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HELP WANTED: MODERNIZING THE SCHEDULE A SHORTAGE OCCUPATION LIST

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Executive summary

Schedule A is the one way that the federal government officially tracks shortage occupations. It is also a mechanism by which the fixed number of employment-based green cards authorized by Congress can be directed to the areas of the economy most in need. But the Schedule A shortage occupation list has not been updated in over three decades, leaving it totally disconnected from current labor market conditions.

As a proof-of-concept, this paper proposes a transparent, objective, and data-driven method by which the Department of Labor (DOL) can regularly update the Schedule A shortage occupation list. Our method relies on a new economic index, which we call the Help Wanted Index, designed to identify and rank occupations by how likely they are to be facing shortage conditions. The Help Wanted Index includes lagged variables and longer data trends to strike a balance between favoring persistent shortages and being responsive to changing labor markets.

We apply our method with recent labor market data, and suggest that DOL should update the Schedule A list to include 28 occupations, which together represent about six percent of PERM applications. The most notable additions to Schedule A in our proposed update would include:

- **STEM occupations**
  - Atmospheric and space scientists
  - Astronomers and physicists
  - Natural science managers
  - Electrical and electronics engineers
  - Environmental engineers
  - Architectural and engineering managers
- **Physical and mental health occupations**
  - Surgeons
  - Registered nurses
  - Nurse practitioners and nurse midwives
  - Diagnostic technologists and technicians
  - Medical and health services managers
  - Psychologists
  - Audiologists
  - Counselors

An objective Schedule A list would be the first systematic way the federal government would monitor and diagnose labor supply gaps and market shortages. With this information, the federal government could also target workforce training programs, educational programs, and similar spending to the areas they are needed most.

Introduction

According to the Bureau of Labor Statistics (BLS), there were 8.7 million vacant job openings in October 2023, near a fifty-year high.[1] So many jobs going unfilled slows economic growth and increases prices.

Job openings are near historic highs

Total Nonfarm Job Openings in the U.S. Since 2000 (Seasonally Adjusted)

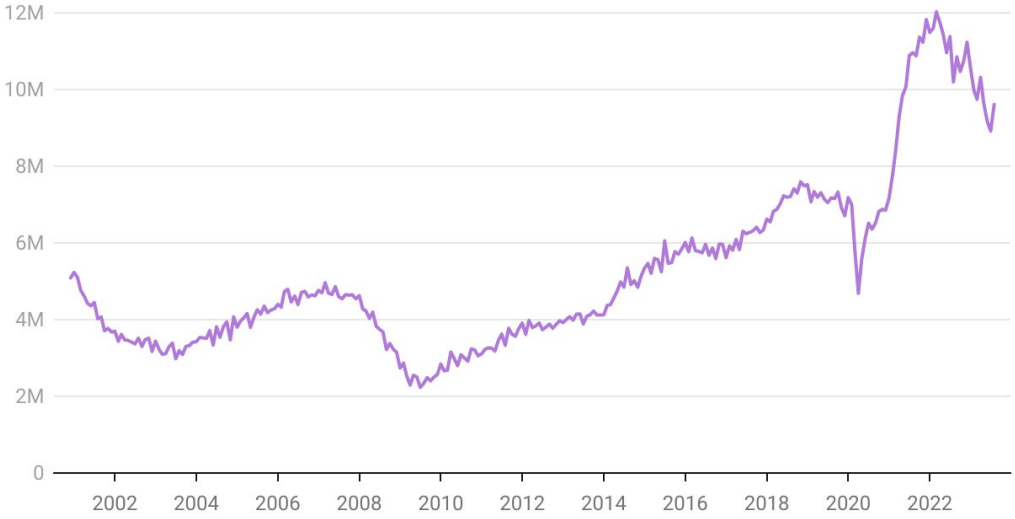

Chart: Lindsay Milliken, Jeremy Neufeld, & Greg Wright • Source: U.S. Bureau of Labor Statistics • Created with Datawrapper

Fortunately, the federal government has an almost 60-year-old tool specifically designed to direct immigration toward labor markets where there are insufficient numbers of U.S. workers available to fill open jobs: the Department of Labor's (DOL) Schedule A Group I list. The Schedule A list consists of occupations for which the Secretary of Labor has deemed that "there are not sufficient workers who are able, willing, qualified… and available" and that "the employment of such [noncitizens] will not adversely affect the wages and working conditions of workers in the United States similarly employed."[2]

Schedule A does not affect the number of green cards — that quota is set by Congress — but it does help target the fixed number of green cards toward occupations facing shortage conditions. Employers looking to hire a foreign worker in an occupation included on the Schedule A list can skip steps in the application process, saving thousands of dollars and months of delays (currently more than 12 months), in those situations where U.S. labor market protections are appropriately pre-certified. The intended result is that immigrants who will be working in occupations on the list will be able to arrive faster and with more predictability, while employers will be encouraged to use the available pool of employment-based green cards to address shortages.

The problem is that the list has not been updated in decades. Locked in stasis since 1991, the current list is completely disconnected from the reality of today's labor market.

Updating the list poses significant challenges. Many employers complain of shortages, and it can be difficult to evaluate when these complaints represent legitimate needs. While some employers struggle to hire in occupations with specialized skills due to lengthy and costly

1 "Job Openings and Labor Turnover – October 2023," Bureau of Labor Statistics, p. 1.

2 Lindsay Milliken, "A Brief History of Schedule A: The United States' Forgotten Shortage Occupation List," *The University of Chicago Law Review Online*, September 22, 2020.

delays for the prerequisite training, others bemoan shortages without actually raising wages or improving working conditions to attract workers.

Historically, updating the Schedule A list has involved fairly subjective evaluations of labor market conditions. We propose that DOL regularly update Schedule A with a transparent, data-driven approach.

In this paper, we introduce the Help Wanted Index, our preferred method by which DOL could make evidence-based updates to the Schedule A list, without relying on the unreliable testimony of employers. For comparison, we also discuss a second method, modeled after the UK's statistical process for updating its own Shortage Occupation List.[3] The method described in this paper is intended as a proof of concept for an objective approach to updating Schedule A, not as the definitive methodology for defining labor market shortages in the United States. The important takeaway is that Schedule A does not need to be forever static or at the whim of subjective assessments.

We identify ten indicators of shortage conditions that can each be measured using existing labor market data. Aggregating across these indicators would allow DOL to objectively evaluate which occupations could be added to the Schedule A list without adversely affecting the wages or working conditions of similarly employed U.S. workers. We also use recent data to show what the Schedule A list would look like if DOL used this method to update the list today (and if it had used the list over the last decade for regular updates).

Labor shortages

Complicating any attempt to discuss labor shortages objectively is that economists, employers, policymakers, and others, often mean drastically different things by the term "shortage." Evaluating labor market shortages requires clarity about how to even define a labor shortage.

To economists, an occupational shortage occurs when the quantity of workers demanded in an occupation exceeds the quantity supplied. In a competitive labor market, such shortages would not be expected — or at least, would not be expected to last very long — as employers would quickly bid up wages (and improve working conditions) to bring the quantities demanded and supplied into equilibrium. Temporary shortages can be quickly resolved by increasing wages. Persistent shortages are more difficult to explain and can have several causes. Blank and Stigler (1957)[4] and Arrow and Capron (1959)[5] point to situations in which there is a steady increase in demand that outpaces the rate at which the supply can grow and the market can react. This is especially likely when it is costly and/or takes a long time to train individuals for an occupation, which makes it difficult for supply to increase in response to higher wages. There may also be a wide range of institutional barriers that restrict the growth of labor supply, such as a lack of degree programs or restricted training pipelines such as the moratorium on medical school enrollment and other restrictions that depressed the number of new doctors each year.[6] There may also be obstacles that prevent the labor market from reacting quickly such as when compensation is set by third parties, like in health care.

3 In the most recent assessment of the UK's Shortage Occupation List (see Review of the Shortage Occupation List (October 2023), it was determined that many of the benefits of the list were rendered moot by recent changes to the Skilled Worker visa pathway. In light of these changes, the committee tasked with evaluating the list recommended that it be abolished. The Help Wanted Index takes inspiration from the analytical portion of the committee's work on the list, which has not changed since the issuance of the committee's Shortage Methodology review in February 2023. More information about the proposed changes to the Shortage Occupation List can be found in the "Shortage occupation lists around the world" section of this paper.

4 David M. Blank and George J. Stigler, "Demand and Supply: Methods of Analysis," The Demand and Supply of Scientific Personnel, National Bureau of Economic Research (1957).

5 Kenneth Arrow and William M. Capron, "Dynamic Shortages and Price Rises: The Engineer-Scientist Case," The Quarterly Journal of Economics, Volume 73, Issue 2 (May 1959), p. 292–308.

6 Robert Orr, "The Planning of U.S. Physician Shortages," Niskanen Center (September 2020).

Employers, by contrast, often invoke labor shortages in cases that do not qualify under the economists' definition. For example, intense international competition may prevent employers from raising wages to fill vacant positions and remain profitable.[7] There may be some role for immigration solutions in this case, though it does not technically qualify as a shortage. However, as BLS has long pointed out, employers often simply assert difficulty in finding qualified candidates without attempting to raise wages to attract them.[8] Such cases where employers are simply trying to avoid market competition must be distinguished from shortage conditions in an occupation.

Lawmakers, journalists, and the general public may be less interested in the narrow and technical definition used by economists. When a lawmaker says there is a shortage of surgeons or semiconductor engineers, she may not necessarily mean that there is any disequilibrium in the labor market; more likely she just means that society would be better off if we had more surgeons or semiconductor engineers. This concept has been called a "social demand shortage," to differentiate between the quantity demanded by society to maximize social welfare and the quantity demanded by employers in the labor market.[9] When an occupation generates broad positive economic spillovers (i.e., when it significantly benefits society beyond the employer, worker, and consumers of the goods and services the occupation is producing), it likely faces a social demand shortage. This definition is therefore often used to describe workers specializing in areas of national interest, like research and development, or national security.

Notably, Schedule A is described as a shortage list, but the term "shortage" appears nowhere in the statutes authorizing the program. The two requirements that an occupation needs to fulfill are:

1. "There are not sufficient workers who are able, willing, qualified… and available at the time of application for a visa and admission to the United States and at the place where the [noncitizen] is to perform such skilled or unskilled labor," and
2. "The employment of such [noncitizen] will not adversely affect the wages and working conditions of workers in the United States similarly employed."[10]

We posit that DOL could reasonably interpret the first point as requiring that there are insufficient workers to satisfy social demand to permit the agency to incorporate evaluations about positive spillover effects of specific occupations. However, measuring spillovers is difficult and may require more subjective assessments — indeed it is a vital area for future research. But in this report, we focus on establishing which occupational categories have insufficient workers to keep up with rising demand and which will not adversely affect similarly employed workers if added to the Schedule A Group I list.

While it is impossible to measure labor demand and supply curves directly, we can infer shortage conditions based on a variety of shortage indicators, which we describe in detail below.

