FEATURE

Identifying shortage occupations in the UK

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SUMMARY

This article describes the top-down methodology used by the Migration Advisory Committee (MAC) to identify shortage occupations. Identifying shortage occupations is difficult and few countries have attempted to do this in a systematic way. The methodology developed by the MAC to identify shortage occupations is the first to use a comprehensive range of indicators. The methodology dovetails national level top-down data with bottom-up micro-level data and qualitative information from stakeholders and was used to advise the UK Government on occupations for inclusion on the UK Government's Shortage Occupation List for use under Tier 2 of the Point Based System for managing migration.[1]

This article describes the top-down methodology; it does not present any new data or conclusions. Further information on the methodology can be found in Chapter 7 and Annex B of the MAC's September 2008 report.

Introduction

The Migration Advisory Committee (MAC) is a non-departmental public body set up in 2007 to provide independent evidence-based advice to the Government. It is made up of five leading economists and a representative from the UK Commission for Employment and Skills, who is also an economist. The Government asked the MAC to provide evidence-based advice on where shortages of skilled labour can sensibly be filled by immigration from outside the European Economic Area[2] (EEA). The Government also asks the MAC to advise on other immigration issues from time to time.

The MAC has been asked to produce two recommended shortage occupation lists: one for the whole of the UK, and one just for Scotland in order to address specific labour market and demographic issues in Scotland. The same methodology was used for both lists, although there were issues around the availability of national-level data pertaining just to Scotland.

Whereas the MAC produces recommended shortage occupation lists, it is for the Government to decide which occupations to include on the official Shortage Occupation List, which will include within it any shortage occupations relating just to Scotland. This official list is then used by employers and the Government in applying the criteria for routes of entry to the UK under Tier 2 of the Point Based System (PBS).

There are five Tiers under the PBS. For each Tier, prospective migrants need sufficient points to obtain entry clearance or leave to remain in the UK. Points are scored for attributes which predict a migrant's success in the labour market.

- Tier 1 is for highly skilled individuals who can contribute to growth and productivity. This includes those taking up post-study work and those coming to the UK as an investor and as an entrepreneur. Those not falling into these categories but wishing to apply under Tier 1 will be expected to hold a Masters degree and a job with a minimum salary of £20,000 in order to accrue sufficient points
- Tier 2 is for skilled workers with a job offer to fill gaps in the UK labour force. Skill is assessed as equivalent to the National Qualifications Framework (NQF) level 3. This route is subject to a resident labour market test whereby jobs have to be advertised in the UK first. In addition to the route for those meeting the relevant points criteria, Tier 2 also includes a route for those coming to fill jobs included on the shortage occupation list (and for which the resident labour market test is regarded as met), as well as routes for intra-company transfers, sportspersons and ministers of religion
- Tier 3 is for low skilled workers needed to fill specific temporary labour shortages; this route is currently suspended as the Government considers that there is a sufficient supply of low skilled workers available within the UK and the wider EEA

- Tier 4 is the route for those coming to the UK to study
- Tier 5 is the route for temporary workers (including those coming to take up temporary positions in the creative and sporting fields, those coming as charity and religious workers, those coming as part of an international agreement, and those on government authorised exchange schemes). It is also for those coming under a youth mobility scheme whereby people are allowed to work in the UK for a limited period of time to satisfy primarily non-economic objectives

A shortage occupation list was first introduced under the work permits system which the PBS replaced. This list was drawn up internally by the UK Border Agency (UKBA) and its predecessors in response to evidence from stakeholders. The shortage occupation lists recommended by the MAC are based on an analysis of the entire skilled labour market dovetailed with stakeholder evidence.

This article begins with a brief description of the methodology developed and deployed by the MAC. The theory behind the method is then discussed, followed by an outline of the shortage indicators used by the MAC, and a description of how these indicators are used (that is, the thresholds applied and the number of resulting 'passes'). The article then lists those skilled occupations which had a higher than 50 per cent pass mark on the indicators as described in the MAC's September (2008) report. Finally, the article discusses how the MAC proposes to develop its methodology.

