Occupations in demand in 2024

Technical report

September 2024

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Introduction

This technical report is the analytical accompaniment to the main Occupations in Demand 2024 report. It outlines the approach and methodology, aggregations and sensitivity analysis and future considerations for this publication.

A demand index, using seven labour market indicators, is used to rank the demand for each occupation in the UK, as defined by the ONS Standard Occupational Classification (SOC). The indicators include the number of visa applications, online job adverts and annual wage growth.

Wherever possible, a working population is used within this analysis[1].

The methodology identifies 39 occupations in the most critical demand and a further 128 showing elevated demand across the UK labour market.

 Occupations in demand are identified using the following cut-off:

- Critical demand: outliers in relation to the seven indicators

- Elevated demand: above-average in relation to the seven indicators

- Not in high demand: below-average in relation to the seven indicators

Results are presented for 336 occupations out of a total of 412 occupations. Occupations were excluded if:

- They were labelled as "not elsewhere classified"

- Data for five or more indicators was missing or imputed

This work identifies occupations which are in demand across the UK, it does not say whether there is a shortage in an occupation.

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[1] 16-64 and in employment https://www.ethnicity-facts-figures.service.gov.uk/uk-population-by-ethnicity/demographics/working-age-population/latest/

Approach and methodology

In this report, we focus on measuring the current demand for occupations in the UK job market at the 2020 SOC 4-digit, unit group level.[2] We calculate the demand based on a combination of demand indicators, as shown in Table 1.

The occupations in demand analysis is presented at UK level, however annual survey of hours and earnings (ASHE) data for Northern Ireland was not available at the time of analysis. The demand index averages across all indicators and therefore a mix of geographies are included in the final demand index value.

In addition to an overall indicator of demand, occupations were clustered using K means clustering to identify occupations which may react in similar ways to the labour market.

Demand indicators were calculated only for indicators which did not contain "n.e.c" (not elsewhere classified) in their SOC20 4-digit description. Further exclusions were made after demand indicators were calculated and full details can be found within the exclusion criteria section.

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[2] SOC 2020 - Office for National Statistics (ons.gov.uk), 4-digit occupations were used to balance the granularity that the occupations in demand could be published at with the availability of demand indicator data.

Table 1: Indicators used to determine occupations in demand

Indicator	Description
Visa application density	The number of visa applications as a proportion of employment.
Skills shortage vacancy density	The number of vacancies employers have indicated are due to a skills shortage as a proportion of all vacancies.
Online job advert density	The number of online job adverts for an occupation as a proportion of employment.
Annual change in hourly wage	The year-on-year change in average hourly wage in an occupation.
Wage premium	The average wage of an occupation compared to other occupations in the same ONS skill level[3] when controlling for factors such as age and sex.
Annual change in hours worked	The year-on-year change in average weekly hours worked in an occupation.
Annual change in contract or temporary workers	The year-on-year change in the number of contract or temporary workers as a proportion of employment across those years.

Overall indicator of demand

To determine which indicator was in the highest demand, the seven demand indicators were combined into an overall demand index.

Indicators were scaled so that they were comparable, and weightings were applied. An average was calculated for each 4-digit SOC20 code, excluding any missing values.

Occupations with an overall indicator score of higher than or equal to one standard deviation above the mean score for all occupations (above or equal to 0.39) were designated as in critical demand. Occupations where their overall indicator score was between the mean and one standard deviation above the mean (above or equal to 0.004) were designated as in elevated demand, all other occupations were designated as not in high demand.

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[3] Published skill levels for sub-major groupings (2-digit) of SOC 2020

It should be noted that, after scaling, a positive indicator score for indicators that compare data year-on-year does not necessarily mean that the year-on-year change was positive in the raw data prior to scaling.

Exclusion criteria

Occupations where there were five or more missing indicator values or where five or more indicator values were imputed from SOC20 3-digit data were excluded, to avoid assuming the demand for the occupation based on a small amount of data.

Occupations which had a SOC20 definition including N.E.C were excluded, because determining which occupations contribute to, or are represented by the demand index is difficult due to them containing a larger number of occupations within the 4-digit SOC20 definition. On average, N.E.C occupations contained 11 distinct ISCO-08 unit group titles, the international standard classification of occupations (ISCO-08) description of the unit groups within a 4-digit SOC20 occupation code, compared to 4 in non-N.E.C occupations. A full list of occupations excluded from the analysis can be found in Table 8 in the appendix.