Schedule A

The federal government awards 40,000 employment-based green cards each for the employment-based second preference and employment-based third preference (EB-2 and EB-3) categories of immigrants, allowing recipients to permanently live and work in the United States.[11]

7 Madeleine Sumption, "Filling Labor Shortages Through Immigration: An Overview of Shortage Lists and Their Implications," Migration Policy Institute (February 2011), p.2. See also Adam Ozimek, "An Alternative Theory of the Skills Shortage," Forbes, Apr 24, 2013.

8 Carolyn M. Veneri, "Can occupational labor shortages be identified using available data?" Monthly Labor Review, U.S. Bureau of Labor Statistics (March 1999).

9 Arrow and Capron, "Dynamic Shortages and Price Rises: The Engineer-Scientist Case."

10 Public Law 101-649, 101st Congress, Immigration Act of 1990.

11 "Employment-Based Immigration," Senate Republican Policy Committee, February 6, 2018.

To be eligible for an EB-2, the applicant must have at least a bachelor's degree (or foreign equivalent) or show "exceptional ability in the sciences, arts, or business."[12] Prospective immigrants applying for EB-3 classifications must show that they either have at least two years of job experience, education, or training, a bachelor's degree (or foreign equivalent), or be performing "unskilled labor" which requires less than two years of training or experience that is not temporary or seasonal.[13] The vast majority of EB-2 and EB-3 recipients are already working in the United States on temporary visas prior to applying for green card status.[14]

For an employer to successfully sponsor an EB-2 or EB-3 green card for a worker, DOL must certify that 1) there are insufficient workers able, willing, qualified, and available and 2) that the employment of the green card beneficiary will not adversely affect the wages and working conditions of similarly employed workers.[15] Almost always, this certification includes going through the lengthy and costly individualized permanent labor certification (since 2005 referred to as PERM) process.

DOL's Schedule A list was created in 1965 to precertify some occupations as meeting both requirements and bypass the individualized permanent labor certification process where it would be redundant and unnecessary. In the past, Schedule A had as many as four Groups, but presently has only two. Group I includes occupations which are in shortage. Group II includes immigrants of exceptional ability in the sciences or arts, including college and university teachers, and immigrants of exceptional ability in the performing arts.[16] If an occupation appears in Schedule A's Group I, it is already determined that there are insufficient workers to fill shortages, and that the hiring of foreign workers will not adversely affect U.S. workers. That determination significantly reduces the time and cost of sponsoring workers in those occupations. The list was updated every few years until the early 1990s (see Appendix A).

PERM requires the employer to show they have listed job openings with State Workforce Agencies, printed job ads in newspapers with wide circulation, and undertaken other recruitment activities (such as running advertisements or participating in job fairs). Because of these requirements, employers, with the exception of universities hiring professors, cannot utilize real-world recruitment practices to demonstrate they were unable to fill a role. The PERM process can take up to six months before the employer is even able to file before DOL for certification, after which the processing time at DOL takes an additional four to nine months. Once the paperwork is submitted to DOL, the processing takes an average of about 200 days.[17] Between the time it takes to assemble necessary documentation and conduct the required recruitment efforts and DOL's processing time, including formally issuing a Prevailing Wage Determination based on publicly available data from the Bureau of Labor Statistics' Occupational Employment and Wage Statistics Survey, PERM takes at least 12-15 months before immigrants can get to the next step in the immigration process. Most employment-based immigrants cannot secure their "reserved place in line" for a green card until the PERM request is filed.

12 "Employment-Based Immigration: Second Preference EB-2," U.S. Citizenship and Immigration Services, last updated April 20, 2022.

13 "Employment-Based Immigration: Third Preference EB-3," U.S. Citizenship and Immigration Services, last updated December 2, 2020.

14 "H-1B Specialty Occupations, DOD Cooperative Research and Development Project Workers, and Fashion Models," U.S. Citizenship and Immigration Services, last updated March 8, 2023.

15 Public Law 101-649, 101st Congress, Immigration Act of 1990.

16 "Chapter 7 - Schedule A Designation Petitions," Policy Manual, U.S. Citizenship and Immigration Services, current as of August 16, 2023.

17 "Processing Times," U.S. Department of Labor, last updated November 30, 2023.

In the first decade following passage of the Immigration and Nationality Act of 1965, Schedule A brought a variety of workers to the United States, including physicists, engineers, physicians and surgeons, mathematicians, and chemists.[18] Up through the 1990s, the list dwindled to include only nurses and physical therapists, in no small part because of significant lobbying efforts to restrict the inflow of specific groups of workers, such as foreign physicians.[19, 20]

Schedule A could provide certainty and predictability to eligible beneficiaries, and to employers hiring in occupations with tight labor markets where there are high job vacancies, and where immigration will not harm U.S. workers. If it were regularly updated in a data-driven way, besides directly addressing labor needs, Schedule A could help agencies and policymakers identify gaps in the workforce beyond those that immigrants can fill. An objective, evidence-based Schedule A list would be the first systematic way the federal government would monitor and diagnose labor supply gaps and market shortages. This would also help target workforce training programs, educational programs, and similar spending to the areas they are needed most. Instead, discussion about shortages currently relies heavily on anecdotes from employers and industry associations, which are unlikely to be objective or complete.[21]

Methodology to support a modernized Schedule A list

To help address labor needs in the United States, we propose that the Department of Labor update and maintain the Schedule A Group I list in a transparent and data-driven process. We propose a method that uses data to measure numerous shortage indicators across occupations. This method is similar to that in other countries. For example, the New Zealand government concluded that it should maintain its shortage occupation list using shortage indicators. The study concluded that the method strikes a balance between feasibility and the use of quantitative methods. It added that there was "significant value to be gained" from a "weighted indicator method," such as better monitoring of the labor market and better coordination between workforce training and migration policies.[22]

Although it may be difficult to measure occupational labor shortages directly, their symptoms will be reflected in labor market data. In this section, we introduce the Help Wanted Index to identify labor market tightness by occupation, incorporating ten critical shortage indicators. For comparison, we take the objective component of the process used by the UK to generate its Shortage Occupation List (which includes many but not all of the indicators used in our Help Wanted Index) and substitute in U.S. data as a benchmark against our preferred method. We also describe the U.S. data required to measure each of these indicators, how to aggregate across indicators to produce a shortage ranking, and where to set the cutoff to determine which occupations make it onto the Schedule A list.

Shortage indicators

UK-based benchmark

This method takes the UK's process for updating its Shortage Occupation List and substitutes U.S. data. The UK's method overall is described further in the next section. In short, it uses nine indicators to determine whether an occupation is in shortage:

- Percentage change in median wage over one year

18 Lindsay Milliken, "A Brief History of Schedule A: The United States' Forgotten Shortage Occupation List," *The University of Chicago Law Review Online*, September 22, 2020.

19 Ibid.

20 Robert Orr, "The Planning of U.S. Physician Shortages," Niskanen Center, September 8, 2020.

21 Stephanie Ferguson, "Understanding America's Labor Shortage," U.S. Chamber of Commerce (August 10, 2023); "2.1 Million Manufacturing Jobs Could Go Unfilled By 2030," National Association of Manufacturers (May 4, 2021); Anneken Tappe and Allison Morrow, "Three key numbers that explain America's labor shortage," CNN Business (December 25, 2021); and "Workforce Participation Shortages," National Conference of State Legislatures, last updated March 23, 2022.

22 "Data-led approach to identifying skills shortages," Taylor Fry (April 11, 2022), p. 5.

- Percentage change in median wage over three years
- Return to occupation; the additional income afforded to each worker after controlling for demographic characteristics
- Total number of vacancies divided by the total employment
- Number of job vacancy postings per worker
- Percentage change in employment over one year
- Percentage change in median hours worked over three years
- Change in new hires over one year
- Stock of the number of unemployed and inactive workers divided by the total number of employed, unemployed, and inactive workers

Because of differences in granularity between the U.S. data and the UK data, we discarded the total number of vacancies divided by the total employment. "The closest U.S. data analog, the Bureau of Labor Statistics' Job Openings and Labor Turnover Survey (BLS JOLTS) is not available at the occupation level. There is not analogous U.S. data for new hires, so the change in new hires over time is also not included in our UK-based benchmark."

Help Wanted Index

To develop the Index, we modified the UK-based list of indicators in light of differences in data availability and included additional important indicators of shortage conditions. In addition to unemployment and lagged unemployment, we also incorporated a new measure of labor market tightness in the literature, the job-to-job transition rate within each occupation over a year, following the work of Autor, Dube, and McGrew (2023). In the end, we measure the following indicators of labor market tightness for each of about 400 occupational categories[23] drawn from the Standard Occupational Classification (SOC) as defined by the American Community Survey (ACS). The federal statistical system is dedicated to independence and integrity, limiting the risk that the index could be manipulated by companies who could stand to benefit.

- **Percentage change in the median wage over one year.** Under shortage conditions, employers will raise pay to attract more workers. We estimate this using data on wage and salary from the U.S. Census Bureau's annual ACS.
- **Percentage change in the median wage over three years.** Similar to the previous indicator, this measure tracks changes over a longer period of time, indicating persistent shortages. To construct this indicator we use data from the ACS.
- **Job vacancy postings per worker.** Unfilled job postings are a sign that employers want to hire but cannot find sufficient workers. Notably, this indicator is particularly useful as a gauge of structural shortages in addition to shortages caused by temporary changes in supply or demand. Unfortunately, job postings data from the BLS are not available at the occupation level. Instead, we use data from Lightcast, combined with occupational employment data from the ACS.
- **Percentage change in employment over one year.** Rising employment would be expected if there are shortage conditions caused by rapidly increasing demand for workers in a certain occupation (note that this indicator will not reflect shortages caused by a falling supply of workers). To construct this indicator, we use data from the ACS.

23 SOC codes are six-digit numbers that categorize nearly all occupations in the United States. Some full six-digit codes have sample sizes that are too small for detailed analysis. Therefore, we use the first five digits to identify "broad" occupations rather than the "detailed" six digit version (but with more specificity than, say, the "general" two digit version). The five-digit version is approximately at the level of specificity as is typically used in Schedule A.

- **Percentage change in median paid hours worked over three years.** If there is a shortage and employers cannot find sufficient workers, the paid hours worked for existing workers may rise. To construct this indicator we use data from the ACS.
- **Labor force non-participation.** This is a stock of unemployed and inactive to employed, unemployed, and inactive workers. To construct this indicator we use data from the ACS.
- **Unemployment rate.** Low unemployment is a good indicator of a structural shortage, in addition to shortages caused by rapid changes in supply and demand. We note that this measure is not used by the UK. To construct this indicator we use data from the ACS.
- **Three year lagged unemployment rate.** We also consider occupational unemployment with a three year lag to capture the unemployment caused by persistent labor shortages. To construct this indicator we use data from the ACS.
- **Job-to-job transition rate over one year.** Following the work of Autor, Dube, and McGrew (2023), job separations are a key measure of labor market tightness, due to the fact that workers are more likely to change jobs when labor markets are tight.[24] We measure the number of job-to-job transitions (i.e., the number of workers who switch jobs) occurring over a period of time in an occupation using the longitudinal component of the Current Population Survey (CPS), which we then divide by total employment in that occupation.
- **Income premium.** To construct this measure, we first estimate the additional income afforded to each worker after controlling for their age, region, sex, and industry. We then take the weighted average of that premium across workers within each occupation, where the weights are the hours worked of each individual.

