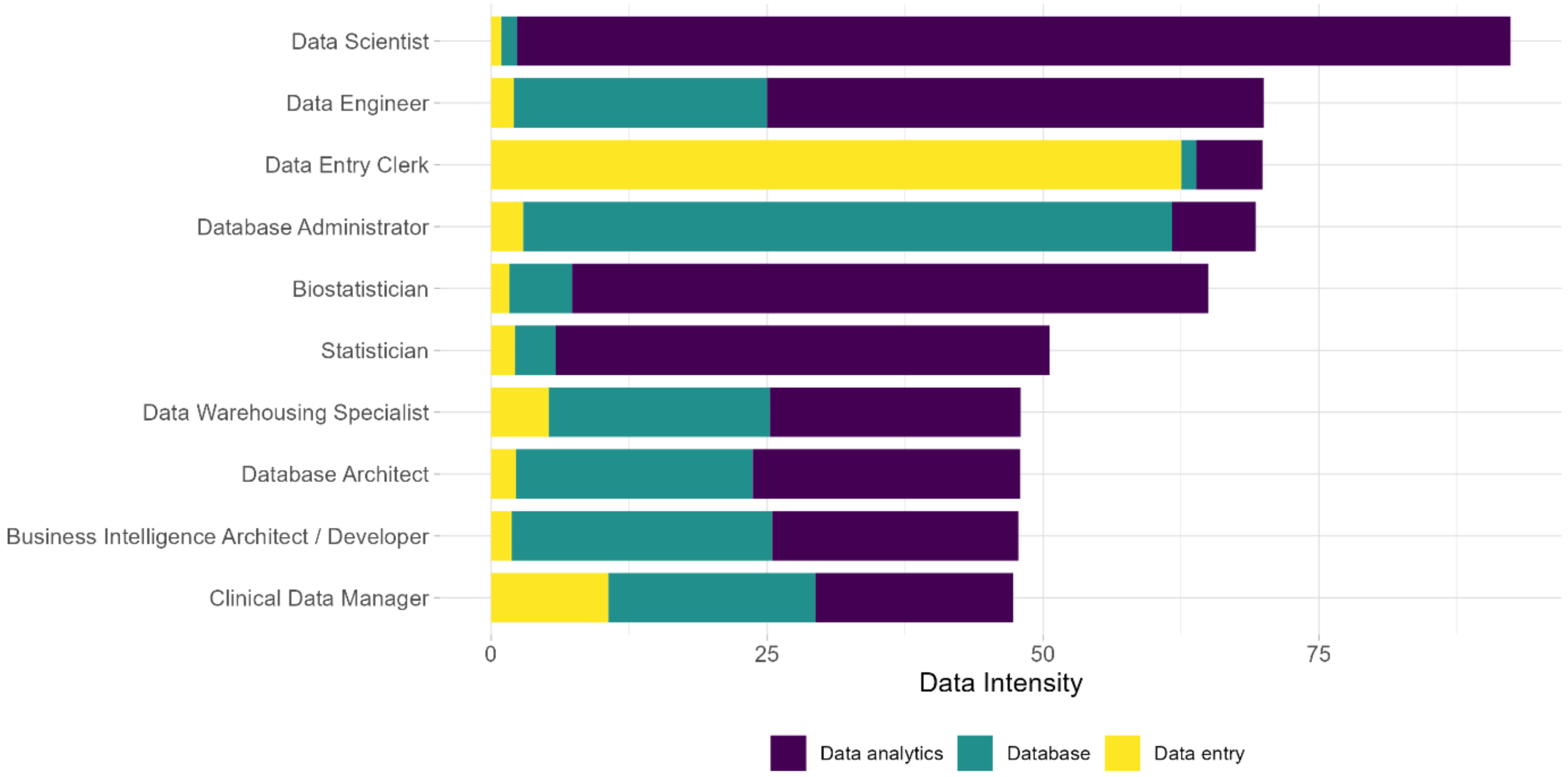
Job online advertisements are a measure of labour demand (flow as opposed to labour stock)

Advantages	Disadvantages
Timely data (2012 – present)	**Country coverage is limited** (GBR, CAN, USA, NZL, AUS as well as EU countries)
Linkage to firm-level and regional data	Limited coverage depending on year and country, no insights on how firms hire
Standardised occupation and industry classifications	**Representativeness** is heterogeneous (industry, occupation level; white collar jobs)
Identify **skill demands beyond standard labour market statistics**	No information about quantity of hiring Recruitment agencies cause duplications

What have we found?

