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‘Anywhere Jobs’: Reshaping the Geography of Work

Jeegar Kaakad, The Tony Blair Institute for Global Change

Starting at 12.30 PM

ESCoE ECONOMIC MEASUREMENT WEBINARS

TONY BLAIR INSTITUTE FOR GLOBAL CHANGE

Anywhere Jobs

Reshaping the geography of work

JEEGAR KAKKAD, 30 SEPTEMBER 2022

When is an occupation likely to be offshored?

NOT JUST WHETHER A JOB CAN BE DONE FROM HOME

- Karan & Peto, others used O*NET to calculate impact of social distancing rules during the pandemic

BUT COULD IT ACTUALLY BE DONE FULLY REMOTELY, IE OFFSHORED?

- Richard Baldwin: 'globotics' wave as AI & RI come for white-collar jobs
- WFH during the pandemic accelerated investment in remote tech, but changed corporate thinking

UK STILL LIVING WITH ECONOMIC, SOCIAL & POLITICAL IMPACT OF AUTOMATION & OFFSHORING OF MANUFACTURING JOBS

What jobs can be done offshore?

1

Use O*NET occupations to create a manual flag for whether a job can be offshored

2

Standardise O*NET 'Work Contexts' & 'Work Activities' scores

3

Use model to find most 'predictive' set of contexts & activities for 'somewhere jobs'

4

Map results of O*NET model BLS into LFS

Data Sets

1. O*NET NOVEMBER 2020 RELEASE

- O*NET (Occupation Information Network)
- A statistics database sponsored by the US Department of Labour of roughly 1,000 occupations
- Range of worker- and job-oriented characteristics
- Each occupations is scored against more than 100 distinct work activity and context metrics
- Pre-pandemic responses to activity and context metrics

2. UK LABOUR FORCE STATISTICS

- Financial-year data from April 2019 to April 2020

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Manual flags for O*NET occupations

- O*NET OCCUPATIONS
  - Use 'Work Activities' & 'Work Contexts' as capture key job characteristics
  - Of 1,006 occupations, 847 appear in Work Activities and Work Contexts
  - Team of 4: first pass, subjective assessment of which were probably remoteable, where 1=non-offshorable

SOC Code	Job Title	Manual outsourcing / offshorable flag (1 = non-offshorable)
11-3051.02	Geothermal Production Managers	1
11-3051.03	Biofuels Production Managers	1
11-3051.04	Biomass Power Plant Managers	1
11-3051.06	Hydroelectric Production Managers	1
11-3061.00	Purchasing Managers	0
11-3071.00	Transportation, Storage, and Distribution Managers	0
11-3071.04	Supply Chain Managers	0
11-3111.00	Compensation and Benefits Managers	0
11-3121.00	Human Resources Managers	0
11-3131.00	Training and Development Managers	0
11-9013.00	Farmers, Ranchers, and Other Agricultural Managers	1
11-9021.00	Construction Managers	1
11-9031.00	Education and Childcare Administrators, Preschool and Daycare	1
11-9032.00	Education Administrators, Kindergarten through Secondary	1
11-9033.00	Education Administrators, Postsecondary	1
11-9041.00	Architectural and Engineering Managers	1
11-9041.01	Biofuels/Biodiesel Technology and Product Development Managers	0
11-9051.00	Food Service Managers	1

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Standardising O*NET scores

O*NET ACTIVITY & CONTEXT

Work Activity: Importance on 1-5 scale

- eg Determining Compliance with Standards

Work Context: Context on 1-5 scale

- eg Face-to-face Contact

Standardise raw scores to 0-100:

S = ((O - L) / (H - L)) * 100

S = standardised score

O = original raw score

L = lowest possible score on that variable's scale

H = highest possible score on that variable's scale

O*NET-SOC Code original	Title	Provide Consultation and Advice to Others	Coordinating the Work and Activities of Others	Guiding, Directing, and Motivating Subordinates	Developing and Building Teams
11-1011.0	Chief Executives	66.25	73.25	89.25	88.75
11-1011.0	Chief Sustainability Officers	74	74	72	78
11-1021.0	General and Operations Managers	54.25	81	78.75	74.5
11-2011.0	Advertising and Promotions Managers	32.75	51.75	49.5	49
11-2021.0	Marketing Managers	54.5	74.25	71	77
11-2022.0	Sales Managers	76	78.25	78.5	80.75
11-3012.0	Administrative Services Managers	55.5	73.5	72.5	67.75
11-3021.0	Computer and Information Systems Managers	61.25	72.5	74.5	78
11-3031.0	Financial Managers	62.5	71	76.75	70.25
11-3031.0	Treasurers and Controllers	68	60.5	71	74
11-3031.0	Investment Fund Managers	48	41.25	44.25	53.25
11-3051.0	Industrial Production Managers	60.5	75.75	79.5	72
11-3051.0	Quality Control Systems Managers	38	59.75	67.5	58.75
11-3051.0	Geothermal Production Managers	64.25	78.25	71.5	82
11-3051.0	Biofuels Production Managers	53.75	70.75	76	71

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Which characteristics should we choose?

Easier to define characteristics that require in-person work.

1. Which of the 100 ‘Work Activities’ and ‘Work Contexts’ are relevant in determining whether a job needs to be done somewhere?

2. Within each activity/context, what are the right scores/cut-offs?

3. What is the ‘best’ combination of Activities & Contexts that provided the ‘best’ (accurate/justifiable/informative) distinction between Somewhere and Anywhere Jobs

Multiple approaches

1. Replicate Koren & Peto social-distancing/WFH analysis

2. Replicate Blinder offshorability index

3. Use quick & dirty analysis to see which activities & contexts best matched our manual flag
   - Propensity score-matching, LASSO regression, histogram charts, decision tree analysis

4. Use results of the above to create an algorithm that maximised four-way accuracy score

Koren & Peto: impact of social distancing

3 categories of tasks that prevent jobs from being done from home

K&P use average 'importance' scores within each category

If an occupation scores above a pre-defined threshold in category & on the 'work context' flag, then flagged as difficult to do from home.