In Table 1 we outline which indicators are used for each of the methods described above, as well as the source of that data.

Table 1: A comparison of indicators used in the Help Wanted Index and a UK-based benchmark

Shortage indicator	U.S. data source	Help Wanted Index	UK-based benchmark
Percentage change in the median wage over one year	ACS	•	•
Percentage change in the median wage over three years	ACS	•	•
Job vacancy postings per worker	Lightcast and ACS	•	•
Percentage change in employment over one year	ACS	•	•
Percentage change over three years in median weekly paid hours worked	ACS	•	•
Labor force non-participation	ACS	•	•
Income premium	ACS	•	•
Unemployment rate	ACS	•	
Three year lagged unemployment rate	ACS	•	
Job-to-job transition rate over one year	CPS	•	

Note: The actual UK method also includes the vacancies to employment ratio, which is not included in our "UK-based benchmark" because we do not have U.S. data for vacancies by occupation.

24 David Autor, et. al., "The Unexpected Compression: Competition at Work in the Low Wage Labor Market," National Bureau of Economic Research (March 2023), p. 1.

These indicators include some that give a snapshot of the labor market (e.g., unemployment, the job-to-job transition rate, income premium for the year), others that show a snapshot of the labor market in the recent past (e.g., lagged unemployment), and still others that measure change over time (e.g., change in wages over one year, change in employment). This combination, and the inclusion of lagged variables and longer trends, is designed to strike a balance between 1) favoring persistent shortages and 2) being responsive to changing labor markets. Too many lagged variables would make for a Schedule A list that could not respond to emerging trends like COVID supply chain disruptions or federal efforts to onshore semiconductor manufacturing. On the other hand, too little focus on persistence would identify transient shortages that are likely to resolve themselves, not to mention yield a volatile list that would change too frequently to be useful for employers and the prospective immigrants, adding to the unpredictability of the U.S. immigration system.

To produce the indices and proposed shortage lists, we calculate these indicators for each five-digit occupation. This calculation allows us to rank occupations from most likely to be in shortage to least likely according to each indicator. The Help Wanted Index for a given occupation is the simple average of the rankings across indicators. We considered a weighted average but as the UK Migration Advisory Committee pointed out in 2020, there is no developed theory for how to pick reasonable weights.[25] We therefore followed the UK's approach in weighing all our indicators evenly. A more detailed demonstration of these calculations can be found in Appendix B.

The method described in the section above yields a rank order list of occupations, but does not directly inform how many of these occupations should be placed on the shortage list. Using a fixed threshold creates two problems: 1) different occupations represent different shares of the economy, so it makes little sense to treat each occupation with equal weight; and 2) current economic conditions will determine the number of occupations that are currently in shortage. Put differently, when the economy is booming, a relatively large number of occupations are likely to be in shortage. When the economy is in a downturn, fewer occupations will be experiencing elevated levels of labor demand. The threshold must reflect that.

To address these concerns, we propose a threshold that adjusts as the market conditions change. The Schedule A list should decrease in size as the labor market slackens and increase as it tightens, to prevent employers from skipping the PERM process unfairly in occupations that are not in high need for workers. To do this, we assign the highest ranking occupations to Schedule A until the list represents the same proportion of the overall workforce as the proportion of U.S. workers in occupations with an unemployment rate lower than 1.8%. In 2021, this gives us about eight percent of the total U.S. workforce working in occupations with less than 1.8% unemployment. Adding the highest ranking shortage occupations' labor market shares gives us 28 occupations in our proposed Schedule A update. This is quite a large change from the existing Schedule A list, which only contains two occupations. However, to put this in perspective, this represents only six percent of PERM applications. For additional perspective, the ranking system proposed by Cohen (1995) for his commissioned study on a Schedule A update in the 1990s would have qualified 96 out of 193 occupations, representing a significantly larger share of the workforce than our method.[26] In any case, the particular choice of 1.8% is also arbitrary, and a smaller or larger threshold could be selected.

25 "Review of the Shortage Occupation List: 2020," Migration Advisory Committee (September 2020), p. 63.

26 Malcolm Cohen, *Labor Shortages as America Approaches the Twenty-first Century* (Ann Arbor: The University of Michigan Press, 1995), p. 79.

Results

The Schedule A lists for the most recent available data (i.e., 2021) generated by the Help Wanted Index and the UK-based benchmark are shown in Table 2 below. The occupation lists for previous years can be found in Appendices D and E.

Table 2: Two sample Schedule A updates

	Help Wanted Index		UK-based benchmark	
Rank	Occupation	Percentage of workforce	Occupation	Percentage of workforce
1	Atmospheric and Space Scientists (19-202)	0.01%	Sales Engineers (41-903)	0.04%
2	Procurement Clerks (43-306)	0.03%	Other Financial Specialists (13-20X)	0.07%
3	Sales Engineers (41-903)	0.04%	Medical and Health Services Managers (11-911)	0.49%
4	Astronomers and Physicists (19-201)	0.01%	Human Resources Managers (11-312)	0.17%
5	Medical and Health Services Managers (11-911)	0.49%	Electrical and Electronics Engineers (17-207)	0.18%
6	Natural Science Managers (11-912)	0.02%	Procurement Clerks (43-306)	0.03%
7	Other Financial Specialists (13-20X)	0.07%	Photographic Process Workers and Processing Machine Operators (51-915)	0.02%
8	Registered Nurses (29-114)	2.18%	Marketing and Sales Managers (11-202)	0.72%
9	Surgeons (29-124)	0.04%	Atmospheric and Space Scientists (19-202)	0.01%
10	Psychologists (19-303)	0.16%	Computer Hardware Engineers (17-206)	0.04%
11	Human Resources Assistants, except Payroll and Timekeeping (43-416)	0.05%	Credit Counselors and Loan Officers (13-207)	0.25%
12	Lawyers, and Judges, Magistrates, and Other Judicial Workers (23-10X)	0.82%	Environmental Engineers (17-208)	0.03%
13	Electrical and Electronics Engineers (17-207)	0.18%	Surgeons (29-124)	0.04%
14	Credit Counselors and Loan Officers (13-207)	0.25%	Conveyor, Dredge, and Hoist and Winch Operators (53-70X)	0.02%
15	Audiologists (29-118)	0.01%	Other Construction and Related Workers (47-40X)	0.03%
16	Human Resources Managers (11-312)	0.17%	Human Resources Assistants, except Payroll and Timekeeping (43-416)	0.05%
17	Urban and Regional Planners (19-305)	0.03%	Training and Development Managers (11-313)	0.05%
18	Nurse Practitioners and Nurse Midwives (29-11X)	0.19%	Chiropractors (29-101)	0.05%
19	Chiropractors (29-101)	0.05%	Human Resources Workers (13-107)	0.63%
20	Diagnostic Related Technologists and Technicians (29-203)	0.31%	Psychologists (19-303)	0.16%
21	Emergency Management Directors (11-916)	0.01%	Fishing and Hunting Workers (45-303)	0.02%

	Help Wanted Index		UK-based benchmark	
Rank	Occupation	Percentage of workforce	Occupation	Percentage of workforce
22	Training and Development Managers (11-313)	0.05%	Emergency Management Directors (11-916)	0.01%
23	Environmental Engineers (17-208)	0.03%	Audiologists (29-118)	0.01%
24	Marketing and Sales Managers (11-202)	0.72%	Astronomers and Physicists (19-201)	0.01%
25	Human Resources Workers (13-107)	0.63%	First-Line Supervisors of Retail and Non-Retail Sales Workers (41-101)	2.47%
26	Counselors (21-101)	0.60%	Nurse Practitioners and Nurse Midwives (29-11X)	0.19%
27	Architectural and Engineering Managers (11-904)	0.14%	Sales Representatives of Services, except Advertising, Insurance, Financial Services, and Travel (41-309)	0.41%
28	Occupational Health and Safety Specialists and Technicians (19-501)	0.06%	Management Analysts (13-111)	0.65%
29			Solar Photovoltaic Installers (47-223)	0.01%

Using the Help Wanted Index, we propose a Schedule A list with 28 occupations, which together account for six percent of PERM applications. These occupations fall roughly into three main categories: health occupations; STEM occupations; and business occupations.

Healthcare professions are, as expected, represented strongly in our list. Nurses would remain on the Schedule A list with registered nurses (RNs) (#8), and nurse practitioners and nurse midwives (#18) qualifying. Physical therapists (#33) do not make the cut and would be removed from the Schedule A list, but still rank highly overall and would qualify under a slightly less restrictive ceiling than the 1.8% threshold we suggest above (a less restrictive cutoff might also include physicians at #30 and optometrists at #37). Nevertheless, many other health occupations would be added, including surgeons (#9), diagnostic related technologists and technicians (#20), audiologists (#15), and medical health services managers (#5). Mental health occupations would also qualify, including psychologists (#10) and counselors (#26).

Many STEM occupations would qualify under the Index and be added to Schedule A. These occupations include electrical and electronics engineers (#13), astronomers and physicists (#4), atmospheric and space scientists (#1), and environmental engineers (#23). Natural science managers (#6) and architectural and engineering managers (#27) would also be included. Adding these occupations would dovetail with the Biden Administration's efforts to attract STEM talent to the United States.[27] Electrical and electronic engineers (which account for over eight percent of the semiconductor manufacturing workforce) as well as architectural and engineering managers (which account for another two percent) will be particularly useful in ongoing efforts to onshore semiconductor manufacturing to the United States.[28] Other semiconductor-related occupations are likely to show up on future lists generated by our rankings as the boost in labor demand caused by the CHIPS and Science Act appears in the data.

27 Jeremy Neufeld, "Unpacking the Biden Administration's Latest Actions to Attract STEM Talent to the United States," Institute for Progress, January 21, 2022.

28 "May 2022 National Industry-Specific Occupational Employment and Wage Estimates," Bureau of Labor Statistics (April 25, 2023).

Finally, occupations involved in improving business efficiency would be added to the Schedule A list. Procurement clerks (#2) score particularly high in 2021 (and would have not appeared in previous years) likely because of supply chain disruptions caused by the pandemic. Other business-related additions to the list include training and development managers (#22) — who will contribute to domestic reskilling efforts — and human resources professions (#11, #16, and #25).

The UK-based benchmark is another feasible option for a Schedule A update, though not radically different from the Help Wanted Index. In fact, the lists have 20 occupations in common suggesting that the methodology is not too sensitive to the indicator set. Still, by including additional indicators that we think are important (see above), our method adds critical health-based occupations, including registered nurses and diagnostic technicians, and STEM management occupations, such as architecture and engineering managers and natural science managers.

Historical proposed lists

How would the Schedule A list have looked if DOL updated it in a data-driven way in previous years? What would be the impact on the U.S. workforce and PERM applications? We analyzed data from 2013, 2016, 2019, and 2021 using the Help Wanted Index and the UK benchmark and applied our threshold as described earlier. The historical lists can also be found in Appendices D and E.