The most data-intensive occupations are those that use data analytics skills

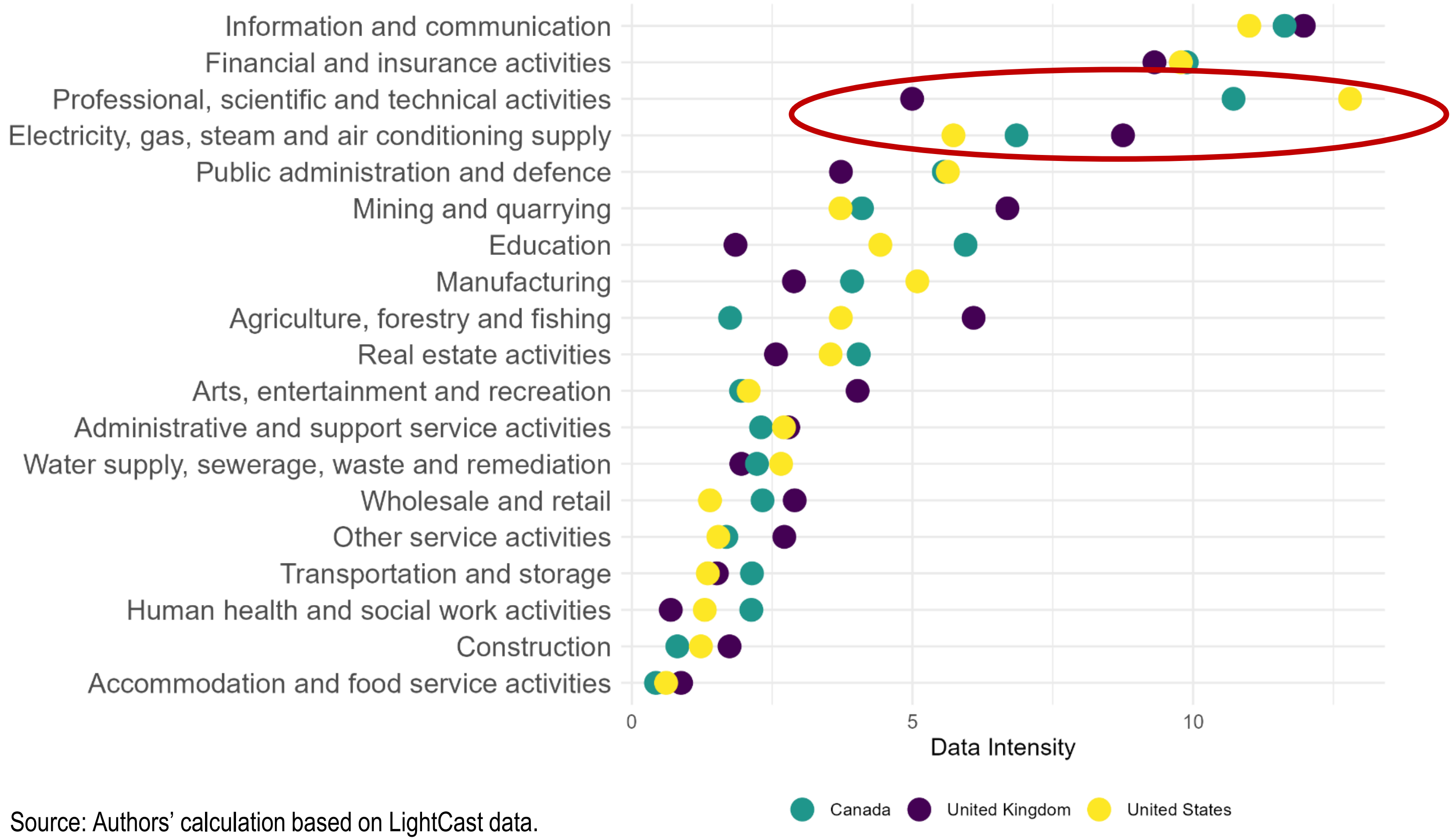
Top 10 data-intensive occupations in the United Kingdom, per cent, 2020



Source: Authors' calculation based on LightCast data.

Differences in data intensity across the countries are concentrated in a handful of industries