MAC Methodology

In drawing up the recommended shortage occupation lists for the UK and Scotland the MAC used a three stage approach.

- First, it considered whether individual occupations or job titles are sufficiently skilled to be included on the shortage occupation lists
- Second, it considered whether there is a shortage of labour within each skilled occupation or job, and
- Third, it considered whether it is sensible for immigrant labour from outside the EEA to be used to fill these shortages

In addressing these questions, the MAC used a hybrid method that combined the consistency and comprehensiveness of a top-down approach (using national data and surveys) with the context and fine-grained detail and contextualisation of a bottom-up method (using micro-level data and qualitative evidence).

For the top-down approach, the MAC analysed the best and most relevant national (that is, mostly UK-wide) labour market data available. It carried out data analysis in-house and commissioned external research. Key data sources used for the top-down analysis include the Labour Force Survey (LFS), the Annual Survey of Hours and Earnings (ASHE), the National Employers Skills Survey (NESS) and Jobcentre Plus (JCP) data.

Bottom-up evidence came from an examination of the individual occupations and job titles. Crucially, this was informed by engagement with, and evidence from, a wide variety of stakeholders, including in face-to-face meetings, workshops set up to inform the work, and written submissions of evidence. It also included analysing micro-level data, for example an individual firm's vacancy data.

The MAC looked for evidence that the three criteria (skilled, shortage and sensible) were satisfied in both the top-down data and the bottom-up evidence before determining whether to include occupations on the shortage lists. The MAC report (2008) gives more information on how the bottom-up and top-down evidence were used together, but this article will now summarise the methods used to define the skilled, shortage and sensible criteria.

The first criterion is that the occupations or, where relevant, job titles must be skilled to at least NQF level 3. The MAC defined an occupation as top-down skilled if at least two out of the following three criteria were satisfied:

- 50 per cent or more of the workforce are qualified to level 3 or above
- median hourly earnings for all employees is £10 or more
- the occupation is defined as skill level 3 or 4 in SOC 2000 (**Box 1**)

Applying these criteria, 192 occupations out of 353 satisfied the definition of skilled.

Assessment of the bottom-up evidence that the MAC received – through a combination of a call for evidence plus visits to stakeholders – allowed for the fact that there may be some specialised skilled jobs within less skilled occupations and that there are other indicators of skill that the top-down data may not pick up, for example innate ability.

The second criterion is that the occupation must be in shortage. The MAC used 12 indicators grouped into four types: employer-based indicators, price-based indicators, volume-based indicators, and other indicators of imbalance based on administrative data. The MAC considered that there was good prima facie top-down evidence that an occupation was in shortage if it exceeded the thresholds for 50 per cent or more of the shortage indicators. Again these data were dovetailed with the bottom-up evidence received from stakeholders.

The third criterion is that it must demonstrably be sensible to fill a skilled

Box 1

Defining occupations using the Standard Occupational Classification (SOC)

The need to identify occupations in the labour market where shortages exist required a clear and consistent view of what is meant by 'occupation'. The MAC methodology, where possible, uses the SOC 2000 which has four levels of aggregation. The 'unit group' (4 digit) level is the most detailed occupational breakdown available and breaks down the labour market into 353 occupations.

Each of these 353 occupations has job titles associated with them (26,000 in total). The aggregate data are typically only available at the 4 digit SOC level, and sometimes more detail is required than this level can provide (that is, the data will be relevant for occupations but less so for individual job titles within those occupations). This is a reason why bottom-up evidence is used in addition to the top-down method. For example, the top-down method may suggest no shortage of secondary school teachers (SOC 2314) in general, however, there may be bottom-up evidence that suggests that within this 4 digit occupation class, specific types of teachers are in shortage, for example maths teachers.