Some occupations show persistent shortage conditions across previous years. These occupations include nurse practitioners and nurse midwives, physician assistants, atmospheric and space scientists, nurse anesthetists, dentists, and optometrists. Still other occupations we can see would be new additions, including diagnostic technicians and counselors.

Under our proposed methodology, the proposed list flexes as economic conditions change. As we would expect, the Schedule A list would be a lot shorter coming off the Great Recession, growing through the recovery in 2019, and shrinking following COVID. We can see in the chart below how the percentage of total U.S. employees and PERMs covered by the proposed list changes over time.

Percentage of workforce in occupations designated by proposed Schedule A Group I update

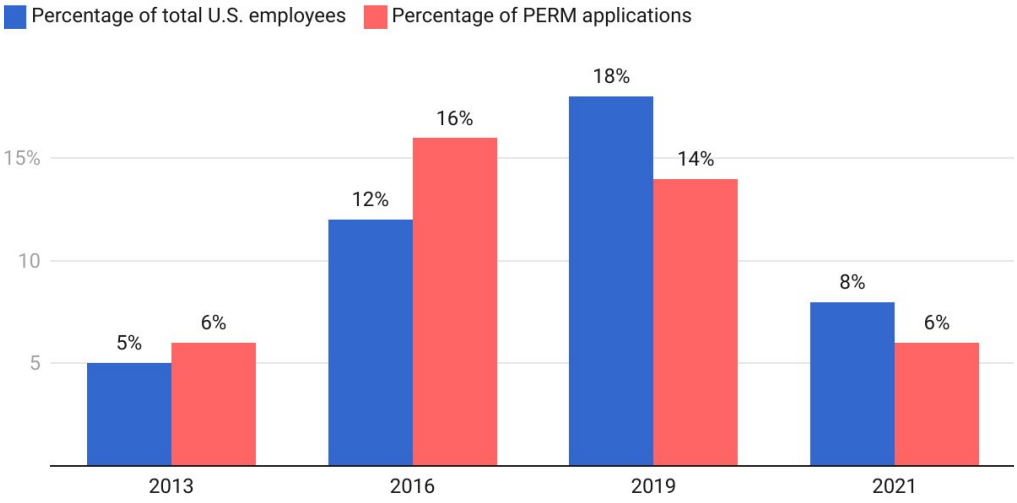

Chart: Lindsay Milliken, Jeremy Neufeld, and Greg Wright • Source: American Community Survey and DOL Performance Data • Created with Datawrapper

Discussion

We can also observe that this data-driven approach does not identify legitimate shortages in many of the occupations where media coverage has relied on employer testimony to assert shortage conditions. For instance common service jobs in the restaurant industry including cooks, dishwashers, waiters/waitresses, and fast food and counter workers all are ranked in the lower half of occupations. Some may score well on one indicator but do very poorly on the others, indicating that they are unlikely to be experiencing labor market conditions that would merit a policy response. For instance, wait staff have a very high job-to-job transition rate, but no other indicator suggests shortage conditions. Construction laborers have higher than average job-to-job transitions and three-year pay growth, but are in the bottom half of occupations on other indicators. Of course, this does not necessarily mean employers are intentionally deceptive about being unable to find workers — shortages might exist in some regions and some employers may simply have a hard time telling the difference between a labor shortage and that their business is unprofitable in a higher wage environment. In any case, the evidence we put together does not justify their claims of shortage conditions.

The Help Wanted Index — Indicator Heatmap (selected occupations)

Red indicates shortage conditions, blue indicates shortage is less likely

HWI ranking	Occupation	Pay increase (one yr)	Pay increase (three yrs)	Transition rate	Income premium	Vacancy rate	Change in hours	Change in employment	Unemployment rate	Unemployment rate (three yr lag)	Labor force nonparticipation
1	Atmospheric and Space Scientists	48%	54%	3%	$7,767.33	14%	−10%	47%	2%	0%	14%
4	Astronomers and Physicists	18%	54%		$102,557.30	36%	0%	−20%	0%	2%	17%
8	Registered Nurses	3%	8%	2%	-$252.85	41%	0%	5%	1%	1%	14%
9	Surgeons	9%	40%	2%	$246,486.00		−8%	0%	2%	0%	10%
10	Psychologists	9%	7%	2%	$31,914.16	19%	0%	2%	1%	1%	11%
13	Electrical and Electronics Engineers	0%	10%	1%	$9,223.56	45%	1%	11%	2%	2%	13%
15	Audiologists	8%	13%		$158.00	23%	1%	−13%	3%	2%	12%
18	Nurse Practitioners and Nurse Midwives	2%	4%	1%	$25,886.39		0%	18%	1%	1%	7%
20	Diagnostic Technologists And Technicians	0%	7%	2%	$4,918.38	37%	0%	8%	2%	1%	12%
22	Training and Development Managers	6%	7%	3%	$37,775.01	27%	0%	11%	4%	3%	16%
23	Environmental Engineers	1%	11%	1%	$3,668.48	57%	0%	17%	2%	2%	13%
46	Computer Hardware Engineers	3%	8%	1%	-$13,562.80	20%	1%	10%	3%	4%	9%
53	Computer and Information Systems Managers	5%	12%	1%	$50,213.51	4%	0%	3%	2%	2%	10%
132	Driver/Sales Workers and Truck Drivers	3%	8%	3%	-$2,233.29	23%	0%	6%	6%	4%	20%
155	Secondary School Teachers	2%	8%	1%	-$19,143.10	3%	0%	1%	2%	1%	16%
231	Electricians	0%	4%	2%	-$28,955.20	6%	0%	4%	5%	3%	16%
278	Construction Laborers	3%	15%	3%	-$71,661.30	4%	0%	9%	10%	8%	25%
298	Pipelayers	0%	13%	2%	-$55,592.90	5%	0%	−6%	7%	4%	19%
324	Welding, Soldering, and Brazing Workers	0%	0%	3%	-$65,808.90	6%	0%	2%	7%	4%	21%
381	Waiters and Waitresses	−14%	−20%	4%	-$29,359.90	9%	−17%	−3%	12%	7%	32%

Our indicators are not equipped to capture shortages that may arise when market outcomes are not governed by market forces. For instance, teachers, who do not appear on our 2021 proposed update, are employees of local and state governments, and face markets constrained more by government budgets and union negotiations than markets typical in the private sector. We note that some teaching occupations, such as special education teachers, would appear in the proposed lists generated by our method in previous years (see Appendices D and E).

Other occupations that are often described in shortage, like physicians, physical therapists, and computer hardware engineers, do score highly across indicators but simply do not make the cutoff suggested in this paper. A small adjustment to the threshold of 1.8% unemployment could add these occupations to the list.

Future improvements

We do not intend the Help Wanted Index to update Schedule A as definitive or the final word on how to measure shortage occupations in America, but instead as a proof of concept that there can be objective, data-driven ways to think about what occupations belong on the list.

For instance, as we describe in the section on "Labor Shortages" above, the Index does not incorporate the positive spillovers associated with different occupations, as related to "social demand shortages." These shortages are not necessarily related to labor market disequilibrium, but refer to whether society would be better off with more people in a particular occupation. There are national security spillovers associated with occupations like electronics engineers or computer hardware engineers who will be vital to onshoring semiconductor manufacturing. The former are captured by our method, but the latter are missed. However it is likely the latter will be added as the data catches up to recent demand increases. Certain research and development occupations like AI researchers also are missed by our method which likely generate significant spillovers. Developing methods to better capture these spillovers would help capture such "social demand shortages."

Further improvements to the method laid out here could be made with better data. If DOL actively used data to inform Schedule A updates, it could help identify data collection improvements to BLS or the Census Bureau that would facilitate better decision-making around shortages.

Regional variations of the Help Wanted Index would also be a valuable improvement, but are difficult given current data limitations we encountered. Measuring these shortage indicators at any level of occupational granularity would rely on sample sizes too small for meaningful analysis. Including data across many years might enable a regional evaluation of shortages, but it would also make our measurements less responsive to changes in the labor market, and require long lags before the list adjusted appropriately. More regional data collection could enable more responsive regional shortage evaluation.

Another limitation is that we focused on occupational shortages, not on skill shortages. The simple reason for this is that much more data is collected on occupations than on skills. Historically, Schedule A did not solely include occupations. Instead, it focused on skills, categories of workers, or levels of educational attainment.[29] Starting in 1965, Group I included people with advanced degrees who were employed in an occupation relevant to their academic specialization. Group II included people with bachelor's degrees specializing in a variety of scientific fields, including physics, chemistry, engineering, and mathematics. Group III hewed more closely to the current Group I list and included only professional nurses. Several years later, Group III was changed to cover people working in religious professions, including conducting religious services, and those whose work supported the "nonprofit operation of a religious organization." In the 1970s, Schedule A added a Group IV which covered intracompany transferees working either in managerial or executive positions, or "positions requiring

29 Lindsay Milliken, "A Brief History of Schedule A: The United States' Forgotten Shortage Occupation List," *The University of Chicago Law Review Online*, September 22, 2020.

specialized knowledge." Schedule A decreased in size in the 1980s and 1990s with the elimination of many of the Groups that covered categories of employees or thresholds of educational attainment.[30] Further details about these changes can be found in Appendix A.

Shortage occupation lists around the world

The idea of using a shortage occupation list to supplement the domestic workforce is not unusual (see Appendix C). The UK's Shortage Occupation List may be the most well-known, with several other countries' lists modeled after it. For instance, Malaysia's government explained that 16 countries in the Organization for Economic Cooperation and Development (OECD) maintain shortage lists for themselves and this provided impetus for Malaysia to develop their own.[31] These OECD countries using shortage lists include:

- Belgium
- Sweden
- Switzerland
- Luxembourg
- United Kingdom
- Lithuania
- Austria
- Slovakia
- New Zealand
- Denmark
- Australia
- Ireland
- Japan
- Iceland

United Kingdom

As noted above, the hypothetical Schedule A list that we constructed is inspired by the methodology developed by labor market experts in the UK. The UK government's version of Schedule A is called the Shortage Occupation List (SOL).[32] If an employer is hiring a foreign worker in an occupation listed on the SOL, the costs of the Skilled Worker visa application are lower and there is a lower salary threshold to qualify for that status, opening up the eligibility to the visa for a greater number of workers.[33] There used to be additional benefits to hiring in an occupation listed on the SOL, such as the waiver of the Resident Labour Market Test (RLMT) and exemption from the cap on the Skilled Worker visa.[34] However, in 2021 the RLMT and the visa cap were eliminated for the Skilled Worker visa pathway, reducing the role of the SOL in the process.[35]

30 Ibid.

31 "Monitoring Occupational Shortages: Lessons from Malaysia's Critical Occupations List," World Bank Group (September 2019), p. 11.

32 "Skilled Worker visa: shortage occupations," UK Visas and Immigration, Government of the United Kingdom, last updated August 7, 2023.

33 "Skilled Worker visa," UK Visas and Immigration, Government of the United Kingdom.

34 "Review of the Shortage Occupation List," Migration Advisory Committee (October 2023), p. 14.