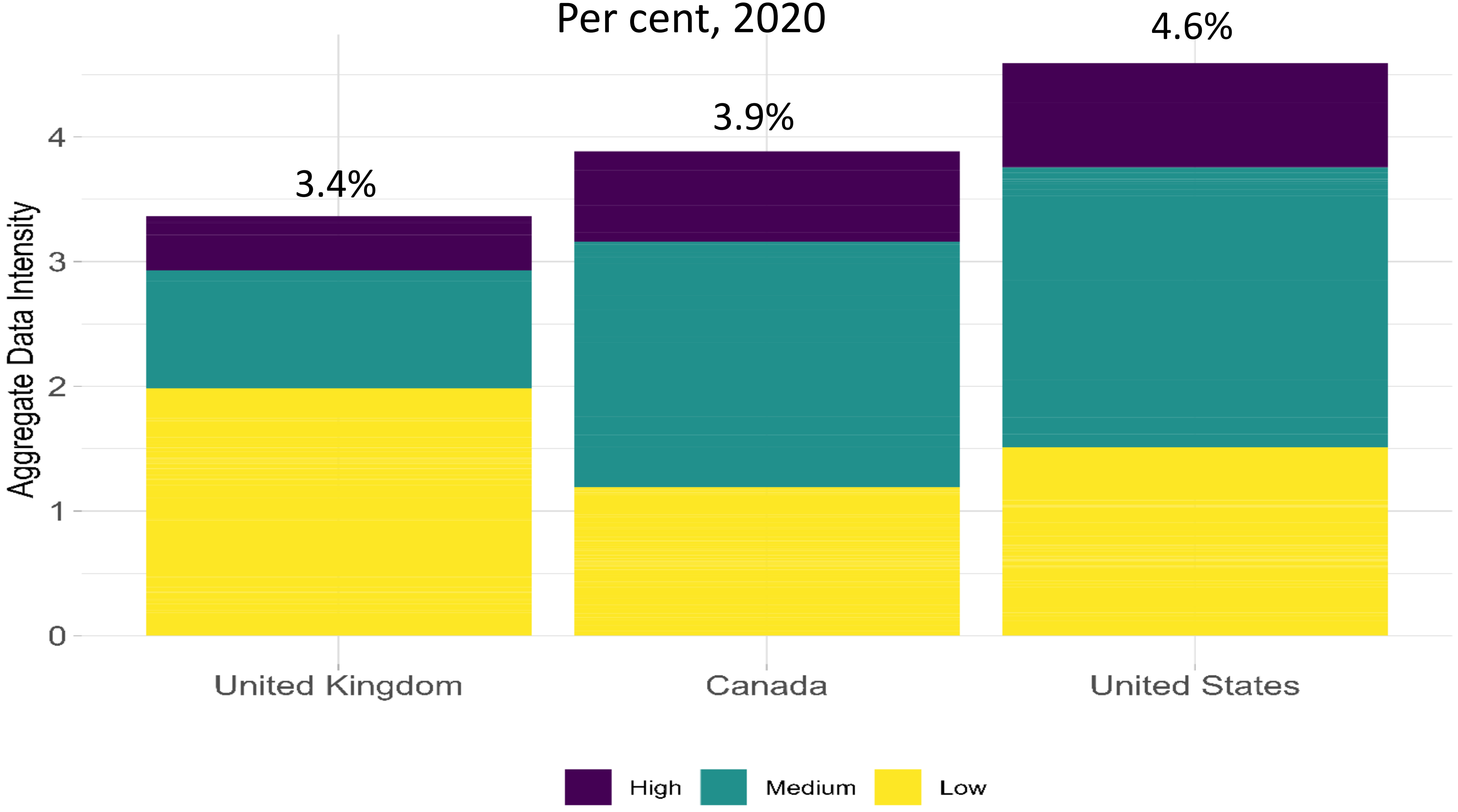
Data intensity at industry level, per cent, 2020



Source: Authors' calculation based on LightCast data.

The United Kingdom and Canada appear to be less data-intensive than the United States