Of these 353 occupations the MAC considered only 192 as skilled at the NQF level 3 required for Tier 2.

shortage occupation with non-EEA labour. This is difficult to assess as the concept of sensible can be interpreted in many different ways and any definition will depend on the underlying policy objectives. The MAC examined the availability of alternatives to employing non-EEA immigrants in response to a shortage of skilled labour. This included considering whether immigrants are in some cases employed primarily as cheap labour, as well as the efforts being made to fill the shortage by other means. The MAC considered whether bringing in immigrants would affect the skills acquisition of the domestic workforce, including potential disincentives to upskill workers. It also examined wider impacts on the UK labour market and economy, including the impact on employment opportunities.

In practice, the question of 'sensible' is specific to sectors and/or occupations and therefore the assessment of this criterion relied heavily on bottom-up evidence. However, there were a few top-down indicators that the MAC used to provide context to the bottom-up evidence, including the share of non-EEA immigrants already employed in an occupation and the percentage of the workforce in receipt of training.

After giving some background to the MAC's work, the next section describes in more detail the MAC's top-down methodology for identifying shortage occupations.

Identifying shortage: theory

There is no universal definition or measure of skill or labour shortage. As stated by Veneri (1999): 'no single empirical measure of occupational shortages exists, nor does it appear that one can easily be developed'.

Several countries such as New Zealand, Australia, Canada and the US have attempted to define and measure shortages of skilled labour in their labour markets. The Australian and New Zealand methodology uses vacancies as an indicator of shortages whereas the method the US Bureau of Labour Statistics has recommended and Canada has used considers employment growth, the unemployment rate and wage growth. More details on these methods are in the MAC's report (2008).

There are two key lessons from a study of the international literature on this subject. First, although attempts at identifying shortages of skilled labour are based on different methods, it is apparent that most approaches do not rely on a single indicator. The MAC therefore used a range of economic indicators. The choice of these indicators was underpinned by the concept of shortage as an imbalance or mismatch between demand and supply, as discussed later in this article.

Second, the difference between the approaches reinforces the suggestion that there is no single infallible way of measuring shortage and therefore that there is a need to contextualise any data. Veneri (1999) concludes that: 'Labour market data should be combined with background information on the occupation and knowledge the workings of the labour market'. Hence the MAC used a hybrid method that combined the consistency and comprehensiveness of a top-down approach with the fine-grained detail and contextualisation of a bottom-up method.

To fully understand the concept of demand and supply, and therefore shortage, it is necessary to look at price and wage signals. A lay definition of shortage is that demand for labour exceeds supply at the current wages and conditions. When the wage is below the equilibrium level, market pressure should increase the wage, helping to raise supply and reduce demand, thus restoring equilibrium.

However, even in a labour market that is moving towards a new equilibrium, signals can be distorted. 'Dynamic' shortage occurs because the factors that influence labour markets change over time, and various factors may limit the speed at which labour markets can adjust, leading to disequilibrium. For instance, wages may be sticky and not move freely up and down with changes in labour demand and supply. Furthermore, it may take time for employees to acquire the skills the market needs, and the availability of state benefits may affect incentives to work.

As well as wages, it is also important to consider quantities (vacancies, employment and unemployment). Low or falling unemployment among people previously employed, or seeking work, in an occupation may indicate shortage. Rising employment may indicate rising demand, which may exist alongside labour shortage. However, this may also indicate that firms have little problem filling jobs. High vacancy levels, rising vacancy rates, or rising vacancy durations may suggest that employers are finding it hard to fill jobs. Alternatively, the occupation may have a high turnover and not necessarily be experiencing a shortage.

A large number of vacancies in an occupation may also simply indicate a high turnover within that occupation. Some vacancies and unemployment will exist even where the labour market is in equilibrium. This is due to natural friction in the labour market as it takes time for employers to search for suitable workers and employees to search for a suitable job.