35 Kim Vowden et. al., "The end of the resident labour market test: good news for employers?," Lexology Employment Law Blog, October 8, 2020.

The SOL is under the purview of the Migration Advisory Committee (MAC), which consists of five academic experts.[36] The MAC, an independent, public organization, is sponsored by the Home Office. Periodically, the Minister for Safe and Legal Migration commissions the MAC to reevaluate and update the SOL. Each time it updates the SOL, the committee ensures that it publishes detailed reports about its findings and the data collected during the process. The MAC's transparent analysis of the UK labor market engenders trust from the public and from the business community.

Broadly, the MAC determines whether an occupation should be included on the SOL using two criteria: whether the occupation is experiencing a labor shortage; and if it is sensible to solve this shortage through immigration.[37] For the first criterion, the MAC relies on an objective method. For the second, the committee makes a subjective determination, incorporating stakeholder evidence and feedback.[38]

Its most recent evaluation of the SOL was published on October 3, 2023. The Minister requested that the committee exclude any occupations where there would only be "negligible benefit" provided by the SOL in hiring international talent.[39] During its review, the MAC determined that the reduced salary threshold benefit was adversely impacting domestic workers and recommended its removal. Thus, because that reduced threshold was the main benefit of the SOL, any occupations that exceed the minimum salary threshold of £26,200 for the Skilled Worker visa overall would only receive "negligible benefit" from the SOL and should be rendered ineligible for the list.[40] This judgment would eliminate most occupations from the SOL and, because very few occupations would qualify, the MAC recommends that the SOL be abolished.

It is important to note that the immigration benefits of the SOL and Schedule A differ significantly. The MAC recommends the UK government abolish the SOL because its major benefits have been rendered moot with changes to the Skilled Worker visa pathway. Unlike hiring through the Skilled Worker visa, U.S. employers hiring through Schedule A still have to pay the prevailing wage and there are no exemptions from the number of EB-2 and EB-3 green cards allotted per year. Additionally, Schedule A's benefit of reducing administrative burden in the permanent labor certification process still exists. As such, despite this determination from the MAC, its statistical method for evaluating shortage conditions is still viable in an American context with our previously described modifications.

New Zealand

The New Zealand government has also used shortage lists to bolster immigration. Its current list, called the Green List, includes high-skill, difficult-to-fill roles. The list contains two tiers: Tier 1 with highly skilled positions such as scientists, engineers, and medical specialists; and Tier 2 with in-demand roles such as teachers, health professionals (including nurses), and certain trades.[41] A prospective immigrant with a job offer included in the Green List can obtain permanent residency in New Zealand immediately (with a Tier 1 job offer) or after only two years of work (in a Tier 2 job).[42]

The Green List is a result of a consolidation of three older lists: the Long Term Skills Shortage List (LTSSL); the Regional Skill Shortage List (RSSL); and the Construction and Infrastructure Skill Shortage List (CISSL).[43] Though labeled as "skill shortage lists," each one identified

36 "Migration Advisory Committee," Government of the United Kingdom.

37 "Shortage Methodology review," Migration Advisory Committee (February 2023), p. 3.

38 Ibid.

39 "Review of the Shortage Occupation List," Migration Advisory Committee (October 2023), p. 9.

40 Ibid.

41 "The new Immigration Green List - what is it?," Pathways, last updated September 14, 2022.

42 "Green List roles," New Zealand Ministry of Business, Innovation & Employment, as of August 21, 2023.

43 "Skill shortage review process," New Zealand Ministry of Business, Innovation & Employment, as of August 21, 2023.

occupations experiencing shortages, not specific in-demand skills. The LTSSL included occupations "where there was a sustained and ongoing shortage of highly skilled workers both globally and throughout New Zealand."[44] The RSSL included occupations "where skilled workers were required in particular regions of New Zealand and indicated that there were no New Zealand citizens or residents available to take up the position."[45] The CISSL included occupations "in critical shortage in the construction industry across New Zealand."[46]

In 2021, the Ministry of Business, Innovation, and Employment (MBIE) decided to shift its skilled visa system towards higher skilled positions and developed the Green List. This shift is intended to help New Zealand recover more quickly from the economic impacts of the country's strict pandemic border closures.[47] MBIE prioritized occupations which were essential to supporting the health of New Zealanders, were pivotal in the value chain, and also were strategically important to the New Zealand government's objectives.[48] Officials at MBIE reviewed several sources of information to create the Green List, including the skills shortage lists, Industry Transformation Plans, the feedback from targeted stakeholders, and the views of relevant government agencies.[49] The New Zealand government plans to review the list every three years to ensure its responsiveness to economic conditions.[50]

Australia

The Australian government uses a variety of shortage occupations and skills lists to inform its immigration policy. The main shortage list is the Skilled Migration Occupation List, which consists of the Short-Term Skilled Occupation List; the Medium and Long-Term Strategic Skills List; and the Regional Occupation List. Between September 2, 2020 and October 28, 2022, the Australian government used another mechanism called the Priority Migration Skilled Occupations List.[51] The former underpins international workers' eligibility for the Temporary Skill Shortage (TSS) visa and the latter includes occupations that were considered critical to the recovery of the economy after the COVID-19 pandemic.

The National Skills Commission, created in July 2020, is responsible for developing the shortage lists and providing advice to the Minister for Employment and Workplace Relations and the Minister for Skills and Training.[52] Like the processes developed by the UK and New Zealand, Australia's procedure for updating its shortage lists include a combination of labor market analysis and meetings with outside stakeholders for feedback.[53] The lists are updated annually, but business organizations have claimed that there is not enough transparency or information publicly available on the decision-making process for including or removing occupations.[54]

44 "Skill shortage list checker," New Zealand Ministry of Business, Innovation & Employment, last updated 2021.

45 Ibid.

46 "Skill shortage list checker," New Zealand Ministry of Business, Innovation & Employment.

47 "Immigration Rebalance - determining the green list and sector agreements," New Zealand Ministry of Business, Innovation & Employment (July 2022), p. 1-6.

48 Ibid.

49 "Immigration Rebalance," New Zealand Ministry of Business, Innovation & Employment.

50 Ibid.

51 "Skilled Migration Occupation Lists," National Skills Commission for the Australian Government, as of August 21, 2023.

52 "About," National Skills Commission for the Australian Government, as of August 21, 2023.

53 "Processes for determining skills shortages, occupation lists and skills assessments," Parliament of Australia, as of August 21, 2023.

54 Ibid.

Malaysia

In the past decade, Malaysia has been concerned with its ability to compete economically with its international neighbors, especially as its economy began to transition away from agriculture and manufacturing. In 2014, Malaysia created the Critical Skills Monitoring Committee, made up of two government agencies: TalentCorp and the Institute of Labor Market Information and Analysis.[55]

The committee partnered with the World Bank to create a Critical Occupation List (COL), which includes occupations "for which there is strong evidence that there is significant labor market shortage that may be alleviated through government action."[56] The list aims to identify occupations which are necessary to continue the growth of the Malaysian economy, but which employers are having difficulty filling.[57]

The goal of the COL is to identify occupations that are middle- or high-skilled, are sought-after in the Malaysian economy, and are strategic for the government's economic objectives.[58] The list and its methodology are based on the structures of both the UK's and Australia's shortage lists.[59] The COL is used as a source of "labor market intelligence," such that universities design their educational programs around the needs identified by the list, and the government uses it to design its immigration system to entice Malaysians working abroad to return.[60] The COL is updated yearly.[61]

Singapore

Starting September 1, 2023, Singapore implemented a new points system for its employment-based immigration pathways called Employment Pass. To obtain an Employment Pass, candidates must meet the qualifying salary threshold and earn 40 points under the Complementarity Assessment Framework.[62] Points are awarded based on attributes of the individual applicant (salary and qualifications) and attributes of the firm hiring them (diversity of the workforce and support for local employment). Candidates can earn up to 20 bonus points if they are filling a job in which skills shortages exist as designated by the Ministry of Manpower's Shortage Occupation List (SOL).[63] The occupations on the SOL require "highly specialized skills and are currently in shortage in the local workforce."[64]

The SOL is developed by the Ministry of Manpower and the Ministry of Trade and Industry with consultation from relevant sector-specific agencies and partners. Occupations are included in the list if they fulfill three criteria:

- Strategic importance to Singapore's economic priorities;
- Degree and nature of the labor shortage; and
- Commitment of the relevant sectors to developing a local pipeline of talent to address the shortages in the medium-term.[65]

55 "Monitoring Occupational Shortages: Lessons from Malaysia's Critical Occupations List," World Bank Group (September 2019), p. 11.

56 Harry Edmund Moroz, "Malaysia's most wanted: The critical occupations list," *East Asia & Pacific on the Rise* (blog), World Bank Group, October 16, 2019.

57 Ibid.

58 "Monitoring Occupational Shortages: Lessons from Malaysia's Critical Occupations List," World Bank Group (September 2019), p. 7.

59 Ibid. p. 16.

60 "Monitoring Occupational Shortages," World Bank Group, p. 17.

61 "Malaysia's 'Critical Occupations List' is an Innovative Tool for Preparing Workers for the Jobs of the Future: World Bank," World Bank Group, September 12, 2019.

62 "Complementarity Assessment Framework (COMPASS)," Singapore Ministry of Manpower, last updated August 25, 2023.

63 Ibid.

64 "COMPASS Skills Bonus - Shortage Occupation List (SOL)," Singapore Ministry of Manpower, last updated August 24, 2023.

65 Ibid.

The six targeted industries in the new list include agricultural technology, financial services, green economy, healthcare, information technology (particularly in artificial intelligence), and maritime.[66] The Singapore government plans to update the list annually and reset it completely every three years to ensure that the SOL does not contribute to specific sectors relying long-term on Employment Pass holders.[67]

Conclusion

In the global race for skilled workers, many countries are in competition with the United States. The U.S. federal government has a shortage list set up and ready to be used to bolster the country's position in this competition, but each year DOL decides not to update Schedule A, it is wasting the opportunity to attract new workers. The United States has been coasting on its reputation as a land of professional opportunities for a long time. As other countries make changes to their employment-based immigration systems, its ability to stay competitive is dwindling rapidly. Each one of the countries listed above, and the ones highlighted in more detail in Appendix C, has adapted the concept of a shortage occupation list to best serve their own workforce markets and policy contexts.

In considering updates to Schedule A, there is an obvious need to strike a balance between protecting U.S. workers and responding to clear economic imperatives. As economic conditions change, occupations at one point added to Schedule A should be removed once a labor shortage is no longer present. Refraining from updating Schedule A could in fact harm DOL's careful protections for workers, by allowing employers hiring in occupations which are no longer in shortage to unfairly skip the PERM process. For the occupations that should be rightfully included in Schedule A, satisfying the PERM process can be costly and redundant, unnecessarily burdening both the incoming immigrant workers and wasting valuable DOL resources.

The Schedule A list can also aid DOL in directing its resources towards the highest impact programs. The list can become a straightforward tool for assessing which occupations would benefit the most from increased workforce training and education programs, strengthening the domestic workforce.