Occupations which have been excluded from the occupations in demand analysis are grouped in the output data filter categories as "Excluded occupations".

Weightings

Weightings were applied to each of the indicators prior to the calculation of the overall indicator, as shown in Table 2.

Table 2: Weightings used for indicators of demand

Indicator	Weighting	Justification
Visa application density	1	Published annually or more frequently so weighting is unchanged.
Skills shortage vacancy density	0.5	The employer skills survey (ESS) data used in this indicator is less timely than other sources, running biennially. Its contribution to the overall indicator was reduced due to being less timely.
Online job advert density	1	Published annually or more frequently so weighting is unchanged.
Annual change in hourly wage	1	Published annually or more frequently so weighting is unchanged.
Wage premium - wage relative to other occupations in the same ONS skill level[3] when controlling for factors such as age and sex.	1	Published annually or more frequently so weighting is unchanged.
Annual change in hours worked	1	Published annually or more frequently so weighting is unchanged.
Annual change in contract or temporary workers	1	Published annually or more frequently so weighting is unchanged.

Clustering

Using 4-digit SOC20 codes, occupations were clustered based on their individual indicator scores before weighting, using K-means clustering. K-means clustering is a method used to partition a set of data points into distinct groups or clusters using unsupervised machine learning.

K-means clustering produced the highest quality clusters in comparison to other clustering methods considered (Wards Hierarchical clustering and Pam clustering), determined through Calinski criterion, average silhouette width and within sum of square elbow plots whilst providing a smaller number of clusters.

Using K-means clustering, each occupation was assigned to one of four clusters based on its demand indicator values, ensuring that occupations within the same cluster are more similar to each other than to those in different clusters.

Average silhouette width for 2 to 15 clusters was calculated, and the highest silhouette width was 0.145 for 4 clusters. A Calinski criterion was then calculated where values of 39.1 and 39.0 were found for 3 and 4 clusters respectively. Finally, within clusters sum of squares was calculated where an elbow was found around k=4.

Clusters 1 and 2 were identified as having a higher proportion of workers in occupations which were in critical demand. Clusters 3 and 4 had a higher proportion of workers in occupations which were in elevated demand or not in demand.

These clusters are summarised in Table 3.

Table 3: K-means clustering summary

Cluster	Cluster attribute	Occupations	Workers	Demand
1	Very high visa application density.	181	978,600	Critical – 100% Elevated – 0% Total – 100%
2	High online job advert density and change in contract or temporary workers.	123	4,646,200	Critical – 25% Elevated – 58% Total – 83%
3	High skills shortage vacancy and a positive annual change in hourly wage but a low wage premium.	13	6,930,100	Critical – 1% Elevated – 48% Total – 49%
4	Positive wage premium and change in hours worked but a low skills shortage vacancy rate and online job advert density.	34	12,382,100	Critical – 1% Elevated – 43% Total – 44%

Individual indicators

Visa application density

The Home Office statistics on work entry clearance visas are published using the 2010 UK standard occupational classification definitions (SOC10) while other sources were available using the 2020 definitions (SOC20). To address this, a mapping was created using data published by ONS on the relationship between SOC10 and SOC20.[4] Using this mapping visa applications could be distributed proportionately from SOC10 into SOC20.[5]

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[4] The relationship between Standard Occupational Classification 2010 and Standard Occupational Classification 2020 - Office for National Statistics

[5] Only visas with the subgroup type of "Senior or Specialist Worker (Global Business Mobility)", "Skilled Worker", "Skilled Worker - Health & Care", and "Seasonal Worker (previously Tier 5)" were included in this analysis to identify visa applications that may have been made to fill a skills gap

The visa application density indicator was calculated as the number of visa applications as a proportion of working age employment[1] at a 4-digit SOC level for occupations across the UK between April 2023 and March 2024.[6] Raw counts of less than 25 at a 4-digit SOC20 level and weighted counts of workers less than or equal to 10,000 were suppressed as outlined by the LFS background and methodology, to reduce the standard error to 20% or below.[7] Where suppression criteria were met, visa application indicator data was set to NA to avoid disclosure from anonymised data and to avoid decisions being made from small sample sizes.

