Firm-Level Job Postings in the COVID-19 Recession and Recovery

Evidence from Online Job Vacancies in the UK

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Nontraditional Data & Statistical Learning with Applications to Macro
Preliminary: please do not circulate

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In a Nutshell

The pandemic shock hit different firms, industries, and regions in asymmetric fashion.

Want to understand effect of pandemic on the demand for labour.

We match several millions of job postings from online aggregator Indeed to the universe of registered firms to create a fast indicator of:

- Sectoral breakdown of job vacancies
- Pandemic effect
- Firm and regional heterogeneity

Literature

Other vacancy papers (US):

- Broad-based collapse, regardless of lockdown or industry type (except "front-line" jobs) (Kahn et al., 2020).
- Hiring cuts and downskilling in concentrated labour markets, low-income and unequal regions. More cuts at small, cash- and credit-constrained firms (listed only) (Campello et al., 2020)

Theory:

- Importance of job destruction for spillover of supply to demand shocks (Guerrieri et al., 2020)

Our contribution:

- Match to universe of firms: beyond listed
- Non-survey, sector-specific evidence for UK labor markets
- Correlate with firm and regional characteristics

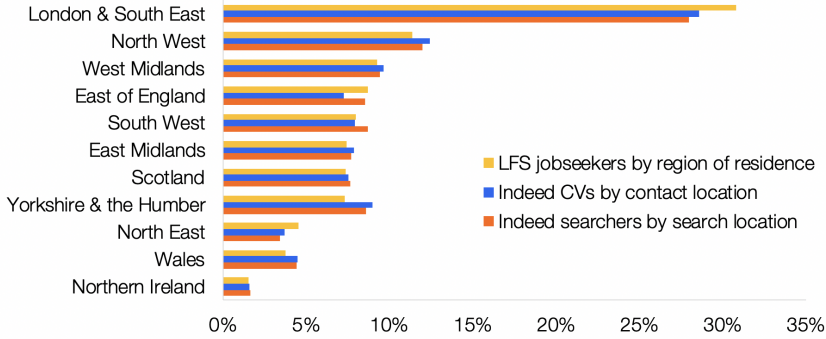
Online Vacancies

Vacancies data from Indeed:

- No. 1 job site in the UK by total visits (by a degree of 3-4 to closest competitors, SimilarWeb, May 2020)
- 6 out of 10 online job seekers in UK come to Indeed each month (Comscore, Feb 2020)
- Aggregated from all over the web + posted directly to Indeed
- Geographically representative
- Observed:
  - New vacancies by firm by day: Jan 2018-present (1 week lag), several millions
  - Vacancy durations $\rightarrow$ infer stock
  - Vacancy locations
- For a discussion of possible biases, see Turrell et al. (2019)

Indeed job search data is geographically representative

Indeed UK CVs and searches vs. Labour Force Survey jobseekers, Feb-Apr 2020



Source: Indeed. LFS jobseekers are defined as people in employment who were looking for a different or additional paid job or business in the reference week (DIFJOB=1) and people in unemployment or inactivity who looked for paid work in the last four weeks (LOOK4=1). The number of searchers on Indeed is estimated as the number of distinct cookies in search data.

Matching: Firm Sector and Balance Sheet Data

Fast fuzzy matching to combine Indeed firm-level vacancies with universe of registered firms via firm name:

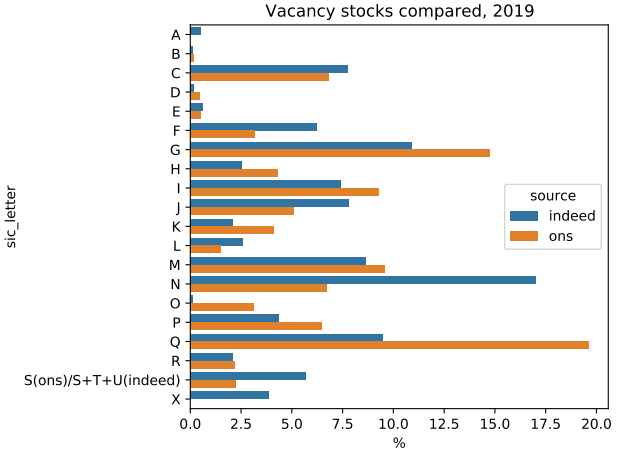
- Match to unique company names from Companies House / Bureau van Dijk (Orbis) (∼5M unique names)

Method:

1. Create matrix of all n-grams in list of all unique firms (Indeed + CH + BvD)
2. Calculate Term Frequency - Inverse Document Frequency matrix for both sets of firms names
3. Calculate cosine similarity and take top match above certain threshold for each Indeed name