Index	Tasks	Context
Teamwork	Work With Work Group or Team	Face-to-face discussions several times a week & more often than emails, letters, memos
	Provide Consultation and Advice to Others	
	Coordinating the Work and Activities of Others	
	Guiding Directing and Motivating Subordinates	
	Developing and Building Teams	
Customer	Deal With External Customers	Face-to-face discussions several times a week & more often than emails, letters, memos
	Performing for or Working Directly with the Public	
	Assisting and Caring for Others	
	Provide Consultation and Advice to Others	
	Establishing and Maintaining Interpersonal Relationships	
Presence	Handling and Moving Objects	Density of co-workers like shared office or more
	Operating Vehicles, Mechanized Devices or Equipment	
	Repairing and Maintaining Electronic Equipment	
	Repairing and Maintaining Mechanical Equipment	
	Inspecting Equipment, Structures, or Material	

Each social distancing index (column 1) is created as an arithmetic average of the component indexes (column 2). To

Pairwise correlation

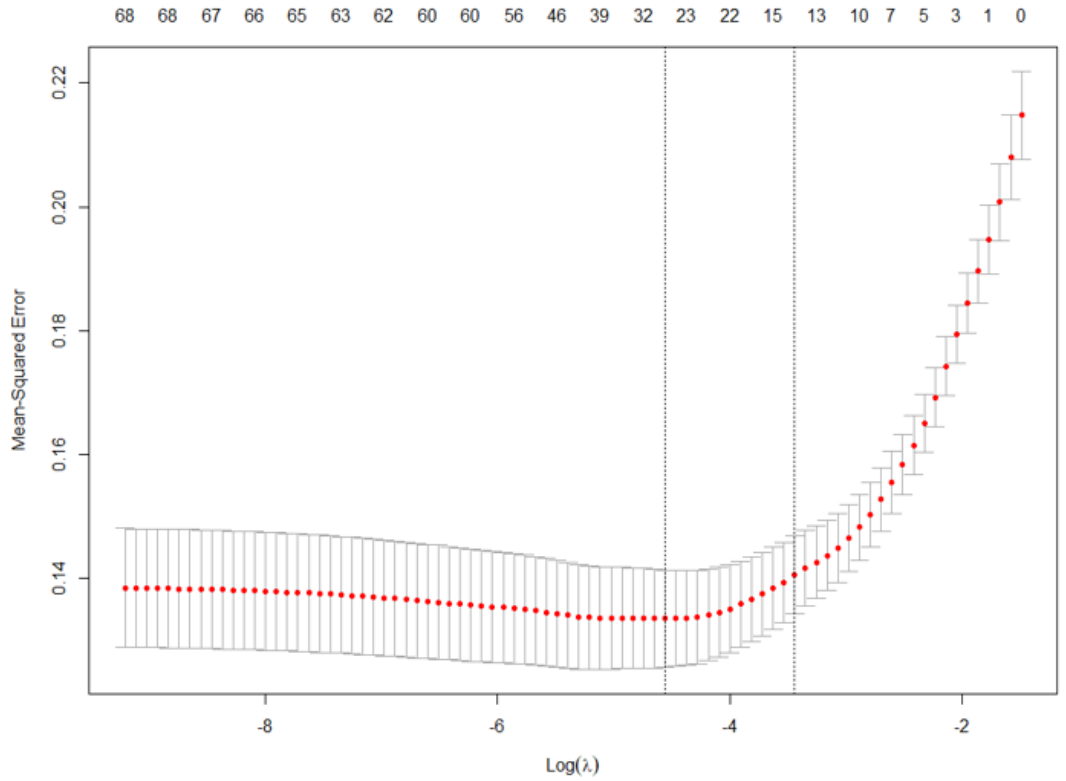
A	B	C	D	E	F	G	H	I	J	K	L
Columns	Provide Consultation and Advice to Others	Coordinating the Work and Activities of	Guiding, Directing, and Motivating	Developing and Building Teams	Performing for or Working Directly with the	Assisting and Caring for Others	Establishing and Maintaining Interpersonal	Handling and Moving Objects	Operating Vehicles, Mechanized	Repairing and Maintaining Electronic	Repairing and Maintaining Mechanical
Provide Consultation and Advice to Others	1	0.59840979	0.653017274	0.659934552	0.13111022	0.214657195	0.587989736	-0.428219031	-0.226251812	-0.106087601	-0.283039413
Coordinating the Work and Activities of Others	0.59840979	1	0.831854229	0.830601507	0.194625349	0.282679535	0.49038757	-0.080632931	0.043070366	0.010040877	-0.040935977
Guiding, Directing, and Motivating Subordinates	0.653017274	0.831854229	1	0.805939551	0.17858398	0.249821255	0.454618018	-0.110833333	0.02438938	0.005948282	-0.029555275
Developing and Building Teams	0.659934552	0.830601507	0.805939551	1	0.217865371	0.336646178	0.612922367	-0.191756903	-0.073071923	-0.08517882	-0.163072794
Performing for or Working Directly with the Public	0.13111022	0.194625349	0.17858398	0.217865371	1	0.554130063	0.472124015	-0.018613164	-0.046572279	-0.192721827	-0.25258247
Assisting and Caring for Others	0.214657195	0.282679535	0.249821255	0.336646178	0.554130063	1	0.428656488	0.184237663	-0.0091808	-0.042521158	-0.055648834
Establishing and Maintaining Interpersonal Relationsh	0.587989736	0.49038757	0.454618018	0.612922367	0.472124015	0.428656488	1	-0.449584647	-0.368622358	-0.342148896	-0.520789032
Handling and Moving Objects	-0.428219031	-0.080632931	-0.110833333	-0.191756903	-0.018613164	0.184237663	-0.449584647	1	0.670036537	0.496769909	0.742616086
Operating Vehicles, Mechanized Devices, or Equipme	-0.226251812	0.043070366	0.02438938	-0.073071923	-0.046572279	-0.0091808	-0.368622358	0.670036537	1	0.488485082	0.738856749
Repairing and Maintaining Electronic Equipment	-0.106087601	0.010040877	0.005948282	-0.08517882	-0.192721827	-0.042521158	-0.342148896	0.496769909	0.488485082	1	0.765305997
Repairing and Maintaining Mechanical Equipment	-0.283039413	-0.040935977	-0.029555275	-0.163072794	-0.25258247	-0.055648834	-0.520789032	0.742616086	0.738856749	0.765305997	1
Inspecting Equipment, Structures, or Material	-0.182796553	0.111581537	0.085281163	0.00200692	-0.135448837	0.11119017	-0.407356071	0.740427635	0.694955973	0.664537429	0.80256492
Coaching and Developing Others	0.657903875	0.724439672	0.790145889	0.747321751	0.208531732	0.382528602	0.521959665	-0.160253302	-0.086718257	-0.067113972	-0.125842968
Communicating with Supervisors, Peers, or Subordina	0.547927323	0.60586541	0.569801899	0.679760875	0.105761525	0.252684762	0.561651348	-0.27701826	-0.069668524	-0.059553032	-0.219771397
Controlling Machines and Processes	-0.324444374	-0.053998735	-0.045336828	-0.177107	-0.251170753	0.01475322	-0.518334552	0.79425264	0.662830751	0.666568743	0.860057346
Performing General Physical Activities	-0.358886446	-0.007387635	-0.06004649	-0.094741619	0.085845557	0.257596629	-0.341184007	0.901831205	0.694722537	0.409116507	0.649970997
Monitoring and Controlling Resources	0.49771272	0.620267026	0.656543581	0.569706268	0.179660928	0.14139909	0.346978582	-0.025817273	0.045469838	0.116016401	0.072937523
Monitor Processes, Materials, or Surroundings	0.215204937	0.369601586	0.349241779	0.340296388	-0.052017009	0.266794167	0.039923725	0.32561274	0.375809766	0.401794963	0.393042257
Interacting With Computers	0.52452466	0.258874511	0.272830066	0.335759121	0.063552051	-0.052307971	0.49623173	-0.647940734	-0.470231673	-0.051752946	-0.45276361
Selling or Influencing Others	0.429286425	0.347555471	0.372637455	0.39861322	0.405004347	0.088354359	0.481877613	-0.236552141	-0.117604745	-0.166565759	-0.210428509
Thinking Creatively	0.539204024	0.378488882	0.40841664	0.39483047	0.063821295	-0.03441853	0.434284245	-0.356385273	-0.26505867	-0.088136783	-0.247197424
Developing Objectives and Strategies	0.717968356	0.593943319	0.632954915	0.669674375	0.121391906	0.138503726	0.564331588	-0.385996018	-0.180368135	-0.141187988	-0.249483755
Resolving Conflicts and Negotiating with Others	0.504156182	0.576915998	0.555767855	0.635649311	0.534859984	0.434538566	0.657705531	-0.257737542	-0.080592127	-0.219384545	-0.291771929
Communicating with Persons Outside Organization	0.554241222	0.415933652	0.411860035	0.466740432	0.504576572	0.106206647	0.672974573	-0.529190584	-0.219529018	-0.252871674	-0.455322098
Work With Work Group or Team	0.294618906	0.508979431	0.422165597	0.54465969	0.105324628	0.297463577	0.351732636	-0.092991782	-0.04542623	-0.015200034	-0.117474537
Deal With External Customers	0.171989332	0.174583887	0.174442497	0.23174681	0.755617661	0.381088184	0.479688271	-0.203104845	-0.116842924	-0.18245276	-0.318103064
Contact With Others	0.179124044	0.280372308	0.244818752	0.331138707	0.525872429	0.487251405	0.498139192	-0.14730084	-0.103419649	-0.157701108	-0.252757959
Electronic Mail	0.547890424	0.280787672	0.313135048	0.346947921	0.155644565	-0.000520476	0.585421608	-0.677828302	-0.477328707	-0.191751637	-0.524567095
Exposed to Disease or Infections	0.156532699	0.118821267	0.105209772	0.181927668	0.468497549	0.775748406	0.297280654	0.12649017	-0.084770286	-0.034130565	-0.098324458
Face-to-Face Discussions	0.318203697	0.361171801	0.369681976	0.356833251	0.121552951	0.213812902	0.312405654	-0.104096294	-0.045413725	0.021946033	-0.053309812
Letters and Memos	0.478926428	0.326711741	0.351221913	0.368435844	0.292148652	0.178972914	0.57911658	-0.528830337	-0.31317265	-0.265891297	-0.443143887