To control for outliers the top and bottom 1 percentile of occupations with a visa application density value were winsorized, in practice this impacted only the top 5 occupations as 76 occupations had 0 visa applications in this period.

Skills shortage vacancy density

ESS data was used to create a skills shortage vacancy density indicator. This was calculated by dividing the total number of employer reported skills shortage vacancies by the total number of vacancies in each 4-digit SOC20 code across the UK. Data with a base size of less than 30 were suppressed in line with reporting thresholds listed in the ESS technical report.[8]

Occupations which were suppressed used imputed data from a 3-digit SOC20 level where the 3-digit SOC code data had a base size which met the suppression threshold. Any SOC codes where both the 4 and 3-digit data did not meet suppression thresholds were excluded from the indicator. In total 173 4-digit SOC code occupations were imputed for this indicator.

Online job advert density

This indicator was calculated as volume of new online job adverts as a proportion of the working age population.[1,9,10] Raw counts of less than 25 at a 4-digit SOC20 level and weighted counts of workers less than or equal to 10,000 were suppressed as outlined by the LFS background and methodology[7] to reduce the standard error to 20% or below. Where suppression criteria were met the indicator data was set to NA to avoid disclosure from anonymised data and to avoid decisions being made from small sample sizes.

Some occupations from ONS' job advert statistics were excluded from this analysis since the relative occupational distribution compared with annual population survey

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[6] Annual Population Survey
[7] Labour Force Survey: Background and methodology
[8] Employer Skills Survey 2019 technical report (publishing.service.gov.uk)
[9] Annual Population Survey, January to December 2023
[10] Labour demand volumes by SOC2020, UK, ONS

occupational data were judged in some cases to be relatively atypical. ONS plan to continue improving their statistics, including with an enhanced SOC allocation process, which may trigger revisions of the occupations excluded in future. These occupations are listed in Table 4 and were set to NA.

Occupations in the bottom 5 percentile were also set to NA.

Table 4: Occupations excluded from the online job advert density indicator

Occupation code (SOC2020 4-digit)	Occupation name
2317	Teachers of English as a foreign language
2311	Higher education teaching professionals
2312	Further education teaching professionals
2313	Secondary education teaching professionals
2314	Primary education teaching professionals

Year-on-year change in hourly wage

Data from ASHE was used to calculate an indicator for the year-on-year change in annual earnings for occupations across Great Britain (GB). Data was filtered to a working age population[1] and the highest of overtime hourly wage or base hourly wage was selected and adjusted by inflation.[11]

Observations with an hourly wage over £1,000 per hour were removed, to reduce the impact of a single observation skewing data with a wage higher than this cutoff in 2023. No other observations were impacted by this cutoff and this will be reviewed in subsequent publications. Hourly wages were winsorized so that the top and bottom five percentile were replaced with the next highest or lowest wage in the data for each 4-digit SOC20 occupation, to reduce the impact of outliers. A weighted average of the hourly wage was then calculated. This methodology differs from hourly wages published at a 4-digit SOC20 level by the ONS.[12] The median hourly wages published by ONS are used in the published report wherever wages are quoted against an occupation.

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[11] Consumer price inflation time series
[12] Earnings and hours worked, occupation by four-digit SOC: ASHE Table 14 - Office for National Statistics (ons.gov.uk)

Raw counts of less than 30 at a 4-digit SOC20 level and weighted counts of workers less than or equal to 5,000 were suppressed to avoid disclosure and to ensure data used was more reliable. Observations which fell below these cutoffs were imputed using 3-digit SOC20 data, where the 3-digit SOC code data had a count and weight which met the suppression threshold. Any observations where both the 4 and 3-digit SOC20 data did not meet suppression thresholds were excluded from the indicator. The year-on-year change was calculated by subtracting the 2022 average hourly wage for each 4-digit occupation from the 2023 average hourly wage.

To avoid cases where an occupation had an extremely high or low indicator value due to one year being imputed at a 3-digit level and the other year at a 4-digit SOC20 level, a threshold was calculated at 2 standard deviations above and below the mean using 4-digit data after suppressions had been applied. Occupations where one year was imputed using 3-digit data and their change in hourly wage indicator value appeared above or below the threshold had their indicator value recalculated for both years at a 3-digit level.

In total 63 4-digit occupations were imputed for this indicator for the 2022 data, and 67 were imputed for the 2023 data.