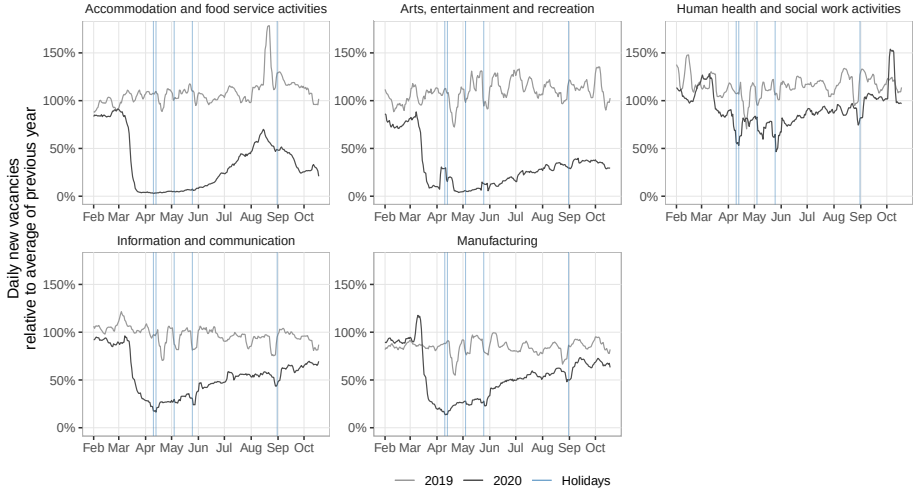
Applied at large scale using sparse matrix multiplication coded in C++ (Python sparse_dot_topn package).

Vacancy stocks by SIC (2019) show Indeed data are broadly representative

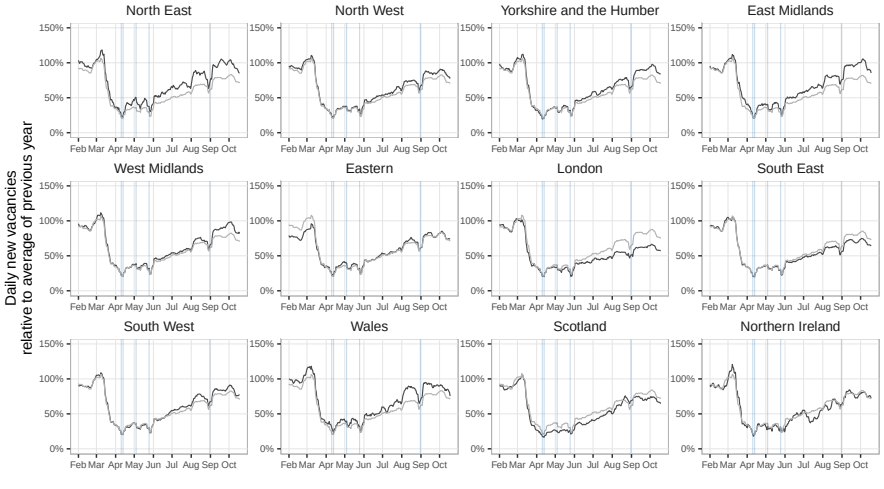


Q: Human health and social work, G: Wholesale and retail trade.

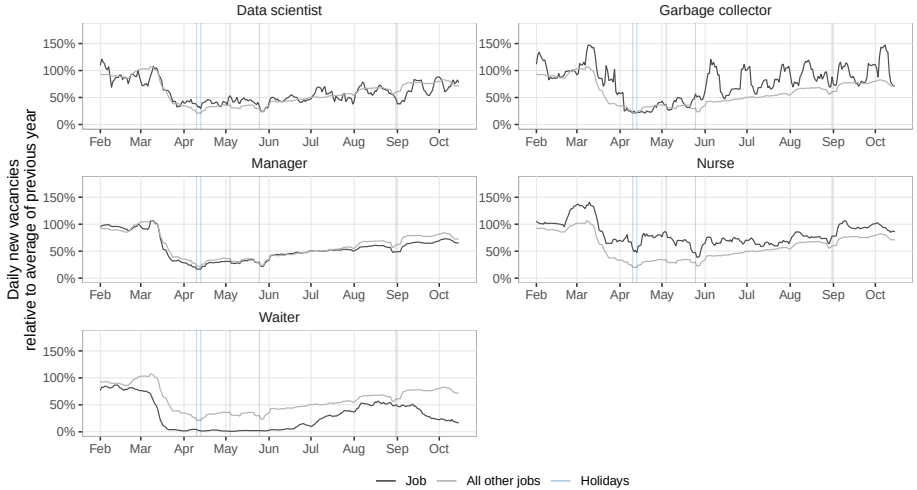
Vacancy Flows by SIC, 2019 vs. 2020



Vacancy Flows by region



Job Title


Data scientist
Garbage collector
Manager
Nurse
Waiter
Daily new vacancies
relative to average of previous year
150%
100%
50%
0%
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Job
All other jobs
Holidays