Routinely updating the list also adds a level of much-needed predictability to the immigration system. There are many aspects of it that are confusing for employers and immigrants, so much so that it can convince people to not even apply. Any bit of predictability in the system, even if the person still has to wait for a green card to become available, can convince them to stay in the queue.

The United States is experiencing a time of great change economically and of increasing competition globally. Our country should use every tool available to ensure it maintains its competitive economic edge and help U.S. workers and businesses grow. Schedule A has been forgotten for decades and we should not forget it now.

66 "Annex B - Shortage Occupation List," Singapore Ministry of Manpower, March 2023.

67 Abigail Ng, "Shortage occupation list for EP applicants takes local graduate pipeline into account: Tan See Leng," Channel News Asia (May 8, 2023).

Appendices

Appendix A: Timeline of changes to Schedule A

Date	Schedule A list contents
October 3, 1965	The Immigration and Nationality Act of 1965 is signed into law, requiring the Secretary of Labor to provide an affirmative individualized certification for each employment-based immigrant, one-by-one, and providing authority to the Secretary to instead identify groups of immigrants for whom such a certification is not necessary
November 19, 1965	**Group I** Persons with an advanced degree from a U.S. institution and who have been employed for at least two years **Group II** Aeronautical engineering, chemical engineering, electrical engineering, electronic engineering, library science, mathematics, mechanical engineering, metallurgical engineering, metallurgy, nuclear engineering, organic chemistry, pharmacology, physical chemistry, and physics **Group III** Professional nurses
February 4, 1971	**Group I** Persons with an advanced degree in dietetics, medicine and surgery, nursing, pharmacy, and physical therapy **Group II** Persons with a degree (bachelor's equivalent) or a combination of experience and education equivalent to that degree in dietetics, nursing, pharmacy, and physical therapy **Group III** Religious workers or workers in nonprofits associated with religious organizations
January 18, 1977	**Group I** Persons with an advanced degree in dietetics, persons who have a bachelor's (or equivalent) in physical therapy **Group II** Persons of exceptional ability in the sciences or arts (except the performing arts), including college and university teachers of exceptional ability "who have been practicing their science or art during the year prior" to their application and who intend to continue practicing it in the United States **Group III** Religious workers, including those working at nonprofit religious organizations **Group IV** Persons who have been admitted to the United States to work (and are currently working in) "managerial or executive positions with the same international corporations or organizations with which they were continuously employed for one year before they were admitted," and persons who will be in managerial or executive positions with "the same international corporations or organizations with which they have been continuously employed for the immediately prior year"
December 19, 1980	**Group I** Physical therapists, physicians, surgeons, and nurses in Health Manpower Shortage Areas or areas identified otherwise as having an insufficient number of workers in the specified specialty of the applicant **Group II** Persons of exceptional ability in science or art (except performing arts), including college and university teachers of exceptional ability **Group III** Religious workers and workers in nonprofit religious organizations **Group IV** Persons admitted to the United States in managerial or executive positions who have worked in that role outside the United States for at least one year and persons in managerial or executive roles working outside the United States in that position for at least one year, with the qualifying organizations for both of these types of applicants doing business inside the United States for at least one year
June 2, 1987	**Group I** Physical therapists and nurses **Group II** Persons of exceptional ability in science or art (except performing arts), including college and university teachers of exceptional ability **Group III** Religious workers and workers in nonprofit religious organizations **Group IV** Persons admitted to the United States in managerial or executive positions who have worked in that role outside the United States for at least one year and persons in managerial or executive roles working outside the United States in that position for at least one year, with the qualifying organizations for both of these types of applicants doing business inside the United States for at least one year

Date	Schedule A list contents
November 29, 1990	The Immigration Act of 1990 created the five Preference Groups for employment-based immigrants, eliminating the need for Groups II-IV in Schedule A
October 23, 1991-present	**Group I** Physical therapists and nurses **Group II** Persons of exceptional ability in the sciences or arts, including college and university teachers, and immigrants of exceptional ability in the performing arts

Appendix B: More notes on data and methods

As described in Table 1 above, most of the data used to construct our shortage indicators come from one-year samples in the American Community Survey (ACS). Vacancy postings per worker combine data from Lightcast with ACS and job-to-job transitions are calculated with the Current Population Survey (CPS). Many of these same indicators that draw from ACS data could have been derived with Occupational Employment and Wage Statistics (OEWS) data from the Bureau of Labor Statistics instead. However, OEWS' sample sizes are too small. CPS could provide more frequent data but also suffers from smaller sample sizes than ACS. Nevertheless, being able to access more frequent and recent data may make CPS more appropriate for DOL to adopt in any final method for Schedule A updates, depending on the level of geographic and occupational aggregation required.

All indicators are evaluated for occupations at the level of five digit SOC codes (in the ACS this is the OCCSOC code). All individuals are therefore assigned to the occupation category along with other individuals sharing the first five digits.

We drop individuals who are out of the labor force or unemployed and who last worked over five years ago, as well as those under 16 years of age. Because the military does not recruit abroad, we also dropped all military-specific occupations (i.e., those with SOCs beginning with "55") since they would not be relevant for the Schedule A list.

When calculating each indicator we scale observations by the ACS person weights (PERWT) provided by the Census Bureau through IPUMS. All medians are calculated as weighted medians. Notes on the measurement of each indicator are available below:

- **Percentage change in the median wage over one year (and three years).** We estimate this using data on wages (INCWAGE) from the ACS.
- **Job vacancy postings per worker.** Since publicly available job postings data from the BLS JOLTS survey are not available at the occupation level, we use proprietary data from Lightcast.io combined with occupational employment data from the ACS. Specifically, for each occupation we calculate the ratio of job postings to workers (employment) in a given year.
- **Percentage change in employment over one year.** This is employment growth as indicated by the ACS employment status variable EMPSTAT.
- **Percentage change in median paid hours worked over three years.** This is growth in the median of weekly paid hours (UHRSWORK) from the ACS.
- **Labor force non-participation.** This is the ratio of unemployed and inactive workers relative to unemployed, inactive, and employed workers, by occupation. These values come from the ACS variable EMPSTAT. Occupations with lower values of this indicator are deemed to be in greater shortage.
- **Unemployment rate (and three year lagged unemployment).** To construct these indicators we use data on employment status (EMPSTAT) from the ACS, which assigns unemployed individuals to their most recent occupation. Occupations with higher values of this indicator are deemed to be in greater shortage.
- **Job-to-job transition rate over one year.** Using data from the two-year longitudinal component of the Current Population Survey, we calculate the number of job-to-job transitions (i.e., the number of workers who switch jobs) within an occupation in a year and divide that value by total occupation employment in that year.
- **Income premium.** To construct this measure we first estimate the additional income afforded to each worker after controlling for their age, region, sex, and industry. We then take the weighted average of that premium across workers within each occupation, where the weights are the hours worked of each individual.

Note that due to data limitations, while vacancy postings per worker is included in the 2021 assessment, it is not included in the pre-2021 historical lists.

Appendix C: Comparison of shortage occupation lists around the world

Country	Name	Immigration pathway	Benefits	Occupations	Methodology
Australia	Skilled Occupation List	A variety of visas	Varies	Link	Labor market analysis from the National Skills Commission Additional details
Austria	Shortage occupation list	Red-White-Red Card	The worker can live and work in Austria for 2 years	Link (national); Link (regional)	Criteria: • Fewer than 1.5 job seekers are available within one year for each vacant position reported to the Austria Public Employment Service
Belgium	Shortage occupation lists	Depends on the province	Depends on the province	• Flanders • Wallonia • Brussels	Depends on the province
Denmark	Positive List for Skilled Work; and the Positive List for the Highly Educated	Residence and work permit	Residency for 4 years, with extensions possible	• Positive List for Skilled Work; Link • Positive List for the Highly Educated; Link	Assessments from the Labour Market Balance Model, profession-specific unemployment insurance funds, and Regional Labour Market Councils Additional details
Ireland	Critical Skills Occupation List	Critical Skills Employment Permits	• A labor market test is not required • The worker can have immediate family reunification, with the dependents and spouses eligible for employment permits • Pathway to permanent residency	Link	N/A
Japan	Specified Industry Fields and Jobs	Specified Skilled Worker Visa	Residency for up to 5 years	Link 1 & 2	N/A
Luxembourg	Shortage occupation list	EU Blue Card	The worker can be paid a lower minimum salary in exchange for permanent residency in the EU	Link	N/A
Malaysia	Critical Occupation List	• Returning Expert Programme • Resident Pass Talent	• Bolsters eligibility of Malaysian citizens wishing to return and work • Bolsters eligibility of non-Malaysian citizens to obtain 10-year residency visa	Link	Review of economic indicators (Labour Force Survey, TalentCorp data) and feedback from stakeholders (regulators, companies, industry associations) Additional details

Country	Name	Immigration pathway	Benefits	Occupations	Methodology
New Zealand	Green List	• Straight to Residence Visa • Work to Residence Visa	• Tier 1 (Straight to Residence): Immediate permanent residency • Tier 2 (Work to Residence): Permanent residency after working in a Green List role for 2 years	Link	Review of skills shortage lists, Industry Transformation Plans, feedback from targeted stakeholders, and views of relevant government agencies Additional details
Singapore	Shortage Occupation List	Employment Pass Visa	Workers can earn up to 20 bonus points in the Complementarity Assessment Framework (COMPASS) stage of their visa application	Link	Criteria: • The occupations' strategic importance to Singapore's economic priorities • The nature and severity of the labor shortage • The sectors' commitment to developing local training pipelines to address the shortages in the medium-term Additional details
Slovakia	List of jobs with a labor shortage	N/A	Accelerated administrative processes for visa applicants; workers can begin training immediately after filing the application, instead of waiting for its approval	Link (in Slovak)	Methodology (in Slovak)
Sweden	N/A	Work permit	The worker can apply for a work permit without having to leave the country	Link (in Swedish only)	N/A
United Kingdom	Shortage Occupation List	Skilled Worker Visa	• The worker can be paid 80% of the job's usual salary • Visa fees are lower	Link	Criteria: • The occupation is in shortage, based on an evaluation of several economic indicators • It is sensible to fill this shortage with migrant workers Additional details
United States	Schedule A	Employment-based green card (EB-2 & EB-3)	Employers do not have to prove they are unable to hire a U.S. worker	• Physical therapists • Nurses	N/A

Appendix D: Comparison of proposed Schedule A Group I lists for past years

This table is sorted by the rank according to the Help Wanted Index in 2021, and then sorted by the rank in each preceding year of consideration. Occupations that do not appear in this table did not qualify for Schedule A in any listed year. Occupations that are listed but show an em dash did not qualify for Schedule A in that particular year. Entries with an asterisk use a code that has since been changed in newer versions of the SOC list.

What lists would our proposed methodology generate in previous years?