Wage premium

The wage premium indicator shows how the hourly wage for each occupation compares to the average hourly wage for occupations in the same ONS skill level[3], when controlling for other factors such as sex, location, age and full-time and part-time employment across GB. This was calculated using ASHE data.

Data was filtered to a working age population[1] in 2023. The highest of overtime hourly wage or base hourly wage was selected, adjusted for inflation and then winsorized so that the top and bottom 5 percentile were replaced with the next highest or lowest wage in the data for each 4-digit SOC20 occupation, to reduce the impact of outliers. A weighted average of the hourly wage was then calculated.

Occupations were grouped based on their skill level and a weighted linear regression was run for each observation in each skill level with the log average hourly wage as the dependent variable and the age, age squared, SOC20 4-digit code, sex, London or south east flag, and type of work between full or part time as independent variables.

This linear regression was repeated at a SOC20 3-digit level.

The coefficient for the SOC20 4-digit and 3-digit code was extracted for each observation. The indicator value was calculated using the average coefficient for each skill level weighted by employment number, subtracted from the coefficient for each SOC20 code in that skill level.

Raw counts of less than 30 at a 4-digit SOC20 level and weighted counts of workers less than or equal to 5,000 were suppressed to avoid disclosure and to ensure data used was more reliable.

Observations which fell below these cutoffs were imputed using 3-digit SOC20 data, where the 3-digit SOC code data had a count and weight which met the suppression threshold. Any observations where both the 4 and 3-digit SOC20 data did not meet suppression thresholds were excluded from the indicator.

In total 67 4-digit SOC code occupations were imputed for this indicator.

Year-on-year change in hours worked

Data from ASHE was used to calculate an indicator for the year-on-year change in weekly hours worked for occupations across GB. Data was filtered to a working age population[1].

Observations with an hourly wage over £1000 per hour were removed for consistency with other ASHE indicators. No other observations were impacted by this cutoff and this will be reviewed in subsequent publications.

Hours worked were winsorized so that the top and bottom five percentile were replaced with the next highest or lowest hours worked in the data for each 4-digit SOC20 occupation to reduce the impact of outliers. A weighted average of the hours worked was then calculated for each SOC20 occupation code.

Raw counts of less than 30 at a 4-digit SOC20 level and weighted counts of workers less than or equal to 5,000 were suppressed to avoid disclosure and to ensure data used was more reliable.

Observations which fell below these cutoffs were imputed using 3-digit SOC20 data, where the 3-digit SOC code data had a count and weight which met the suppression threshold. Any observations where both the 4 and 3-digit SOC20 data did not meet suppression thresholds were excluded from the indicator.

The year-on-year change was calculated by subtracting the 2022 average number of hours worked for each 4-digit occupation from the 2023 average number of hours worked.

To avoid cases where an occupation had an extremely high or low indicator value due to one year being imputed at a 3-digit SOC20 level and the other year at a 4-digit SOC20 level, a threshold was calculated at 2 standard deviations above and below the mean using 4-digit SOC20 data after suppressions had been applied. Occupations where one year was imputed using 3-digit SOC20 data and their change in hours worked indicator value appeared above or below the threshold had their indicator value recalculated for both years at a 3-digit SOC20 level.

In total 63 4-digit SOC20 occupations were imputed for this indicator for the 2022 data, and 67 were imputed for the 2023 data.

Year-on-year change in temporary or contract workers

An indicator for the change in proportion of contract or agency workers in an occupation was calculated using annual population survey (APS) data.

The numerator used was the total number of workers in each SOC20 4-digit occupation code who were employed under a "Fixed", "Agency temp" or "Other temp" contract, across the UK, who were of a working age[1] between April 2023 and March 2024 for the 2023 value and between April 2022 and March 2023 for the 2022 value.

The denominator used was the sum of workers in the UK in each SOC20 4-digit occupation code who were in employment and of a working age[1] in the April 2023 to March 2024 APS data and April 2022 to March 2023 APS data.

The APS data was suppressed to avoid disclosure from anonymised data and to avoid decisions being made from small sample sizes. A cutoff of a minimum count of 25 and weighting of over 10,000 was used after data was aggregated at a 4-digit level as outlined by the LFS background and methodology,[7] to reduce the standard error to 20% or below.