Regression Estimates

Effect of WHO declaration of coronavirus as pandemic:

$$\ln v_{ijt} = \underbrace{\alpha_{ij} \cdot D_{ij}}_{\text{Fixed effects}} + \beta_0 \cdot \delta_t^{\text{WHO}}$$

Interaction of declaration with various firm and regional effects:

$$\ln v_{ijt} = \alpha_{ij} \cdot D_{ij} + \boldsymbol{\beta} \cdot \delta_t^{\text{WHO}} \cdot X_{ijt} + \beta_1 \cdot (\textit{cases}) + \beta_2 \cdot (\textit{deaths})$$

Dynamic effect k weeks from declaration, split-sample:

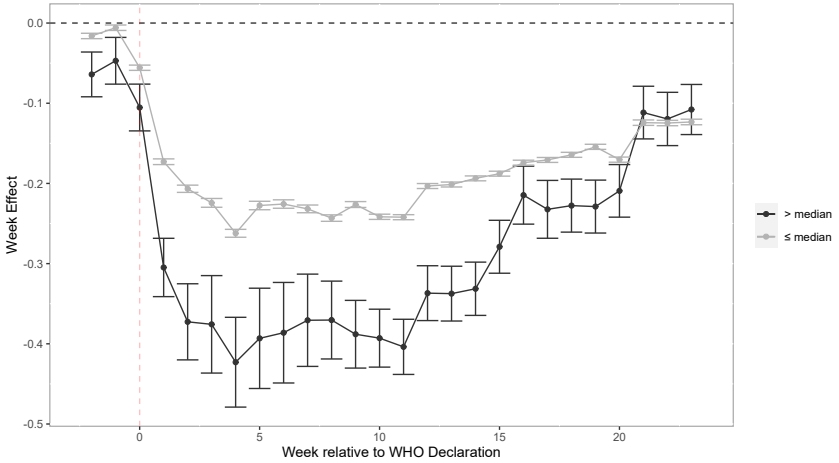
$$\ln v_{ijt} = \alpha_{ij} \cdot D_{ij} + \sum_{k=-2}^{25} \gamma_k \cdot \delta_{t_0+k}^{\text{WHO}} + \beta_3 \cdot (\textit{cases}) + \beta_4 \cdot (\textit{deaths})$$

Effect on log flow of vacancies

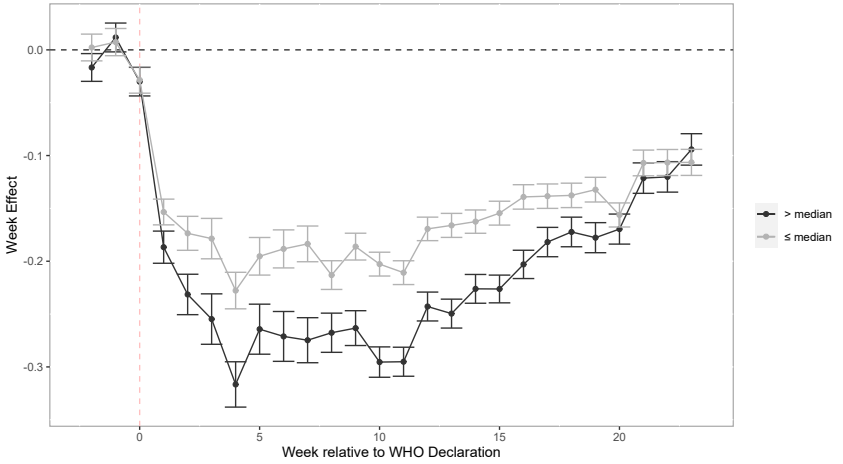
March 11 Effect	-0.221^{***} (0.0004)	
New COVID cases		-0.011^{*} (0.006)
COVID deaths		-0.015 (0.010)
Interactions with March 11 effect:		
Age of firm		-0.001^{***} (0.0002)
Listed firm		-0.159^{***} (0.018)
Cash (log)		0.006^{**} (0.002)
Mean wage (log)		0.030^{***} (0.007)
Turnover (log)		-0.019^{***} (0.005)
Total assets (log)		0.002 (0.004)
Number of employees (log)		-0.001 (0.004)
Credit score		-0.00004 (0.0002)
Number of subsidiaries		0.0004^{***} (0.0001)
Profit margin		0.0001 (0.0002)
Output per worker		-0.00000 (0.00000)
Market share		-0.036 (0.033)
Household income (log)		-0.047^{***} (0.007)
COVID cases (log)		0.015 (0.009)
COVID deaths (log)		0.003 (0.012)
Fixed effects: Firm-NUTS2 regions	✓	✓
Fixed effects: Week		✓
Observations	5,942,406	583,790
Adj. R-Squared	0.405	0.377