LASSO regression on our subjective flags

Bold Used in final model with LASSO recommendation

Red Used in final model against LASSO recommendation

```
> coef(cv.lasso, s=cv.lasso$lambda.min)
72 x 1 sparse Matrix of class "dgCMatrix"
                                                                  1
(Intercept)                                                0.083687
(Intercept)                                                .
`Provide Consultation and Advice to Others`               -0.00118
`Coordinating the Work and Activities of Others`           .
`Guiding, Directing, and Motivating Subordinates`          .
`Developing and Building Teams`                           -0.00129
`Performing for or Working Directly with the Public`       0.004364
`Assisting and Caring for Others`                          0.000422
`Establishing and Maintaining Interpersonal Relationships` .
`Handling and Moving Objects`                              .
`Operating Vehicles, Mechanized Devices, or Equipment`     .
`Repairing and Maintaining Electronic Equipment`           .
`Repairing and Maintaining Mechanical Equipment`           .
`Inspecting Equipment, Structures, or Material`            0.000847
`Coaching and Developing Others`                           0.00433
`Communicating with Supervisors, Peers, or Subordinates`  -0.00054
`Controlling Machines and Processes`                       .
`Performing General Physical Activities`                   0.001665
`Monitoring and Controlling Resources`                     .
`Monitor Processes, Materials, or Surroundings`            .
`Interacting With Computers`                              -0.00171
`Selling or Influencing Others`                           -0.0024
`Thinking Creatively`                                      .
`Developing Objectives and Strategies`                    -0.00181
`Resolving Conflicts and Negotiating with Others`          .
`Communicating with Persons Outside Organization`          .
```



Algorithm

- K&P + LASSO: initial list of activities and contexts
- Used a VBA Excel model to check how many true positives/negatives & false positives/negatives the variables together picked up
  - True positives: jobs flagged as non-offshorable both in the subjective flag as well as by the variables
  - False positives: variables predicted as non-offshorable, but subjective flag disagreed
  - False negative: variables predicted as offshorable, but subjective flag disagreed
  - True negative: both variables and subjective flag agreed as offshorable
- We used initial cutoff values of 75 to reflect the "somewhat important" benchmark from O*NET
- Included any job if it was above the cutoff in any variable

In other words, the idea was: "if we include jobs that are at least somewhat important on this particular O*NET variable (a standardized score >= 75), how accurate a predictor is that of which jobs we think are remoteable based on our subjective flag?"