Occupations which fell below these cutoffs were imputed using 3-digit SOC20 data, where the 3-digit SOC code data had a count and weight which met the suppression threshold. Any observations where both the 4 and 3-digit SOC20 data did not meet suppression thresholds were excluded from the indicator.

To calculate proportion of workers on a fixed contract or in temporary employment, the number of temporary or contract workers was divided by the total number of workers across the 2022 and 2023 data for each 4-digit occupation.

The indicator was calculated by subtracting the proportion of workers on a fixed contract or in temporary employment in 2022 from the proportion in 2023, for each SOC20 occupation.

To avoid cases where an occupation had an extremely high or low indicator value due to one year being imputed at a 3-digit SOC code level and another year at a 4-digit SOC code level, a threshold was calculated at 2 standard deviations above and below the mean using 4-digit SOC code data after suppression had been applied. Occupations where one year was imputed at a 3-digit SOC code level and their indicator value appeared above or below the threshold had their indicator value recalculated for both years at a 3-digit SOC code level.

Aggregations

Industry (SIC)

The distribution of occupations across industries was calculated using the proportional split of workers in each 4-digit SOC20 code across 2-digit standard industrial classification (SIC) codes[13].

SIC codes were grouped to a section and named group level, based on the lookup found in the supporting document "SIC to industry name map".

This proportional distribution was applied to the number of workers within each 4-digit SOC20 code to determine the proportion of workers in demand occupations across industries, and to the identify which industries had the highest number of workers in demand occupations, or proportion of workers in demand occupations.

Worker numbers and demand levels in each 4-digit SOC20 code assigned to each industry have been published in the supporting document "Mapping of SOC to SIC". The number of workers has been suppressed where occupations with less than or equal to 10,000 workers or with a count of less than 25 observations in the APS data are replaced with "c".

It is purposefully impossible to filter the published industry demand data by SOC20 4-digit code and Industry name, this is to avoid disclosing unsuppressed values which are used in the demand analysis.

Skill level

Published ONS skill level for sub-major groupings (2-digit) were used to group occupations[3]. The percentage of employment in demand occupations was then calculated for each of these skill levels shown in Table 5.

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[13] Annual Population Survey, Apr 2023 to Mar 2024

Table 5: ONS skill level descriptions and equivalent qualification levels

ONS skill level	Description	Equivalent qualification level[14]
1	Occupations where competence is associated with satisfactory grades from compulsory education.	Below level 2
2	Occupations which require a longer period of work-related training on top of a compulsory education	Level 2
3	Occupations which normally require a body of knowledge associated with a period of post-compulsory education but not normally to degree level	Level 3 to 5
4	Occupations which normally require a degree of equivalent period of relevant work experience	Level 6 +

STEM, Construction and Shortage occupation list

Occupations were aggregated into STEM, construction, and shortage occupation list (SOL) occupations based on the following resources:

- STEM – Unit for future skills published Science and technology occupation classifications.[15]
- Construction – A subset of the occupational groups in construction published by the construction industry training board (CITB)[16], Occupations classed by CITB as "non-construction" were excluded from this list.
- SOL – SOC10 4-digit occupations on the SOL were published by the migration advisory committee.[17] These were mapped from SOC10 to SOC20 based on data published by ONS on the relationship between SOC10 and SOC20.[4]

A full list of occupations in each of these aggregations is available as part of the supporting files "STEM, shortage occupation list and construction aggregation lookup".

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[14] What qualification levels mean: England, Wales and Northern Ireland

[15] Supply of skills for jobs in science and technology, Calendar year 2023 - Explore education statistics - GOV.UK (explore-education-statistics.service.gov.uk)

[16] ctb1003_csn_technical-doc_aw2.pdf (citb.co.uk)

[17] Review of the shortage occupation list 2023 - GOV.UK (www.gov.uk)

Sensitivity analysis

The sensitivity of the occupations in demand analysis was investigated through several methods, including where:

- indicators were removed to determine the impact on the number of workers and occupations moving into and out of demand
- correlation analysis was carried out between indicators
- indicators were weighted between 0 and 2 to determine the impact on the ranking of occupations.

Across all measures of sensitivity, the skills shortage vacancy density, wage premium and annual change in hours worked indicators are the most sensitive. The visa application density, annual change in hourly wage and online job advert density are the least sensitive.

Indicator removal sensitivity

Indicators were removed from the occupations in demand analysis, the overall demand index was recalculated and demand cutoffs re-applied. The total number of occupations and workers which moved in and out of demand categories was then counted, and indicators where there was the most movement were identified as being the most sensitive.