Nonetheless, firms will find it easier to fill vacancies the higher the ratio of potential supply (or unemployment) to the total number of vacancies. Therefore, a high vacancy/unemployment ratio within an occupation suggests that employers are having particular difficulty filling vacancies given the supply of workers available. This may indicate a shortage of workers with the skills, experience or characteristics required. Vacancy/unemployment (and vacancy/employment) ratios therefore indicate employer demand relative to potential labour supply and are widely used by economists as a potential indicator of labour shortage.

An alternative, but potentially complementary, approach is to ask employers directly where they think the shortages are. Employer-based indicators are derived from surveys that ask employers questions about their businesses. Green *et al* (1998) argue that although employers have no problem interpreting questions on skill shortages, their assessments are not necessarily consistent or accurate. York Consulting (2008), in research carried out for the MAC, reported that accidental reporting can occur when employers confuse skill shortages in their industry with other types of hard-to-fill vacancies, or with long-term macroeconomic fluctuations. Employer surveys may also suffer from deliberate over-reporting of shortages of skilled labour, where an employer believes that it is in their interest to misreport the level of shortage. However, despite the potential drawbacks, employer survey evidence clearly has a role to play alongside other indicators in helping identify labour shortage.

Identifying shortage: the indicators

The MAC used the following four criteria to assess the suitability of the potential indicators.

- Validity: is it measuring the right thing?
- Robustness: specifically the sample size, as a larger sample size will give more accurate estimates for the population
- Distribution of observations: for example, if there are likely to be outliers at the upper end of distribution then there are statistical reasons why it might be better to use medians rather than means as a measure of average, and
- Other data limitations: for example, it

is likely to be the case that vacancies for some occupations are unlikely to be advertised through Job Centre Plus, which may bias these data

After assessing over 70 possible indicators against the criteria, the MAC chose three employer-based indicators, three price-based indicators, four volume-based indicators and two indicators of imbalance. These indicators are listed in **Table 1**, along with how often the data are available, data source, and the date or period of data used in the MAC's analysis for their September report (2008).

The MAC's analysis was carried out using the latest available data. However, some of the data is always going to be untimely. For example, the major UK earnings survey, ASHE, is conducted in April each year and published in October. Therefore, the latest available data for analysis conducted by the MAC in September 2008 referred to April 2007. This is another reason why the MAC used bottom-up evidence alongside the top-down data, in order to have a contemporaneous account of what was happening on the ground.

We expect most of the indicators to move, to a greater or lesser extent, with the economic cycle. For example, when aggregate demand in the economy is falling, then we expect overall unemployment rates to rise, as a smaller quantity of labour is needed to produce the goods and services that the economy demands. However, it is not clear how the economic cycle will affect occupational shortages or the indicators. It is likely, even if fewer shortages occur in times of economic downturn, that change will vary across occupations and there will be other longstanding needs and shortages that transcend the economic cycle. The MAC also considers that it is not the case that all shortages are cyclical. Some are due to occupations functioning in a global market, others may be due to the impact of public sector spending patterns which may be less affected by the cycle, others may be due to a lack of people with the required innate ability to carry out some occupations or an historic tendency to train up sufficient numbers of workers. The MAC is very carefully considering the impact of the present economic downturn on its methodology and on its recommended shortage occupation lists.

Identifying shortage: the thresholds

The next stage for the MAC after choosing the twelve indicators was to determine at what level an indicator demonstrated shortage. The MAC set a threshold value for each indicator, where the threshold represents the point above which shortage is indicated. Note that for every indicator apart from percentage change in unemployment, the value of the indicator must exceed the threshold for shortage to be inferred. Because we expect lower levels of unemployment to indicate shortage, this condition is reversed for the unemployment indicator.

The MAC identified a point at which shortage was not indicated. There is no empirical determinant to this point, so the MAC exercises a degree of judgement. The MAC started from the assumption that an occupation is not showing signs of a shortage if the measure for that occupation is at the centre of the distribution across all occupations for that indicator.

The MAC chose to use the median as a measure of central tendency rather than the mean. In a normal distribution, the mean, median, and mode are equal to each other. In a skewed distribution, there are extreme values (outliers) at either side of the distribution. The median is less sensitive to extreme values than the mean. Therefore, as the indicators include outliers it is a good measure of central tendency to use.