Occupation	Rank in 2021	Rank in 2019	Rank in 2016	Rank in 2013
Atmospheric and Space Scientists (19-202)	1	12	61	–
Procurement Clerks (43-306)	2	–	–	–
Sales Engineers (41-903)	3	62	20	20
Astronomers and Physicists (19-201)	4	1	40	–
Medical and Health Services Managers (11-911)	5 (tied)	–	39	27
Natural Science Managers (11-912)	5 (tied)	–	–	–
Other Financial Specialists (13-20X)	7	27	–	–
Registered Nurses (29-114)	8	–	–	–
Surgeons (29-124)	9	9	–	–
Psychologists (19-303)	10	6	–	–
Human Resources Assistants, except Payroll and Timekeeping (43-416)	11	–	–	–
Lawyers, and Judges, Magistrates, and Other Judicial Workers (23-10X)	12	–	58	–
Electrical and Electronics Engineers (17-207)	13	31	–	–
Credit Counselors and Loan Officers (13-207)	14	71	–	–
Audiologists (29-118)	15	17	–	11
Human Resources Managers (11-312)	16	–	–	–
Urban and Regional Planners (19-305)	17	18	–	–
Nurse Practitioners and Nurse Midwives (29-11X)	18	24	11	7
Chiropractors (29-101)	19	22	15	–
Diagnostic Related Technologists and Technicians (29-203)	20	–	–	–
Emergency Management Directors (11-916)	21	–	–	–
Training and Development Managers (11-313)	22	80	–	–
Environmental Engineers (17-208)	23	74	–	–
Marketing and Sales Managers (11-202)	24	–	–	–
Human Resources Workers (13-107)	25	–	–	–
Counselors (21-101)	26	–	–	–
Architectural and Engineering Managers (11-904)	27	13	–	32
Occupational Health and Safety Specialists and Technicians (19-501)	28	–	–	14
Nurse Anesthetists (29-115)	–	2	26	10

Occupation	Rank in 2021	Rank in 2019	Rank in 2016	Rank in 2013
Aircraft Pilots and Flight Engineers (53-201)	–	3	30	–
Physicians (29-121)	–	4	–	–
Architects, except Naval (17-101)	–	5	–	–
Dentists (29-102)	–	7	43	31
Detectives and Criminal Investigators (33-302)	–	8	–	–
Supervisors of Personal Care and Service Workers (39-100)	–	10	–	–
Credit Analysts (13-204)	–	11	–	–
Air Traffic Controllers and Airfield Operations Specialists (53-202)	–	14	–	–
Conservation Scientists and Foresters (19-103)	–	15	35	–
Flight Attendants (53-203)	–	16	–	–
Physical Scientists, All Other (19-209)	–	19	–	–
Motor Vehicle Operators, All Other (53-309)	–	20	–	–
Stationary Engineers and Boiler Operators (51-802)	–	21	–	–
Locomotive Engineers and Operators (53-401)	–	23	25	–
Aircraft Mechanics and Service Technicians (49-301)	–	25	–	–
First-Line Supervisors of Correctional Officers, Police, and Detectives (33-101)	–	26	–	26
Chief Executives and Legislators (11-10X)	–	28	59	–
Special Education Teachers (25-205)	–	29	–	–
Librarians and Media Collections Specialists (25-402)	–	30	–	–
Computer and Information Research Scientists (15-122)	–	32	–	–
Optometrists (29-104)	–	33	46	13
Elevator Installers and Repairers (47-402)	–	34	–	–
Pharmacists (29-105)	–	35	36	–
Health Diagnosing and Treating Practitioners, All Other, Acupuncturists, Dental Hygienists (29-129)	–	36	–	–
Water and Wastewater Treatment Plant and System Operators (51-803)	–	37	–	–
Biomedical and Agricultural Engineers (17-20X)	–	38	10	–
Glaziers (47-212)	–	39	–	–
Physician Assistants (29-107)	–	40	16	19
Tailors, Dressmakers, and Sewers (51-605)	–	41	–	–
Miscellaneous First-Line Supervisors, Protective Service Workers (33-109)	–	42	–	–
Computer Programmers, Software Developers, Web Developers, Web and Digital Interface Designers (15-125)	–	43	–	–
Real Estate Brokers and Sales Agents (41-902)	–	44	–	–
Podiatrists (29-108)	–	45	–	18
Chemists and Materials Scientists (19-203)	–	46	–	–
Computer and Information Systems Managers (11-302)	–	47	–	–

Occupation	Rank in 2021	Rank in 2019	Rank in 2016	Rank in 2013
Mechanical Engineers (17-214)	–	48	48	–
First-Line Supervisors of Fire Fighting and Prevention Workers (33-102)	–	49	21	–
Construction Managers (11-902)	–	50	–	–
Computer Systems and Information Security Analysts (15-121)	–	51	–	–
Transportation, Storage, and Distribution Managers (11-307)	-	52	–	–
Property Appraisers and Assessors (13-202)	–	53	33	–
Gambling Services Workers (39-301)	–	54	–	–
Budget Analysts (13-203)	–	55	–	–
Musicians, Singers, and Related Workers (27-204)	–	56 (tied)	–	–
Jewelers and Precious Stone and Metal Workers (51-907)	–	56 (tied)	–	–
Miscellaneous Personal Appearance Workers (39-509)	–	59	22	–
Lodging Managers (11-908)	–	59	–	–
Compensation, Benefits, and Job Analysis Specialists (13-114)	–	59	–	–
Statistical Assistants (43-911)	–	61	–	–
Administrative Services and Facilities Managers (11-301)	–	63	–	–
Emergency Medical Technicians and Paramedics (29-204)	–	64	–	–
Other Social Scientists (19-30X)	–	65 (tied)	–	–
Fire Inspectors (33-202)	–	65 (tied)	–	–
Civil Engineers (17-205)	–	67	–	–
Business Operations Specialists, All Other (13-119)	–	68	–	–
Farmers, Ranchers, and Other Agricultural Managers (11-901)	–	69	–	–
Occupational Therapists (29-112)	–	70	34	–
Materials Engineers (17-213)	–	72	–	–
Financial Managers (11-303)	–	73	–	–
Financial and Investment Analysts, Personal Financial Advisors, Insurance Underwriters (13-205)	–	75	–	–
Broadcast Announcers and Radio Disc Jockeys (27-301)	–	76	–	–
Structural Metal Fabricators and Fitters (51-204)	–	77	–	–
Financial Examiners (13-206)	–	78	27	–
Clergy (21-201)	–	79	62	36
General and Operations Managers (11-102)	–	81	–	–
Chemical Engineers (17-204)	–	82	–	–
Secondary School Teachers (25-203)	–	83	–	–
Preschool and Kindergarten Teachers (25-201)	–	84	–	–
Other Educational Instruction and Library Workers (25-90X)	–	85	–	–
Agents and Business Managers of Artists, Performers, and Athletes (13-101)	–	86	31	–
Animal Trainers (39-201)	–	87	44	–

Occupation	Rank in 2021	Rank in 2019	Rank in 2016	Rank in 2013
Medical Records Specialists (29-207)	–	88	–	–
Dieticians and Nutritionists (29-103)	–	89	–	–
Avionics Technicians, Electric Motor and Power Tool Repairers, and Other Electrical and Electronic Equipment Mechanics, Installers, and Repairers (49-209)	–	90	–	–
Baggage Porters, Bellhops, and Concierges (39-601)	–	91	–	–
Court, Municipal, and License Clerks (43-403)	–	92	–	–
Fishing and Hunting Workers (45-303)	–	–	1	2
Food Preparation and Serving Related Workers, All Other (35-909)	–	–	3	1
Other Teachers and Instructors (25-30X)	–	–	4	6
Dining Room and Cafeteria Attendants and Bartender Helpers (35-901)	–	–	5	3
Other Entertainment Attendants and Related Workers (39-30X)	–	–	6	4
Physicians and Surgeons (29-106)*	–	–	7	15
Veterinarians (29-113)	–	–	8	29
Opticians, Dispensing (29-208)	–	–	9	–
Massage Therapists (31-901)	–	–	12	30
Health Diagnosing and Treating Practitioners, All Other (29-119)	–	–	13	–
Home Health and Personal Care Aides (31-112)	–	–	14	12
Other Assemblers and Fabricators (51-20X)	–	–	17	8
Occupational Therapy Assistants and Aides (31-201)	–	–	18	–
Bus Drivers-School, Transit, and Intercity, Shuttle Drivers and Chauffeurs, Taxi Drivers (53-305)	–	–	19	–
Morticians, Undertakers, and Funeral Arrangers (39-403)	–	–	23	–
Agricultural and Food Scientists (19-101)	–	–	24	16
Marine Engineers and Naval Architects (17-212)	–	–	28	–
Advertising and Promotions Managers (11-201)	–	–	29	–
Aerospace Engineers (17-201)	–	–	32	–
Other Construction and Related Workers (47-40X)	–	–	37	–
Pest Control Workers (37-202)	–	–	38	–
Actuaries (15-201)	–	–	41	5
Cost Estimators (13-105)	–	–	42	–
Computer Systems and Information Security Analysts (15-112)	–	–	45	–
Other Mathematical Science Occupations (15-20X)	–	–	47	–
Registered Nurses (29-114)	–	–	49	–
Explosives Workers, Ordnance Handling Experts, and Blasters (47-503)	–	–	50	–
Public Relations and Fundraising Managers (11-203)	–	–	51	–
Financial Clerks, All Other (43-309)	–	–	52	21

Occupation	Rank in 2021	Rank in 2019	Rank in 2016	Rank in 2013
Compliance Officers (13-104)	–	–	53	34
Supervisors of Transportation and Material Moving Workers (53-100)	–	–	54	–
Entertainment and Recreation Managers (11-907)	–	–	55	–
Power Plant Operators, Distributors, and Dispatchers (51-801)	–	–	56 (tied)	35
Miscellaneous Managers, including Funeral Service Managers and Postmasters and Mail Superintendents (11-9XX)*	–	–	56 (tied)	–
Industrial Engineers, including Health and Safety (17-211)	–	–	60	–
Pumping Station Operators (53-707)	–	–	–	9
Cargo and Freight Agents (43-501)	–	–	–	17
Other Engineers (17-21Y)	–	–	–	22
First-Line Supervisors of Personal Service Workers (39-102)	–	–	–	23
Religious Workers, All Other (21-209)	–	–	–	24
Compensation and Benefits Managers (11-311)	–	–	–	25
First-Line Supervisors of Farming, Fishing, and Forestry Workers (45-101)	–	–	–	28
Natural Science Managers (11-912)	–	–	–	33
First-Line Supervisors of Mechanics, Installers, and Repairers (49-101)	–	–	–	37
Computer and Information Research Scientists (15-111)	–	–	–	38

Appendix E: Historical comparison to UK-based benchmark

This table is sorted by the UK-based benchmark ranking in 2021, and then sorted by the rank in each preceding year of consideration. Occupations that do not appear in this table did not qualify for Schedule A in any listed year. Occupations that are listed but show an em dash did not qualify for Schedule A in that particular year. Entries with an asterisk use a code that has since been changed in newer versions of the OCCSOC list.

What lists would the UK-based benchmark generate in previous years?