Algorithm cont…

ACCURACY SCORE

- How accurately does this model (ie specific set of work activities and contexts) accurately filter the job into true positives, false positives, true negatives and false negatives, as a % of all jobs

Match Category	*(1) Koren & Peto Model (Original Variables, No Context Flag, Averaging)*	*(2) Koren & Peto Model (Original Variables, With Context Flag, Averaging)*	*(3) Combined KP & DB 9-Variable Model (Additional Variables, No Context Flag, Averaging)*	*(4) Combined KP & DB 9-Variable Model (Additional Variables, With Context Flag, Averaging)*	*(5) Combined KP & DB 9-Variable Model (Additional Variables, No Context Flag, "Or" Conditions)*	*(6) DB Model (17 Variables, No Context Flag, Averaging)*
True Positives (Manual flag = 1; Predicted flag = 1)	371	252	362	250	659	339
False Positives (Manual flag = 0; Predicted flag = 1)	81	6	66	4	205	52
True Negatives (Manual flag = 0; Predicted flag = 0)	129	204	144	206	5	158
False Negatives (Manual flag = 1; Predicted flag = 0)	292	411	301	413	4	324
Overall Percentage Flagged Correctly	**57.3%**	**52.2%**	**58.0%**	**52.2%**	**76.1%**	**56.9%**
Overall Percentage of Jobs Considered Outsourcable in M	**48.2%**	**70.4%**	**51.0%**	**70.9%**	**1.0%**	**55.2%**

Overall Percentage of Jobs Considered Outsourcable in Manual Flag	**24.1%**

Notes:

1. Numbers presented are overall matches: for all models, if a job is flagged as non-outsourcable in any of the subsidiary flags (e.g. Teamwork, Customer and Presence for Koren & Peto), it gets counted as non-outsourcab
2. Manual flag / predicted flag = 1 if a job is considered non-outsourcable, 0 if a job is considered outsourcable.
3. "Context Flag" models include Koren & Peto's secondary condition that a job must have high face-to-face interaction and more face-to-face interaction than emails / letters / memos, in addition to satisfying the subdiary fla "No Context Flag" models do not have this extra condition.
4. "Averaging" models average scores across the basket of variables included in a particular subsidiary flag (e.g. scores for dealing with external customers, working with the public, caring for others etc. are averaged for cutoff, the flag is 1 for non-outsourcable for that subsidiary flag.
5. "Or Conditions" models allow a job to qualify as non-outsourcable if the job scores above any one of the cutoffs for the 15+ variables used in that model.
6. Averaging methods are generally too conservative in identifying non-offshorable jobs, although this critically depends on how accurate the manual offshorable flag is (i.e. this variable is important as a provisional outcom
7. Based on the current manual outsourcing flag, the 17 variable model proposed on 19 January is slightly more accurate with an averaging method than the original Koren & Peto model [Model (6) vs (2)].
8. "Or" condition models are generally more accurate as they are more liberal in allowing jobs to count as non-offshorable. Model (5) with both Koren & Peto and Britto variables is too liberal, however.

Algorithm 2

ACCURACY SCORE

- How accurately does this model (ie specific set of work activities and contexts) accurately filter the job into true positives, false positives, true negatives and false negatives, as a % of all jobs

Match Category	*(7) DB Model (9 Variables, No Context Flag, Averaging)*	*(8) DB Model (24 Variables, No Context Flag, "Or" Conditions)*	*(9) DB Model (17 Variables, No Context Flag, "Or" Conditions)*	*(10) DB Model (9 Variables, No Context Flag, "Or" Conditions)*	*(11) DB Model (5 Variables, No Context Flag, "Or" Conditions)*
True Positives (Manual flag = 1; Predicted flag = 1)	199	630	623	619	572
False Positives (Manual flag = 0; Predicted flag = 1)	161	107	104	87	63
True Negatives (Manual flag = 0; Predicted flag = 0)	161	103	106	123	147
False Negatives (Manual flag = 1; Predicted flag = 0)	199	33	40	44	91
Overall Percentage Flagged Correctly	**41.2%**	**84.0%**	**83.5%**	**85.0%**	**82.4%**
Overall Percentage of Jobs Considered Outsourcable in M	**41.2%**	**15.6%**	**16.7%**	**19.1%**	**27.3%**

Overall Percentage of Jobs Considered Outsourcable in Manual Flag

Notes:
1. Numbers presented are overall matches: for all models, if a job is flagged as non-outsourcable in any of the subsidiary flags (e.g. Teamwork, Customer and Presence for Koren & Peto), it gets counted as non-outsourcable in this exhibit.
2. Manual flag / predicted flag = 1 if a job is considered non-outsourcable, 0 if a job is considered outsourcable.
3. "Context Flag" models include Koren & Peto's secondary condition that a job must have high face-to-face interaction and more face-to-face
"No Context Flag" models do not have this extra condition.
4."Averaging" models average scores across the basket of variables included in a particular subsidiary flag (e.g. scores for dealing with
external customers, working with the public, caring for others etc. are averaged for the customer flag). For "Averaging" models, if the average
5. "Or Conditions" models allow a job to qualify as non-outsourcable if the job scores above any one of the cutoffs for the 15+ variables used in that model.
6. Averaging methods are generally too conservative in identifying non-offshorable jobs, although this critically depends on how accurate the manual offshorable flag is (i.e. this variable is important as a provisional outcome variable against v
7. Based on the current manual outsourcing flag, the 17 variable model proposed on 19 January is slightly more accurate with an averaging method than the original Koren & Peto model [Model (6) vs (2)].
8. "Or" condition models are generally more accurate as they are more liberal in allowing jobs to count as non-offshorable. Model (5) with both Koren & Peto and Britto variables is too liberal, however.

Algorithm 3

MARGINAL IMPROVEMENTS

- For variables not in the initial selection, we calculated how many more true positives and false positives including that variable would add if it were an extra factor in the model.