It follows from this that any occupation that is equal to or less than the median does not show signs of shortage for this indicator. However, what point above the median should be taken as indicating a shortage? **Box 2** sets out the MAC's consideration of this question.

After considering the pros and cons of various thresholds, the MAC decided that their first choice of threshold would be the median plus 50 per cent of the median. This is one of the thresholds used for identifying shortage in the Canadian labour market (see Strategic Policy Research Directorate (2006)). It also reflected the MAC's view that it is important to have some flexibility about how many occupations pass on a threshold, rather than changing the threshold as the distribution changes. Therefore, the MAC used the median plus 50 per cent of the median where suitable.

In cases where the MAC believed it was not suitable to use the median plus 50 per cent, it chose to use the top quartile (above the 75th percentile) as the threshold. The MAC chose to use this because, in practice, the seven indicators that used median plus 50 per cent as the threshold together defined an average of approximately 25 per cent of occupations as in shortage. The MAC considered adding a percentage of the standard deviation to the median as their alternative measure. However, due to the issues reported in the discussion in Box 2, the threshold was too strict for indicators to be meaningful. Therefore, the MAC settled on the top quartile as the second choice of threshold for the remaining five indicators.

To judge where it is suitable to use

Table 1
The twelve indicators of shortage

Indicator	Frequency available	Date/period used[1]	Source used
Employer based indicators			
Skill shortage vacancies as a percentage of employment by occupation	Every two years	2007	NESS and LFS
Skill shortage vacancies as a percentage of all vacancies	Every two years	2007	NESS
Skill shortage vacancies as a percentage of hard to fill vacancies	Every two years	2007	NESS
Price-based indicators			
Percentage change in median hourly pay for all employees	Annually	2006–07	ASHE
Percentage change in mean hourly pay for all employees	Annually	2006–07	ASHE
Relative premium to an occupation, given NQF3, controlling for region and age.	Quarterly	2007	LFS
Volume-based indicators			
Percentage change in unemployed by sought occupation	Monthly	2007–08	JCP
Percentage change in hours worked for full-time employees	Annually	2006–07	ASHE
Percentage change in employment	Quarterly	2006–07	LFS
Absolute change in proportion of workers in occupation less than 1 year	Quarterly	2006–07	LFS
Indicators of imbalance based on administrative data			
Absolute change in median vacancy duration	Monthly	2007–08	JCP
Stock of vacancies/ claimant count by sought occupation	Monthly	2007	JCP

Note: *Source: Migration Advisory Committee*

1 The dates here refer to the data used in the analysis for the MAC's (2008) September report, and this data will be subsequently updated for future MAC reports. The MAC's twelve key indicators are discussed in further detail in Chapter 7 and Annex B of the MAC's September report (2008).

this threshold and where it is not, it is necessary to look at the distributions of each indicator. The MAC decided that it is not suitable to use the median plus 50 per cent of the median in certain situations, such as where the median is close to 0 or because the shape of the distribution is not approximately normal.

For example for the 'percentage change in median hourly pay' indicator, the MAC used the median plus 50 per cent of the median as the threshold because the distribution was approximately normal (see **Figure 1**).

For the 'skill shortage vacancies as a percentage of hard-to-fill vacancies' indicator the MAC used the top quartile as the threshold. **Figure 2** shows the distribution is non-normal with the mode being towards the furthest point on the scale possible (100).

The MAC realises the limitations of using thresholds, like quartiles, that always point to a specific number of occupations indicated as 'in shortage' rather than using benchmarked thresholds, and will commission research to look into how the methodology could be improved.

Identifying shortage: the results

This section describes how many of the twelve indicators the skilled occupations 'pass', that is how many exceed thresholds and so indicate possible shortages.

Table 2 shows how many occupations pass on 0–12 of the indicators. It also shows in brackets the 2007 LFS employment estimates, in thousands, for the working age population.