The impact of removing an indicator was compared to a version of the occupations in demand analysis where all indicators were weighted at 1, this was to ensure there was an equivalent decrease in the proportion each indictor contributed to the demand index when it was removed from the analysis.

This impacted the skills shortage vacancy density, which is weighted at 0.5 in the published analysis, however comparing the removal of an indicator weighted at 0.5 to the removal of other indicators weighted at 1 produced artificially lower impacts.

Indicator correlation

Correlations were calculated between each of the seven demand indicators., A value of 1 indicates that indicators are perfectly positively correlated, -1 indicates perfect negative correlation and zero indicates no correlation.

No indicators were strongly positively or negatively correlated with another indicator. The largest correlation seen was between the annual change in hourly wage and online job advert density indicators (0.11) and the lowest correlation was between the wage premium and skills shortage vacancy density (-0.21).

The annual change in contract or temporary workers and online job advert density indicators have the highest average correlation (0.043) and are therefore the most well correlated with other indicators. The contract or temporary workers indicator is positively correlated with all six other indicators and has a correlation >.1 with one other indicator, online job advert density. Online job advert density is positively correlated with five other indicators and has a correlation >.1 with two other indicators, the annual change in contract or temporary workers and annual change in hourly wage indicators.

Wage premium has the lowest average correlation (-0.024) and is therefore the least well correlated with other indicators.

Overall, this correlation analysis suggests that each of the demand indicators react to demand in a different way. By averaging across the indicators to create a demand index, a more comprehensive picture of occupational demand is created.

Indicator weightings sensitivity

Indicators were randomly weighted between 0 and 2 with the demand index recalculated for each weight. Occupations were then ranked by the demand index value. The 5th and 95th percentile rank after weighting were applied were subtracted to calculate the difference for each occupation.

An average difference was calculated across all occupations for each of the demand indicators, where a low average difference indicates that changes to the weight of the indicator have a smaller impact on the ranking of occupations, and a large average difference indicates a larger impact on the ranking of occupations.

Based on the random weighting of indicators:

- The visa application density indicator is the least sensitive to adjustments to weighting, followed by online job advert density.
- The skills shortage vacancy density and wage premium indicator are the most sensitive indicators to adjustments to weighting.

Future considerations

The following are considerations and changes which could be implemented into future versions of the occupations in demand publication.

Wage premium

The wage premium indicator compares the hourly wage for an occupation with occupations in the same ONS skill level, controlling for sex, age, location of work and whether full- or part-time worker.

This comparison may miss differences in the hourly wage of groups of similar occupations within the same skill levels, for instance the hourly wage of teaching professionals within qualification level 6+ occupations may differ from other occupations which require the same qualification level. This could cause this indicator to give an artificially higher or lower score than if comparisons were made between more similar groups of occupations.

As part of future publications, it may be possible to compare the wage premium within ONS skill levels as well as within other groups of occupations, such as those within the same industry.

Occupations with the highest score for this indicator are mostly in occupations which are senior posts or require a considerable amount of experience and expertise, for example train and tram drivers, aircraft pilots and air traffic controllers, head teachers and principals, and chief executives and senior officials. This could show that this indicator is higher for occupations where seniority or experience has led to higher hourly wages, rather than demand.

Alternative methodologies for the wage premium indicator may be investigated in further publications.

Alternative number of workers denominator

Annual population Survey (APS) data is used as a denominator for the number of workers in an occupation in the visa application density, online job advert density and as a numerator and denominator in the year-on-year change in temporary or contract worker density indicators.

In some instances, numerator data is available for the visa application density and online job advert density indicators but because the APS denominator data is suppressed the indicator value for these occupations is set to NA. As APS data is taken as a survey and is sampled from specific postcodes, it may be possible that some occupations, such as those that have a large number of seasonal workers, have a lower count of workers than

others. In future publications consideration should be given to whether an alternative source of occupational worker data can be used, or whether the APS data can be made more reliable, such as through the combination of multiple years of APS data.

Time series analysis

Year-on-year indicators may miss longer trends in the data. In future publications considerations should be given to whether these indicators could contain comparisons between a larger number of years, to help identify longer term demand.