Edit this column

These columns populate automatically with the macro "Compute Marginal Contributions"

Variable in Model	True Positives Added	False Positives Added	Base Case True Positives	Base Case False Positives
Performing General Physical Activities	3	0	164	3
Very Hot or Cold Temperatures	7	1	271	6
Physical Proximity	6	1	237	5
Outdoors, Exposed to Weather	13	6	276	16
Exposed to Hazardous Conditions	26	3	199	10
Assisting and Caring for Others	4	2	203	7
Performing for or Working Directly with the Public	20	13	287	29
Responsibility for Outcomes and Results	12	6	155	22
Spend Time Walking and Running	3	1	140	6
Training and Teaching Others	19	4	61	8
Selling or Influencing Others	1	0	7	7
Judging the Qualities of Things, Services, or People	3	1	43	7
Responsible for Others' Health and Safety	1	0	175	9

Algorithm 4

MARGINAL IMPROVEMENTS

- If the number of true positives a variable would add was high, and the number of false positives low, we would include it in the next run of the Excel VBA macro to see if that improved the accuracy scores.

These columns populate automatically with the macro "Compute Marginal Contributions"

Other Variables	True Positives Added	False Positives Added	Base Case False Positives	Base Case False Positives
Provide Consultation and Advice to Others	0	2	9	4
Coordinating the Work and Activities of Others	5	24	205	60
Guiding, Directing, and Motivating Subordinates	5	12	146	45
Developing and Building Teams	0	0	12	6
Establishing and Maintaining Interpersonal Relationships	5	14	116	41
Handling and Moving Objects	3	7	184	11
Operating Vehicles, Mechanized Devices, or Equipment	0	0	77	1
Repairing and Maintaining Electronic Equipment	0	2	14	2
Repairing and Maintaining Mechanical Equipment	0	1	36	1
Inspecting Equipment, Structures, or Material	1	1	91	1
Coaching and Developing Others	6	8	196	38
Communicating with Supervisors, Peers, or Subordinates	11	48	213	88
Controlling Machines and Processes	3	13	135	20
Monitoring and Controlling Resources	0	0	13	5
Monitor Processes, Materials, or Surroundings	0	2	73	5
Interacting With Computers	19	114	278	175
Thinking Creatively	2	21	62	33
Developing Objectives and Strategies	0	4	12	10
Resolving Conflicts and Negotiating with Others	2	2	22	7
Communicating with Persons Outside Organization	1	13	45	31
Getting Information	16	108	356	164
Identifying Objects, Actions, and Events	1	0	6	0
Estimating the Quantifiable Characteristics of Products, Events, or Information	1	14	39	24
Processing Information	14	92	208	130
Evaluating Information to Determine Compliance with Standards	4	9	77	22

Algorithm 5

MARGINAL IMPROVEMENTS

- We also varied the 'cut-off' score by +/-5 and +/-10 to understand sensitivity to scores

Variable in Model	True Positives Added	False Positives Added	+5 Effect On Marginal Contributions, True Positives	+5 Effect on Marginal Contributions, False Positives	-5 Effect On Marginal Contributions, True Positives	-5 Effect on Marginal Contributions, False Positives
Performing General Physical Activities	3	0	-1	0	2	3
Very Hot or Cold Temperatures	7	1	-1	0	1	3
Physical Proximity	6	1	-3	-1	0	3
Outdoors, Exposed to Weather	13	6	-2	0	2	3
Exposed to Hazardous Conditions	26	3	-6	-3	0	3
Assisting and Caring for Others	4	2	-2	0	1	4
Performing for or Working Directly with the Public	20	13	-3	-2	2	6
Responsibility for Outcomes and Results	12	6	-3	-1	7	10
Spend Time Walking and Running	3	1	-1	-1	2	4
Training and Teaching Others	19	4	-2	-1	1	3
Selling or Influencing Others	1	0	0	0	0	1
Judging the Qualities of Things, Services, or People	3	1	-3	-1	0	3
Responsible for Others' Health and Safety	1	0	0	0	0	5

Algorithm 6

ITERATION

- For every new run of the model, we would add some variables, take some out.
- We did this dozens of times to arrive at a list of Activities and Context factors that together captured the universe of non-remoteable jobs well.
- The final list was somewhat selective – ie choosing between similar variables to help tell a wider story
- Returned to pairwise to double check correlations (ie that no variable being flagged as ‘no marginal’ contribution were not being masked by other variables in the model)
- No ‘freebies’!

18 variable model for ‘Somewhere Jobs’

Location oriented Requires being regularly physically onsite	**Working with others** Requires softer, interpersonal skills	**Leadership responsibilities** Requires management & strategic skills
Outdoors, exposed to weather	Selling or influencing others	Developing objectives and strategies
Exposed to hazardous conditions	Training and teaching others	Responsibility for outcomes and results
Very hot or cold temperatures	Coaching and developing others	Responsibility for health and safety
Spend time walking and running	Assisting and caring for others	Developing and building teams
Performing general physical activities	Resolving conflicts and negotiating with others	Judging the qualities of things, services or people
Inspecting equipment, structures and material	Performing for or working directly with the public	Guiding, directing and motivating subordinates

Common characteristics of Anywhere Jobs

IDENTIFYING CHARACTERISTICS

- Different distribution of ‘negatives’ than ‘positives’
- High concentration of occupations (>50%) are ‘negatives’

Variable	Low	High	*18 Variable Model*							
			True Positives	False Positives	True Negatives	False Negatives	Total Positives	Total Negatives	% Ratio Positive	% Ratio Negative
Interacting With Computers	0	10	16	0	0	2	16	2	89%	11%
Interacting With Computers	10	20	32	1	0	0	33	0	100%	0%
Interacting With Computers	20	30	58	0	1	3	58	4	94%	6%
Interacting With Computers	30	40	69	1	1	2	70	3	96%	4%
Interacting With Computers	40	50	56	4	4	0	60	4	94%	6%
Interacting With Computers	50	60	53	4	8	2	57	10	85%	15%
Interacting With Computers	60	70	94	3	8	2	97	10	91%	9%
Interacting With Computers	70	80	133	24	11	4	157	15	91%	9%
Interacting With Computers	80	90	102	35	38	4	137	*42*	77%	23%
Interacting With Computers	90	100	26	17	51	4	43	*55*	44%	56%