The table shows that only twelve occupations, employing approximately 478,000 people, passed six or more of the indicators. The number of occupations that passed six or more of the indicators may be low on account of some of the indicators being omitted for some of the occupations because of reliability issues. This means that at the extreme, some occupations only had data for six indicators. Therefore, rather than assessing evidence of a shortage by considering how many indicators an occupation has passed, the MAC considered the percentage of available indicators an occupation had passed.

Table 3 lists the 20 skilled occupations[5] which passed 50 per cent or more of the indicators.

The MAC considered there to be good top-down evidence for a potential shortage if an occupation passes 50 per cent or more of the indicators. For example, dancers and choreographers passed five of the indicators but, as they only had data available for ten of the indicators, the MAC considered that to be good top-down evidence of potential shortage.

However, the MAC was aware that some occupations may have passed 50 per cent or more of the indicators due to reasons other than shortage. By using 12 indicators, the MAC reduced the chance of the evidence erroneously indicating a shortage. However, it was still possible for the top-down evidence to suggest shortages where they do not exist and vice versa. For example, for some of the occupations it may have been that the indicators used were unsuitable, for example if the main

Box 2

Potential approaches to thresholds

The MAC considered various ways of deciding on the upper thresholds including:

- a given percentile
- median + X% of the median
- median + X% of the standard deviation

The MAC took into account the relative and/or absolute distributions. The former refers to the threshold being affected by the distance a value is from the median relative to how far all the other values are from the median. The latter two refer to the threshold being affected by the total distance a value is from the median, regardless of what the other values in the distribution are.

The main advantages and disadvantages to using each of the above approaches are described below.

A given percentile

One way to decide on a threshold is to use a percentile cut off, such as the top quartile (top 25 per cent) or top quintile (top 20 per cent). The main advantage to doing this is that it is neat and easy to understand. In addition, it takes into account the relative distribution.

The main disadvantages are that it does not take into account the absolute distribution, and by definition there will always be the same number of occupations suggested by an indicator to be in a shortage. This is a problem because even if shortages are being filled, and the distribution is changing, there would still always be 25 per cent of occupations in shortage.

Median + X% of the median

The advantages of using a measure such as the median plus 50 per cent of the median is that it takes into account the absolute distribution. So an occupation has to be a given absolute distance above the median before it is considered a shortage.

Another key advantage is that it does not imply a fixed number of occupations in shortage.

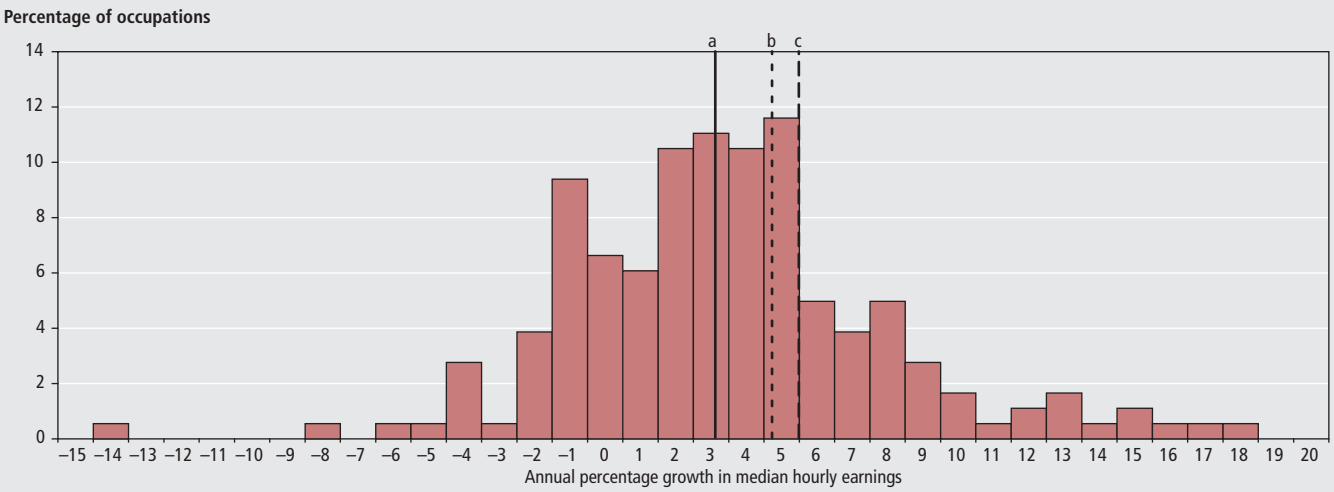
The disadvantage is that using a percentage total of the median makes the implied absolute distance based on this percentage sensitive to the level of the median. The closer the median value is to zero the less helpful this threshold becomes. This threshold does not take into account the relative distribution of an indicator or the shape of the distribution. The number of occupations classified as a shortage for an indicator depends both on the distribution of an indicator and on how far the median is from zero.