Taking this approach would require the mapping of data from SOC10 definitions to SOC20 definitions and comparing historic mapped SOC20 data to recent actual SOC20 data in some instances. This may cause inaccuracies which must be considered.

Wage aggregation analysis

Future publications could aggregate occupations by the average hourly wage. Workers in demand could then be calculated for occupations with higher, medium, or lower average hourly wages. Comparisons should be made between this aggregation and aggregations by ONS skill level to determine whether any significant differences are identified.

Hourly wage calculations

Currently the mean hourly wage for each 4-digit SOC20 occupation does not match with the data published by ONS12.

Hourly wage values used in this analysis differ to those published by ONS due to a number of methodological differences, different data is used in terms of geography and age and different methods are used in terms of excluding or including those on adult rates, those who have had a period of absence contributing to a lower hourly wage. Finally, the occupations in demand analysis uses the highest value for hourly wage, between the hourly wage including or excluding overtime, whereas this is published separately.

In future publications consideration should be taken to align closer with the published ONS analysis.

ASHE data geographies

Currently ASHE data in the occupations in demand analysis is only available at GB level (excluding Northern Ireland), ONS publish ASHE data at UK level. In future publications efforts should be made to add Northern Ireland data into our analysis so that UK level data is available for all indicators.

Data exclusions

Further changes may be made to the data exclusions criteria in future publications, such as excluding occupations where a combination of indicators which are imputed or are missing means that there is no data used at a 4-digit SOC20 level to determine demand.

Appendix

Indicators of labour demand

Table 6: Indicators of labour demand

Indicator	Sources	Time period	Geography
Visa application density	Home office (HO) sponsored work entry clearance visas by occupation and industry & Annual population survey (APS)	April 2023 – March 2024	UK
Skills shortage vacancy density	Employer skills survey (ESS)	June 2022 – March 2023	UK
Online job advert density	ONS Textkernal data & Annual population survey (APS)	January 2023 – December 2023	UK
Annual change in hourly wage	Annual survey of Hours and Earnings (ASHE) employee earnings in the UK Consumer price index	April 2022 – April 2023 (ASHE) & 2022/2023 (CPI)	GB
Wage premium[18]	Annual survey of Hours and Earnings (ASHE) employee earnings in the UK	April 2022 – April 2023	GB
Annual change in hours worked	Annual survey of Hours and Earnings (ASHE) employee earnings in the UK	April 2022 – April 2023	GB
Annual change in contract or temporary workers	Annual population survey (APS)	April 2023 – March 2024 & April 2022 – March 2023	UK

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[18] wage relative to other occupations in the same ONS skill level when controlling for factors such as age and sex.

Count of missing or imputed values by indicator

Table 7: Count of missing or imputed values by indicator

Indicator	Occupations with imputed values	Occupations with missing values
Visa application density	N/A[19]	60
Skills shortage vacancy density	162[20]	32
Online job advert density	N/A[19]	77
Annual change in hourly wage	2022 data - 60 2023 data - 63	2
Wage premium	63	2
Annual change in hours worked	2022 data - 60 2023 data - 63	2
Annual change in contract or temporary workers	2022 data – 37 2023 data - 59	2

[19] Data which did not meet APS suppression thresholds were not imputed for these indicators due to a mix of data sources, these occupations instead had their indicator value set to NA.

[20] A large number of occupations (182) did not meet the base size suppression threshold, a portion of these occupations were imputed from 3-digit SOC20 data (20).