Characteristics of ‘Anywhere Jobs’

LIMITED PHYSICAL ACTIVITY:

- Almost no physical task (across a range of physical activities)
- Most tasks are done on a computer
- Requires a degree of technical knowledge

ASYNCHRONOUS & DETAILED TASKS:

- Requires a lot of attention to detail, but a lot of the work doesn’t need to be done at the same time as other work in the business (eg entails a lot of email and/or programming)

LIMITED RESPONSIBILITY:

- Occasional decision-making (eg 2-3x per month)
- Limited impact of decisions on co-workers & company
- Limited responsibility for outcomes & results

What jobs can be done offshore

1

Use O*NET occupations to create a manual flag for whether a job can be offshored

2

Standardise O*NET 'Work Contexts' & 'Work Activities' scores

3

Use model to find most 'predictive' set of contexts & activities for 'somewhere jobs'

4

Map results of O*NET model BLS into LFS

From US data sets to the UK data sets

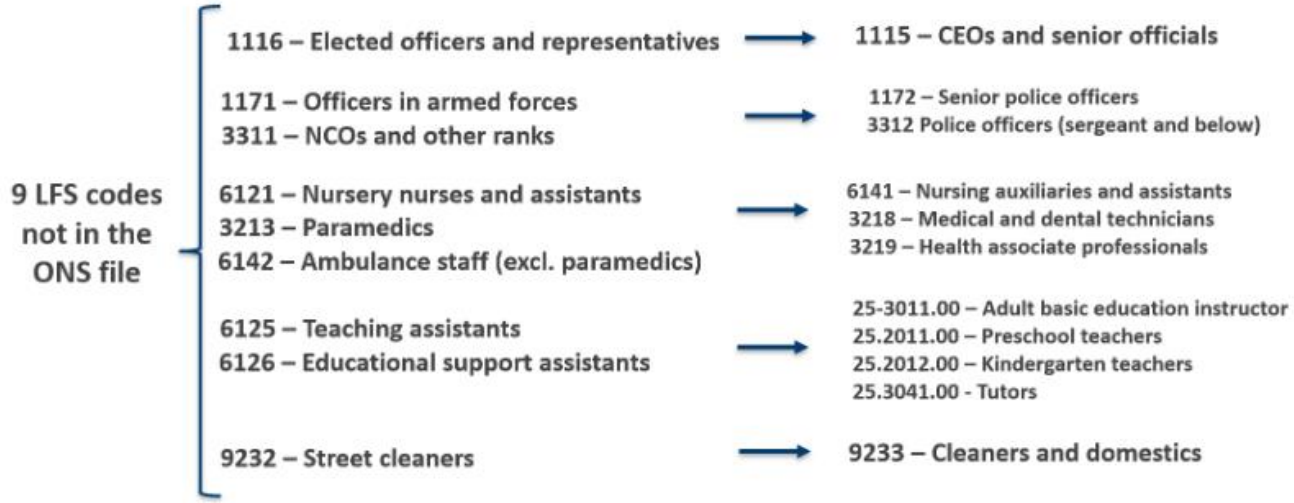
- No direct correspondence between US & UK occupation codes
- Used a set of 'crosswalks' provide by US BLS & UK ONS

- Results based on population-weighted characteristics of the working age population in occupations classified as having the potential to be offshored or not by our index.

Lost in translation

- Some occupations in the LFS correspond to more than one O*NET code, so we calculated the offshoring-likelihood index score based on the average score of each criterion across the different O*NET occupations corresponding to that one LFS code.

- Nine LFS codes were not in the ONS file, and so we provided score based on occupations with a close fit (eg teaching assistants)



Anywhere Jobs
Results

Overview: Remote work & offshoring

Issue: Professional jobs had been sheltered from globalisation, but remote work during the pandemic has changed this: If a job can be done from home, there is a risk that it can be done from anywhere.

Politics: If left unaddressed, outsourcing & offshoring of white-collar jobs could have political, economic & social consequences similar to loss of manufacturing jobs, but on a accelerated time frame.

Analysis: Looked at over 100 tasks in 800 occupations to identify the characteristics of which jobs are most likely to stay in the UK, and which jobs are at risk of being offshored.

We call the jobs at risk of being moved abroad **Anywhere Jobs**:
they can be done anywhere in the UK, but they can also be done from anywhere in the world, potentially for cheaper.

Anywhere Jobs

Jobs at risk of being offshored because the can be done fully remotely

Anywhere Jobs

Jobs that, by the very nature of the tasks and work required, can by done from anywhere, and so are at risk of being outsourced or offshored to cheaper, but equally skilled workers.

# of jobs at risk

18% of all jobs across the UK

5.9 million jobs mainly in ICT, finance and professional services.

Why are they different?

Limited physical activity: most tasks are done on a computer and require a degree of technical knowledge

Limited responsibility: Occasional decision-making (eg 2-3x per month)

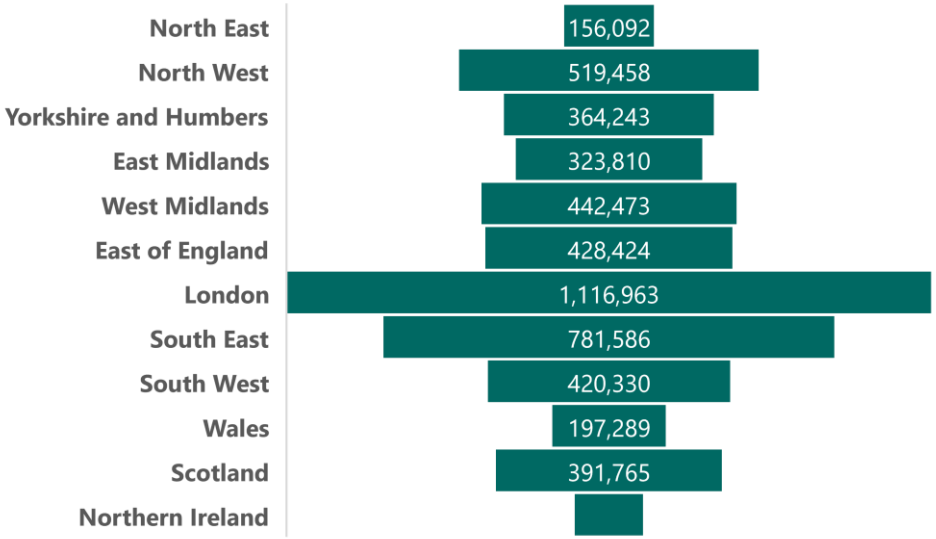
Asynchronous & detailed tasks: requires a lot of attention to detail, but a lot of the work doesn't need to be done at the same time as other work in the business (eg entails a lot of email and/or programming).