The models are demeaned panel regressions. Panel is weekly from March 2019-June 2020, firm-NUTS2. SEs clustered by company-NUTS2. March 11 date of WHO pandemic declaration. *p<0.05; **p<0.01, ***p<0.001

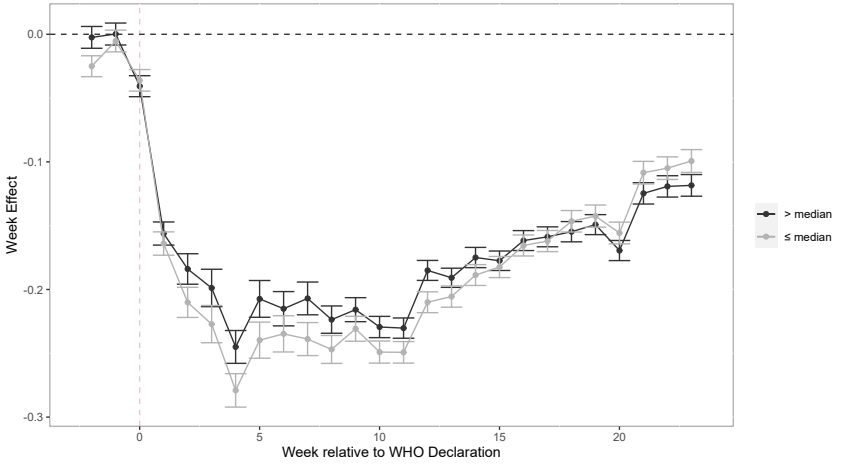
March 11 Effect – Listed firms



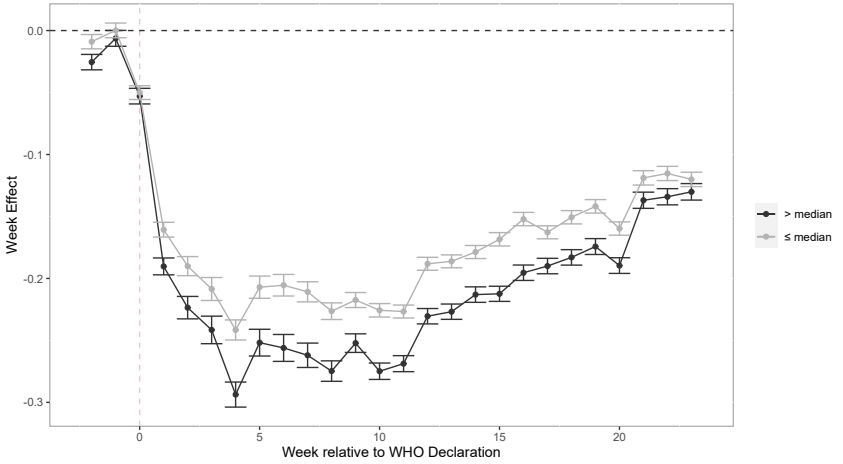
March 11 Effect – Turnover (Log)



March 11 Effect – Cash (Log)



March 11 Effect – Age



Conclusions

- The fall in job posting activity was **broad-based** and drastic
- The recovery so far is **dispersed across sectors** with human health and social work seeing a smaller drop in vacancies and vacancies in the arts and hospitality industries having been hit very hard
- The flow of jobs in **services** shows **little sign of recovery**
- Evidence of **firm heterogeneity** in response to COVID crash:
  - Listed, larger, high-wage and older firms cut (much) more jobs
  - Cash holdings mattered
  - Having more subsidiaries softens blow
  - Richer areas saw more vacancy cuts

References

Campello, M., Kankanhalli, G., and Muthukrishnan, P. (2020). Corporate hiring under covid-19: Labor market concentration, downskilling, and income inequality. Technical report, National Bureau of Economic Research.

Guerrieri, V., Lorenzoni, G., Straub, L., and Werning, I. (2020). Macroeconomic implications of covid-19: Can negative supply shocks cause demand shortages? Technical report, National Bureau of Economic Research.

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Turrell, A., Speigner, B. J., Djumalieva, J., Copple, D., and Thurgood, J. (2019). Transforming naturally occurring text data into economic statistics: The case of online job vacancy postings. Technical report, National Bureau of Economic Research.