Median + X% of the standard deviation

The advantage of using this threshold is that it takes into account both the relative and the absolute aspects of the distribution. However, unless only a very small percentage of the standard deviation is used, for example 25 per cent, few occupations would ever pass the shortage threshold.

The reason for this is that in a normal distribution we expect that around 16 per cent of observations would be greater than the mean or median + 1 standard deviation. However, in practice several of the shortage indicator distributions do not approximate a normal distribution and for some indicators this results in very few observations being greater than the median + 1 standard deviation.

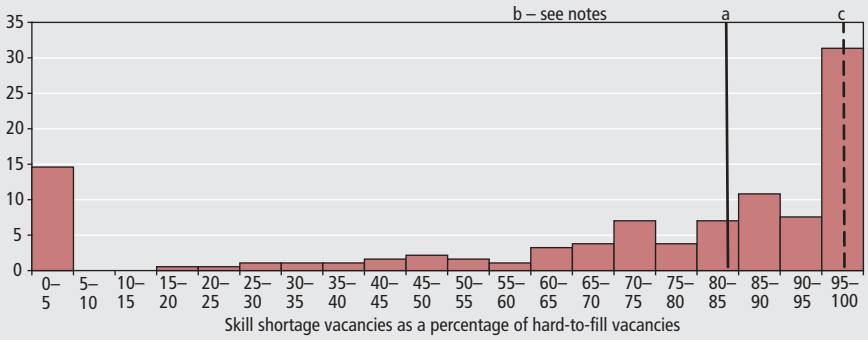
Figure 1
Histogram of percentage change in median hourly pay, for all skilled occupations[3]



Notes:
a median = 3.2 per cent.
b median + 50 per cent of median = 4.8 per cent.
c 75th percentile = 5.5 per cent.

Source: MAC analysis (2008), Annual Survey of Hours and Earnings 2006–2007

Figure 2
Histogram of skill shortage vacancies as a percentage of hard-to-fill vacancies, for all skilled occupations[3]



Notes:
a median = 83.7 per cent.
b median + 50 per cent of median = 125.5 per cent (off the scale at >100 per cent).
c 75th percentile = 97.6 per cent.

Source: MAC analysis (2008), National Employers Skills Survey 2007

Table 2
Distribution of skilled occupations passing indicators of shortage[4]

Number of indicators passed by occupations	Number of occupations (and estimated number of people employed in these occupations)[1]
9+	2 (64)
8	2 (119)
7	0
6	8 (295)
5	27 (881)
4	42 (2,734)
3	42 (2,982)
2	44 (3,904)
1	18 (1,718)
0	7 (518)
Total	**192 (13,215)**

Note:
1 Employment data from LFS 2007are for working age population in thousands.

Source: MAC analysis (2008)

source of employment in an occupation is the self employed then the ASHE data may not adequately reflect this. Limiting analysis to labour market statistics alone does not present a complete picture of the market for a particular occupation or job title. Background information on employer demand in the occupation and supply is needed too. This is why it was essential that the MAC supplemented this top-down analysis with the bottom-up evidence[7] from stakeholders.