Types of jobs

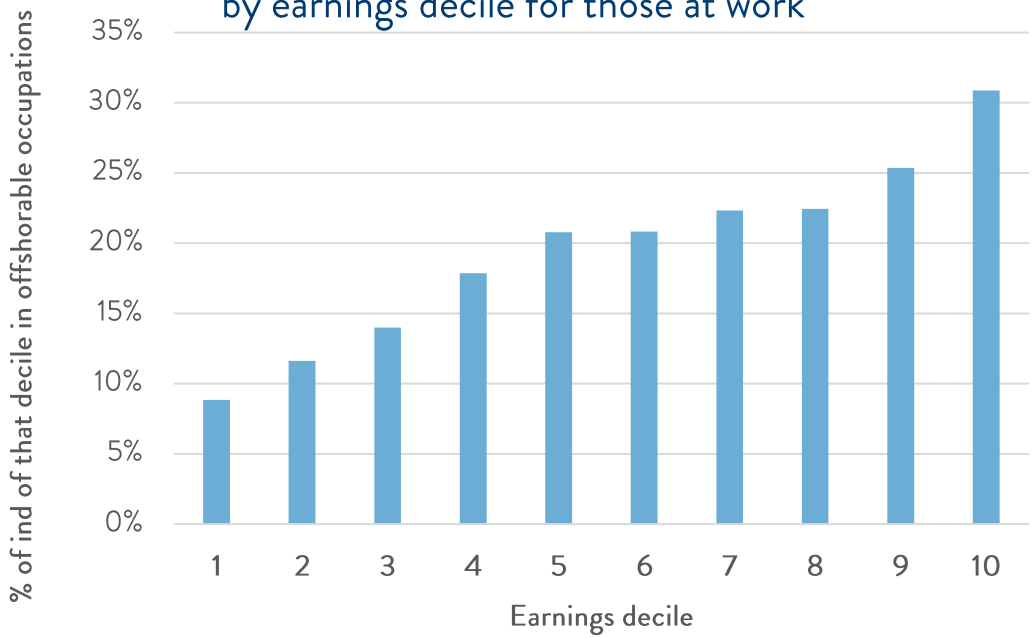
Accountants	IT technicians & support	Graphic designers
Economists	Programmers & developers	Marketing & advertising managers
Insurance underwriters	Electrical engineers	Web design & development