Per cent, 2020



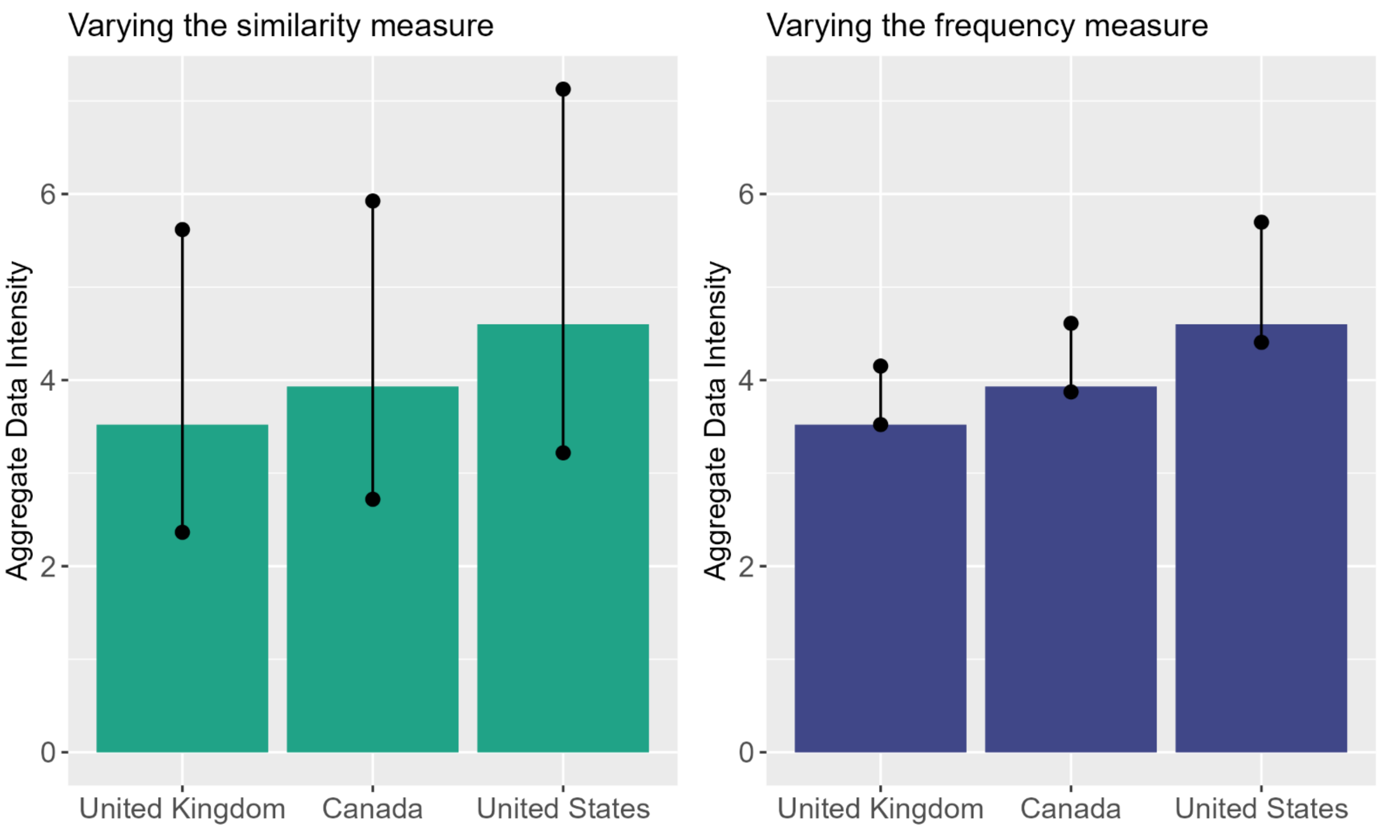
Notes: Data intensity takes values between 0 and 100. Low data-intensive occupations: 0<10%, medium data-intensive occupations: 10-50% and high data-intensive occupations > 50%

Results at aggregate level are sensitive to changes in the classification rule

- Order of magnitude of results broadly similar

- Estimates seem to depend on the similarity parameter we use in the model, but not on the other parameters

- The ranking between countries does not seem to be affected



Source: Authors' calculation based on LightCast data.

A sum-of-cost approach for investment in data

$$investment_{d,i} = \alpha * compensation\ of\ employees_i * \frac{number\ of\ data\_intensive\ jobs_d\ in\ i}{number\ of\ jobs_d\ in\ i}$$

d : type of job (data entry, database or data analytics), i : industry

α : mark-up (non-wage cost and a margin for capital services) → use a range

Remark: Use a data intensity share based on the frequency of skills requirements and tasks contained in job ads rather a time-use factor.

Caveats:

- Capital and intermediary consumption not considered
- Uniform wages within industry

Estimates of investment in data using data intensity shares

Investment in data in 2020	Canada	United Kingdom	United States
Billion, national currency	69.3 – 147.9	63.4 – 141.7	901.1 – 1902.2
As a share of GVA, per cent	3.1 – 6.7	3.0 - 6.7	4.4 - 9.4
Of which			
Data entry, pp	0.7 - 1.5	0.3 - 0.7	0.5 - 1.1
Database, pp	1.0 - 2.2	0.9 - 2.0	2.0 - 4.1
Data analytics, pp	1.4 – 2.9	1.7 - 3.9	2.2 - 4.7

Note: The estimates are derived using the equation in section 3.4. The lower bound estimates, apply a markup of 1.5 following STATCAN (2019). The upper bound estimates use a country-specific markup = (compensation of employees + intermediate consumption (excluding materials) + consumption of fixed capital + net operating surplus)/ compensation of employees. For Canada, data on intermediate consumption was not available in 2020 and was approximated by applying the growth rate of the GVA to the 2019 estimate.
Source: Authors' calculations based on LightCast data and national accounts data (OECD, 2023)

Conclusions

- The paper has developed an NLP methodology using online job postings to derive estimates of data intensity of jobs, which can be used to get insight on investment in data.

- The approach is subject to a number of limitations, including sensitivity to some of the assumption in the NLP classification rules and in the use of a sum-of-cost approach, although the country ranking appears to be robust.

- Further research:
  - Expanding the time and country coverage
  - Use the methodology to derive estimates of AI-hiring intensity

Thanks!

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