Occupation	Rank in 2021	Rank in 2019	Rank in 2016	Rank in 2013
Sales Engineers (41-903)	1	56	14	13
Other Financial Specialists (13-20X)	2	13	–	–
Medical and Health Services Managers (11-911)	3	–	22	22
Human Resources Managers (11-312)	4	88	–	–
Electrical and Electronics Engineers (17-207)	5 (tied)	63	–	28
Procurement Clerks (43-306)	5 (tied)	–	–	21
Photographic Process Workers and Processing Machine Operators (51-915)	7	–	–	–
Marketing and Sales Managers (11-202)	8	–	47	–
Atmospheric and Space Scientists (19-202)	9	16	59	–
Computer Hardware Engineers (17-206)	10	68	–	–
Credit Counselors and Loan Officers (13-207)	11	78	–	–
Environmental Engineers (17-208)	12	89	–	–
Surgeons (29-124)	13	5	–	–
Conveyor, Dredge, and Hoist and Winch Operators (53-70X)	14	–	–	–
Other Construction and Related Workers (47-40X)	15	–	–	–
Human Resources Assistants, except Payroll and Timekeeping (43-416)	16	–	–	–
Training and Development Managers (11-313)	17	93	–	–
Chiropractors (29-101)	18	69	6	–
Human Resources Workers (13-107)	19	–	–	–
Psychologists (19-303)	20	10	–	–
Fishing and Hunting Workers (45-303)	21	–	–	–
Emergency Management Directors (11-916)	22	–	–	–
Audiologists (29-118)	23	50	–	19
Astronomers and Physicists (19-201)	24	1	–	–
First-Line Supervisors of Retail and Non-Retail Sales Workers (41-101)	25	–	37	–
Nurse Practitioners and Nurse Midwives (29-11X)	26	37	19	7
Sales Representatives of Services, except Advertising, Insurance, Financial Services, and Travel (41-309)	27	–	–	–
Management Analysts (13-111)	28	–	–	25

Occupation	Rank in 2021	Rank in 2019	Rank in 2016	Rank in 2013
Solar Photovoltaic Installers (47-223)	29	–	–	–
Physical Scientists, All Other (19-209)	–	2	–	–
Motor Vehicle Operators, All Other (53-309)	–	3	–	–
Architects, except Naval (17-101)	–	4	–	–
Nurse Anesthetists (29-115)	–	6	44	15
Aircraft Pilots and Flight Engineers (53-201)	–	7	20	–
Gambling Services Workers (39-301)	–	8	–	–
Physicians (29-121)	–	9	–	–
Chief Executives and Legislators (11-10X)	–	11	33	–
Supervisors of Personal Care and Service Workers (39-100)	–	12	–	–
Aircraft Mechanics and Service Technicians (49-301)	–	14	–	–
Stationary Engineers and Boiler Operators (51-802)	–	15	–	–
Broadcast Announcers and Radio Disc Jockeys (27-301)	–	17	21	–
Computer Programmers, Software Developers, Web Developers, Web and Digital Interface Designers (15-125)	–	18	–	–
Detectives and Criminal Investigators (33-302)	–	19	–	–
Architectural and Engineering Managers (11-904)	–	20	–	–
Archivists, Curators, and Museum Technicians (25-401)	–	21	–	–
Transportation, Storage, and Distribution Managers (11-307)	–	22	–	–
Computer and Information Systems Managers (11-302)	–	23	51	24
Television, Video, and Motion Picture Camera Operators and Editors (27-403)	–	24	–	–
Urban and Regional Planners (19-305)	–	25	54	–
Air Traffic Controllers and Airfield Operations Specialists (53-202)	–	26	–	–
Petroleum, Mining and Geological Engineers, including Mining Safety Engineers (17-21X)	–	27	–	–
Dentists (29-102)	–	28	57	30 (tied)
Credit Analysts (13-204)	–	29	–	–
Musicians, Singers, and Related Workers (27-204)	–	30	–	–
Health Diagnosing and Treating Practitioners, All Other, Acupuncturists, Dental Hygienists (29-129)	–	31	–	–
Special Education Teachers (25-205)	–	32	–	–
Entertainers and Performers, Sports and Related Workers, except Radio Disc Jockeys (27-209)	–	33	–	–
Preschool and Kindergarten Teachers (25-201)	–	34	–	–
Flight Attendants (53-203)	–	35	–	–
Business Operations Specialists, All Other (13-119)	–	36	–	–
Elevator Installers and Repairers (47-402)	–	38 (tied)	–	–
Lodging Managers (11-908)	–	38 (tied)	–	–
Computer Systems and Information Security Analysts (15-121)	–	40	–	–

Occupation	Rank in 2021	Rank in 2019	Rank in 2016	Rank in 2013
Artists and Related Workers (27-101)	–	41	–	–
Other Educational Instruction and Library Workers (25-90X)	–	42	–	–
General and Operations Managers (11-102)	–	43	–	–
Avionics Technicians, Electric Motor and Power Tool Repairers, and Other Electrical and Electronic Equipment Mechanics, Installers, and Repairers (49-209)	–	44	–	–
Optometrists (29-104)	–	45	39	3
Chefs and Head Cooks, and First-Line Supervisors of Food Preparation and Serving Workers (35-101)	–	46 (tied)	31	–
Jewelers and Precious Stone and Metal Workers (51-907)	–	46 (tied)	–	–
Conservation Scientists and Foresters (19-103)	–	48	–	–
Advertising and Promotions Managers (11-201)	–	49	18	–
Real Estate Brokers and Sales Agents (41-902)	–	51	–	26 (tied)
Small Engine Mechanics (49-305)	–	52	–	–
Librarians and Media Collections Specialists (25-402)	–	53	–	–
Constructions Managers (11-902)	–	54	–	–
Database Administrators and Architects (15-124)	–	55	–	–
Agents and Business Managers of Artists, Performers, and Athletes (13-101)	–	57 (tied)	2	–
Miscellaneous First-Line Supervisors, Protective Service Workers (33-109)	–	57 (tied)	–	–
Locomotive Engineers and Operators (53-401)	–	59	10	–
Other Managers (11-91X)	–	60	–	–
Glaziers (47-212)	–	61	32	–
Dancers and Choreographers (27-203)	–	62	–	–
Property Appraisers and Assessors (13-202)	–	64	48	–
Chemists and Materials Scientists (19-203)	–	65	–	–
Statistical Assistants (43-911)	–	66	–	–
Miscellaneous Personal Appearance Workers (39-509)	–	67	12	–
Medical Records Specialists (29-207)	–	70	55	–
Structural Metal Fabricators and Fitters (51-204)	–	71	–	–
Crane and Tower Operators (53-702)	–	72	–	–
Other Social Scientists (19-30X)	–	73	–	–
Tailors, Dressmakers, and Sewers (51-605)	–	74	–	18
Administrative Services and Facilities Managers (11-301)	–	75	–	–
Compensation, Benefits, and Job Analysis Specialists (13-114)	–	76	–	–
Fire Inspectors (33-202)	–	77	–	–
First-Line Supervisors of Correctional Officers, Police, and Detectives (33-101)	–	79 (tied)	–	–
Electricians (47-211)	–	79 (tied)	–	–

Occupation	Rank in 2021	Rank in 2019	Rank in 2016	Rank in 2013
Financial Managers (11-303)	–	81 (tied)	–	–
Proofreaders and Copy Markers (43-908)	–	81 (tied)	–	–
Civil Engineers (17-205)	–	83	–	–
Roofers (47-218)	–	84	–	–
Budget Analysts (13-203)	–	85	–	–
Electrical Power-Line and Telecommunications Line Installers and Repairers (49-905)	–	86	–	–
Pharmacists (29-105)	–	87	30	–
Other Rail Transportation Workers (53-40X)	–	90	–	–
Baggage Porters, Bellhops, and Concierges (39-601)	–	91	–	–
Computer and Information Research Scientists (15-122)	–	92	–	–
Veterinarians (29-113)	–	–	1	–
Massage Therapists (31-901)	–	–	3	–
Opticians, Dispensing (29-208)	–	–	4	–
Biomedical and Agricultural Engineers (17-20X)	–	–	5	–
Agricultural and Food Scientists (19-101)	–	–	7	26.5
Pest Control Workers (37-202)	–	–	8	–
Physicians and Surgeons (29-106)*	–	–	9	23
Health Diagnosing and Treating Practitioners, All Other (29-119)	–	–	11	–
Cost Estimators (13-105)	–	–	13	–
Entertainment and Recreation Managers (11-907)	–	–	15	–
Physician Assistants (29-107)	–	–	16	14
Financial Examiners (13-206)	–	–	17	–
Animal Trainers (39-201)	–	–	23	–
Occupational Therapy Assistants and Aides (31-201)	–	–	24	–
Compliance Officers (13-104)	–	–	25	17
Brokerage Clerks (43-401)	–	–	26	–
Aerospace Engineers (17-201)	–	–	27	–
Explosives Workers, Ordnance Handling Experts, and Blasters (47-503)	–	–	28	–
Cabinetmakers and Bench Carpenters (51-701)	–	–	29	–
Industrial Engineers, including Health and Safety (17-211)	–	–	34	–
Construction and Building Inspectors (47-401)	–	–	35	–
Morticians, Undertakers, and Funeral Arrangers (39-403)	–	–	36	–
Mechanical Engineers (17-214)	–	–	38	–
Occupational Therapists (29-112)	–	–	40	–
Marine Engineers and Naval Architects (17-212)	–	–	41	–
First-Line Supervisors of Fire Fighting and Prevention Workers (33-102)	–	–	42	–

Occupation	Rank in 2021	Rank in 2019	Rank in 2016	Rank in 2013
Laundry and Dry-Cleaning Workers (51-601)	–	–	43	–
First-Line Supervisors of Gaming Workers (39-101)	–	–	45	–
Supervisors of Transportation and Material Moving Workers (53-100)	–	–	46	–
Fence Erectors (47-403)	–	–	49	–
Computer Systems and Information Security Analysts (15-112)	–	–	50	–
Financial Clerks, All Other (43-309)	–	–	52	5
Gaming Cage Workers (43-304)	–	–	53	–
Coin, Vending, and Amusement Machine Servicers and Repairers, Locksmiths and Safe Repairers, Riggers, and Installation, Maintenance, and Repair Workers (49-909)	–	–	56	–
Barbers and Hairdressers, Hairstylists, and Cosmetologists (39-501)	–	–	58	–
Actuaries (15-201)	–	–	–	1
First-Line Supervisors of Farming, Fishing, and Forestry Workers (45-101)	–	–	–	2
Pumping Station Operators (53-707)	–	–	–	4
Underground Mining Machine Operators (47-504)	–	–	–	6
Cargo and Freight Agents (43-501)	–	–	–	8
Religious Workers, All Other (21-209)	–	–	–	9
Other Engineers (17-21Y)	–	–	–	10
First-Line Supervisors of Personal Service Workers (39-102)	–	–	–	11
Door-to-Door Sales Workers, News and Street Vendors, and Related Workers (41-909)	–	–	–	12
Environmental Science and Geoscience Technicians, and Nuclear Technicians (19-40X)	–	–	–	16
Bartenders (35-301)	–	–	–	20
First-Line Supervisors of Mechanics, Installers, and Repairers (49-101)	–	–	–	29
Derrick, Rotary Drill, and Service Unit Operators, and Roustabouts, Oil, Gas, and Mining (47-50Y)	–	–	–	30 (tied)