Better-paid jobs in London, SE most at risk

of Anywhere Jobs by region

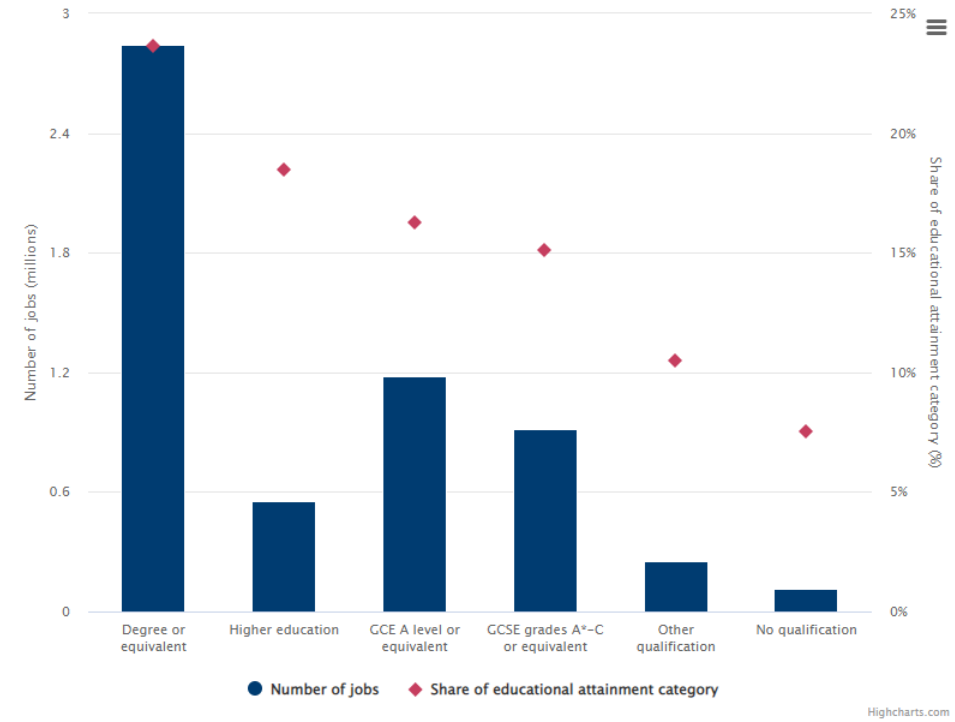


% of individuals in an Anywhere Job, by earnings decile for those at work



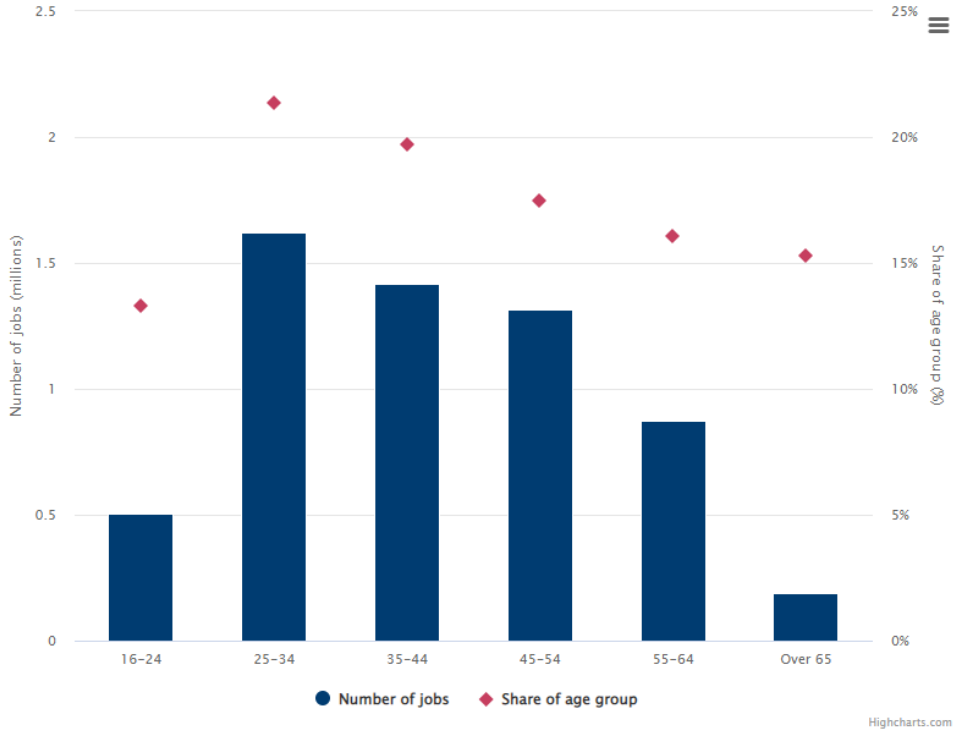
Younger worker, those w degrees at risk

Figure 10 – Anywhere Jobs by qualification level



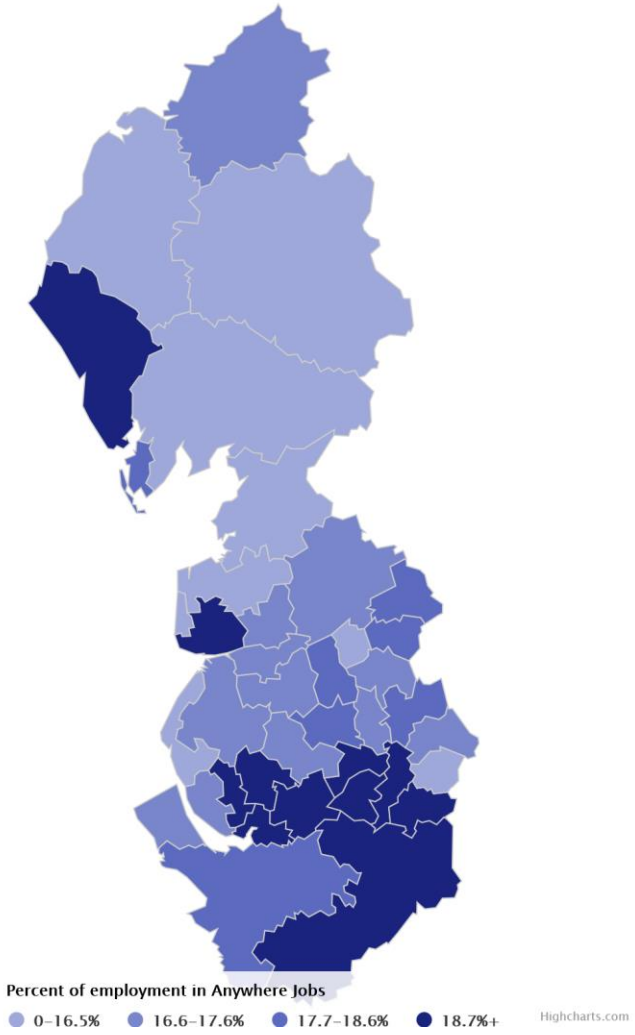
*Source: TBI calculations using O*NET and ONS's LFS*

Figure 13 – Young workers are relatively more likely to be working in Anywhere Jobs



*Source: TBI calculations using O*NET and ONS's LFS*

But Anywhere Jobs are everywhere



North West			
Area	**Share of local jobs**	**Area**	**Share of local jobs**
Trafford	20.5	Ribble Valley	17.6
Manchester	20.2	Carlisle	17.5
Halton	20.2	Liverpool	17.5
Warrington	20.0	Oldham	17.5
Knowsley	19.5	Wigan	17.4
Stockport	19.3	West Lancashire	17.3
Copeland	19.3	Rossendale	17.2
St. Helens	19.1	Preston	16.9
Cheshire East	19.1	Chorley	16.9
Fylde	19.0	Wirral	16.8
Salford	18.9	Lancaster	16.5
Barrow-in-Furness	18.4	Tameside	16.5
Bolton	18.3	Sefton	16.3
Pendle	18.2	Hyndburn	16.3
Cheshire West & Chester	18.1	Allerdale	15.9
Rochdale	18.1	Blackpool	15.7
Burnley	17.9	Wyre	15.2
Blackburn with Darwen	17.9	Eden	14.6
Bury	17.7	South Lakeland	14.6
South Ribble	17.7		

Factors that will keep/attract jobs

Factor	Anchors (Factors that will decrease the risk of jobs shifting abroad or increase the attractiveness of jobs shifting to the UK)	Accelerants (Factors that will increase the risk of jobs shifting abroad)
Support systems	• Easy access to childcare, work space, devices, high-speed internet • Onerous overseas regulatory, identification & tax requirements	• Ease in navigating overseas regulatory, identification & tax requirements
Skills	• Access to a broad, deep pool of skills • Education & training designed around softer-interpersonal skills • Strong management capabilities in the UK	• Skill shortages in the UK • Over reliance on immigrant labour • An erosion of thick, local labour markets raising search costs • Ease of using thick, digital labour markets
Productivity & wellbeing	• Working practices (esp office spaces and management practices) designed to optimise productivity, wellbeing and collaboration. • Resilience of agglomeration effects in large cities	• Desire to boost productivity by cutting the cost of office space or staff without cutting capability
Community	• Connection to people and places with shared interests, culture or language • Strong organisational capital and corporate culture	• Weak local connections in the UK • Pre-existing connections to communities outside the UK (eg either via customers or supply chains)
Competition	• Business model is based on or related to the provision of proximity services	• Desire or pressure to scale or grow at pace • Desire or pressure to unbundle or disaggregate service provision • Using or adopting an intangible-intensive business model

Questions?