Excluded 4-digit occupations

Table 8: Excluded 4-digit occupations

SOC2020 code	Description	Exclusion reason
1139	Functional managers and directors n.e.c.	N.E.C occupation
1225	Travel agency managers and proprietors	>= 5 imputed indicators
1233	Early education and childcare services proprietors	>= 5 imputed indicators
1252	Garage managers and proprietors	>= 5 imputed indicators
1259	Managers and proprietors in other services n.e.c.	N.E.C occupation
2119	Natural and social science professionals n.e.c.	N.E.C occupation
2129	Engineering professionals n.e.c.	N.E.C occupation
2139	Information technology professionals n.e.c.	N.E.C occupation
2229	Therapy professionals n.e.c.	N.E.C occupation
2259	Other health professionals n.e.c.	N.E.C occupation
2319	Teaching professionals n.e.c.	N.E.C occupation
2329	Other educational professionals n.e.c.	N.E.C occupation
2419	Legal professionals n.e.c.	N.E.C occupation
2435	Professional/Chartered company secretaries	>= 5 imputed indicators
2439	Business, research and administrative professionals n.e.c.	N.E.C occupation
2464	Youth work professionals	>= 5 imputed indicators
2469	Welfare professionals n.e.c.	N.E.C occupation
3119	Science, engineering and production technicians n.e.c.	N.E.C occupation
3211	Dispensing opticians	>= 5 imputed indicators
3219	Health associate professionals n.e.c.	N.E.C occupation
3229	Welfare and housing associate professionals n.e.c.	N.E.C occupation
3319	Protective service associate professionals n.e.c.	N.E.C occupation
3414	Dancers and choreographers	>= 5 imputed indicators
3429	Design occupations n.e.c.	N.E.C occupation
3542	Importers and exporters	>= 5 imputed indicators
3549	Business associate professionals n.e.c.	N.E.C occupation
3573	Information technology trainers	>= 5 imputed indicators
4129	Financial administrative occupations n.e.c.	N.E.C occupation
4159	Other administrative occupations n.e.c.	N.E.C occupation
4217	Typists and related keyboard occupations	>= 5 imputed indicators
5112	Horticultural trades	>= 5 imputed indicators
5119	Agricultural and fishing trades n.e.c.	N.E.C occupation
5214	Pipe fitters	>= 5 imputed indicators
5236	Rail and rolling stock builders and repairers	>= 5 imputed indicators
5243	TV, video and audio servicers and repairers	>= 5 imputed indicators
5249	Electrical and electronic trades n.e.c.	N.E.C occupation
5311	Steel erectors	>= 5 imputed indicators
5312	Stonemasons and related trades	>= 5 imputed indicators
5319	Construction and building trades n.e.c.	N.E.C occupation
5411	Upholsterers	>= 5 imputed indicators

SOC2020 code	Description	Exclusion reason
5412	Footwear and leather working trades	>= 5 imputed indicators
5413	Tailors and dressmakers	>= 5 imputed indicators
5419	Textiles, garments and related trades n.e.c.	N.E.C occupation
5421	Pre-press technicians	>= 5 imputed indicators
5433	Fishmongers and poultry dressers	>= 5 imputed indicators
5443	Florists	>= 5 imputed indicators
5449	Other skilled trades n.e.c.	N.E.C occupation
6121	Pest control officers	>= 5 missing indicators
6129	Animal care services occupations n.e.c.	N.E.C occupation
6219	Leisure and travel service occupations n.e.c.	N.E.C occupation
6250	Bed and breakfast and guest house owners and proprietors	>= 5 missing indicators
7129	Sales related occupations n.e.c.	N.E.C occupation
7212	Telephonists	>= 5 imputed indicators
7214	Market research interviewers	>= 5 imputed indicators
7219	Customer service occupations n.e.c.	N.E.C occupation
8119	Process operatives n.e.c.	N.E.C occupation
8132	Mining and quarry workers and related operatives	>= 5 imputed indicators
8133	Energy plant operatives	>= 5 imputed indicators
8139	Plant and machine operatives n.e.c.	N.E.C occupation
8144	Weighers, graders and sorters	>= 5 imputed indicators
8149	Assemblers and routine operatives n.e.c.	N.E.C occupation
8159	Construction operatives n.e.c.	N.E.C occupation
8219	Road transport drivers n.e.c.	N.E.C occupation
8229	Mobile machine drivers and operatives n.e.c.	N.E.C occupation
8232	Marine and waterways transport operatives	>= 5 imputed indicators
8239	Other drivers and transport operatives n.e.c.	N.E.C occupation
9112	Forestry and related workers	>= 5 imputed indicators
9119	Fishing and other elementary agriculture occupations n.e.c.	N.E.C occupation
9129	Elementary construction occupations n.e.c.	N.E.C occupation
9139	Elementary process plant occupations n.e.c.	N.E.C occupation
9219	Elementary administration occupations n.e.c.	N.E.C occupation
9222	Street cleaners	>= 5 imputed indicators
9229	Elementary cleaning occupations n.e.c.	N.E.C occupation
9249	Elementary sales occupations n.e.c.	N.E.C occupation
9259	Elementary storage occupations n.e.c.	N.E.C occupation
9269	Other elementary services occupations n.e.c.	N.E.C occupation

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