Next steps

There has been limited research in this area that is specifically focused on the questions the MAC needed to address. The MAC is commissioning research to extend and complement its analysis of shortage.

One of the research projects aims to inform the selection, weighting, and thresholds of the shortage indicators. It will involve economic analysis to determine the appropriateness of the current shortage indicators, choice of threshold, their statistical robustness, and weighting. In addition, the MAC plans to extend the analysis to a longer period, to identify trends, issues with time lags and volatility of the data for some occupations; examining the relationship between shortage in individual firms and the economic cycle, including analysis of the relationship between the growth rate of the economy and the nature and severity of shortage at the occupational level. The results from the commissioned research are due to be out at the end of the summer and will be published on the MAC's website[8].

The recommended occupational shortage

Table 3
Skilled occupations ordered by percentage of shortage indicators passed[6]

SOC 2000 description and code		Total indicators passed	Total indicators available	Percentage Indicators passed	LFS Employment estimates 2007 (thousands)
Officers in armed forces	1171	5	6	*83*	28
Moulders, core makers, die casters	5212	9	11	*82*	4
Photographers and audio-visual equipment operators	3434	9	12	*75*	61
Musicians	3415	8	12	*67*	32
Welding trades	5215	8	12	*67*	87
Dispensing opticians	3216	5	9	*56*	5
NCOs and other ranks	3311	5	9	*56*	53
Ship and hovercraft officers	3513	6	11	*55*	17
Senior officials in national government	1111	4	8	*50*	12
Directors and chief executives of major organisations	1112	6	12	*50*	48
Hairdressing and beauty salon managers and proprietors	1233	5	10	*50*	22
Veterinarians	2216	5	10	*50*	15
Engineering technicians	3113	6	12	*50*	70
Midwives	3212	5	10	*50*	37
Pharmaceutical dispensers	3217	6	12	*50*	31
Dancers and choreographers	3414	5	10	*50*	6
Pipe fitters	5216	6	12	*50*	11
Metal machining setters and setter-operators	5221	6	12	*50*	66
Computer engineers, installation and maintenance	5245	6	12	*50*	39
Steel erectors	5311	6	12	*50*	14

Source: MAC calculations (2008), LFS 2007

list is reviewed approximately every six months, with a complete review of all occupations once every two years. The MAC's next partial review of occupations and job titles has been completed in spring 2009 and there will be another partial review in autumn 2009.

The MAC believes that it has developed the most comprehensive approach to identifying skill shortage occupations used anywhere in the world. Nonetheless, it is always open to suggestions as to how it might do it better. If you have any views on the top-down shortage methodology described in this article then the MAC would be happy to receive your suggestions (please email the secretariat: mac@homeoffice.gsi.gov.uk).

Notes

1 The UK Shortage Occupation List is available to download at: www.ukba.homeoffice.gov.uk/employers/points/sponsoringmigrants/employingmigrants/shortageoccupationlist

2 The EEA is made up of: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Irish Republic, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom, Iceland, Liechtenstein and Norway.

3 Indicators are presented in bands along the x axes of the histograms. On the y axis is the percentage of occupations, so the height of the bars is the percent of occupations at this level. The sum of the heights equals 100. The vertical lines represent: a – the median; b – the median + 50 per cent; and c – the top quartile. The data presented is for the 192 occupations that the MAC classifies as skilled, see MAC September report (2008) for more details.

4 Totals may not add up exactly due to rounding. A 'pass' refers to an occupation exceeding the threshold for an indicator and thus indicating shortage for that indicator.

5 See Annex B of the MAC report (2008) for more information.

6 A 'pass' refers to an occupation exceeding the threshold for an indicator and thus indicating shortage for that indicator.

7 See Chapter 4 of the MAC report (2008) for more information.

8 The MAC website can be accessed at: www.ukba.homeoffice.gov.uk/aboutus/workingwithus/indbodies/mac/

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